



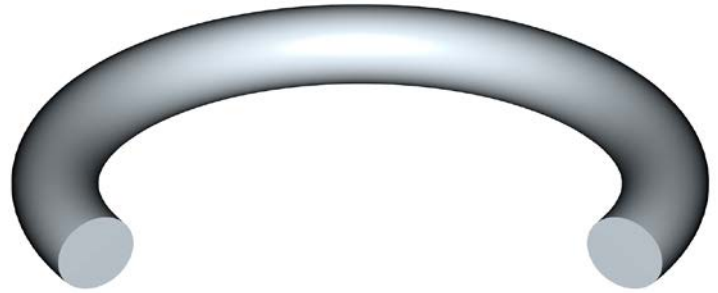
# PDF Catalog

Including Technical Bulletins  
and Product Data Brochures



# O-Rings

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# O-Rings Standard Size



O-Rings first became popular during World War II. One of the early standards, AN6227, contained only 88 sizes. As the usefulness and flexibility of the O-Ring became apparent, additional standards were developed to expand the sizes available to the engineers of the day. Today, AS-568, containing 379 sizes, is considered to be the O-Ring industry's standard.

The following 11 pages list the O-Rings that *Precision Associates* considers to be standard sizes. This list contains not only the AS-568 O-Rings, but our unique extended sizes. PAI has added these O-Rings to the beginning and/or end of each Cross Section series. You will find 26 sizes added to the 400 series alone.

Our O-Rings are available in more than 1,000 compounds developed by PAI chemists to meet the challenging requirements of today's applications. Refer to our Compound Selection guide, or call us for help determining the material best suited for your application.

The dimensions and tolerances listed are per AS-568 and apply to our standard 70 Durometer Buna N. Due to the variations in shrink characteristics of rubber materials, design engineers should not assume that the dimensions and tolerances will apply to all materials. General shrink characteristics are available in PAI Technical Bulletin 111. When necessary, you may contact Precision Associates' Customer Service department to obtain the expected dimensions and tolerances for our other compounds.

If our Standard Size O-Rings will not meet your needs, be sure to check out our very large selection of Special Sizes starting on page 15 of this document.

Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
1-001	1/32	3/32	1/32	.029 ± .004	.040 ± .003	.109
40-70	5/64	9/64	1/32	.070 ± .005	.040	.150
1-002	3/64	9/64	3/64	.042 ± .004	.050	.142
1-003	1/16	11/64	1/16	.056	.060	.176
1-004	5/64	13/64	1/16	.070 ± .005	.070	.210
1-005	7/64	15/64	1/16	.101	.070	.241
1-006	1/8	1/4	1/16	.114	.070	.254
1-007	5/32	9/32	1/16	.145	.070	.285
1-008	3/16	5/16	1/16	.176	.070	.316
1-009	7/32	11/32	1/16	.208	.070	.348
1-010	1/4	3/8	1/16	.239	.070	.379
1-011	5/16	7/16	1/16	.301	.070	.441
1-012	3/8	1/2	1/16	.364	.070	.504
1-013	7/16	9/16	1/16	.426	.070	.566
1-014	1/2	5/8	1/16	.489	.070	.629
1-015	9/16	11/16	1/16	.551 ± .007	.070	.691
1-016	5/8	3/4	1/16	.614 ± .009	.070	.754
1-017	11/16	13/16	1/16	.676	.070	.816
1-018	3/4	7/8	1/16	.739	.070	.879
1-019	13/16	15/16	1/16	.801	.070	.941



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Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
1-019	13/16	15/16	1/16	.801 ± .009	.070 ± .003	.941
1-020	7/8	1	1/16	.864	.070	1.004
1-021	15/16	1 1/16	1/16	.926	.070	1.066
1-022	1	1 1/8	1/16	.989 ± .010	.070	1.129
1-023	1 1/16	1 3/16	1/16	1.051	.070	1.191
1-024	1 1/8	1 1/4	1/16	1.114	.070	1.254
1-025	1 3/16	1 5/16	1/16	1.176 ± .011	.070	1.316
1-026	1 1/4	1 3/8	1/16	1.239	.070	1.379
1-027	1 5/16	1 7/16	1/16	1.301	.070	1.441
1-028	1 3/8	1 1/2	1/16	1.364 ± .013	.070	1.504
1-029	1 1/2	1 5/8	1/16	1.489	.070	1.629
1-030	1 5/8	1 3/4	1/16	1.614	.070	1.754
1-031	1 3/4	1 7/8	1/16	1.739 ± .015	.070	1.879
1-032	1 7/8	2	1/16	1.864	.070	2.004
1-033	2	2 1/8	1/16	1.989 ± .018	.070	2.129
1-034	2 1/8	2 1/4	1/16	2.114	.070	2.254
1-035	2 1/4	2 3/8	1/16	2.239	.070	2.379
1-036	2 3/8	2 1/2	1/16	2.364	.070	2.504
1-037	2 1/2	2 5/8	1/16	2.489	.070	2.629
1-038	2 5/8	2 3/4	1/16	2.614 ± .020	.070	2.754
1-039	2 3/4	2 7/8	1/16	2.739	.070	2.879
1-040	2 7/8	3	1/16	2.864	.070	3.004
1-041	3	3 1/8	1/16	2.989 ± .024	.070	3.129
1-042	3 1/4	3 3/8	1/16	3.239	.070	3.379
1-043	3 1/2	3 5/8	1/16	3.489	.070	3.629
1-044	3 3/4	3 7/8	1/16	3.739 ± .027	.070	3.879
1-045	4	4 1/8	1/16	3.989	.070	4.129
1-046	4 1/4	4 3/8	1/16	4.239 ± .030	.070	4.379
1-047	4 1/2	4 5/8	1/16	4.489	.070	4.629
1-048	4 3/4	4 7/8	1/16	4.739	.070	4.879
1-049	5	5 1/8	1/16	4.989 ± .037	.070	5.129
1-050	5 1/4	5 3/8	1/16	5.239	.070	5.379
1-051	5 1/2	5 5/8	1/16	5.489	.070	5.629
1-052	5 3/4	5 7/8	1/16	5.739	.070	5.879
1-053	6	6 1/8	1/16	5.989	.070	6.129
1-054	6 1/4	6 3/8	1/16	6.239 ± .040	.070	6.379
1-055	6 1/2	6 5/8	1/16	6.489	.070	6.629
1-056	6 3/4	6 7/8	1/16	6.739	.070	6.879
1-057	7	7 1/8	1/16	6.989	.070	7.129
1-058	7 1/4	7 3/8	1/16	7.239 ± .045	.070	7.379
1-059	7 1/2	7 5/8	1/16	7.489	.070	7.629
1-060	7 3/4	7 7/8	1/16	7.739	.070	7.879
1-061	8	8 1/8	1/16	7.989	.070	8.129



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Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
1-102	1/16	1/4	3/32	.049 ± .005	.103 ± .003	0.256
1-103	3/32	9/32	3/32	.081	.103	0.287
1-104	1/8	5/16	3/32	.112	.103	0.318
1-105	5/32	11/32	3/32	.143	.103	0.349
1-106	3/16	3/8	3/32	.175	.103	0.381
1-107	7/32	13/32	3/32	.206	.103	0.412
1-108	1/4	7/16	3/32	.237	.103	0.443
1-109	5/16	1/2	3/32	.299	.103	0.505
1-110	3/8	9/16	3/32	.362	.103	0.568
1-111	7/16	5/8	3/32	.424	.103	0.630
1-112	1/2	11/16	3/32	.487	.103	0.693
1-113	9/16	3/4	3/32	.549 ± .007	.103	0.755
1-114	5/8	13/16	3/32	.612 ± .009	.103	0.818
1-115	11/16	7/8	3/32	.674	.103	0.880
1-116	3/4	15/16	3/32	.737	.103	0.943
1-117	13/16	1	3/32	.799 ± .010	.103	1.005
1-118	7/8	1 1/16	3/32	.862	.103	1.068
1-119	15/16	1 1/8	3/32	.924	.103	1.130
1-120	1	1 3/16	3/32	.987	.103	1.193
1-121	1 1/16	1 1/4	3/32	1.049	.103	1.255
1-122	1 1/8	1 5/16	3/32	1.112	.103	1.318
1-123	1 3/16	1 3/8	3/32	1.174 ± .012	.103	1.380
1-124	1 1/4	1 7/16	3/32	1.237	.103	1.443
1-125	1 5/16	1 1/2	3/32	1.299	.103	1.505
1-126	1 3/8	1 9/16	3/32	1.362	.103	1.568
1-127	1 7/16	1 5/8	3/32	1.424	.103	1.630
1-128	1 1/2	1 11/16	3/32	1.487	.103	1.693
1-129	1 9/16	1 3/4	3/32	1.549 ± .015	.103	1.755
1-130	1 5/8	1 13/16	3/32	1.612	.103	1.818
1-131	1 11/16	1 7/8	3/32	1.674	.103	1.880
1-132	1 3/4	1 15/16	3/32	1.737	.103	1.943
1-133	1 13/16	2	3/32	1.799	.103	2.005
1-134	1 7/8	2 1/16	3/32	1.862	.103	2.068
1-135	1 15/16	2 1/8	3/32	1.925 ± .017	.103	2.131
1-136	2	2 3/16	3/32	1.987	.103	2.193
1-137	2 1/16	2 1/4	3/32	2.050	.103	2.256
1-138	2 1/8	2 5/16	3/32	2.112	.103	2.318
1-139	2 3/16	2 3/8	3/32	2.175	.103	2.381
1-140	2 1/4	2 7/16	3/32	2.237	.103	2.443
1-141	2 5/16	2 1/2	3/32	2.300 ± .020	.103	2.506
1-142	2 3/8	2 9/16	3/32	2.362	.103	2.568
1-143	2 7/16	2 5/8	3/32	2.425	.103	2.631
1-144	2 1/2	2 11/16	3/32	2.487	.103	2.693



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Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
1-145	2 9/16	2 3/4	3/32	2.550 ± .020	.103 ± .003	2.756
1-146	2 5/8	2 13/16	3/32	2.612 ±	.103	2.818
1-147	2 11/16	2 7/8	3/32	2.675 ± .022	.103	2.881
1-148	2 3/4	2 15/16	3/32	2.737 ±	.103	2.943
1-149	2 13/16	3	3/32	2.800 ±	.103	3.006
1-150	2 7/8	3 1/16	3/32	2.862 ±	.103	3.068
1-151	3	3 3/16	3/32	2.987 ± .024	.103	3.193
1-152	3 1/4	3 7/16	3/32	3.237 ±	.103	3.443
1-153	3 1/2	3 11/16	3/32	3.487 ±	.103	3.693
1-154	3 3/4	3 15/16	3/32	3.737 ± .028	.103	3.943
1-155	4	4 3/16	3/32	3.987 ±	.103	4.193
1-156	4 1/4	4 7/16	3/32	4.237 ± .030	.103	4.443
1-157	4 1/2	4 11/16	3/32	4.487 ±	.103	4.693
1-158	4 3/4	4 15/16	3/32	4.737 ±	.103	4.943
1-159	5	5 3/16	3/32	4.987 ± .035	.103	5.193
1-160	5 1/4	5 7/16	3/32	5.237 ±	.103	5.443
1-161	5 1/2	5 11/16	3/32	5.487 ±	.103	5.693
1-162	5 3/4	5 15/16	3/32	5.737 ±	.103	5.943
1-163	6	6 3/16	3/32	5.987 ±	.103	6.193
1-164	6 1/4	6 7/16	3/32	6.237 ± .040	.103	6.443
1-165	6 1/2	6 11/16	3/32	6.487 ±	.103	6.693
1-166	6 3/4	6 15/16	3/32	6.737 ±	.103	6.943
1-167	7	7 3/16	3/32	6.987 ±	.103	7.193
1-168	7 1/4	7 7/16	3/32	7.237 ± .045	.103	7.443
1-169	7 1/2	7 11/16	3/32	7.487 ±	.103	7.693
1-170	7 3/4	7 15/16	3/32	7.737 ±	.103	7.943
1-171	8	8 3/16	3/32	7.987 ±	.103	8.193
1-172	8 1/4	8 7/16	3/32	8.237 ± .050	.103	8.443
1-173	8 1/2	8 11/16	3/32	8.487 ±	.103	8.693
1-174	8 3/4	8 15/16	3/32	8.737 ±	.103	8.943
1-175	9	9 3/16	3/32	8.987 ±	.103	9.193
1-176	9 1/4	9 7/16	3/32	9.237 ± .055	.103	9.443
1-177	9 1/2	9 11/16	3/32	9.487 ±	.103	9.693
1-178	9 3/4	9 15/16	3/32	9.737 ±	.103	9.943
1-179	10	10 3/16	3/32	9.987 ±	.103	10.193



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## Standard Size



Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
1-201	3/16	7/16	1/8	0.171 ± .005	.139 ± .004	0.449
1-202	1/4	1/2	1/8	0.234	.139	0.512
1-203	5/16	9/16	1/8	0.301	.139	0.579
1-204	3/8	5/8	1/8	0.359	.139	0.637
1-205	7/16	11/16	1/8	0.421	.139	0.699
1-206	1/2	3/4	1/8	0.484	.139	0.762
1-207	9/16	13/16	1/8	0.549 ± .007	.139	0.827
1-208	5/8	7/8	1/8	0.609 ± .009	.139	0.887
1-209	11/16	15/16	1/8	.672	.139	0.950
1-210	3/4	1	1/8	.734 ± .010	.139	1.012
1-211	13/16	1 1/16	1/8	.796	.139	1.074
1-212	7/8	1 1/8	1/8	.859	.139	1.137
1-213	15/16	1 3/16	1/8	.921	.139	1.199
1-214	1	1 1/4	1/8	.984	.139	1.262
1-215	1 1/16	1 5/16	1/8	1.046	.139	1.324
1-216	1 1/8	1 3/8	1/8	1.109 ± .012	.139	1.387
1-217	1 3/16	1 7/16	1/8	1.171	.139	1.449
1-218	1 1/4	1 1/2	1/8	1.234	.139	1.512
1-219	1 5/16	1 9/16	1/8	1.296	.139	1.574
1-220	1 3/8	1 5/8	1/8	1.359	.139	1.637
1-221	1 7/16	1 11/16	1/8	1.421	.139	1.699
1-222	1 1/2	1 3/4	1/8	1.484 ± .015	.139	1.762
1-223	1 5/8	1 7/8	1/8	1.609	.139	1.887
1-224	1 3/4	2	1/8	1.734	.139	2.012
1-225	1 7/8	2 1/8	1/8	1.859 ± .018	.139	2.137
1-226	2	2 1/4	1/8	1.984	.139	2.262
1-227	2 1/8	2 3/8	1/8	2.109	.139	2.387
1-228	2 1/4	2 1/2	1/8	2.234 ± .020	.139	2.512
1-229	2 3/8	2 5/8	1/8	2.359	.139	2.637
1-230	2 1/2	2 3/4	1/8	2.484	.139	2.762
1-231	2 5/8	2 7/8	1/8	2.609	.139	2.887
1-232	2 3/4	3	1/8	2.734 ± .024	.139	3.012
1-233	2 7/8	3 1/8	1/8	2.859	.139	3.137
1-234	3	3 1/4	1/8	2.984	.139	3.262
1-235	3 1/8	3 3/8	1/8	3.109	.139	3.387
1-236	3 1/4	3 1/2	1/8	3.234	.139	3.512
1-237	3 3/8	3 5/8	1/8	3.359	.139	3.637
1-238	3 1/2	3 3/4	1/8	3.484	.139	3.762
1-239	3 5/8	3 7/8	1/8	3.609 ± .028	.139	3.887
1-240	3 3/4	4	1/8	3.734	.139	4.012
1-241	3 7/8	4 1/8	1/8	3.859	.139	4.137
1-242	4	4 1/4	1/8	3.984	.139	4.262
1-243	4 1/8	4 3/8	1/8	4.109	.139	4.387



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Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
1-244	4 1/4	4 1/2	1/8	4.234 ± .030	.139 ± .004	4.512
1-245	4 3/8	4 5/8	1/8	4.359	.139	4.637
1-246	4 1/2	4 3/4	1/8	4.484	.139	4.762
1-247	4 5/8	4 7/8	1/8	4.609	.139	4.887
1-248	4 3/4	5	1/8	4.734	.139	5.012
1-249	4 7/8	5 1/8	1/8	4.859 ± .035	.139	5.137
1-250	5	5 1/4	1/8	4.984	.139	5.262
1-251	5 1/8	5 3/8	1/8	5.109	.139	5.387
1-252	5 1/4	5 1/2	1/8	5.234	.139	5.512
1-253	5 3/8	5 5/8	1/8	5.359	.139	5.637
1-254	5 1/2	5 3/4	1/8	5.484	.139	5.762
1-255	5 5/8	5 7/8	1/8	5.609	.139	5.887
1-256	5 3/4	6	1/8	5.734	.139	6.012
1-257	5 7/8	6 1/8	1/8	5.859	.139	6.137
1-258	6	6 1/4	1/8	5.984	.139	6.262
1-259	6 1/4	6 1/2	1/8	6.234 ± .040	.139	6.512
1-260	6 1/2	6 3/4	1/8	6.484	.139	6.762
1-261	6 3/4	7	1/8	6.734	.139	7.012
1-262	7	7 1/4	1/8	6.984 ±	.139	7.262
1-263	7 1/4	7 1/2	1/8	7.234 ± .045	.139	7.512
1-264	7 1/2	7 3/4	1/8	7.484	.139	7.762
1-265	7 3/4	8	1/8	7.734	.139	8.012
1-266	8	8 1/4	1/8	7.984	.139	8.262
1-267	8 1/4	8 1/2	1/8	8.234 ± .050	.139	8.512
1-268	8 1/2	8 3/4	1/8	8.484	.139	8.762
1-269	8 3/4	9	1/8	8.734	.139	9.012
1-270	9	9 1/4	1/8	8.984	.139	9.262
1-271	9 1/4	9 1/2	1/8	9.234 ± .055	.139	9.512
1-272	9 1/2	9 3/4	1/8	9.484	.139	9.762
1-273	9 3/4	10	1/8	9.734	.139	10.012
1-274	10	10 1/4	1/8	9.984	.139	10.262
1-275	10 1/2	10 3/4	1/8	10.484	.139	10.762
1-276	11	11 1/4	1/8	10.984 ± .065	.139	11.262
1-277	11 1/2	11 3/4	1/8	11.484	.139	11.762
1-278	12	12 1/4	1/8	11.984	.139	12.262
1-279	13	13 1/4	1/8	12.984	.139	13.262
1-280	14	14 1/4	1/8	13.984	.139	14.262
1-281	15	15 1/4	1/8	14.984	.139	15.262
1-282	16	16 1/4	1/8	15.955 ± .075	.139	16.233
1-283	17	17 1/4	1/8	16.955 ± .080	.139	17.233
1-284	18	18 1/4	1/8	17.955 ± .085	.139	18.233
1-286	20	20 1/4	1/8	19.960 ± .090	.139	20.238





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Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
<b>1-514</b>	1	1 5/16	5/32	.975 ± .010	.176 ± .005	1.327
<b>1-515</b>	1 1/16	1 3/8	5/32	1.038	.176	1.390
<b>1-516</b>	1 1/8	1 7/16	5/32	1.100 ± .012	.176	1.452
<b>1-517</b>	1 3/16	1 1/2	5/32	1.163	.176	1.515
<b>1-518</b>	1 1/4	1 9/16	5/32	1.225	.176	1.577
<b>1-519</b>	1 5/16	1 5/8	5/32	1.288	.176	1.640
<b>1-520</b>	1 3/8	1 11/16	5/32	1.350	.176	1.702
<b>1-521</b>	1 7/16	1 3/4	5/32	1.413	.176	1.765
<b>1-522</b>	1 1/2	1 13/16	5/32	1.475 ± .015	.176	1.827
<b>1-524</b>	1 5/8	1 15/16	5/32	1.600	.176	1.952
<b>1-526</b>	1 3/4	2 1/16	5/32	1.725	.176	2.077
<b>1-528</b>	1 7/8	2 3/16	5/32	1.850	.176	2.202
<b>1-530</b>	2	2 5/16	5/32	1.975 ± .018	.176	2.327
<b>1-532</b>	2 1/8	2 7/16	5/32	2.100	.176	2.452
<b>1-534</b>	2 1/4	2 9/16	5/32	2.225	.176	2.577
<b>1-536</b>	2 3/8	2 11/16	5/32	2.350	.176	2.702
<b>1-538</b>	2 1/2	2 13/16	5/32	2.475 ± .020	.176	2.827
<b>1-540</b>	2 5/8	2 15/16	5/32	2.600	.176	2.952
<b>1-542</b>	2 3/4	3 1/16	5/32	2.725	.176	3.077
<b>1-544</b>	2 7/8	3 3/16	5/32	2.850	.176	3.202
<b>1-546</b>	3	3 5/16	5/32	2.975 ± .024	.176	3.327
<b>1-548</b>	3 1/8	3 7/16	5/32	3.100	.176	3.452
<b>1-550</b>	3 1/4	3 9/16	5/32	3.225	.176	3.577
<b>1-552</b>	3 3/8	3 11/16	5/32	3.350	.176	3.702
<b>1-554</b>	3 1/2	3 13/16	5/32	3.475	.176	3.827
<b>1-556</b>	3 5/8	3 15/16	5/32	3.600 ± .028	.176	3.952
<b>1-558</b>	3 3/4	4 1/16	5/32	3.725	.176	4.077
<b>1-560</b>	3 7/8	4 3/16	5/32	3.850	.176	4.202
<b>1-562</b>	4	4 5/16	5/32	3.975	.176	4.327
<b>1-563</b>	4 1/8	4 7/16	5/32	4.100	.176	4.452
<b>1-565</b>	4 1/4	4 9/16	5/32	4.225 ± .030	.176	4.577
<b>1-566</b>	4 3/8	4 11/16	5/32	4.350	.176	4.702
<b>1-568</b>	4 1/2	4 13/16	5/32	4.475	.176	4.827
<b>1-569</b>	4 5/8	4 15/16	5/32	4.600	.176	4.952
<b>1-571</b>	4 3/4	5 1/16	5/32	4.725	.176	5.077
<b>1-572</b>	4 7/8	5 3/16	5/32	4.850	.176	5.202



# O-Rings

## Standard Size



Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
1-308	3/8	3/4	3/16	.350 ± .005	0.210 ± .005	0.770
1-309	7/16	13/16	3/16	.412	0.210	0.832
1-310	1/2	7/8	3/16	.475	0.210	0.895
1-311	9/16	15/16	3/16	.537 ± .007	0.210	0.959
1-312	5/8	1	3/16	.600 ± .009	0.210	1.022
1-313	11/16	1 1/16	3/16	.662	0.210	1.084
1-314	3/4	1 1/8	3/16	.725 ± .010	0.210	1.147
1-315	13/16	1 3/16	3/16	.787	0.210	1.209
1-316	7/8	1 1/4	3/16	.850	0.210	1.270+Q537
1-317	15/16	1 5/16	3/16	.912 ± .010	0.210	1.334
1-318	1	1 3/8	3/16	.975	0.210	1.395
1-319	1 1/16	1 7/16	3/16	1.037	0.210	1.457
1-320	1 1/8	1 1/2	3/16	1.100 ± .012	0.210	1.520
1-321	1 3/16	1 9/16	3/16	1.162	0.210	1.582
1-322	1 1/4	1 5/8	3/16	1.225	0.210	1.645
1-323	1 5/16	1 11/16	3/16	1.287	0.210	1.707
1-324	1 3/8	1 3/4	3/16	1.350	0.210	1.770
1-325	1 1/2	1 7/8	3/16	1.475 ± .015	0.210	1.895
1-326	1 5/8	2	3/16	1.600	0.210	2.020
1-327	1 3/4	2 1/8	3/16	1.725	0.210	2.145
1-328	1 7/8	2 1/4	3/16	1.850	0.210	2.270
1-329	2	2 3/8	3/16	1.975 ± .018	0.210	2.395
1-330	2 1/8	2 1/2	3/16	2.100	0.210	2.520
1-331	2 1/4	2 5/8	3/16	2.225	0.210	2.645
1-332	2 3/8	2 3/4	3/16	2.350	0.210	2.770
1-333	2 1/2	2 7/8	3/16	2.475 ± .020	0.210	2.895
1-334	2 5/8	3	3/16	2.600	0.210	3.020
1-335	2 3/4	3 1/8	3/16	2.725	0.210	3.145
1-336	2 7/8	3 1/4	3/16	2.850	0.210	3.270
1-337	3	3 3/8	3/16	2.975 ± .024	0.210	3.395
1-338	3 1/8	3 1/2	3/16	3.100	0.210	3.520
1-339	3 1/4	3 5/8	3/16	3.225	0.210	3.645
1-340	3 3/8	3 3/4	3/16	3.350	0.210	3.770
1-341	3 1/2	3 7/8	3/16	3.475	0.210	3.895
1-342	3 5/8	4	3/16	3.600 ± .028	0.210	4.020
1-343	3 3/4	4 1/8	3/16	3.725	0.210	4.145
1-344	3 7/8	4 1/4	3/16	3.850	0.210	4.270
1-345	4	4 3/8	3/16	3.975	0.210	4.395
1-346	4 1/8	4 1/2	3/16	4.100	0.210	4.520
1-347	4 1/4	4 5/8	3/16	4.225 ± .030	0.210	4.645
1-348	4 3/8	4 3/4	3/16	4.350	0.210	4.770
1-349	4 1/2	4 7/8	3/16	4.475	0.210	4.895
1-350	4 5/8	5	3/16	4.600	0.210	5.020
1-351	4 3/4	5 1/8	3/16	4.725	0.210	5.145
1-352	4 7/8	5 1/4	3/16	4.850 ± .037	0.210	5.270

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: 612-333-7464  
Fax: 612-342-2417  
Toll: 800-394-6590

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# O-Rings

## Standard Size



Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
1-353	5	5 3/8	3/16	4.975 ± .037	0.210 ± .005	5.395
1-354	5 1/8	5 1/2	3/16	5.100	0.210	5.520
1-355	5 1/4	5 5/8	3/16	5.225	0.210	5.645
1-356	5 3/8	5 3/4	3/16	5.350	0.210	5.770
1-357	5 1/2	5 7/8	3/16	5.475	0.210	5.895
1-358	5 5/8	6	3/16	5.600	0.210	6.020
1-359	5 3/4	6 1/8	3/16	5.725	0.210	6.145
1-360	5 7/8	6 1/4	3/16	5.850 ± .037	0.210	6.270
1-361	6	6 3/8	3/16	5.975	0.210	6.395
1-362	6 1/4	6 5/8	3/16	6.225 ± .040	0.210	6.645
1-363	6 1/2	6 7/8	3/16	6.475	0.210	6.895
1-364	6 3/4	7 1/8	3/16	6.725	0.210	7.145
1-365	7	7 3/8	3/16	6.975	0.210	7.395
1-366	7 1/4	7 5/8	3/16	7.225 ± .045	0.210	7.645
1-367	7 1/2	7 7/8	3/16	7.475	0.210	7.895
1-368	7 3/4	8 1/8	3/16	7.725	0.210	8.145
1-369	8	8 3/8	3/16	7.975	0.210	8.395
1-370	8 1/4	8 5/8	3/16	8.225 ± .050	0.210	8.645
1-371	8 1/2	8 7/8	3/16	8.475	0.210	8.895
1-372	8 3/4	9 1/8	3/16	8.725	0.210	9.145
1-373	9	9 3/8	3/16	8.975	0.210	9.395
1-374	9 1/4	9 5/8	3/16	9.225 ± .055	0.210	9.645
1-375	9 1/2	9 7/8	3/16	9.475	0.210	9.895
1-376	9 3/4	10 1/8	3/16	9.725	0.210	10.145
1-377	10	10 3/8	3/16	9.975	0.210	10.395
1-378	10 1/2	10 7/8	3/16	10.475 ± .060	0.210	10.895
1-379	11	11 3/8	3/16	10.975	0.210	11.395
1-380	11 1/2	11 7/8	3/16	11.475 ± .065	0.210	11.895
1-381	12	12 3/8	3/16	11.975	0.210	12.395
1-382	13	13 3/8	3/16	12.975	0.210	13.395
1-383	14	14 3/8	3/16	13.975 ± .070	0.210	14.395
1-384	15	15 3/8	3/16	14.975	0.210	15.395
1-385	16	16 3/8	3/16	15.955 ± .075	0.210	16.375
1-386	17	17 3/8	3/16	16.955 ± .080	0.210	17.375
1-387	18	18 3/8	3/16	17.955 ± .085	0.210	18.375
1-388	19	19 3/8	3/16	18.955 ± .090	0.210	19.375
1-389	20	20 3/8	3/16	19.955 ± .095	0.210	20.375
1-390	21	21 3/8	3/16	20.955	0.210	21.375
1-391	22	22 3/8	3/16	21.955 ± .100	0.210	22.373
1-392	23	23 3/8	3/16	22.940 ± .105	0.210	23.360
1-393	24	24 3/8	3/16	23.940 ± .110	0.210	24.360
1-394	25	25 3/8	3/16	24.940 ± .115	0.210	25.360
1-395	26	26 3/8	3/16	25.940 ± .120	0.210	26.360
1-396	27	27 3/8	3/16	26.940	0.210	27.360



# O-Rings Standard Size



Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
1-400	1 3/8	1 7/8	1/4	1.350 ± .012	.275 ± .006	1.900
1-401	1 1/2	2	1/4	1.475 ± .015	.275	2.025
1-402	1 5/8	2 1/8	1/4	1.600	.275	2.150
1-403	1 3/4	2 1/4	1/4	1.725	.275	2.275
1-404	1 7/8	2 3/8	1/4	1.850	.275	2.400
1-405	2	2 1/2	1/4	1.975 ± .018	.275	2.525
1-406	2 1/8	2 5/8	1/4	2.100 ± .018	.275	2.650
1-407	2 1/4	2 3/4	1/4	2.225	.275	2.775
1-408	2 3/8	2 7/8	1/4	2.350	.275	2.900
1-409	2 1/2	3	1/4	2.475 ± .020	.275	3.025
1-410	2 5/8	3 1/8	1/4	2.600	.275	3.150
1-411	2 3/4	3 1/4	1/4	2.725	.275	3.275
1-412	2 7/8	3 3/8	1/4	2.850	.275	3.400
1-413	3	3 1/2	1/4	2.975 ± .024	.275	3.525
1-414	3 1/8	3 5/8	1/4	3.100	.275	3.650
1-415	3 1/4	3 3/4	1/4	3.225	.275	3.775
1-416	3 3/8	3 7/8	1/4	3.350	.275	3.900
1-417	3 1/2	4	1/4	3.475	.275	4.025
1-418	3 5/8	4 1/8	1/4	3.600 ± .028	.275	4.150
1-419	3 3/4	4 1/4	1/4	3.725	.275	4.275
1-420	3 7/8	4 3/8	1/4	3.850	.275	4.400
1-421	4	4 1/2	1/4	3.975	.275	4.525
1-422	4 1/8	4 5/8	1/4	4.100	.275	4.650
1-423	4 1/4	4 3/4	1/4	4.225 ± .030	.275	4.775
1-424	4 3/8	4 7/8	1/4	4.350	.275	4.900
1-425	4 1/2	5	1/4	4.475 ± .033	.275	5.025
1-426	4 5/8	5 1/8	1/4	4.600	.275	5.150
1-427	4 3/4	5 1/4	1/4	4.725	.275	5.275
1-428	4 7/8	5 3/8	1/4	4.850	.275	5.400
1-429	5	5 1/2	1/4	4.975 ± .037	.275	5.525
1-430	5 1/8	5 5/8	1/4	5.100	.275	5.650
1-431	5 1/4	5 3/4	1/4	5.225	.275	5.775
1-432	5 3/8	5 7/8	1/4	5.350	.275	5.900
1-433	5 1/2	6	1/4	5.475	.275	6.025
1-434	5 5/8	6 1/8	1/4	5.600	.275	6.150
1-435	5 3/4	6 1/4	1/4	5.725	.275	6.275
1-436	5 7/8	6 3/8	1/4	5.850	.275	6.400
1-437	6	6 1/2	1/4	5.975	.275	6.525
1-438	6 1/4	6 3/4	1/4	6.225 ± .040	.275	6.775
1-439	6 1/2	7	1/4	6.475	.275	7.025
1-440	6 3/4	7 1/4	1/4	6.725	.275	7.275
1-441	7	7 1/2	1/4	6.975	.275	7.525
1-442	7 1/4	7 3/4	1/4	7.225 ± .045	.275	7.775

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: 612-333-7464  
Fax: 612-342-2417  
Toll: 800-394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



# O-Rings

## Standard Size



Mold IDen	Nominal Dimensions			Actual Dimensions		
	ID	OD	C/S	ID	C/S	OD (Ref)
1-443	7 1/2	8	1/4	7.475 ± .045	.275 ± .006	8.025
1-444	7 3/4	8 1/4	1/4	7.725	.275	8.275
1-445	8	8 1/2	1/4	7.975	.275	8.525
1-446	8 1/2	9	1/4	8.475 ± .055	.275	9.025
1-447	9	9 1/2	1/4	8.975	.275	9.525
1-448	9 1/2	10	1/4	9.475	.275	10.025
1-449	10	10 1/2	1/4	9.975 ± .055	.275	10.525
1-450	10 1/2	11	1/4	10.475 ± .060	.275	11.025
1-451	11	11 1/2	1/4	10.975	.275	11.525
1-452	11 1/2	12	1/4	11.475	.275	12.025
1-453	12	12 1/2	1/4	11.975	.275	12.525
1-454	12 1/2	13	1/4	12.475	.275	13.025
1-455	13	13 1/2	1/4	12.975	.275	13.525
1-456	13 1/2	14	1/4	13.475 ± .070	.275	14.025
1-457	14	14 1/2	1/4	13.975	.275	14.525
1-458	14 1/2	15	1/4	14.475	.275	15.025
1-459	15	15 1/2	1/4	14.975	.275	15.525
1-460	15 1/2	16	1/4	15.475	.275	16.025
1-461	16	16 1/2	1/4	15.955 ± .075	.275	16.505
1-462	16 1/2	17	1/4	16.455	.275	17.005
1-463	17	17 1/2	1/4	16.955 ± .080	.275	17.505
1-464	17 1/2	18	1/4	17.455 ± .085	.275	18.005
1-465	18	18 1/2	1/4	17.955	.275	18.505
1-466	18 1/2	19	1/4	18.455	.275	19.005
1-467	19	19 1/2	1/4	18.955 ± .090	.275	19.505
1-468	19 1/2	20	1/4	19.455	.275	20.005
1-469	20	20 1/2	1/4	19.955 ± .095	.275	20.505
1-470	21	21 1/2	1/4	20.955	.275	21.505
1-471	22	22 1/2	1/4	21.955 ± .100	.275	22.505
1-472	23	23 1/2	1/4	22.940 ± .105	.275	23.490
1-473	24	24 1/2	1/4	23.940 ± .110	.275	24.490
1-474	25	25 1/2	1/4	24.940 ± .115	.275	25.490
1-475	26	26 1/2	1/4	25.940 ± .120	.275	26.490
1-476	27	27 1/2	1/4	26.955	.275	27.505



# O-Rings Tube & Boss



Mold IDen	Tube Size	Actual Dimensions		
		ID	C/S	OD (Ref)
1-901	3/32	.185 ± .005	.056 ± .003	0.297
1-902	1/8	.239	.064	0.367
1-903	3/16	.301	.064	0.429
1-904	1/4	.351	.072	0.495
1-905	5/16	.414	.072	0.558
1-906	3/8	.468	.078	0.624
1-907	7/16	.530 ± .007	.082	0.694
1-908	1/2	.644 ± .009	.087	0.818
1-909	9/16	.706	.097	0.900
1-910	5/8	.755	.097	0.949
1-911	11/16	.863	.116 ± .004	1.095
1-912	3/4	.924	.116	1.156
1-913	13/16	.986 ± .010	.116	1.218
1-914	7/8	1.047	.116	1.279
1-915	15/16	1.109	.116	1.341
1-916	1	1.171	.116	1.403
1-918	1 1/8	1.355 ± .012	.116	1.587
1-920	1 1/4	1.475	.118	1.711
1-924	1 1/2	1.720 ± .015	.118	1.956
1-928	1 3/4	2.090 ± .018	.118	2.326
1-932	2	2.337	.118	2.573



# O-Rings Standard Size



Back by popular demand! Precision Associates has re-created the full size line drawings of our standard O-Rings. Samples of 1/8" and 5/32" Cross Sections are shown below. Call customer service to request your copy, or download a set today from our websites at: <http://www.PrecisionAssoc.com> or <http://www.PAICustomers.com>.

**O-Rings Standard Size 5/32 Cross Section**

**O-Rings Standard Size 1/8 Cross Section**

Mold IDen	Nominal Dimensions			Actual Dimensions		O.D. (Ref)	Specification
	I.D.	O.D.	C/S	I.D.	C/S		
1-201	3/16	7/16	1/8	.171 ±.005	.139 ±.004	.449	AS568-201
1-202	1/4	1/2	1/8	.234	.139	.512	AS568-202
1-203	5/16	9/16	1/8	.301	.139	.579	AS568-203
1-204	3/8	5/8	1/8	.359	.139	.637	AS568-204
1-205	7/16	11/16	1/8	.421	.139	.699	AS568-205
1-206	1/2	3/4	1/8	.484	.139	.762	AS568-206
1-207	9/16	13/16	1/8	.549 ±.007	.139	.827	AS568-207
1-208	5/8	7/8	1/8	.609 ±.009	.139	.887	AS568-208
1-209	11/16	15/16	1/8	.672	.139	.950	AS568-209
1-210	3/4	1	1/8	.734 ±.010	.139	1.012	AS568-210
1-211	13/16	1 1/16	1/8	.796	.139	1.074	AS568-211
1-212	7/8	1 1/8	1/8	.859	.139	1.137	AS568-212
1-213	15/16	1 3/16	1/8	.921	.139	1.199	AS568-213
1-214	1	1 1/4	1/8	.984	.139	1.262	AS568-214
1-215	1 1/16	1 5/16	1/8	1.046	.139	1.324	AS568-215
1-216	1 1/8	1 3/8	1/8	1.109 ±.012	.139	1.387	AS568-216
1-217	1 3/16	1 7/16	1/8	1.171	.139	1.449	AS568-217

Use Scale below to verify dimensional integrity

Precision Associates, Inc.  
740 N. Washington Ave.  
Minneapolis, MN 55401  
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Phone: (612) 333-7464  
Fax: (612) 342-2417  
Toll: (800) 394-6590

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# O-Rings Special Size



Precision Associates has one of the industries largest collections of special size O-Ring tools. Currently we have over 2,600 different size O-Rings in production. On average, we add a new size each week. To keep up on all of the new sizes, please check out our website at [www.PrecisionAssoc.com](http://www.PrecisionAssoc.com).

The O-Rings listed here are in order by Inside Diameter (ID) and then Cross Section (C/S). You may also want to reference our Engineer's Guide. It has all of PAI's O-Rings, including Standard Sizes listed in ascending order by OD, with tolerances and volumetric data. If you still can't find the O-Ring to fit your special need, please call our engineering department. Our On-Site Mold Shop can produce a mold in short order at a very reasonable cost.

Mold IDen	C/S	ID	OD (Ref)
4-4	0.004	0.004	0.012
6-8	0.006	0.008	0.020
10-10	0.010	0.010	0.030
25-10	0.025	0.010	0.060
50-10	0.050	0.010	0.110
93-10ES	0.094	0.010	0.198
14-12	0.014	0.012	0.040
38-14	0.038	0.014	0.090
59-15	0.059	0.015	0.133
93-15ES	0.095	0.015	0.205
15-16	0.015	0.016	0.046
20-17	0.020	0.017	0.057
40-17	0.040	0.017	0.097
35-18	0.035	0.018	0.088
20-20	0.020	0.020	0.060
29-22	0.029	0.022	0.080
30-23	0.030	0.023	0.083
40-23	0.040	0.023	0.103
20-24	0.020	0.024	0.064
13-25VS	0.013	0.025	0.051
16-28	0.016	0.028	0.060
48-28	0.048	0.028	0.124
121-029	0.121	0.029	0.271
17-30	0.017	0.030	0.064
20-30	0.020	0.030	0.070
31-31ES	0.031	0.031	0.093
27-32	0.027	0.032	0.086
87-33VS	0.088	0.033	0.209
15-34	0.015	0.034	0.064
45-35	0.045	0.035	0.125
86-37	0.086	0.037	0.209
19-38	0.019	0.038	0.076
32-39	0.032	0.039	0.103
73-40	0.073	0.040	0.186
23-41	0.023	0.041	0.087
42-42	0.042	0.042	0.126
31-43	0.031	0.043	0.105

Mold IDen	C/S	ID	OD (Ref)
17-44	0.017	0.044	0.078
31-43SS	0.031	0.044	0.106
32-44VS	0.032	0.044	0.108
20-45	0.020	0.045	0.085
43-45VS	0.043	0.045	0.131
34-46	0.034	0.046	0.114
16-47	0.016	0.047	0.079
31-47	0.031	0.047	0.109
36-47	0.036	0.047	0.119
7-48VS	0.007	0.048	0.062
74-47NS	0.074	0.048	0.195
35-50	0.035	0.050	0.120
59-49VS	0.060	0.050	0.170
62-50	0.062	0.050	0.174
12-51VS	0.012	0.051	0.075
34-53	0.034	0.053	0.121
64-53	0.064	0.053	0.181
80-54	0.080	0.054	0.214
24-55SS	0.024	0.055	0.103
32-55	0.032	0.055	0.119
42-55	0.042	0.055	0.139
50-55NS	0.050	0.055	0.155
40-57	0.040	0.057	0.137
94-57	0.094	0.057	0.245
40-59SS	0.040	0.060	0.140
56-60	0.056	0.060	0.172
76-60	0.076	0.060	0.212
65-60SS	0.066	0.061	0.193
32-62	0.032	0.062	0.126
47-62	0.047	0.062	0.156
56-61VS	0.056	0.062	0.174
66-61VS	0.067	0.062	0.196
22-63	0.022	0.063	0.107
63-63ES	0.063	0.063	0.189
17-65	0.017	0.065	0.099
35-65	0.035	0.065	0.135
44-65	0.044	0.065	0.153





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Mold IDen	C/S	ID	OD (Ref)
20-66	0.020	0.066	0.106
12-67VS	0.012	0.068	0.092
31-67SS	0.031	0.068	0.130
25-70	0.025	0.070	0.120
30-70	0.030	0.070	0.130
34-70	0.034	0.070	0.138
109-70	0.109	0.070	0.288
133-70	0.133	0.070	0.336
17-72VS	0.017	0.073	0.107
21-74	0.021	0.074	0.116
53-74	0.053	0.074	0.180
35-75	0.035	0.075	0.145
47-71VS	0.047	0.075	0.169
29-76	0.029	0.076	0.134
30-78	0.030	0.078	0.138
49-78	0.049	0.078	0.176
56-78	0.056	0.078	0.190
24-78SS	0.024	0.079	0.127
39-79	0.039	0.079	0.157
33-78SS	0.034	0.080	0.148
85-80	0.085	0.080	0.250
28-81	0.028	0.081	0.137
59-79VS	0.060	0.081	0.201
18-81ES	0.018	0.082	0.118
42-82	0.043	0.082	0.168
23-84	0.023	0.084	0.130
48-84	0.048	0.084	0.180
55-85	0.055	0.085	0.195
75-85	0.075	0.085	0.235
93-085	0.093	0.085	0.271
34-86	0.034	0.086	0.154
20-87	0.020	0.087	0.127
40-87	0.040	0.087	0.167
47-87	0.047	0.087	0.181
81-87	0.081	0.087	0.249
70-87	0.071	0.088	0.230
36-89	0.036	0.089	0.161
13-89SS	0.013	0.090	0.116
20-90	0.020	0.090	0.130
25-90	0.025	0.090	0.140
39-91ES	0.039	0.092	0.170
28-94	0.028	0.094	0.150
50-94	0.050	0.094	0.194
63-94	0.063	0.094	0.220
50-94VS	0.051	0.096	0.198

Mold IDen	C/S	ID	OD (Ref)
26-97	0.026	0.097	0.149
44-97	0.044	0.097	0.185
23-98	0.023	0.098	0.144
30-98	0.030	0.098	0.158
72-97VS	0.072	0.098	0.242
70-98SS	0.071	0.099	0.241
18-100	0.018	0.100	0.136
25-100	0.025	0.100	0.150
38-100	0.038	0.100	0.176
60-100	0.060	0.100	0.220
35-100SS	0.035	0.101	0.171
51-102	0.051	0.102	0.204
75-102	0.075	0.102	0.252
30-103	0.030	0.103	0.163
45-105	0.045	0.105	0.195
34-106	0.034	0.106	0.174
42-105ES	0.042	0.106	0.190
10-107	0.010	0.107	0.127
70-108	0.070	0.108	0.248
40-109	0.040	0.109	0.189
133-109	0.133	0.109	0.375
139-109	0.139	0.109	0.387
20-110	0.020	0.110	0.150
28-110	0.028	0.110	0.166
51-110	0.051	0.110	0.212
32-110VS	0.032	0.111	0.175
60-111	0.060	0.111	0.231
70-113ES	0.070	0.113	0.253
47-114	0.047	0.114	0.208
68-113VS	0.068	0.114	0.250
40-117	0.040	0.117	0.197
25-117VS	0.025	0.118	0.168
42-117	0.042	0.118	0.202
40-118VS	0.040	0.119	0.199
30-118VS	0.030	0.120	0.180
34-118SS	0.035	0.120	0.190
50-120	0.050	0.120	0.220
80-120	0.080	0.120	0.280
63-122VS	0.064	0.124	0.252
31-125	0.031	0.125	0.187
36-125	0.036	0.125	0.197
62-125	0.062	0.125	0.249
70-125	0.070	0.125	0.265
20-125VS	0.020	0.126	0.166
40-126SS	0.040	0.127	0.207

Precision Associates, Inc.

3800 N. Washington Ave.  
Minneapolis, MN 55412

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Phone: 612-333-7464

Fax: 612-342-2417

Toll: 800-394-6590

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Mold IDen	C/S	ID	OD (Ref)
56-125VS	0.057	0.127	0.241
50-129	0.050	0.129	0.229
70-127SS	0.071	0.129	0.271
25-130	0.025	0.130	0.180
35-130	0.035	0.130	0.200
95-130	0.095	0.130	0.320
187-130ES	0.188	0.130	0.506
29-134	0.029	0.134	0.192
32-133SS	0.032	0.134	0.198
60-134	0.060	0.134	0.254
75-134	0.075	0.134	0.284
88-135	0.088	0.135	0.311
40-136	0.040	0.136	0.216
58-133SS	0.059	0.136	0.254
25-137SS	0.025	0.138	0.188
36-138	0.036	0.138	0.210
59-138	0.059	0.138	0.256
79-138	0.079	0.138	0.296
48-140	0.048	0.140	0.236
50-140	0.050	0.140	0.240
30-140SS	0.030	0.141	0.201
94-142	0.094	0.142	0.330
27-143	0.027	0.143	0.197
25-144	0.025	0.144	0.194
80-145NS	0.080	0.144	0.304
12-145	0.012	0.145	0.169
23-144	0.023	0.145	0.191
76-145	0.076	0.145	0.297
80-145	0.080	0.145	0.305
31-146	0.031	0.146	0.208
150-145SVS	0.151	0.146	0.448
40-147	0.040	0.147	0.227
71-147	0.071	0.147	0.289
20-150	0.020	0.150	0.190
43-150	0.043	0.150	0.236
22-150ES	0.022	0.151	0.195
23-150ES	0.023	0.151	0.197
36-152	0.036	0.152	0.224
46-152	0.046	0.152	0.244
70-145SS	0.073	0.152	0.298
139-152	0.139	0.152	0.430
32-154	0.032	0.154	0.218
50-154	0.050	0.154	0.254
160-155	0.160	0.155	0.475
18-156	0.018	0.156	0.192

Mold IDen	C/S	ID	OD (Ref)
39-154SS	0.039	0.156	0.234
38-157	0.038	0.157	0.233
30-157VS	0.030	0.158	0.218
54-158	0.054	0.158	0.266
59-158	0.059	0.158	0.276
79-157SS	0.079	0.158	0.316
50-158VS	0.050	0.159	0.259
12-158SS	0.012	0.160	0.184
87-158SS	0.089	0.161	0.339
32-160VS	0.032	0.162	0.226
40-162	0.040	0.162	0.242
70-161ES	0.070	0.162	0.302
75-165	0.075	0.165	0.315
178-165	0.178	0.165	0.521
21-165VS	0.021	0.166	0.208
60-166	0.060	0.166	0.286
93-166	0.093	0.166	0.352
24-169	0.024	0.169	0.217
70-170NS	0.070	0.169	0.309
20-170	0.020	0.170	0.210
45-165SS	0.046	0.170	0.262
48-170	0.048	0.170	0.266
16-171	0.016	0.171	0.203
20-170VS	0.020	0.172	0.212
37-172	0.037	0.172	0.246
16-175	0.016	0.175	0.207
30-176	0.030	0.176	0.236
40-176	0.040	0.176	0.256
50-176	0.050	0.176	0.276
56-176	0.056	0.176	0.288
68-176	0.068	0.176	0.312
104-176	0.104	0.176	0.384
71-178	0.071	0.178	0.320
40-180	0.040	0.180	0.260
73-182	0.073	0.182	0.328
28-181VS	0.028	0.183	0.239
35-182VS	0.035	0.184	0.254
48-185	0.048	0.185	0.281
40-184SS	0.040	0.186	0.266
31-187	0.031	0.187	0.249
50-187	0.050	0.187	0.287
70-187	0.070	0.187	0.327
139-187	0.139	0.187	0.465
35-182VS	0.035	0.188	0.258
62-188	0.062	0.188	0.312

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: 612-333-7464  
Fax: 612-342-2417  
Toll: 800-394-6590

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Mold IDen	C/S	ID	OD (Ref)
35-188VS	0.035	0.190	0.260
35-190	0.035	0.190	0.260
23-191	0.023	0.191	0.237
39-189SS	0.039	0.191	0.269
55-195	0.055	0.195	0.305
63-193VS	0.064	0.195	0.323
70-195	0.070	0.195	0.335
25-190SS	0.025	0.196	0.246
98-197	0.098	0.197	0.393
118-197	0.118	0.197	0.433
39-197ES	0.039	0.198	0.276
30-199ES	0.030	0.199	0.259
40-200	0.040	0.200	0.280
51-199ES	0.051	0.200	0.302
122-200	0.122	0.200	0.444
28-201	0.028	0.201	0.257
23-200	0.023	0.202	0.248
70-202	0.070	0.202	0.342
59-200VS	0.060	0.203	0.323
24-205	0.024	0.205	0.253
30-208	0.030	0.208	0.268
39-208	0.039	0.208	0.286
50-208	0.050	0.208	0.308
54-210NS	0.053	0.209	0.315
33-210	0.033	0.210	0.276
40-210	0.040	0.210	0.290
45-209ES	0.045	0.210	0.300
71-210	0.071	0.210	0.352
80-208VS	0.081	0.210	0.372
90-208VS	0.091	0.210	0.392
71-211ES	0.071	0.212	0.354
28-210SS	0.028	0.213	0.269
30-212SS	0.030	0.214	0.274
33-210SS	0.034	0.214	0.282
60-215	0.060	0.215	0.335
18-214VS	0.018	0.216	0.252
41-216	0.041	0.216	0.298
53-216	0.053	0.216	0.322
25-218	0.025	0.218	0.268
94-218NS	0.094	0.218	0.406
156-218	0.156	0.218	0.530
188-218	0.188	0.218	0.594
47-217VS	0.047	0.219	0.313
60-217ES	0.061	0.219	0.341
70-219	0.070	0.219	0.359

Mold IDen	C/S	ID	OD (Ref)
125-219	0.125	0.219	0.469
32-220	0.032	0.220	0.284
37-220	0.037	0.220	0.294
46-224	0.046	0.224	0.316
74-224	0.074	0.224	0.372
79-224	0.079	0.224	0.382
40-228	0.040	0.228	0.308
12-227VS	0.012	0.229	0.253
52-229	0.052	0.229	0.333
140-230ES	0.141	0.231	0.513
40-228SS	0.041	0.232	0.314
62-230SS	0.063	0.232	0.358
51-232SS	0.052	0.234	0.338
34-232SS	0.034	0.235	0.303
195-235	0.195	0.235	0.625
78-236	0.078	0.236	0.392
25-237	0.025	0.237	0.287
59-236VS	0.059	0.238	0.356
31-238	0.031	0.238	0.300
40-238	0.040	0.238	0.318
40-239	0.040	0.239	0.319
42-239	0.042	0.239	0.323
48-239	0.048	0.239	0.335
51-239	0.051	0.239	0.341
174-239	0.174	0.239	0.587
63-240	0.063	0.240	0.366
70-240	0.070	0.240	0.380
77-240	0.077	0.240	0.394
30-239VS	0.030	0.241	0.301
73-239SS	0.074	0.241	0.389
164-242	0.164	0.242	0.570
56-239VS	0.057	0.243	0.357
71-243	0.071	0.243	0.385
74-244	0.074	0.244	0.392
45-245	0.045	0.245	0.335
60-246	0.060	0.246	0.366
68-246	0.068	0.246	0.382
125-247	0.125	0.247	0.497
20-248	0.020	0.248	0.288
48-248	0.048	0.248	0.344
71-248	0.071	0.248	0.390
51-249	0.051	0.249	0.351
32-250	0.032	0.250	0.314
35-250	0.035	0.250	0.320
80-250	0.080	0.250	0.410

Precision Associates, Inc.

3800 N. Washington Ave.  
Minneapolis, MN 55412

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Phone: 612-333-7464

Fax: 612-342-2417

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Mold IDen	C/S	ID	OD (Ref)
93-250	0.093	0.250	0.436
94-248VS	0.095	0.251	0.441
62-250VS	0.063	0.252	0.378
40-248SS	0.041	0.253	0.335
77-250SS	0.078	0.255	0.411
14-256	0.014	0.256	0.284
34-256	0.034	0.256	0.324
46-257	0.046	0.257	0.349
40-258	0.040	0.258	0.338
59-256VS	0.060	0.259	0.379
71-256VS	0.072	0.259	0.403
89-255SS	0.090	0.259	0.439
21-260	0.021	0.260	0.302
70-258SS	0.071	0.262	0.404
110-265NS	0.110	0.264	0.484
60-265	0.060	0.265	0.385
75-262SS	0.076	0.266	0.418
32-264VS	0.032	0.267	0.331
53-270	0.053	0.270	0.376
70-270	0.070	0.270	0.410
75-268SS	0.076	0.271	0.423
5-275ES	0.005	0.275	0.285
6-275ES	0.006	0.275	0.287
7-275ES	0.007	0.275	0.289
30-272SS	0.030	0.275	0.335
70-275	0.070	0.275	0.415
70-270SS	0.071	0.275	0.417
104-272VS	0.105	0.275	0.485
197-276	0.197	0.276	0.670
36-272SS	0.037	0.277	0.351
44-277	0.044	0.277	0.365
44-278	0.044	0.277	0.365
76-277	0.076	0.277	0.429
53-276ES	0.053	0.278	0.384
40-275SS	0.041	0.279	0.361
59-279	0.059	0.279	0.397
190-280	0.190	0.280	0.660
140-281	0.140	0.281	0.561
46-278VS	0.047	0.283	0.377
25-285	0.025	0.285	0.335
63-281SS	0.063	0.285	0.411
35-283SS	0.035	0.286	0.356
24-285VS	0.024	0.287	0.333
50-287	0.050	0.287	0.387
45-290	0.045	0.290	0.380

Mold IDen	C/S	ID	OD (Ref)
55-287VS	0.056	0.290	0.402
70-285SS	0.071	0.290	0.432
86-290	0.086	0.290	0.462
70-291	0.070	0.291	0.431
94-287VS	0.095	0.291	0.481
39-295	0.039	0.295	0.373
59-295	0.059	0.295	0.413
49-295ES	0.049	0.297	0.395
32-295VS	0.032	0.297	0.362
78-298	0.078	0.298	0.454
110-299	0.110	0.299	0.519
50-300	0.050	0.300	0.400
25-301	0.025	0.301	0.351
38-301	0.038	0.301	0.377
42-301	0.042	0.301	0.385
60-301	0.060	0.301	0.421
35-301VS	0.035	0.304	0.374
35-301VS	0.035	0.304	0.374
54-301VS	0.055	0.304	0.414
71-304	0.071	0.304	0.446
20-305	0.020	0.305	0.345
108-305	0.108	0.305	0.521
34-306	0.034	0.306	0.374
52-306	0.052	0.306	0.410
46-307	0.046	0.307	0.399
35-307ES	0.035	0.308	0.378
72-309	0.072	0.309	0.453
150-310	0.150	0.310	0.610
31-312	0.031	0.312	0.374
40-310VS	0.040	0.312	0.392
78-312	0.078	0.312	0.468
97-312	0.097	0.312	0.506
103-312	0.103	0.312	0.518
135-312	0.135	0.312	0.582
51-313	0.051	0.313	0.415
59-311SS	0.060	0.314	0.434
36-312SS	0.036	0.315	0.387
43-315	0.043	0.315	0.401
70-313ES	0.070	0.315	0.455
51-313VS	0.052	0.316	0.420
45-315ES	0.045	0.317	0.407
70-313VS	0.071	0.317	0.459
74-317	0.074	0.317	0.465
63-319	0.063	0.319	0.445
39-317VS	0.039	0.320	0.398

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: 612-333-7464  
Fax: 612-342-2417  
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Mold IDen	C/S	ID	OD (Ref)
70-320	0.070	0.320	0.460
35-322	0.035	0.322	0.392
63-319VS	0.064	0.322	0.450
28-320VS	0.028	0.323	0.379
35-318VS	0.036	0.323	0.395
95-320SS	0.097	0.326	0.520
103-326	0.103	0.326	0.532
125-327	0.125	0.326	0.576
39-327	0.039	0.327	0.405
90-324VS	0.091	0.328	0.510
50-330	0.050	0.330	0.430
31-332	0.031	0.332	0.394
70-334	0.070	0.334	0.474
42-335	0.042	0.335	0.419
86-336	0.086	0.336	0.508
60-340	0.060	0.340	0.460
285-340	0.285	0.340	0.910
79-335SS	0.081	0.341	0.503
45-346	0.045	0.346	0.436
125-348	0.125	0.348	0.598
70-344SS	0.071	0.349	0.491
28-347VS	0.028	0.350	0.406
74-350	0.074	0.350	0.498
28-346VS	0.028	0.351	0.407
54-344SS	0.055	0.351	0.461
47-350VS	0.047	0.352	0.446
118-352	0.118	0.352	0.588
125-343SS	0.126	0.352	0.604
39-354	0.039	0.354	0.432
108-352VS	0.109	0.355	0.573
20-354VS	0.020	0.357	0.397
73-357	0.073	0.357	0.503
56-355VS	0.057	0.358	0.472
156-359	0.156	0.359	0.671
59-354SS	0.060	0.360	0.480
35-361	0.035	0.361	0.431
79-354SS	0.081	0.361	0.523
35-362	0.035	0.362	0.432
210-362	0.210	0.362	0.782
45-364	0.045	0.364	0.454
80-364	0.080	0.364	0.524
62-358SS	0.063	0.365	0.491
72-364VS	0.072	0.365	0.509
24-362VS	0.024	0.366	0.414
25-356SS	0.026	0.366	0.418

Mold IDen	C/S	ID	OD (Ref)
87-366	0.087	0.366	0.540
104-366	0.104	0.366	0.574
52-364SS	0.052	0.367	0.471
68-364SS	0.069	0.367	0.505
71-367	0.071	0.367	0.509
74-362VS	0.075	0.367	0.517
50-366SS	0.050	0.369	0.469
80-364VS	0.081	0.369	0.531
94-366SS	0.095	0.369	0.559
40-370	0.040	0.370	0.450
60-364SS	0.061	0.370	0.492
8-372	0.008	0.372	0.388
30-368VS	0.030	0.373	0.433
70-373ES	0.070	0.374	0.514
119-374	0.119	0.374	0.612
46-375	0.046	0.375	0.467
62-375	0.062	0.375	0.499
79-370SS	0.080	0.375	0.535
93-375	0.093	0.375	0.561
106-375	0.106	0.375	0.587
125-375	0.125	0.375	0.625
180-375	0.180	0.375	0.735
38-377	0.038	0.377	0.453
103-374VS	0.104	0.378	0.586
74-375VS	0.075	0.379	0.529
30-380	0.030	0.380	0.440
91-380	0.091	0.380	0.562
31-378VS	0.031	0.382	0.444
76-382	0.076	0.382	0.534
39-386	0.039	0.386	0.464
37-384VS	0.037	0.387	0.461
74-382SS	0.075	0.388	0.538
142-390NS	0.142	0.389	0.673
50-386SS	0.051	0.390	0.492
75-386VS	0.076	0.390	0.542
103-391	0.103	0.391	0.597
54-394	0.054	0.394	0.502
139-390	0.140	0.394	0.674
40-395	0.040	0.395	0.475
43-393ES	0.043	0.395	0.481
70-395	0.070	0.395	0.535
69-392VS	0.070	0.395	0.535
43-395ES	0.043	0.397	0.483
62-400	0.062	0.400	0.524
80-400	0.080	0.400	0.560



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Mold IDen	C/S	ID	OD (Ref)
92-400	0.092	0.400	0.584
50-397SS	0.050	0.401	0.501
45-405	0.045	0.405	0.495
74-401VS	0.075	0.405	0.555
80-406	0.080	0.406	0.566
174-406	0.174	0.406	0.754
39-408	0.039	0.408	0.486
90-401SS	0.092	0.409	0.593
31-410	0.031	0.410	0.472
31-409SS	0.031	0.413	0.475
32-409SS	0.032	0.413	0.477
59-416ES	0.059	0.417	0.535
139-417	0.139	0.417	0.695
184-417	0.184	0.417	0.785
56-414SS	0.057	0.418	0.532
95-418	0.095	0.418	0.608
104-417VS	0.105	0.421	0.631
70-418SS	0.071	0.425	0.567
103-425	0.103	0.425	0.631
130-425	0.130	0.425	0.685
35-426	0.035	0.426	0.496
40-426	0.040	0.426	0.506
45-426	0.045	0.426	0.516
50-426	0.050	0.426	0.526
45-425ES	0.045	0.428	0.518
180-429	0.180	0.429	0.789
71-430	0.071	0.430	0.572
34-432	0.034	0.432	0.500
76-432	0.076	0.432	0.584
39-433	0.039	0.433	0.511
53-429SS	0.053	0.433	0.539
59-433	0.059	0.433	0.551
31-435	0.031	0.435	0.497
20-433VS	0.020	0.437	0.477
70-437	0.070	0.437	0.577
16-438	0.016	0.438	0.470
93-437ES	0.093	0.438	0.624
110-438	0.110	0.438	0.658
40-440	0.040	0.440	0.520
360-440	0.360	0.440	1.160
68-438SS	0.069	0.444	0.582
26-445	0.026	0.445	0.497
87-445	0.087	0.445	0.619
120-445	0.120	0.445	0.685
132-445	0.132	0.445	0.709

Mold IDen	C/S	ID	OD (Ref)
84-446	0.084	0.446	0.614
52-447	0.052	0.447	0.551
40-445SS	0.040	0.449	0.529
46-450	0.046	0.450	0.542
94-445VS	0.095	0.451	0.641
80-443SS	0.082	0.452	0.616
139-452	0.140	0.452	0.732
40-445RS	0.041	0.453	0.535
46-453	0.046	0.453	0.545
118-453	0.118	0.453	0.689
148-453	0.148	0.453	0.749
42-451ES	0.042	0.454	0.538
70-455	0.070	0.455	0.595
84-456	0.084	0.456	0.624
103-456	0.103	0.456	0.662
165-456	0.165	0.456	0.786
28-457	0.028	0.457	0.513
59-453VS	0.060	0.457	0.577
53-458	0.053	0.458	0.564
40-459	0.040	0.459	0.539
79-450SS	0.081	0.459	0.621
60-460	0.060	0.460	0.580
70-460	0.070	0.460	0.600
28-457VS	0.028	0.463	0.519
36-465	0.036	0.465	0.537
169-465	0.169	0.465	0.803
70-466	0.070	0.466	0.606
30-468	0.030	0.468	0.528
50-468	0.050	0.468	0.568
250-469	0.250	0.469	0.969
270-470	0.270	0.470	1.010
24-472	0.024	0.472	0.520
39-472	0.039	0.472	0.550
59-472	0.059	0.472	0.590
70-468SS	0.071	0.472	0.614
160-472	0.160	0.472	0.792
103-469VS	0.104	0.474	0.682
79-472VS	0.079	0.476	0.634
113-477	0.113	0.477	0.703
151-477	0.151	0.477	0.779
77-468SS	0.079	0.478	0.636
50-475SS	0.050	0.480	0.580
106-480	0.106	0.480	0.692
172-480	0.172	0.480	0.824
70-478VS	0.071	0.482	0.624

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: 612-333-7464  
Fax: 612-342-2417  
Toll: 800-394-6590

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Mold IDen	C/S	ID	OD (Ref)
40-484	0.040	0.484	0.564
121-485	0.121	0.485	0.727
104-482VS	0.105	0.486	0.696
105-485PL	0.106	0.487	0.699
110-487	0.110	0.487	0.707
55-489	0.055	0.489	0.599
41-490	0.041	0.490	0.572
70-487VS	0.070	0.490	0.630
39-492	0.039	0.492	0.570
104-492	0.104	0.492	0.700
71-495	0.071	0.495	0.637
30-496	0.030	0.496	0.556
47-490SS	0.048	0.496	0.592
26-492VS	0.026	0.497	0.549
43-495TS	0.043	0.497	0.583
75-489SS	0.076	0.498	0.650
139-496VS	0.140	0.498	0.778
93-500	0.093	0.500	0.686
125-500	0.125	0.500	0.750
234-500	0.234	0.500	0.968
243-500	0.243	0.500	0.986
70-495SS	0.071	0.503	0.645
70-505	0.070	0.505	0.645
40-504ES	0.040	0.506	0.586
40-508NS	0.040	0.506	0.586
25-507	0.025	0.507	0.557
60-507	0.060	0.507	0.627
49-508	0.049	0.508	0.606
62-501SS	0.063	0.508	0.634
70-489SS	0.073	0.508	0.654
60-507ES	0.060	0.511	0.631
98-512	0.098	0.512	0.708
20-515	0.020	0.515	0.555
100-514	0.100	0.515	0.715
139-515	0.140	0.515	0.795
35-512SS	0.035	0.517	0.587
100-520	0.100	0.520	0.720
94-523	0.094	0.523	0.711
138-523	0.138	0.523	0.799
87-524	0.087	0.524	0.698
168-524	0.168	0.524	0.860
31-526	0.031	0.526	0.588
21-524VS	0.021	0.528	0.570
70-518SS	0.072	0.529	0.673
55-530	0.055	0.530	0.640

Mold IDen	C/S	ID	OD (Ref)
98-520SS	0.100	0.530	0.730
59-531	0.059	0.531	0.649
71-525SS	0.072	0.533	0.677
39-535	0.039	0.535	0.613
51-531ES	0.052	0.537	0.641
113-539	0.113	0.539	0.765
31-539SS	0.031	0.544	0.606
51-547	0.051	0.547	0.649
40-550	0.040	0.550	0.630
112-549ES	0.112	0.550	0.774
79-551	0.079	0.551	0.709
51-551VS	0.051	0.555	0.657
32-551SS	0.032	0.556	0.620
32-551VS	0.032	0.557	0.621
39-550VS	0.040	0.557	0.637
51-547VS	0.052	0.557	0.661
71-557	0.071	0.557	0.699
104-557	0.104	0.557	0.765
80-551SS	0.082	0.562	0.726
109-562	0.109	0.562	0.780
39-570	0.039	0.570	0.648
106-570	0.106	0.570	0.782
32-566VS	0.032	0.571	0.635
60-575	0.060	0.575	0.695
139-576	0.139	0.576	0.854
30-577	0.030	0.577	0.637
218-578	0.218	0.578	1.014
345-580	0.345	0.580	1.270
415-580	0.415	0.580	1.410
70-583	0.070	0.583	0.723
70-575SS	0.071	0.585	0.727
20-583ES	0.020	0.587	0.627
40-583VS	0.040	0.587	0.668
79-591NS	0.079	0.589	0.747
50-590	0.050	0.590	0.690
92-590	0.092	0.590	0.774
103-590	0.103	0.590	0.796
98-591	0.098	0.591	0.787
20-595	0.020	0.595	0.635
171-595	0.171	0.595	0.937
70-590VS	0.071	0.596	0.738
68-598	0.068	0.598	0.734
92-590SS	0.094	0.601	0.789
95-590SS	0.097	0.601	0.795
59-602	0.059	0.602	0.720

Precision Associates, Inc.

3800 N. Washington Ave.  
Minneapolis, MN 55412

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Fax: 612-342-2417

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Mold IDen	C/S	ID	OD (Ref)
87-602	0.087	0.602	0.776
63-594SS	0.064	0.605	0.733
105-605	0.105	0.605	0.815
158-605	0.158	0.605	0.921
83-606	0.083	0.606	0.772
187-609	0.187	0.609	0.983
58-610	0.058	0.610	0.726
40-612	0.040	0.612	0.692
166-612	0.166	0.612	0.944
170-612	0.170	0.612	0.952
74-614	0.074	0.614	0.762
77-614	0.077	0.614	0.768
34-611ES	0.034	0.617	0.685
47-618	0.047	0.618	0.712
95-618	0.095	0.618	0.808
104-618	0.104	0.618	0.826
71-620	0.071	0.620	0.762
30-622	0.030	0.622	0.682
103-612SS	0.105	0.622	0.832
94-614SS	0.096	0.624	0.816
50-625	0.050	0.625	0.725
125-625	0.125	0.625	0.875
39-630	0.039	0.630	0.708
30-622SS	0.030	0.631	0.691
45-632	0.045	0.632	0.722
47-632	0.047	0.632	0.726
52-632	0.052	0.632	0.736
56-632	0.056	0.632	0.744
185-625SS	0.187	0.632	1.006
39-636NS	0.039	0.633	0.711
79-623SS	0.080	0.634	0.794
32-630SS	0.032	0.635	0.699
79-630SS	0.080	0.637	0.797
62-638	0.062	0.638	0.762
190-638	0.190	0.638	1.018
249-635SS	0.251	0.640	1.142
31-643	0.031	0.643	0.705
103-643	0.103	0.643	0.849
50-640ES	0.050	0.644	0.744
87-644	0.087	0.644	0.818
92-635SS	0.093	0.644	0.830
120-636SS	0.122	0.645	0.889
43-642SS	0.043	0.646	0.732
70-646	0.070	0.646	0.786
139-640	0.140	0.646	0.926

Mold IDen	C/S	ID	OD (Ref)
93-634SS	0.095	0.648	0.838
70-652	0.070	0.652	0.792
46-656	0.046	0.656	0.748
94-656	0.094	0.656	0.844
57-658	0.057	0.658	0.772
70-646SS	0.071	0.658	0.800
40-660	0.040	0.660	0.740
64-660	0.064	0.660	0.788
59-669	0.059	0.669	0.787
79-669VS	0.080	0.673	0.833
106-665VS	0.107	0.674	0.888
113-674	0.113	0.674	0.900
86-675	0.086	0.675	0.847
140-675	0.140	0.675	0.955
56-670SS	0.057	0.676	0.790
63-670SS	0.064	0.676	0.804
70-675ES	0.070	0.676	0.816
87-681	0.087	0.681	0.855
104-681	0.104	0.681	0.889
71-683	0.071	0.683	0.825
395-677SS	0.400	0.685	1.485
275-687	0.275	0.687	1.237
159-688	0.159	0.688	1.006
20-685VS	0.020	0.689	0.729
30-690	0.030	0.690	0.750
83-676SS	0.085	0.690	0.860
46-691	0.046	0.691	0.783
57-690VS	0.058	0.700	0.816
103-700	0.103	0.700	0.906
40-701	0.040	0.701	0.781
140-692SS	0.142	0.701	0.985
91-702	0.091	0.702	0.884
70-688SS	0.072	0.703	0.847
46-705	0.046	0.705	0.797
87-705	0.087	0.705	0.879
70-706	0.070	0.706	0.846
138-708	0.138	0.708	0.984
59-709	0.059	0.709	0.827
118-709	0.118	0.709	0.945
75-710	0.075	0.710	0.860
50-720	0.050	0.720	0.820
70-720	0.070	0.720	0.860
157-715VS	0.159	0.722	1.040
70-724	0.070	0.724	0.864
40-725	0.040	0.725	0.805

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Minneapolis, MN 55412

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Mold IDen	C/S	ID	OD (Ref)
36-732	0.036	0.730	0.802
50-720SS	0.051	0.730	0.832
158-730	0.158	0.730	1.046
103-734PL	0.103	0.734	0.940
73-735	0.073	0.735	0.881
118-728SS	0.119	0.735	0.973
140-741	0.140	0.741	1.021
70-742	0.070	0.742	0.882
104-745	0.104	0.745	0.953
71-746	0.071	0.746	0.888
70-739VS	0.071	0.748	0.890
40-750	0.040	0.750	0.830
62-750	0.062	0.750	0.874
82-750	0.082	0.750	0.914
250-750	0.250	0.750	1.250
281-750	0.281	0.750	1.312
118-748VS	0.119	0.755	0.993
70-739SS	0.072	0.760	0.904
87-760	0.087	0.760	0.934
100-760	0.100	0.760	0.960
98-765	0.098	0.765	0.961
139-765	0.139	0.765	1.043
178-767	0.178	0.767	1.123
103-768	0.103	0.768	0.974
70-769	0.070	0.769	0.909
80-758SS	0.081	0.769	0.931
91-760SS	0.093	0.773	0.959
31-779	0.031	0.779	0.841
40-785	0.040	0.785	0.865
47-780SS	0.047	0.788	0.882
47-780SS	0.048	0.788	0.884
98-787ES	0.098	0.789	0.985
155-790	0.155	0.790	1.100
45-787VS	0.045	0.794	0.884
63-787VS	0.064	0.794	0.922
104-787VS	0.105	0.794	1.004
118-787VS	0.119	0.794	1.032
80-796	0.080	0.796	0.956
49-782SS	0.050	0.797	0.897
176-787SS	0.179	0.799	1.157
210-799	0.210	0.799	1.219
140-800	0.140	0.800	1.080
63-799VS	0.064	0.807	0.935
104-809	0.104	0.809	1.017
71-810	0.071	0.810	0.952

Mold IDen	C/S	ID	OD (Ref)
118-795SS	0.120	0.810	1.050
30-810ES	0.030	0.812	0.872
63-813	0.063	0.813	0.939
156-800SS	0.159	0.813	1.131
103-814	0.103	0.814	1.020
223-813SS	0.224	0.815	1.263
87-817	0.087	0.817	0.991
40-820	0.040	0.820	0.900
40-825	0.040	0.825	0.905
150-825	0.150	0.825	1.125
125-827	0.125	0.827	1.077
30-840	0.030	0.840	0.900
185-840	0.185	0.840	1.210
59-836SS	0.059	0.841	0.959
156-837ES	0.157	0.842	1.156
104-835VS	0.105	0.843	1.053
156-844	0.156	0.844	1.156
406-844	0.406	0.844	1.656
103-850	0.103	0.848	1.054
45-850	0.045	0.850	0.940
59-850	0.059	0.850	0.968
70-831SS	0.072	0.850	0.994
68-843SS	0.069	0.856	0.994
150-850VS	0.151	0.856	1.158
45-850VS	0.045	0.857	0.947
70-850VS	0.071	0.858	1.000
158-855SS	0.159	0.858	1.176
135-859	0.135	0.859	1.129
275-859	0.275	0.859	1.409
32-860	0.032	0.860	0.924
80-850SS	0.081	0.860	1.022
52-864	0.052	0.864	0.968
59-866	0.059	0.866	0.984
70-843SSS	0.072	0.866	1.010
70-868	0.070	0.868	1.008
197-866	0.198	0.869	1.265
79-866ES	0.079	0.870	1.028
104-870	0.104	0.870	1.078
90-854SS	0.092	0.872	1.056
118-866SS	0.119	0.873	1.111
50-875	0.050	0.875	0.975
203-875	0.203	0.875	1.281
312-875	0.312	0.875	1.499
71-876	0.071	0.876	1.018
40-879	0.040	0.879	0.959

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3800 N. Washington Ave.  
Minneapolis, MN 55412

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70-879ES	0.070	0.882	1.022
150-886	0.150	0.886	1.186
190-870SS	0.194	0.887	1.275
130-888	0.130	0.888	1.148
156-875SS	0.159	0.889	1.207
80-880SS	0.081	0.893	1.055
70-879SS	0.071	0.896	1.038
31-898	0.031	0.898	0.960
125-900	0.125	0.900	1.150
47-894SS	0.048	0.903	0.999
59-905	0.059	0.905	1.023
141-905	0.141	0.905	1.187
83-906	0.083	0.906	1.072
52-910	0.052	0.910	1.014
31-915	0.031	0.915	0.977
54-908SS	0.055	0.917	1.027
123-924	0.123	0.924	1.170
81-925	0.081	0.925	1.087
72-926	0.072	0.926	1.070
40-929	0.040	0.929	1.009
114-929	0.114	0.929	1.157
40-930	0.040	0.930	1.010
88-910SS	0.090	0.931	1.111
104-933	0.104	0.933	1.141
71-935	0.071	0.935	1.077
321-937	0.321	0.937	1.579
141-938	0.141	0.938	1.220
195-938	0.195	0.938	1.328
103-940	0.103	0.940	1.146
39-945NS	0.039	0.942	1.020
70-943	0.070	0.943	1.083
24-945	0.024	0.945	0.993
79-945	0.079	0.945	1.103
275-945	0.275	0.945	1.495
40-950	0.040	0.950	1.030
45-945ES	0.045	0.950	1.040
215-950	0.215	0.950	1.380
118-953	0.118	0.953	1.189
139-953	0.139	0.953	1.231
156-938SS	0.158	0.953	1.269
59-945SS	0.060	0.954	1.074
300-957	0.300	0.957	1.557
35-950SS	0.035	0.959	1.029
125-950SS	0.126	0.960	1.212
63-962	0.063	0.962	1.088

Mold IDen	C/S	ID	OD (Ref)
55-690VS	0.055	0.965	1.075
176-975	0.176	0.975	1.327
235-975	0.235	0.975	1.445
46-967VS	0.046	0.976	1.068
63-970ES	0.064	0.979	1.107
50-970SS	0.051	0.980	1.082
250-980	0.250	0.980	1.480
39-984NS	0.039	0.981	1.059
50-984	0.050	0.984	1.084
79-984	0.079	0.984	1.142
100-984	0.100	0.984	1.184
140-988	0.140	0.988	1.268
197-984VS	0.198	0.988	1.384
58-989	0.058	0.989	1.105
45-990	0.045	0.990	1.080
70-985SS	0.071	0.992	1.134
30-980SS	0.030	0.994	1.054
32-995	0.032	0.995	1.059
71-998	0.071	0.998	1.140
55-1.000	0.055	1.000	1.110
141-1.005	0.141	1.005	1.287
46-1.000SS	0.046	1.007	1.099
80-1.000SS	0.080	1.010	1.170
59-1.012	0.059	1.012	1.130
103-1.008ES	0.104	1.014	1.222
39-1.010ES	0.039	1.015	1.093
156-1.000SS	0.159	1.016	1.334
70-1.015ES	0.070	1.017	1.157
30-1.010VS	0.030	1.019	1.079
174-1.020	0.174	1.020	1.368
65-1.030	0.065	1.030	1.160
47-1.024SS	0.048	1.034	1.130
65-1.030ES	0.065	1.035	1.165
32-1.039	0.032	1.039	1.103
40-1.040	0.040	1.040	1.120
93-1.040	0.093	1.040	1.226
53-1.037ES	0.053	1.042	1.148
32-1.050	0.032	1.050	1.114
275-1.050	0.275	1.050	1.600
60-1.051	0.060	1.051	1.171
140-1.056	0.140	1.056	1.336
250-1.062NS	0.249	1.056	1.554
213-1.057	0.213	1.057	1.483
104-1.059	0.104	1.059	1.267
71-1.061	0.071	1.061	1.203

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: 612-333-7464  
Fax: 612-342-2417  
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Mold IDen	C/S	ID	OD (Ref)
40-1.062	0.040	1.062	1.142
59-1.063	0.059	1.063	1.181
63-1.063	0.063	1.063	1.189
79-1.063	0.079	1.063	1.221
98-1.063	0.098	1.063	1.259
71-1.046SS	0.072	1.065	1.209
93-1.065	0.093	1.065	1.251
212-1.060VS	0.213	1.065	1.491
39-1.063VS	0.039	1.069	1.147
62-1.069	0.062	1.069	1.193
31-1.071	0.031	1.071	1.133
176-1.077	0.176	1.077	1.429
26-1.080	0.026	1.080	1.132
72-1.081	0.072	1.081	1.225
37-1.080	0.037	1.082	1.156
40-1.086	0.040	1.086	1.166
90-1.091SS	0.090	1.087	1.267
187-1.088	0.187	1.088	1.462
65-1.090	0.065	1.090	1.220
32-1.100	0.032	1.100	1.164
70-1.082SS	0.071	1.100	1.242
176-1.100	0.176	1.100	1.452
275-1.100	0.275	1.100	1.650
43-1.101	0.043	1.101	1.187
78-1.102	0.078	1.102	1.258
157-1.102	0.157	1.102	1.416
229-1.099SS	0.230	1.103	1.563
40-1.105	0.040	1.105	1.185
167-1.105	0.167	1.105	1.439
31-1.109	0.031	1.109	1.171
158-1.105SS	0.159	1.109	1.427
25-1.110	0.025	1.110	1.160
43-1.101SS	0.043	1.110	1.196
47-1.106ES	0.047	1.111	1.205
212-1.111	0.212	1.111	1.535
81-1.114	0.081	1.114	1.276
275-1.100VS	0.275	1.114	1.664
25-1.115	0.025	1.115	1.165
50-1.106SS	0.051	1.117	1.219
140-1.119	0.140	1.119	1.399
36-1.118	0.036	1.120	1.192
374-1.102VS	0.380	1.121	1.881
104-1.125	0.104	1.125	1.333
40-1.116VS	0.040	1.126	1.206
118-1.121ES	0.119	1.129	1.367

Mold IDen	C/S	ID	OD (Ref)
49-1.130	0.049	1.130	1.228
70-1.114SS	0.071	1.130	1.272
151-1.138	0.151	1.138	1.440
70-1.135ES	0.070	1.141	1.281
149-1.136SS	0.149	1.147	1.445
215-1.147	0.215	1.147	1.577
56-1.148	0.056	1.148	1.260
46-1.130SS	0.047	1.149	1.243
45-1.153	0.045	1.153	1.243
54-1.153	0.054	1.153	1.261
176-1.156	0.176	1.156	1.508
193-1.158	0.193	1.158	1.544
65-1.140SS	0.066	1.159	1.291
114-1.165	0.114	1.165	1.393
47-1.161ES	0.047	1.167	1.261
69-1.157VS	0.070	1.168	1.308
125-1.160ES	0.126	1.168	1.420
60-1.173	0.060	1.173	1.293
62-1.176	0.062	1.176	1.300
140-1.176	0.140	1.176	1.456
149-1.180	0.149	1.180	1.478
28-1.181	0.028	1.181	1.237
104-1.186	0.104	1.186	1.394
210-1.187	0.210	1.187	1.607
71-1.188	0.071	1.188	1.330
76-1.188	0.076	1.188	1.340
94-1.188	0.094	1.188	1.376
39-1.189	0.039	1.189	1.267
30-1.190	0.030	1.190	1.250
157-1.181	0.158	1.191	1.507
52-1.176SS	0.053	1.194	1.300
210-1.200	0.210	1.200	1.620
60-1.214NS	0.060	1.205	1.325
60-1.203ES	0.060	1.212	1.332
47-1.201SS	0.048	1.213	1.309
149-1.213	0.149	1.213	1.511
60-1.190SS	0.060	1.214	1.334
50-1.204SS	0.051	1.216	1.318
40-1.220	0.040	1.220	1.300
157-1.220	0.157	1.220	1.534
300-1.220	0.300	1.220	1.820
70-1.220ES	0.070	1.222	1.362
104-1.222	0.104	1.222	1.430
173-1.225	0.173	1.225	1.571
176-1.225	0.176	1.225	1.577

Precision Associates, Inc.

3800 N. Washington Ave.  
Minneapolis, MN 55412

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Mold IDen	C/S	ID	OD (Ref)
275-1.225	0.275	1.225	1.775
31-1.226	0.031	1.226	1.288
141-1.226	0.141	1.226	1.508
197-1.230	0.197	1.230	1.624
31-1.226ES	0.031	1.232	1.294
78-1.234	0.078	1.234	1.390
176-1.236	0.176	1.236	1.588
212-1.237	0.212	1.237	1.661
54-1.228SS	0.055	1.240	1.350
250-1.240	0.250	1.240	1.740
52-1.245	0.052	1.245	1.349
140-1.246	0.140	1.246	1.526
104-1.249	0.104	1.249	1.457
50-1.250	0.050	1.250	1.350
71-1.251	0.071	1.251	1.393
70-1.240VS	0.071	1.255	1.397
281-1.250NS	0.282	1.256	1.820
47-1.245SS	0.047	1.257	1.351
53-1.257	0.053	1.257	1.363
92-1.259	0.092	1.259	1.443
210-1.260	0.210	1.260	1.680
40-1.249VS	0.040	1.261	1.341
50-1.257SS	0.050	1.264	1.364
47-1.257VS	0.047	1.266	1.360
70-1.240SS	0.072	1.267	1.411
65-1.262ES	0.065	1.268	1.398
30-1.272	0.030	1.272	1.332
60-1.274	0.060	1.274	1.394
120-1.280	0.120	1.280	1.520
139-1.265SS	0.141	1.283	1.565
39-1.290	0.039	1.290	1.368
55-1.290	0.055	1.290	1.400
71-1.280VS	0.072	1.293	1.437
70-1.281SS	0.071	1.301	1.443
60-1.304	0.060	1.304	1.424
140-1.309	0.140	1.309	1.589
40-1.310	0.040	1.310	1.390
104-1.311	0.104	1.311	1.519
55-1.307ES	0.055	1.313	1.423
71-1.314	0.071	1.314	1.456
50-1.325	0.050	1.325	1.425
93-1.320SS	0.094	1.330	1.518
31-1.331	0.031	1.331	1.393
210-1.335	0.210	1.334	1.754
40-1.310SS	0.041	1.335	1.417

Mold IDen	C/S	ID	OD (Ref)
92-1.338	0.092	1.338	1.522
39-1.340	0.039	1.340	1.418
45-1.340	0.045	1.340	1.430
176-1.350	0.176	1.350	1.702
237-1.347SS	0.238	1.352	1.828
215-1.364	0.215	1.364	1.794
140-1.365	0.140	1.365	1.645
80-1.370	0.080	1.370	1.530
40-1.350SS	0.041	1.371	1.453
213-1.372	0.213	1.372	1.798
48-1.375	0.048	1.375	1.471
259-1.375	0.259	1.375	1.893
70-1.370ES	0.070	1.376	1.516
30-1.377ES	0.030	1.379	1.439
210-1.373VS	0.211	1.379	1.801
157-1.388SS	0.156	1.380	1.692
148-1.385	0.148	1.385	1.681
71-1.387	0.071	1.387	1.529
77-1.362VS	0.078	1.387	1.543
45-1.395	0.045	1.395	1.485
70-1.378VS	0.071	1.397	1.539
180-1.402	0.180	1.402	1.762
264-1.406	0.264	1.406	1.934
286-1.407	0.286	1.407	1.979
63-1.394SS	0.064	1.408	1.536
60-1.403ES	0.060	1.410	1.530
299-1.410	0.299	1.410	2.008
50-1.406	0.050	1.411	1.511
90-1.387SS	0.092	1.411	1.595
75-1.414	0.075	1.414	1.564
60-1.415	0.060	1.415	1.535
93-1.415	0.093	1.415	1.601
78-1.417	0.078	1.417	1.573
50-1.420	0.050	1.420	1.520
70-1.424	0.070	1.424	1.564
111-1.424	0.111	1.424	1.646
50-1.419ES	0.050	1.426	1.526
98-1.417VS	0.099	1.426	1.624
70-1.427	0.070	1.427	1.567
70-1.424SS	0.070	1.432	1.572
140-1.434	0.140	1.434	1.714
39-1.437	0.039	1.437	1.515
94-1.437	0.094	1.437	1.625
250-1.438	0.250	1.438	1.938
430-1.438	0.430	1.438	2.298

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

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Fax: 612-342-2417  
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Mold IDen	C/S	ID	OD (Ref)
105-1.452	0.105	1.452	1.662
47-1.453	0.047	1.453	1.547
70-1.437SS	0.071	1.454	1.596
168-1.460	0.168	1.460	1.796
70-1.465	0.070	1.465	1.605
79-1.457ES	0.080	1.466	1.626
65-1.465ES	0.065	1.472	1.602
176-1.475	0.176	1.475	1.827
39-1.476	0.039	1.476	1.554
144-1.484	0.144	1.484	1.772
38-1.463SS	0.039	1.485	1.563
62-1.485	0.062	1.485	1.609
63-1.472ES	0.064	1.486	1.614
81-1.489	0.081	1.489	1.651
31-1.491	0.031	1.491	1.553
140-1.491	0.140	1.491	1.771
74-1.489ES	0.074	1.493	1.641
138-1.491ES	0.138	1.493	1.769
234-1.493	0.234	1.493	1.961
50-1.500	0.050	1.500	1.600
55-1.500	0.055	1.500	1.610
437-1.500	0.437	1.500	2.374
500-1.500	0.500	1.500	2.500
47-1.484SS	0.048	1.501	1.597
104-1.501	0.104	1.501	1.709
45-1.510	0.045	1.510	1.600
71-1.510	0.071	1.510	1.652
125-1.515	0.125	1.515	1.765
231-1.500VS	0.234	1.519	1.987
56-1.506SS	0.057	1.520	1.634
114-1.520	0.114	1.520	1.748
59-1.535	0.059	1.535	1.653
40-1.520VS	0.040	1.536	1.616
50-1.527ES	0.050	1.536	1.636
210-1.537	0.210	1.537	1.957
45-1.540	0.045	1.540	1.630
70-1.545	0.070	1.545	1.685
139-1.546	0.139	1.546	1.824
92-1.550	0.092	1.550	1.734
176-1.550	0.176	1.550	1.902
55-1.560	0.055	1.560	1.670
250-1.562	0.250	1.562	2.062
118-1.543VS	0.119	1.563	1.801
39-1.574NS	0.039	1.569	1.647
32-1.559SS	0.032	1.574	1.638

Mold IDen	C/S	ID	OD (Ref)
67-1.541SS	0.068	1.574	1.710
47-1.575	0.047	1.575	1.669
125-1.575	0.125	1.575	1.825
157-1.575	0.157	1.575	1.889
76-1.580	0.076	1.580	1.732
118-1.583SS	0.119	1.593	1.831
312-1.594	0.312	1.594	2.218
225-1.595PL	0.225	1.595	2.045
45-1.600	0.045	1.600	1.690
176-1.600	0.176	1.600	1.952
180-1.600	0.180	1.600	1.960
118-1.595VS	0.119	1.602	1.840
237-1.597SS	0.238	1.603	2.079
78-1.609	0.078	1.609	1.765
140-1.616	0.140	1.616	1.896
212-1.616	0.212	1.616	2.040
59-1.623	0.059	1.623	1.741
375-1.625	0.375	1.625	2.375
104-1.628	0.104	1.628	1.836
71-1.629	0.071	1.629	1.771
141-1.629	0.141	1.629	1.911
70-1.614SS	0.071	1.634	1.776
29-1.620SS	0.029	1.635	1.693
30-1.635	0.030	1.635	1.695
103-1.612SS	0.105	1.637	1.847
73-1.639	0.073	1.639	1.785
45-1.650	0.045	1.650	1.740
50-1.640VS	0.050	1.651	1.751
275-1.655	0.275	1.655	2.205
250-1.660	0.250	1.660	2.160
70-1.662	0.070	1.662	1.802
70-1.670	0.070	1.670	1.810
47-1.672	0.047	1.672	1.766
108-1.674	0.108	1.674	1.890
50-1.675	0.050	1.675	1.775
107-1.675	0.107	1.675	1.889
93-1.689NS	0.093	1.685	1.871
62-1.686	0.062	1.686	1.810
70-1.687	0.070	1.687	1.827
70-1.690NS	0.070	1.687	1.827
125-1.688	0.125	1.688	1.938
118-1.673VS	0.119	1.689	1.927
50-1.690	0.050	1.690	1.790
750-1.690	0.750	1.690	3.190
167-1.693	0.167	1.693	2.027

Precision Associates, Inc.

3800 N. Washington Ave.  
Minneapolis, MN 55412

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Mold IDen	C/S	ID	OD (Ref)
29-1.692SS	0.029	1.709	1.767
103-1.718	0.103	1.718	1.924
357-1.719	0.357	1.719	2.433
31-1.718	0.031	1.724	1.786
176-1.725	0.176	1.725	2.077
39-1.732	0.039	1.732	1.810
59-1.732	0.059	1.732	1.850
62-1.740	0.062	1.740	1.864
285-1.735VS	0.286	1.741	2.313
93-1.750	0.093	1.744	1.930
225-1.745	0.225	1.745	2.195
176-1.747	0.176	1.747	2.099
140-1.750	0.140	1.750	2.030
250-1.750	0.250	1.750	2.250
275-1.745VS	0.276	1.751	2.303
104-1.754	0.104	1.754	1.962
71-1.756	0.071	1.756	1.898
114-1.756	0.114	1.756	1.984
70-1.738VS	0.071	1.761	1.903
62-1.772	0.062	1.772	1.896
79-1.772	0.079	1.772	1.930
98-1.772	0.098	1.772	1.968
210-1.772	0.210	1.772	2.192
50-1.764ES	0.050	1.774	1.874
50-1.750SS	0.051	1.775	1.877
55-1.775	0.055	1.775	1.885
70-1.775	0.070	1.775	1.915
39-1.772SS	0.039	1.787	1.865
210-1.787	0.210	1.787	2.207
32-1.790	0.032	1.790	1.854
139-1.790	0.139	1.790	2.068
50-1.796	0.050	1.796	1.896
70-1.799	0.070	1.799	1.939
46-1.800	0.046	1.807	1.899
104-1.808	0.104	1.808	2.016
103-1.812	0.103	1.812	2.018
125-1.812	0.125	1.812	2.062
40-1.828	0.040	1.828	1.908
70-1.830	0.070	1.830	1.970
75-1.840	0.075	1.840	1.990
237-1.848	0.237	1.848	2.322
79-1.850	0.079	1.850	2.008
176-1.850	0.176	1.850	2.202
40-1.856	0.040	1.856	1.936
40-1.860	0.040	1.860	1.940

Mold IDen	C/S	ID	OD (Ref)
250-1.860	0.250	1.860	2.360
28-1.844SS	0.028	1.864	1.920
50-1.864	0.050	1.864	1.964
235-1.845SS	0.238	1.869	2.345
500-1.875	0.500	1.875	2.875
140-1.878	0.140	1.878	2.158
39-1.889NS	0.039	1.883	1.961
93-1.888	0.093	1.888	2.074
119-1.888	0.119	1.888	2.126
47-1.891	0.047	1.891	1.985
70-1.864SS	0.071	1.900	2.042
215-1.890VS	0.217	1.905	2.339
375-1.906	0.375	1.906	2.656
103-1.889SS	0.104	1.909	2.117
93-1.888ES	0.094	1.910	2.098
210-1.912	0.210	1.912	2.332
80-1.921	0.080	1.921	2.081
31-1.895SS	0.031	1.925	1.987
70-1.927	0.070	1.927	2.067
43-1.934	0.043	1.934	2.020
47-1.934	0.047	1.934	2.028
450-1.937	0.450	1.937	2.837
104-1.943	0.104	1.943	2.151
70-1.927VS	0.071	1.946	2.088
125-1.950	0.125	1.950	2.200
210-1.950	0.210	1.950	2.370
40-1.958	0.040	1.958	2.038
224-1.941VS	0.226	1.959	2.411
47-1.954	0.047	1.961	2.055
47-1.954SS	0.047	1.961	2.055
125-1.968	0.125	1.967	2.217
103-1.968	0.103	1.968	2.174
157-1.968	0.157	1.968	2.282
176-1.944SS	0.178	1.968	2.324
39-1.969	0.039	1.969	2.047
63-1.969	0.063	1.969	2.095
176-1.975	0.176	1.975	2.327
210-1.975PL	0.210	1.975	2.395
147-1.976	0.147	1.976	2.270
39-1.969SS	0.039	1.977	2.055
38-1.984	0.038	1.984	2.060
38-1.980ES	0.038	1.985	2.061
118-1.969SS	0.119	1.986	2.224
211-1.989	0.211	1.989	2.411
282-1.986VS	0.283	1.995	2.561

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: 612-333-7464  
Fax: 612-342-2417  
Toll: 800-394-6590

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Mold IDen	C/S	ID	OD (Ref)
139-1.954SS	0.142	1.996	2.280
104-1.997	0.104	1.997	2.205
60-1.993ES	0.060	1.998	2.118
25-2.000	0.025	2.000	2.050
80-2.000	0.080	2.000	2.160
118-2.008NS	0.118	2.000	2.236
156-2.000	0.156	2.000	2.312
140-2.003	0.140	2.003	2.283
71-2.014	0.071	2.014	2.156
60-1.993SS	0.061	2.021	2.143
285-2.027	0.285	2.027	2.597
335-2.027	0.335	2.027	2.697
105-2.028	0.105	2.028	2.238
70-2.030	0.070	2.030	2.170
101-2.015SS	0.102	2.030	2.234
139-2.046	0.139	2.046	2.324
63-2.050	0.063	2.050	2.176
70-2.050	0.070	2.050	2.190
224-2.052	0.224	2.052	2.500
70-2.057ES	0.070	2.060	2.200
75-2.066	0.075	2.066	2.216
50-2.070	0.050	2.070	2.170
93-2.065VS	0.093	2.070	2.256
243-2.060VS	0.245	2.077	2.567
176-2.085	0.176	2.085	2.437
40-2.044SS	0.041	2.087	2.169
36-2.050SS	0.037	2.089	2.163
176-2.100	0.176	2.100	2.452
70-2.093SS	0.070	2.102	2.242
108-2.100VS	0.109	2.117	2.335
104-2.122	0.104	2.122	2.330
47-2.115SS	0.047	2.124	2.218
70-2.124	0.070	2.124	2.264
78-2.125	0.078	2.125	2.281
187-2.125	0.187	2.125	2.499
59-2.126	0.059	2.126	2.244
140-2.131	0.140	2.131	2.411
158-2.126ES	0.159	2.137	2.455
79-2.135ES	0.079	2.140	2.298
125-2.140	0.125	2.140	2.390
47-2.141	0.047	2.141	2.235
47-2.141ES	0.047	2.146	2.240
40-2.152	0.040	2.152	2.232
70-2.156	0.070	2.156	2.296
210-2.162	0.210	2.162	2.582

Mold IDen	C/S	ID	OD (Ref)
70-2.146VS	0.071	2.167	2.309
176-2.145VS	0.178	2.169	2.525
70-2.175	0.070	2.175	2.315
40-2.177	0.040	2.177	2.257
62-2.187	0.062	2.187	2.311
185-2.187	0.185	2.187	2.557
70-2.175VS	0.071	2.195	2.337
104-2.196	0.104	2.196	2.404
42-2.199	0.042	2.199	2.283
250-2.200	0.250	2.200	2.700
70-2.180VS	0.071	2.201	2.343
118-2.175VS	0.119	2.201	2.439
176-2.225	0.176	2.225	2.577
83-2.226	0.083	2.226	2.392
114-2.228	0.114	2.228	2.456
50-2.220VS	0.050	2.235	2.335
245-2.235	0.245	2.235	2.725
215-2.231ES	0.216	2.241	2.673
104-2.248	0.104	2.248	2.456
40-2.249	0.040	2.249	2.329
70-2.249	0.070	2.249	2.389
70-2.250	0.070	2.250	2.390
125-2.250	0.125	2.250	2.500
275-2.250	0.275	2.250	2.800
625-2.250	0.625	2.250	3.500
140-2.256	0.140	2.256	2.536
48-2.236SS	0.048	2.260	2.356
187-2.272	0.187	2.272	2.646
93-2.277	0.093	2.277	2.463
98-2.283	0.098	2.283	2.479
60-2.287	0.060	2.287	2.407
79-2.283ES	0.080	2.304	2.464
312-2.312	0.311	2.304	2.926
32-2.248SS	0.032	2.306	2.370
70-2.307	0.070	2.307	2.447
104-2.311	0.104	2.311	2.519
375-2.335NS	0.372	2.319	3.063
168-2.328	0.168	2.328	2.664
103-2.340	0.103	2.340	2.546
40-2.342	0.040	2.342	2.422
118-2.342	0.118	2.342	2.578
47-2.350	0.047	2.350	2.444
176-2.350	0.176	2.350	2.702
313-2.350	0.313	2.350	2.976
79-2.362	0.079	2.362	2.520

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3800 N. Washington Ave.  
Minneapolis, MN 55412

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217-2.362	0.217	2.362	2.796
224-2.362	0.224	2.362	2.810
215-2.373	0.215	2.373	2.803
104-2.374	0.104	2.374	2.582
187-2.375	0.187	2.375	2.749
375-2.375	0.375	2.375	3.125
140-2.381	0.140	2.381	2.661
275-2.385	0.275	2.385	2.935
394-2.362SS	0.397	2.385	3.179
281-2.391	0.281	2.391	2.953
53-2.394	0.053	2.394	2.500
103-2.394	0.103	2.394	2.600
105-2.396	0.105	2.396	2.606
500-2.375SS	0.505	2.397	3.407
17-2.400	0.017	2.400	2.434
40-2.400	0.040	2.400	2.480
150-2.400	0.150	2.400	2.700
319-2.411	0.319	2.411	3.049
70-2.425	0.070	2.425	2.565
139-2.425	0.139	2.425	2.703
70-2.440	0.070	2.440	2.580
70-2.410SS	0.071	2.447	2.589
104-2.449	0.104	2.449	2.657
103-2.450	0.103	2.450	2.656
118-2.441VS	0.119	2.455	2.693
238-2.458	0.238	2.458	2.934
179-2.459	0.179	2.459	2.817
260-2.476	0.260	2.473	2.993
176-2.475	0.176	2.475	2.827
30-2.472SS	0.030	2.482	2.542
108-2.487	0.108	2.487	2.703
282-2.490VS	0.283	2.499	3.065
105-2.500	0.105	2.500	2.710
375-2.500	0.375	2.500	3.250
79-2.480SS	0.080	2.508	2.668
104-2.511	0.104	2.511	2.719
32-2.500SS	0.032	2.524	2.588
47-2.495SS	0.048	2.524	2.620
50-2.520VS	0.050	2.534	2.634
40-2.550	0.040	2.550	2.630
118-2.520VS	0.120	2.551	2.791
70-2.560	0.070	2.560	2.700
187-2.562	0.187	2.562	2.936
104-2.563	0.104	2.563	2.771
312-2.564	0.312	2.564	3.188

Mold IDen	C/S	ID	OD (Ref)
176-2.534SS	0.179	2.573	2.931
104-2.575	0.104	2.575	2.783
80-2.585	0.080	2.585	2.745
209-2.587	0.209	2.587	3.005
209-2.592	0.209	2.592	3.010
118-2.584ES	0.119	2.596	2.834
176-2.596	0.176	2.596	2.948
139-2.601	0.139	2.601	2.879
375-2.608	0.375	2.608	3.358
176-2.600SS	0.178	2.622	2.978
375-2.625	0.375	2.625	3.375
70-2.627	0.070	2.627	2.767
144-2.629	0.144	2.629	2.917
104-2.637	0.104	2.637	2.845
47-2.641	0.047	2.641	2.735
48-2.666	0.048	2.666	2.762
71-2.638VS	0.072	2.666	2.810
139-2.671	0.139	2.671	2.949
70-2.677	0.070	2.677	2.817
115-2.683	0.115	2.683	2.913
104-2.688	0.104	2.688	2.896
84-2.661SS	0.085	2.702	2.872
70-2.690VS	0.071	2.715	2.857
50-2.719	0.050	2.719	2.819
176-2.725	0.176	2.725	3.077
250-2.725	0.250	2.725	3.225
103-2.675SS	0.105	2.726	2.936
250-2.750	0.250	2.750	3.250
70-2.753	0.070	2.753	2.893
70-2.750ES	0.070	2.754	2.894
330-2.755	0.330	2.755	3.415
140-2.761	0.140	2.761	3.041
63-2.766	0.063	2.766	2.892
268-2.763	0.268	2.767	3.303
176-2.725VS	0.179	2.769	3.127
125-2.750SS	0.126	2.776	3.028
125-2.756SS	0.126	2.782	3.034
70-2.739SS	0.071	2.792	2.934
70-2.800	0.070	2.800	2.940
312-2.812	0.311	2.803	3.425
104-2.814	0.104	2.814	3.022
103-2.830	0.103	2.830	3.036
90-2.832	0.090	2.832	3.012
59-2.835ES	0.059	2.839	2.957
176-2.850	0.176	2.850	3.202

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Mold IDen	C/S	ID	OD (Ref)
148-2.859	0.148	2.859	3.155
157-2.835VS	0.158	2.859	3.175
141-2.874	0.141	2.874	3.156
40-2.875	0.040	2.875	2.955
85-2.875	0.085	2.875	3.045
375-2.875	0.375	2.875	3.625
437-2.875	0.437	2.875	3.749
104-2.874	0.104	2.876	3.084
70-2.878	0.070	2.878	3.018
140-2.887	0.140	2.887	3.167
312-2.875SS	0.315	2.905	3.535
118-2.913	0.118	2.913	3.149
78-2.919	0.078	2.919	3.075
70-2.921	0.070	2.921	3.061
197-2.921	0.197	2.921	3.315
177-2.925	0.177	2.925	3.279
375-2.930	0.375	2.930	3.680
103-2.935ES	0.103	2.932	3.138
147-2.935	0.147	2.935	3.229
224-2.925	0.226	2.945	3.397
79-2.943ES	0.079	2.950	3.108
70-2.950ES	0.070	2.954	3.094
152-2.965	0.152	2.965	3.269
176-2.975	0.176	2.975	3.327
370-2.982	0.370	2.982	3.722
140-2.997	0.140	2.997	3.277
40-3.000	0.040	3.000	3.080
103-3.000	0.103	3.000	3.206
220-2.975VS	0.222	3.003	3.447
104-3.016	0.104	3.016	3.224
140-3.018	0.140	3.018	3.298
130-3.062	0.130	3.062	3.322
70-3.085	0.070	3.085	3.225
158-3.071ES	0.159	3.086	3.404
83-3.083	0.083	3.087	3.253
176-3.100	0.176	3.100	3.452
103-3.109	0.103	3.109	3.315
47-3.053SS	0.048	3.112	3.208
176-3.115	0.176	3.115	3.467
44-3.038SS	0.045	3.122	3.212
140-3.123	0.140	3.123	3.403
118-3.130	0.118	3.130	3.366
330-3.137	0.330	3.137	3.797
30-3.145	0.030	3.145	3.205
70-3.114VS	0.071	3.146	3.288

Mold IDen	C/S	ID	OD (Ref)
103-3.147	0.103	3.147	3.353
141-3.150	0.141	3.150	3.432
60-3.156	0.060	3.156	3.276
310-3.136SS	0.313	3.165	3.791
214-3.166	0.214	3.166	3.594
60-3.115SS	0.061	3.175	3.297
60-3.167SS	0.061	3.202	3.324
63-3.125VS	0.066	3.203	3.335
98-3.189VS	0.099	3.211	3.409
103-3.185SS	0.104	3.222	3.430
176-3.225	0.176	3.225	3.577
40-3.200SS	0.040	3.230	3.310
65-3.239	0.065	3.239	3.369
140-3.248	0.140	3.248	3.528
250-3.250	0.250	3.250	3.750
104-3.253	0.104	3.253	3.461
170-3.253	0.170	3.253	3.593
212-3.255	0.212	3.255	3.679
79-3.218VS	0.080	3.257	3.417
185-3.260	0.185	3.260	3.630
93-3.237ES	0.094	3.266	3.454
71-3.269	0.071	3.269	3.411
141-3.282	0.141	3.282	3.564
103-3.290	0.103	3.290	3.496
275-3.252SS	0.279	3.299	3.857
87-3.307	0.087	3.307	3.481
187-3.312	0.187	3.312	3.686
312-3.300SS	0.315	3.331	3.961
375-3.325SS	0.377	3.346	4.100
176-3.350	0.176	3.350	3.702
103-3.359	0.103	3.359	3.565
103-3.362	0.103	3.362	3.568
211-3.366	0.211	3.366	3.788
70-3.376NS	0.070	3.369	3.509
140-3.374	0.140	3.374	3.654
80-3.375	0.080	3.375	3.535
203-3.375	0.204	3.384	3.792
103-3.400	0.103	3.400	3.606
40-3.370VS	0.040	3.402	3.482
103-3.410ES	0.103	3.415	3.621
111-3.422	0.111	3.422	3.644
70-3.440	0.070	3.440	3.580
152-3.420VS	0.153	3.449	3.755
46-3.455	0.046	3.455	3.547
103-3.460ES	0.103	3.469	3.675

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70-3.474	0.070	3.474	3.614
176-3.475	0.176	3.475	3.827
300-3.475	0.300	3.475	4.075
80-3.500	0.080	3.500	3.660
140-3.500	0.140	3.500	3.780
156-3.500	0.156	3.500	3.812
500-3.500	0.500	3.500	4.500
84-3.506	0.084	3.506	3.674
80-3.483VS	0.081	3.509	3.671
179-3.522	0.178	3.510	3.866
104-3.520	0.104	3.520	3.728
122-3.520	0.122	3.520	3.764
230-3.475VS	0.233	3.521	3.987
71-3.523	0.071	3.523	3.665
70-3.562	0.070	3.562	3.702
125-3.562	0.125	3.562	3.812
248-3.575	0.248	3.575	4.071
125-3.543SS	0.127	3.597	3.851
75-3.600	0.075	3.600	3.750
176-3.600	0.176	3.600	3.952
103-3.612	0.103	3.612	3.818
256-3.563SS	0.260	3.614	4.134
375-3.622	0.375	3.622	4.372
140-3.625	0.140	3.625	3.905
212-3.635	0.212	3.635	4.059
125-3.640	0.125	3.640	3.890
210-3.640	0.210	3.640	4.060
212-3.641	0.212	3.641	4.065
58-3.645	0.058	3.645	3.761
147-3.656	0.147	3.656	3.950
50-3.670	0.050	3.661	3.761
90-3.661	0.090	3.661	3.841
32-3.638SS	0.032	3.674	3.738
500-3.675	0.500	3.675	4.675
210-3.640SS	0.212	3.678	4.102
50-3.670SS	0.050	3.704	3.804
224-3.724	0.224	3.724	4.172
176-3.725	0.176	3.725	4.077
150-3.734	0.150	3.734	4.034
95-3.744	0.095	3.744	3.934
104-3.755	0.104	3.755	3.963
140-3.757	0.140	3.757	4.037
71-3.776	0.071	3.776	3.918
158-3.780ES	0.159	3.799	4.117
118-3.819	0.118	3.819	4.055

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125-3.750SS	0.127	3.824	4.078
103-3.837	0.103	3.837	4.043
281-3.844	0.281	3.844	4.406
70-3.833ES	0.070	3.845	3.985
176-3.850	0.176	3.850	4.202
400-3.850	0.400	3.850	4.650
70-3.840ES	0.070	3.851	3.991
150-3.859	0.150	3.859	4.159
70-3.860	0.070	3.860	4.000
140-3.876	0.140	3.876	4.156
70-3.840VS	0.071	3.878	4.020
103-3.875	0.103	3.891	4.097
139-3.910	0.139	3.910	4.188
70-3.937	0.070	3.937	4.077
500-3.937	0.500	3.937	4.937
103-3.862	0.105	3.938	4.148
312-3.938	0.312	3.938	4.562
176-3.975	0.176	3.975	4.327
156-3.984	0.156	3.984	4.296
375-4.006	0.375	4.006	4.756
140-4.008	0.140	4.008	4.288
71-4.028	0.071	4.028	4.170
139-4.046	0.139	4.036	4.314
139-4.020SS	0.140	4.037	4.317
103-4.093	0.103	4.093	4.299
224-4.098	0.224	4.098	4.546
176-4.100	0.176	4.100	4.452
186-4.095SS	0.186	4.107	4.479
103-4.109	0.103	4.109	4.315
125-4.109	0.125	4.109	4.359
211-4.120	0.211	4.120	4.542
140-4.127	0.140	4.127	4.407
118-4.134	0.118	4.134	4.370
155-4.139	0.155	4.139	4.449
70-4.107SS	0.071	4.147	4.289
103-4.150	0.103	4.150	4.356
103-4.169	0.103	4.169	4.375
70-4.180NS	0.070	4.172	4.312
103-4.175	0.103	4.175	4.381
40-4.140VS	0.040	4.179	4.259
103-4.204ES	0.103	4.215	4.421
140-4.125SS	0.143	4.216	4.502
176-4.225	0.176	4.225	4.577
83-4.226	0.083	4.226	4.392
375-4.250	0.374	4.244	4.992

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3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: 612-333-7464  
Fax: 612-342-2417  
Toll: 800-394-6590

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Mold IDen	C/S	ID	OD (Ref)
103-4.256	0.103	4.256	4.462
104-4.258	0.104	4.258	4.466
140-4.274	0.140	4.274	4.554
104-4.279	0.104	4.279	4.487
71-4.281	0.071	4.281	4.423
375-4.250VS	0.379	4.294	5.052
150-4.295	0.150	4.295	4.595
70-4.300	0.070	4.300	4.440
210-4.304	0.210	4.304	4.724
103-4.300ES	0.103	4.311	4.517
139-4.300ES	0.139	4.311	4.589
313-4.300ES	0.315	4.312	4.942
111-4.322	0.111	4.322	4.544
215-4.331	0.215	4.331	4.761
47-4.343	0.047	4.343	4.437
78-4.266SS	0.079	4.348	4.506
103-4.350	0.103	4.350	4.556
176-4.350	0.176	4.350	4.702
103-4.359	0.103	4.359	4.565
250-4.375	0.250	4.375	4.875
140-4.379	0.140	4.379	4.659
44-4.390	0.044	4.390	4.478
103-4.397	0.103	4.397	4.603
375-4.438ES	0.376	4.449	5.201
71-4.409VS	0.072	4.455	4.599
60-4.500SS	0.060	4.467	4.587
176-4.475	0.176	4.475	4.827
220-4.475	0.220	4.475	4.915
241-4.475	0.241	4.475	4.957
181-4.488	0.181	4.488	4.850
103-4.487ES	0.103	4.498	4.704
103-4.487ES	0.103	4.498	4.704
500-4.500	0.500	4.500	5.500
30-4.523	0.030	4.507	4.567
140-4.508	0.140	4.508	4.788
70-4.562	0.070	4.562	4.702
125-4.600	0.125	4.600	4.850
188-4.976	0.188	4.600	4.976
103-4.612	0.103	4.612	4.818
157-4.606ES	0.158	4.620	4.936
140-4.630	0.140	4.630	4.910
212-4.645	0.212	4.645	5.069
103-4.609SS	0.104	4.654	4.862
141-4.654	0.141	4.654	4.936
70-4.672	0.070	4.672	4.812

Mold IDen	C/S	ID	OD (Ref)
176-4.725	0.176	4.725	5.077
117-4.750	0.117	4.734	4.968
219-4.750	0.219	4.750	5.188
312-4.700ES	0.316	4.754	5.386
140-4.755	0.140	4.755	5.035
278-4.769	0.278	4.769	5.325
212-4.774	0.212	4.774	5.198
315-4.776	0.315	4.776	5.406
104-4.783	0.104	4.783	4.991
71-4.784	0.071	4.784	4.926
625-4.812	0.625	4.812	6.062
159-4.850	0.159	4.850	5.168
176-4.850	0.176	4.850	5.202
241-4.850	0.241	4.850	5.332
103-4.859	0.103	4.859	5.065
70-4.864	0.070	4.864	5.004
455-4.866	0.455	4.866	5.776
140-4.881	0.140	4.881	5.161
70-4.890	0.070	4.890	5.030
103-4.886ES	0.103	4.898	5.104
197-4.921	0.197	4.921	5.315
141-4.928	0.141	4.928	5.210
103-4.930	0.103	4.930	5.136
139-4.910ES	0.140	4.937	5.217
438-4.938	0.438	4.938	5.814
252-4.905VS	0.255	4.968	5.478
147-4.984	0.147	4.984	5.278
500-5.000	0.500	5.000	6.000
140-5.006	0.140	5.006	5.286
375-5.000SS	0.377	5.023	5.777
147-4.984SS	0.148	5.031	5.327
104-5.036	0.104	5.036	5.244
71-5.038	0.071	5.038	5.180
168-5.005VS	0.170	5.057	5.397
103-5.106	0.103	5.106	5.312
70-5.114	0.070	5.114	5.254
103-5.117	0.103	5.117	5.323
1.062-5.125	1.062	5.125	7.249
103-5.140ES	0.103	5.153	5.359
140-5.159	0.140	5.159	5.439
170-5.118SS	0.172	5.191	5.535
197-5.197	0.197	5.197	5.591
50-5.163VS	0.050	5.212	5.312
62-5.250	0.062	5.250	5.374
211-5.251	0.211	5.251	5.673

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140-5.253	0.140	5.253	5.533
140-5.260	0.140	5.260	5.540
125-5.270	0.125	5.270	5.520
103-5.272ES	0.103	5.285	5.491
71-5.288	0.071	5.288	5.430
103-5.290ES	0.103	5.303	5.509
104-5.305	0.104	5.305	5.513
103-5.300ES	0.103	5.313	5.519
118-5.315	0.118	5.315	5.551
103-5.322ES	0.103	5.336	5.542
70-5.360	0.070	5.360	5.500
50-5.302VS	0.051	5.365	5.467
70-5.379	0.070	5.379	5.519
103-5.380ES	0.103	5.394	5.600
210-5.450	0.208	5.394	5.810
330-5.319SS	0.335	5.395	6.065
79-5.315VS	0.080	5.396	5.556
330-5.354SS	0.335	5.431	6.101
142-5.466	0.142	5.466	5.750
118-5.492	0.118	5.492	5.728
103-5.483ES	0.103	5.497	5.703
162-5.500	0.162	5.500	5.824
139-5.503	0.139	5.503	5.781
103-5.496ES	0.103	5.510	5.716
140-5.512	0.140	5.511	5.791
104-5.512	0.104	5.514	5.722
125-5.531	0.125	5.531	5.781
71-5.543	0.071	5.543	5.685
121-5.562	0.121	5.562	5.804
500-5.562	0.500	5.562	6.562
104-5.565	0.104	5.565	5.773
105-5.566	0.105	5.566	5.776
103-5.602	0.103	5.602	5.808
157-5.512VS	0.160	5.607	5.927
189-5.650	0.188	5.631	6.007
140-5.661	0.140	5.661	5.941
118-5.689	0.118	5.689	5.925
70-5.700	0.070	5.703	5.843
97-5.723	0.097	5.723	5.917
241-5.725	0.241	5.725	6.207
375-5.750	0.375	5.750	6.500
103-5.750ES	0.103	5.765	5.971
197-5.708VS	0.200	5.781	6.181
71-5.795	0.071	5.795	5.937
70-5.740SS	0.071	5.796	5.938

Mold IDen	C/S	ID	OD (Ref)
278-5.796	0.278	5.796	6.352
500-5.750VS	0.509	5.849	6.867
70-5.810SS	0.071	5.865	6.007
118-5.905	0.118	5.905	6.141
375-5.850VS	0.381	5.950	6.712
70-5.910SS	0.071	5.966	6.108
70-5.968	0.070	5.968	6.108
176-5.906SS	0.179	5.996	6.354
500-6.000	0.500	6.000	7.000
245-6.015	0.245	6.015	6.505
140-6.043	0.140	6.043	6.323
71-6.048	0.071	6.048	6.190
141-6.064	0.141	6.064	6.346
224-6.075	0.224	6.075	6.523
74-6.100	0.074	6.080	6.228
103-6.125	0.103	6.125	6.331
256-6.181	0.256	6.172	6.684
70-6.180	0.070	6.180	6.320
103-6.167ES	0.103	6.183	6.389
60-6.187	0.060	6.187	6.307
241-6.225	0.241	6.225	6.707
500-6.264	0.497	6.225	7.219
80-6.250	0.080	6.250	6.410
211-6.256	0.211	6.256	6.678
258-6.179VS	0.261	6.258	6.780
104-6.299	0.104	6.298	6.506
157-6.299	0.157	6.299	6.613
71-6.300	0.071	6.300	6.442
70-6.284ES	0.070	6.306	6.446
455-6.308	0.455	6.308	7.218
70-6.309	0.070	6.309	6.449
112-6.378SS	0.112	6.325	6.549
260-6.325	0.260	6.325	6.845
70-6.310VS	0.070	6.349	6.489
139-6.350	0.139	6.350	6.628
139-6.350	0.139	6.350	6.628
210-6.350	0.210	6.350	6.770
103-6.380	0.103	6.380	6.586
164-6.299SS	0.167	6.395	6.729
103-6.400ES	0.103	6.416	6.622
103-6.424	0.103	6.424	6.630
63-6.400VS	0.064	6.460	6.588
118-6.378VS	0.120	6.460	6.700
125-6.460	0.125	6.460	6.710
80-6.500	0.080	6.500	6.660

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94-6.500	0.094	6.500	6.688
91-6.394SS	0.093	6.510	6.696
140-6.516	0.140	6.516	6.796
103-6.501ES	0.103	6.518	6.724
520-6.519	0.520	6.519	7.559
70-6.520	0.070	6.520	6.660
258-6.437VS	0.261	6.520	7.042
104-6.551	0.104	6.551	6.759
71-6.553	0.071	6.553	6.695
275-6.600	0.275	6.600	7.150
139-6.609	0.139	6.609	6.887
500-6.625	0.500	6.625	7.625
50-6.567VS	0.050	6.629	6.729
380-6.640	0.380	6.640	7.400
139-6.630ES	0.139	6.646	6.924
210-6.666	0.210	6.666	7.086
45-6.690	0.045	6.667	6.757
70-6.687	0.070	6.687	6.827
380-6.688	0.380	6.688	7.448
103-6.674ES	0.103	6.691	6.897
70-6.734	0.070	6.734	6.874
437-6.750	0.437	6.750	7.624
375-6.650VS	0.381	6.763	7.525
312-6.700VS	0.315	6.770	7.400
150-6.650SS	0.153	6.778	7.084
224-6.783	0.224	6.783	7.231
70-6.722SS	0.071	6.785	6.927
140-6.797	0.140	6.797	7.077
104-6.803	0.104	6.803	7.011
71-6.805	0.071	6.805	6.947
47-6.812	0.047	6.812	6.906
295-6.835NS	0.294	6.822	7.410
157-6.830	0.157	6.830	7.144
103-6.850ES	0.103	6.867	7.073
139-6.850ES	0.139	6.867	7.145
70-6.950	0.070	6.950	7.090
295-6.910SS	0.297	6.964	7.558
241-6.975	0.241	6.975	7.457
60-7.000	0.060	7.000	7.120
160-7.006	0.160	7.006	7.326
272-7.051	0.272	7.051	7.595
104-7.053	0.104	7.053	7.261
140-7.053	0.140	7.053	7.333
71-7.058	0.071	7.058	7.200
375-7.125SS	0.377	7.157	7.911

Mold IDen	C/S	ID	OD (Ref)
241-7.225	0.241	7.225	7.707
104-7.308	0.104	7.308	7.516
71-7.310	0.071	7.310	7.452
103-7.300ES	0.103	7.319	7.525
500-7.250ES	0.506	7.339	8.351
70-7.360ES	0.070	7.371	7.511
281-7.378	0.281	7.378	7.940
375-7.324SS	0.379	7.409	8.167
103-7.416	0.103	7.435	7.641
241-7.475	0.241	7.475	7.957
70-7.500	0.070	7.500	7.640
375-7.500	0.375	7.500	8.250
500-7.250VS	0.518	7.505	8.541
236-7.441	0.238	7.509	7.985
104-7.560	0.104	7.560	7.768
71-7.562	0.071	7.562	7.704
140-7.562	0.140	7.562	7.842
278-7.567	0.278	7.567	8.123
215-7.581	0.215	7.571	8.001
103-7.583ES	0.103	7.602	7.808
103-7.609	0.103	7.609	7.815
70-7.613	0.070	7.613	7.753
139-7.609ES	0.139	7.628	7.906
103-7.673ES	0.103	7.692	7.898
28-7.717NS	0.028	7.694	7.750
241-7.725	0.241	7.725	8.207
375-7.733	0.375	7.733	8.483
104-7.813	0.104	7.813	8.021
146-7.700SS	0.148	7.817	8.113
118-7.784NS	0.118	7.843	8.079
103-7.862	0.103	7.862	8.068
103-7.848ES	0.103	7.868	8.074
70-7.870	0.070	7.870	8.010
139-7.850ES	0.139	7.870	8.148
230-7.829VS	0.231	7.875	8.337
103-7.950NS	0.103	7.939	8.145
103-7.950ES	0.103	7.970	8.176
139-7.950ES	0.139	7.970	8.248
241-7.975	0.241	7.975	8.457
625-8.000	0.625	8.000	9.250
140-8.023	0.140	8.023	8.303
104-8.065	0.104	8.065	8.273
103-8.039ES	0.104	8.083	8.291
199-8.029ES	0.200	8.083	8.483
279-8.105	0.279	8.105	8.663



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187-8.115ES	0.188	8.147	8.523
70-8.135ES	0.070	8.148	8.288
375-8.159	0.375	8.159	8.909
331-8.197	0.331	8.197	8.859
275-8.225	0.275	8.225	8.775
375-8.130SS	0.379	8.225	8.983
224-8.240	0.224	8.240	8.688
375-8.250	0.375	8.250	9.000
104-8.277	0.104	8.277	8.485
140-8.295	0.140	8.295	8.575
103-8.282ES	0.103	8.303	8.509
236-8.225VS	0.238	8.306	8.782
270-8.240SS	0.273	8.336	8.882
388-8.380	0.388	8.380	9.156
275-8.350ES	0.277	8.404	8.958
70-8.400ES	0.070	8.413	8.553
187-8.553	0.186	8.524	8.896
241-8.475SS	0.243	8.546	9.032
328-8.500VS	0.331	8.569	9.231
104-8.570	0.104	8.570	8.778
118-8.504VS	0.119	8.584	8.822
375-8.505SS	0.379	8.604	9.362
625-8.625	0.625	8.625	9.875
142-8.634	0.142	8.634	8.918
210-8.641	0.210	8.641	9.061
275-8.725	0.275	8.725	9.275
312-8.750	0.312	8.750	9.374
104-8.780	0.104	8.780	8.988
380-8.812ES	0.381	8.834	9.596
103-8.825ES	0.103	8.847	9.053
103-8.840ES	0.103	8.862	9.068
323-8.898	0.323	8.898	9.544
103-8.998ES	0.103	9.021	9.227
103-9.050	0.103	9.050	9.256
140-9.072	0.140	9.072	9.352
104-9.075	0.104	9.075	9.283
103-9.250	0.103	9.250	9.456
104-9.328	0.104	9.328	9.536
272-9.413	0.272	9.413	9.957
375-9.312SS	0.379	9.421	10.179
70-9.435ES	0.070	9.450	9.590
375-9.250SS	0.384	9.464	10.232
103-9.500ES	0.103	9.524	9.730
140-9.531	0.140	9.531	9.811
270-9.421SS	0.273	9.531	10.077

Mold IDen	C/S	ID	OD (Ref)
202-9.598VS	0.203	9.641	10.047
70-9.621ES	0.070	9.659	9.799
374-9.646ES	0.375	9.664	10.413
70-9.650ES	0.070	9.665	9.805
70-9.675ES	0.070	9.690	9.830
375-9.600	0.380	9.690	10.450
139-9.700	0.139	9.700	9.978
241-9.475SS	0.247	9.713	10.207
140-9.782	0.140	9.782	10.062
215-9.837	0.215	9.837	10.267
103-9.892ES	0.103	9.917	10.123
159-9.950	0.159	9.950	10.268
103-9.940ES	0.103	9.965	10.171
70-9.970	0.070	9.970	10.110
375-9.881SS	0.379	9.996	10.754
103-9.982ES	0.103	10.007	10.213
215-10.060	0.215	10.060	10.490
139-10.048ES	0.139	10.073	10.351
70-9.989VS	0.071	10.112	10.254
241-9.975VS	0.244	10.118	10.606
103-10.095ES	0.103	10.121	10.327
210-10.115ES	0.211	10.141	10.563
139-10.178	0.139	10.178	10.456
70-10.207ES	0.070	10.223	10.363
210-10.250	0.210	10.250	10.670
351-10.270	0.351	10.270	10.972
167-10.186SS	0.169	10.282	10.620
210-10.190SS	0.212	10.296	10.720
210-10.300	0.210	10.300	10.720
70-10.232SS	0.071	10.328	10.470
349-10.199VS	0.354	10.335	11.043
104-10.372	0.104	10.372	10.580
70-10.433ES	0.070	10.459	10.599
70-10.485	0.070	10.485	10.625
103-10.450ES	0.103	10.487	10.693
103-10.449	0.104	10.517	10.725
260-10.425SS	0.262	10.523	11.047
140-10.535	0.140	10.535	10.815
159-10.600	0.159	10.600	10.918
139-10.610	0.139	10.610	10.888
70-10.530SS	0.071	10.629	10.771
71-10.635	0.071	10.635	10.777
103-10.622ES	0.103	10.649	10.855
103-10.500SS	0.105	10.660	10.870
275-10.725	0.275	10.725	11.275

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375-10.690SS	0.379	10.728	11.486
139-10.734	0.139	10.760	11.038
256-10.846SS	0.255	10.801	11.311
103-10.781ES	0.103	10.808	11.014
70-10.800ES	0.070	10.817	10.957
157-10.827	0.157	10.827	11.141
380-10.875	0.380	10.875	11.635
103-10.710SS	0.105	10.958	11.168
103-10.984	0.103	10.984	11.190
272-10.988	0.272	10.988	11.532
103-10.964ES	0.103	10.992	11.198
139-11.034ES	0.139	11.062	11.340
70-11.085ES	0.070	11.102	11.242
103-11.120	0.103	11.120	11.326
141-11.120	0.141	11.120	11.402
103-11.150ES	0.103	11.178	11.384
103-11.239NS	0.103	11.190	11.396
103-11.096SS	0.104	11.200	11.408
103-11.275ES	0.103	11.275	11.481
70-11.339ES	0.070	11.368	11.508
70-11.240SS	0.071	11.423	11.565
103-11.480ES	0.103	11.509	11.715
290-11.475ES	0.291	11.532	12.114
93-11.500	0.093	11.541	11.727
339-11.654	0.339	11.638	12.316
103-11.897NS	0.103	11.846	12.052
70-11.989	0.070	11.989	12.129
275-12.000	0.275	12.000	12.550
277-12.064	0.277	12.064	12.618
140-12.073	0.140	12.073	12.353
370-12.157	0.368	12.081	12.817
370-12.106	0.370	12.106	12.846
256-12.205	0.255	12.164	12.674
103-12.155ES	0.103	12.186	12.392
142-12.214	0.142	12.214	12.498
142-12.224	0.142	12.224	12.508
375-12.250VS	0.376	12.269	13.021
139-12.278	0.139	12.278	12.556
209-12.413	0.209	12.413	12.831
210-12.475	0.210	12.475	12.895
139-12.484	0.139	12.516	12.794
139-12.475VS	0.141	12.653	12.935
70-12.720	0.070	12.720	12.860
103-12.718ES	0.104	12.788	12.996
312-12.750SS	0.316	12.899	13.531

Mold IDen	C/S	ID	OD (Ref)
375-12.750SS	0.379	12.899	13.657
139-13.062	0.139	13.062	13.340
139-13.114	0.140	13.114	13.394
70-13.114ES	0.070	13.134	13.274
139-13.234	0.139	13.234	13.512
139-13.248	0.139	13.248	13.526
224-13.252	0.224	13.252	13.700
103-13.425ES	0.103	13.459	13.665
210-13.475	0.210	13.475	13.895
139-13.484	0.139	13.484	13.762
210-13.375SS	0.212	13.514	13.938
625-13.875SS	0.630	14.101	15.361
631-14.101	0.631	14.101	15.363
339-14.189	0.338	14.128	14.804
224-14.146	0.224	14.146	14.594
500-14.156	0.500	14.156	15.156
1.000-14.430	0.993	14.325	16.311
139-14.484	0.139	14.484	14.762
288-14.250SS	0.293	14.515	15.101
87-14.470SS	0.088	14.649	14.825
197-14.764	0.197	14.764	15.158
225-14.900NS	0.224	14.836	15.284
248-15.000	0.247	14.950	15.444
104-14.990	0.104	14.990	15.198
103-15.170VS	0.104	15.259	15.467
338-15.410	0.338	15.410	16.086
210-15.475	0.210	15.475	15.895
139-15.484	0.139	15.484	15.762
103-15.500VS	0.104	15.591	15.799
225-15.500SS	0.227	15.646	16.100
1.000-15.735	1.000	15.735	17.735
110-16.186	0.110	16.186	16.406
70-16.268SS	0.070	16.357	16.497
139-16.455	0.139	16.455	16.733
70-16.535	0.070	16.577	16.717
375-16.625	0.375	16.625	17.375
312-16.690	0.311	16.690	17.312
275-16.750	0.274	16.694	17.242
210-16.830	0.210	16.830	17.250
290-16.625SS	0.294	16.830	17.418
139-17.455	0.139	17.455	17.733
139-17.480	0.139	17.480	17.758
240-17.250SS	0.245	17.581	18.071
313-18.000	0.313	18.000	18.626
139-18.455	0.139	18.455	18.733

Precision Associates, Inc.

3800 N. Washington Ave.  
Minneapolis, MN 55412

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Phone: 612-333-7464

Fax: 612-342-2417

Toll: 800-394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



# O-Rings

## Special Size



Mold IDen	C/S	ID	OD (Ref)
125-18.600	0.125	18.600	18.850
139-18.875	0.139	18.875	19.153
210-19.200	0.210	19.200	19.620
500-19.411	0.500	19.411	20.411
139-19.455	0.139	19.455	19.733
352-20.126	0.352	20.098	20.802
346-20.125	0.346	20.125	20.817
22-20.370	0.022	20.370	20.414
139-20.455	0.139	20.455	20.733
197-20.669	0.196	20.600	20.992
197-20.670	0.196	20.601	20.993
197-20.669VS	0.199	20.936	21.334
124-21.000	0.124	21.000	21.248
70-20.840SS	0.071	21.077	21.219
139-21.455	0.139	21.455	21.733
70-21.270SS	0.071	21.512	21.654
139-21.800SS	0.140	22.014	22.294
212-22.106	0.212	22.106	22.530
277-23.098	0.277	23.098	23.652
210-22.940VS	0.212	23.178	23.602
212-24.104	0.212	24.104	24.528
212-24.188	0.212	24.188	24.612
210-24.625	0.210	24.625	25.045
340-25.275VS	0.344	25.599	26.287
250-25.375VS	0.252	25.614	26.118
70-25.570SS	0.071	25.810	25.952
210-25.580VS	0.212	25.846	26.270
341-25.984	0.339	25.846	26.524
212-26.209	0.212	26.209	26.633
210-26.940	0.210	26.940	27.360
375-27.250VS	0.377	27.399	28.153
275-27.485	0.275	27.485	28.035
139-27.750SS	0.140	28.291	28.571
275-28.801	0.275	28.801	29.351
275-29.331ES	0.276	29.520	30.072
210-29.880VS	0.212	30.190	30.614
210-33.750VS	0.211	33.949	34.371
275-33.750VS	0.277	33.949	34.503





# O-Rings 5/32" Cross Section

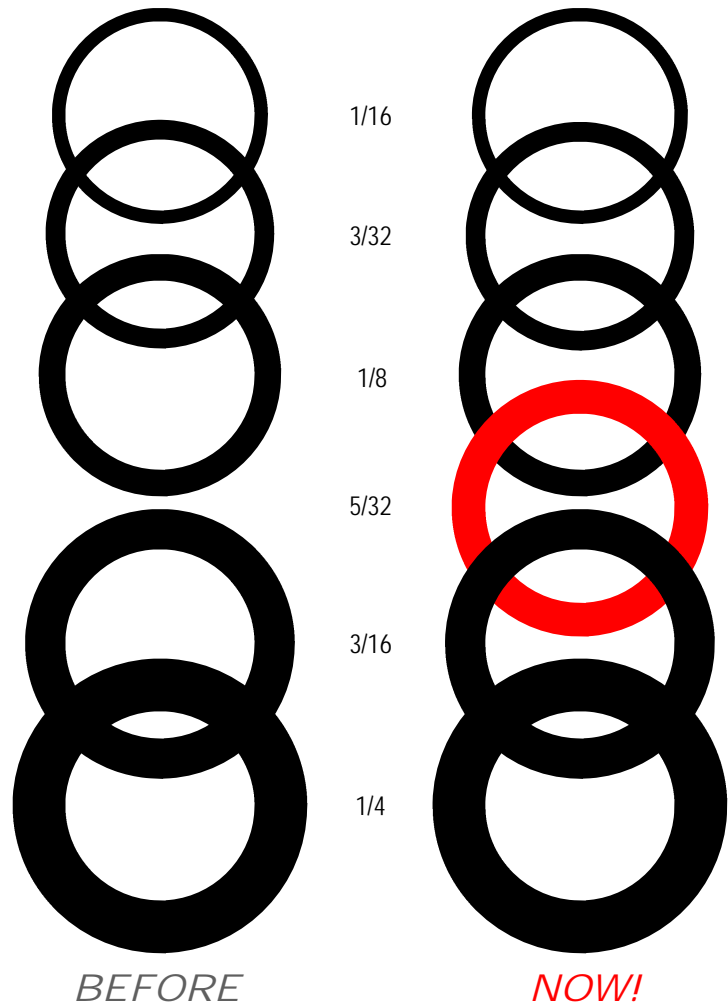


For some time AS-568 has been the standard used for choosing seals to build products using off-the-shelf materials. Standard O-Ring cross sections were developed for 1/16", 3/32", 1/8", 3/16", and 1/4". Unfortunately, when the standard was designed, a gap in nominal cross section was left between 1/8" and 3/16". Engineers desiring an O-Ring cross section larger than 1/8" have been forced to jump a full 1/16 of an inch, or try to find a non-standard solution.

Precision Associates, the company that first extended the AS-568 sizes to O-Rings smaller and larger than the standard, has now designed a series of 5/32" cross section seals to fill the gap left by AS-568. We've labeled these O-Rings our 5 series. Use the table below for seal gland design. See the reverse of this page for dimensional information on individual O-Rings.

<b>O-RING CROSS SECTION</b>	.176
PAI Size Number Range	1-514 thru 1-572
O-Ring ID Size Range	1" thru 4-7/8"
<b>AXIAL</b>	
Squeeze (min.)	.027
Gland Depth (max.)	.147 ± .003
Groove Width (wall to wall)	.235 ± .005
<b>RADIAL</b>	
Squeeze (min.) Per Side	.022
Gland Depth (max.)	.150 - .004
Groove Width (Wall to Wall)	.210 ± .005
<b>DYNAMIC</b>	
Squeeze (min.) Per Side	.015
Gland Depth (max.)	.156
Groove Width	
With Roll	.235 ± .005
No Roll	.210 ± .005
<b>DIAMETRAL CLEARANCE*</b>	
500 PSI	.013
1500 PSI	.007
<b>R Radius (max.)</b>	.040
<b>Eccentricity (max.)</b>	.004

\*Diametral Clearance based on 70 Durometer Compound



*The Gland dimensions provided are only intended to be a starting point for your design. We recommend that you test each application to meet your requirements.*



# O-Rings

## 5/32"

### Cross Section



Mold IDen	Nominal Dimensions			Actual Dimensions		
	C/S	I.D	O.D	C/S	I.D	O.D
1-514	5/32	1	1 5/16	.176	.975	1.327
1-515	5/32	1 1/16	1 3/8	.176	1.038	1.390
1-516	5/32	1 1/8	1 7/16	.176	1.100	1.452
1-517	5/32	1 3/16	1 1/2	.176	1.163	1.515
1-518	5/32	1 1/4	1 9/16	.176	1.225	1.577
1-519	5/32	1 5/16	1 5/8	.176	1.288	1.640
1-520	5/32	1 3/8	1 11/16	.176	1.350	1.702
1-521	5/32	1 7/16	1 3/4	.176	1.413	1.765
1-522	5/32	1 1/2	1 13/16	.176	1.475	1.827
1-524	5/32	1 5/8	1 15/16	.176	1.600	1.952
1-526	5/32	1 3/4	2 1/16	.176	1.725	2.077
1-528	5/32	1 7/8	2 3/16	.176	1.850	2.202
1-530	5/32	2	2 5/16	.176	1.975	2.327
1-532	5/32	2 1/8	2 7/16	.176	2.100	2.452
1-534	5/32	2 1/4	2 9/16	.176	2.225	2.577
1-536	5/32	2 3/8	2 11/16	.176	2.350	2.702
1-538	5/32	2 1/2	2 13/16	.176	2.475	2.827
1-540	5/32	2 5/8	2 15/16	.176	2.600	2.952
1-542	5/32	2 3/4	3 1/16	.176	2.725	3.077
1-544	5/32	2 7/8	3 3/16	.176	2.850	3.202
1-546	5/32	3	3 5/16	.176	2.975	3.327
1-548	5/32	3 1/8	3 7/16	.176	3.100	3.452
1-550	5/32	3 1/4	3 9/16	.176	3.225	3.577
1-552	5/32	3 3/8	3 11/16	.176	3.350	3.702
1-554	5/32	3 1/2	3 13/16	.176	3.475	3.827
1-556	5/32	3 5/8	3 15/16	.176	3.600	3.952
1-558	5/32	3 3/4	4 1/16	.176	3.725	4.077
1-560	5/32	3 7/8	4 3/16	.176	3.850	4.202
1-562	5/32	4	4 5/16	.176	3.975	4.327
1-563	5/32	4 1/8	4 7/16	.176	4.100	4.452
1-565	5/32	4 1/4	4 9/16	.176	4.225	4.577
1-566	5/32	4 3/8	4 11/16	.176	4.350	4.702
1-568	5/32	4 1/2	4 13/16	.176	4.475	4.827
1-569	5/32	4 5/8	4 15/16	.176	4.600	4.952
1-571	5/32	4 3/4	5 1/16	.176	4.725	5.077
1-572	5/32	4 7/8	5 3/16	.176	4.850	5.202

*Call  
Precision  
Associates  
For Sizes  
Not Listed*

D20C28b



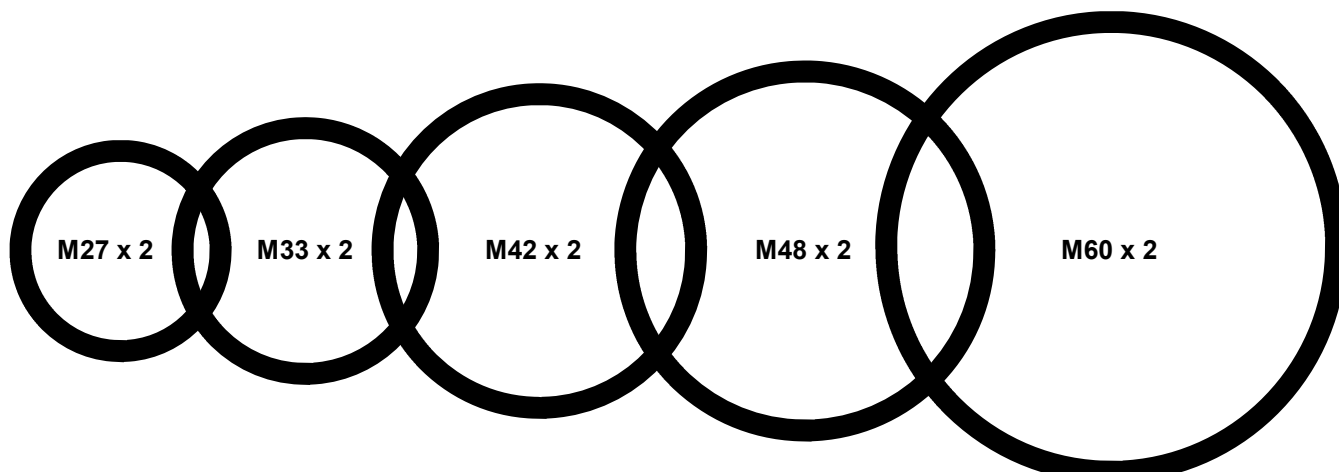
# ISO 6149 Metric Tube Fitting O-Rings

Illustrated below, the O-Rings listed to the right are designed for use with ISO 6149 Metric Tube Fittings.

Precision Associates manufactures these O-Rings in all of the common polymers. Our standard material is a peroxide cured Nitrile, compound 3920, designed for sealing at higher pressures and temperatures up to 115°C (240°F).

Contact Precision Associates for your copy of our Product Data Sheet for compound 3920 or any of our 1,000+ other rubber compounds.

PAI Size	C/S mm	I.D. mm	C/S inch	I.D. inch	Thread Size
<b>63-240</b>	1,60	6,10	.063	.240	<b>M8 x 1</b>
<b>63-319*</b>	1,60	8,10	.063	.319	<b>M10 x 1</b>
<b>87-366</b>	2,20	9,30	.087	.366	<b>M12 x 1.5</b>
<b>87-445</b>	2,20	11,30	.087	.445	<b>M14 x 1.5</b>
<b>87-524</b>	2,20	13,30	.087	.524	<b>M16 x 1.5</b>
<b>87-602</b>	2,20	15,30	.087	.602	<b>M18 x 1.5</b>
<b>87-681</b>	2,20	17,30	.087	.681	<b>M20 x 1.5</b>
<b>87-760</b>	2,20	19,30	.087	.760	<b>M22 x 1.5</b>
<b>114-929</b>	2,90	23,60	.114	.929	<b>M27 x 2</b>
<b>114-1.165</b>	2,90	29,60	.114	1.165	<b>M33 x 2</b>
<b>114-1.520</b>	2,90	38,60	.114	1.520	<b>M42 x 2</b>
<b>114-1.756</b>	2,90	44,60	.114	1.756	<b>M48 x 2</b>
<b>114-2.228</b>	2,90	56,60	.114	2.228	<b>M60 x 2</b>



\* Available in shrink compensated sizes as well as the standard Nitrile size.



## O-Ring Kits

### Top Quality Precision O-Rings in Attractive, Functional, & Durable O-Ring Kits

#### Our Most Popular O-Rings at Your Fingertips

Attractive and functional describes these special O-Ring assortment packages.

Kits D-2, D-7, and D-14 contain 190 rings

- 10 each of the 19 inside diameters.

D-2714 contains 228 rings, 4 each of:

- 19 sizes 1/16" C/S
- 19 sizes 3/32" C/S
- 19 sizes 1/8" C/S

Precision Associates Kits are made up of Butadiene Acrylonitrile (Buna N) O-Rings resistant to:

- Gasoline
- Kerosene
- LP Fuels
- Oil
- Water
- Grease
- Gases

Material Meets ASTM D2000 2 BG 715 B14 B34 EA14 EF11 EF21

Ask your customer service representative about kits in special materials



D20C01c

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: (612) 333-7464  
Fax: (612) 342-2417  
Toll: (800) 394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



# O-Ring Kits

PAI No.	Nominal			Actual		(Ref)
	I.D.	O.D.	C/S	I.D	C/S	O.D.
1-010	1/4	3/8	1/16	.239 ±.005	.070 ±.003	.379
1-011	5/16	7/16	1/16	.301	.070	.441
1-012	3/8	1/2	1/16	.364	.070	.504
1-013	7/16	9/16	1/16	.426	.070	.566
1-014	1/2	5/8	1/16	.489	.070	.629
1-015	9/16	11/16	1/16	.551 ±.007	.070	.691
1-016	5/8	3/4	1/16	.614 ±.009	.070	.754
1-017	11/16	13/16	1/16	.676	.070	.816
1-018	3/4	7/8	1/16	.739	.070	.879
1-019	13/16	15/16	1/16	.801	.070	.941
1-020	7/8	1	1/16	.864	.070	1.004
1-021	15/16	1 1/16	1/16	.926	.070	1.006
1-022	1	1 1/8	1/16	.989 ±.010	.070	1.129
1-023	1 1/16	1 3/16	1/16	1.051	.070	1.191
1-024	1 1/8	1 1/4	1/16	1.114	.070	1.254
1-025	1 3/16	1 15/16	1/16	1.176 ±.011	.070	1.316
1-026	1 1/4	1 3/8	1/16	1.239	.070	1.379
1-027	1 15/16	1 7/16	1/16	1.301	.070	1.441
1-028	1 3/8	1 1/2	1/16	1.364 ±.013	.070	1.504

## D-2

- 10 Rings of Each Size
- 19 Different Sizes
- 1-010 - 1-028
- Buna N

PAI No.	Nominal			Actual		(Ref)
	I.D.	O.D.	C/S	I.D	C/S	O.D.
1-108	1/4	7/16	3/32	.237 ±.005	.103 ±.003	.445
1-109	5/16	1/2	3/32	.299	.103	.507
1-110	3/8	9/16	3/32	.362	.103	.568
1-111	7/16	5/8	3/32	.424	.103	.630
1-112	1/2	11/16	3/32	.487	.103	.693
1-113	9/16	3/4	3/32	.549 ±.007	.103	.755
1-114	5/8	13/16	3/32	.612 ±.009	.103	.818
1-115	11/16	7/8	3/32	.674	.103	.880
1-116	3/4	15/16	3/32	.737	.103	.943
1-117	13/16	1	3/32	.779 ±.010	.103	1.005
1-118	7/8	1 1/16	3/32	.862	.103	1.068
1-119	15/16	1 1/8	3/32	.924	.103	1.130
1-120	1	1 3/16	3/32	.987	.103	1.193
1-121	1 1/16	1 1/4	3/32	1.049	.103	1.255
1-122	1 1/8	1 15/16	3/32	1.112	.103	1.318
1-123	1 3/16	1 3/8	3/32	1.174 ±.012	.103	1.380
1-124	1 1/4	1 7/16	3/32	1.237	.103	1.443
1-125	1 15/16	1 1/2	3/32	1.299	.103	1.505
1-126	1 3/8	1 9/16	3/32	1.362	.103	1.568

## D-7

## D-2714

- 10 Rings of Each Size
- 19 Different Sizes
- 1-108 - 1-126
- Buna N
- 4 Rings of Each Size
- 57 Different Sizes
- 1-010 - 1-028
- 1-108 - 1-126
- 1-202 - 1-220
- Buna N

PAI No.	Nominal			Actual		(Ref)
	I.D.	O.D.	C/S	I.D	C/S	O.D.
1-202	1/4	1/2	1/8	.234 ±.005	.139 ±.004	.512
1-203	5/16	9/16	1/8	.296	.139	.579
1-204	3/8	5/8	1/8	.359	.139	.637
1-205	7/16	11/16	1/8	.421	.139	.699
1-206	1/2	3/4	1/8	.484	.139	.762
1-207	9/16	13/16	1/8	.546 ±.007	.139	.827
1-208	5/8	7/8	1/8	.609 ±.009	.139	.887
1-209	11/16	15/16	1/8	.672	.139	.950
1-210	3/4	1	1/8	.734 ±.010	.139	1.012
1-211	13/16	1 1/16	1/8	.796	.139	1.074
1-212	7/8	1 1/8	1/8	.859	.139	1.137
1-213	15/16	1 3/16	1/8	.921	.139	1.199
1-214	1	1 1/4	1/8	.984	.139	1.262
1-215	1 1/16	1 5/16	1/8	1.046	.139	1.324
1-216	1 1/8	1 3/8	1/8	1.109 ±.012	.139	1.387
1-217	1 3/16	1 7/16	1/8	1.171	.139	1.449
1-218	1 1/4	1 1/2	1/8	1.234	.139	1.512
1-219	1 5/16	1 9/16	1/8	1.296	.139	1.574
1-220	1 3/8	1 5/8	1/8	1.359	.139	1.637

## D-14

- 10 Rings of Each Size
- 19 Different Sizes
- 1-202 - 1-220
- Buna N



# *O-Ring Cord Spliced O-Rings*

---





# O-Ring Cord

O-Ring cord is available off-the-shelf in a number of sizes:

- AS-568 Cross sections
- English sizes - fractional
- Metric sizes

Precision Associates extruded O-Ring cord can be ordered in 4 standard materials as well as specialty compounds. NBR, Silicone, FKM, EPDM are generally available from stock.

Buy it by the foot, or have us splice rings for you. We can cold splice (glue bond) or hot splice (cured bond), depending on your application and the polymer of choice.

Have a specialty compound requirement? In some cases, we can make an O-Ring from a PAI compound using existing molding tools and splice an O-Ring to your required size from the molded ring. Ask us about non-round extrusions including 4-Lobed profiles.

O-Ring Cord stock is sold by the foot. Contact our Customer Service group to see about having us splice O-Rings for you.

Most in-stock orders for extruded cord placed before 12:00 (Central Time) will be shipped the same day. Orders placed after noon will normally ship the next day.

Spliced ring orders under 20 pieces can generally be shipped within 24 hours. Larger orders will be quoted upon request.

## Hot or Cold Splice?

Why would I choose hot vs. cold. We recommend hot splices for most applications, but our ability to hot splice is dependent on the polymer and having a suitable mold.

Cold splicing can be performed by us or by the end user. Splicing rings is relatively easy to do, but consideration must be taken for applications that have exposure to water.

The table below list splice type by polymer. The table on the next page shows which sizes we have splicing molds for.

Polymer	Hot	Cold
Nitrile (NBR)	Y	Y
Silicone (VMQ)	Y	
Fluoroelastomer (FKM)	Y	Y
EPDM	Y	Y
Neoprene	Y	Y



**A 70 NBR Hot Splice**

Hot Spliced O-Rings have a minimum 4½" ID. The limit for cold spliced rings is determined by the extrusion cross section.

PAI has performed tensile tests on our hot spliced rings. They routinely test to greater than 850 psi at break.



# O-Ring Cord

Fractional Inch	Metric	As 568	Decimal Inch	70 NBR	70 Sil	70 FKM	70 EPDM
	<b>1 mm</b>		<b>.039</b>	B	B	C	C
<b>1/16</b>			<b>.063</b>	A	B	B	B
		<b>-0xx</b>	<b>.070</b>	A	A	A	A
	<b>2 mm</b>		<b>.079</b>	A	B	B	B
<b>3/32</b>			<b>.093</b>	A	B	B	B
	<b>2.5 mm</b>		<b>.098</b>	B	B	C	C
		<b>-1xx</b>	<b>.103</b>	A	A	A	A
	<b>3 mm</b>		<b>.118</b>	A	B	A	B
<b>1/8</b>			<b>.125</b>	A	A	A	B
		<b>-2xx</b>	<b>.139</b>	A	A	A	A
<b>5/32</b>			<b>.156</b>	A	A	A	B
	<b>4 mm</b>		<b>.157</b>	A	B	B	B
<b>3/16</b>			<b>.187</b>	A	A	B	B
	<b>5 mm</b>		<b>.197</b>	A	B	B	B
		<b>-3xx</b>	<b>.210</b>	A	A	A	A
	<b>6 mm</b>		<b>.236</b>	A	B	B	B
<b>1/4</b>			<b>.250</b>	A	B	B	B
		<b>-4xx</b>	<b>.275</b>	A	A	A	A
<b>5/16</b>			<b>.312</b>	A	B	B	B
	<b>8 mm</b>		<b>.315</b>	B	B	B	B
	<b>9 mm</b>		<b>.354</b>	A	B	B	B
<b>3/8</b>			<b>.375</b>	A	B	A	A
	<b>10 mm</b>		<b>.394</b>	A	B	B	B
<b>7/16</b>			<b>.437</b>	A	B	B	B
<b>1/2</b>			<b>.500</b>	A	B	B	B
<b>5/8</b>			<b>.625</b>	A	B	B	B
<b>3/4</b>			<b>.750</b>	A	B	B	B

Code	Inventory Status
<b>A</b>	In Stock
<b>B</b>	Special Order
<b>C</b>	Not Available

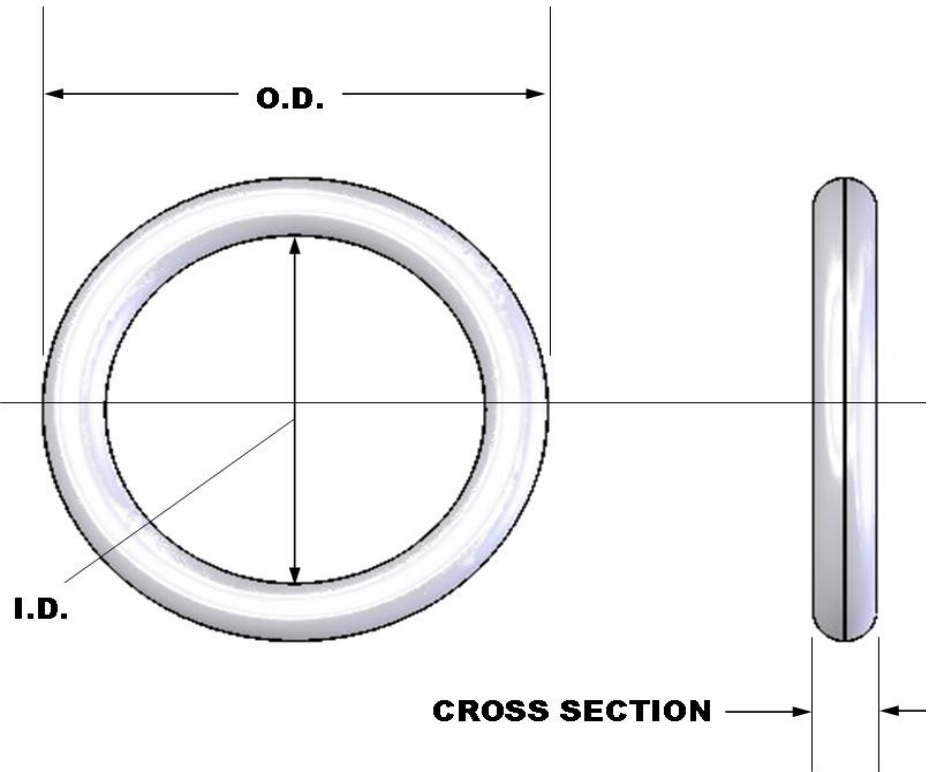
Please Contact us regarding sizes and materials not listed





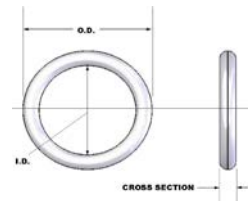
# Engineers Guide

## for O-Rings





# Engineers Guide for O-Rings



O-Ring manufacturers, including Precision Associates, traditionally publish O-Ring tooling lists in order by Inside Diameter (ID). Also typical is the separation of standard O-Rings from special sizes.

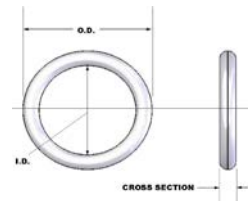
Here we list of *all* of PAI's O-Rings, presented in order by Outside Diameter (OD). ID, Cross Section (C/S) and seal tolerances are provided, as is volumetric information required for gland dimensioning. Metric dimensions are shown as well.

PAI adds a new size to our collection approximately each week. You may wish to check out our website at [www.PrecisionAssoc.com](http://www.PrecisionAssoc.com) to obtain the most up-to-date listing, or call our Customer Service department. If you still can't find the O-Ring to fit your special need, please call our Engineering department. Our In-House Tool Shop will produce a mold in short order at a very reasonable cost.

Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
4-4	.012	.004 ±.001	.004 ±.001	.00000	.30	.10	.10
6-8	.020	.006 ±.001	.008 ±.002	.00000	.50	.15	.20
10-10	.030	.010 ±.001	.010 ±.003	.00000	.75	.25	.25
14-12	.040	.014 ±.002	.012 ±.003	.00001	1.00	.35	.30
15-16	.046	.015 ±.002	.016 ±.003	.00002	1.15	.40	.40
13-25VS	.051	.013 ±.003	.025 ±.004	.00002	1.30	.35	.65
20-17	.057	.020 ±.003	.017 ±.004	.00004	1.45	.50	.45
16-28	.060	.016 ±.002	.028 ±.004	.00003	1.50	.40	.70
20-20	.060	.020 ±.002	.020 ±.004	.00004	1.50	.50	.50
25-10	.060	.025 ±.003	.010 ±.004	.00005	1.50	.65	.25
7-48VS	.062	.007 ±.003	.048 ±.005	.00001	1.55	.20	1.20
15-34	.064	.015 ±.002	.034 ±.004	.00003	1.65	.40	.85
17-30	.064	.017 ±.003	.030 ±.004	.00003	1.65	.45	.75
20-24	.064	.020 ±.003	.024 ±.004	.00004	1.65	.50	.60
20-30	.070	.020 ±.003	.030 ±.004	.00005	1.80	.50	.75
12-51VS	.075	.012 ±.001	.051 ±.003	.00002	1.90	.30	1.30
19-38	.076	.019 ±.003	.038 ±.004	.00005	1.95	.50	.95
17-44	.078	.017 ±.003	.044 ±.004	.00004	2.00	.45	1.10
16-47	.079	.016 ±.003	.047 ±.004	.00004	2.00	.40	1.20
29-22	.080	.029 ±.003	.022 ±.004	.00011	2.05	.75	.55
30-23	.083	.030 ±.003	.023 ±.004	.00012	2.10	.75	.60
20-45	.085	.020 ±.003	.045 ±.004	.00006	2.15	.50	1.15
27-32	.086	.027 ±.003	.032 ±.004	.00011	2.20	.70	.80
23-41	.087	.023 ±.003	.041 ±.004	.00008	2.20	.60	1.05
35-18	.088	.035 ±.003	.018 ±.004	.00016	2.25	.90	.45
38-14	.090	.038 ±.003	.014 ±.004	.00019	2.30	.95	.35
12-67VS	.092	.012 ±.002	.068 ±.004	.00003	2.35	.30	1.75
31-31ES	.093	.031 ±.003	.031 ±.004	.00015	2.35	.80	.80
40-17	.097	.040 ±.003	.017 ±.004	.00023	2.45	1.00	.45
17-65	.099	.017 ±.003	.065 ±.004	.00006	2.50	.45	1.65



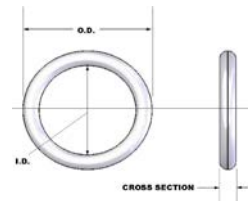
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
24-55SS	.103	.024 ±.003	.055 ±.005	.00011	2.60	.60	1.40
32-39	.103	.032 ±.003	.039 ±.004	.00018	2.60	.80	1.00
40-23	.103	.040 ±.003	.023 ±.004	.00025	2.60	1.00	.60
31-43	.105	.031 ±.003	.043 ±.004	.00018	2.65	.80	1.10
20-66	.106	.020 ±.002	.066 ±.005	.00008	2.70	.50	1.70
31-43SS	.106	.031 ±.003	.044 ±.004	.00018	2.70	.80	1.10
17-72VS	.107	.017 ±.003	.073 ±.005	.00006	2.70	.45	1.85
22-63	.107	.022 ±.003	.063 ±.004	.00010	2.70	.55	1.60
32-44VS	.108	.032 ±.003	.044 ±.005	.00019	2.75	.80	1.10
31-47	.109	.031 ±.003	.047 ±.004	.00018	2.75	.80	1.20
1-001	.109	.040 ±.003	.029 ±.004	.00027	2.75	1.00	.75
50-10	.110	.050 ±.003	.010 ±.003	.00037	2.80	1.25	.25
34-46	.114	.034 ±.003	.046 ±.004	.00023	2.90	.85	1.15
13-89SS	.116	.013 ±.002	.090 ±.005	.00004	2.95	.35	2.30
21-74	.116	.021 ±.003	.074 ±.005	.00010	2.95	.55	1.90
18-81ES	.118	.018 ±.003	.082 ±.005	.00008	3.00	.45	2.10
32-55	.119	.032 ±.003	.055 ±.004	.00022	3.00	.80	1.40
36-47	.119	.036 ±.003	.047 ±.004	.00027	3.00	.90	1.20
25-70	.120	.025 ±.003	.070 ±.005	.00015	3.05	.65	1.80
35-50	.120	.035 ±.003	.050 ±.004	.00026	3.05	.90	1.25
34-53	.121	.034 ±.003	.053 ±.004	.00025	3.05	.85	1.35
48-28	.124	.048 ±.003	.028 ±.004	.00043	3.15	1.20	.70
45-35	.125	.045 ±.003	.035 ±.004	.00040	3.20	1.15	.90
32-62	.126	.032 ±.003	.062 ±.004	.00024	3.20	.80	1.55
42-42	.126	.042 ±.003	.042 ±.004	.00037	3.20	1.05	1.05
10-107	.127	.010 ±.002	.107 ±.005	.00003	3.25	.25	2.70
20-87	.127	.020 ±.003	.087 ±.005	.00011	3.25	.50	2.20
24-78SS	.127	.024 ±.003	.079 ±.005	.00015	3.25	.60	2.00
20-90	.130	.020 ±.003	.090 ±.005	.00011	3.30	.50	2.30
23-84	.130	.023 ±.003	.084 ±.005	.00014	3.30	.60	2.15
30-70	.130	.030 ±.003	.070 ±.005	.00022	3.30	.75	1.80
31-67SS	.130	.031 ±.003	.068 ±.004	.00023	3.30	.80	1.75
43-45VS	.131	.043 ±.003	.045 ±.004	.00040	3.35	1.10	1.15
59-15	.133	.059 ±.003	.015 ±.003	.00064	3.40	1.50	.40
29-76	.134	.029 ±.003	.076 ±.005	.00022	3.40	.75	1.95
35-65	.135	.035 ±.003	.065 ±.004	.00030	3.45	.90	1.65
18-100	.136	.018 ±.002	.100 ±.005	.00009	3.45	.45	2.55
28-81	.137	.028 ±.003	.081 ±.004	.00021	3.50	.70	2.05
40-57	.137	.040 ±.003	.057 ±.004	.00038	3.50	1.00	1.45
30-78	.138	.030 ±.003	.078 ±.005	.00024	3.50	.75	2.00
34-70	.138	.034 ±.003	.070 ±.005	.00030	3.50	.85	1.80
42-55	.139	.042 ±.003	.055 ±.004	.00042	3.55	1.05	1.40
25-90	.140	.025 ±.003	.090 ±.005	.00018	3.55	.65	2.30
40-59SS	.140	.040 ±.003	.060 ±.004	.00039	3.55	1.00	1.50
1-002	.142	.050 ±.003	.042 ±.004	.00057	3.60	1.25	1.05



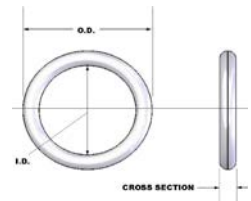
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
23-98	.144	.023 ±.003	.098 ±.005	.00016	3.65	.60	2.50
35-75	.145	.035 ±.003	.075 ±.005	.00033	3.70	.90	1.90
33-78SS	.148	.034 ±.003	.080 ±.005	.00033	3.75	.85	2.05
26-97	.149	.026 ±.003	.097 ±.005	.00021	3.80	.65	2.45
20-110	.150	.020 ±.003	.110 ±.005	.00013	3.80	.50	2.80
25-100	.150	.025 ±.003	.100 ±.005	.00019	3.80	.65	2.55
28-94	.150	.028 ±.003	.094 ±.005	.00024	3.80	.70	2.40
40-70	.150	.040 ±.003	.070 ±.005	.00043	3.80	1.00	1.80
44-65	.153	.044 ±.003	.065 ±.004	.00052	3.90	1.10	1.65
34-86	.154	.034 ±.003	.086 ±.005	.00034	3.90	.85	2.20
50-55NS	.155	.050 ±.003	.055 ±.004	.00065	3.95	1.25	1.40
47-62	.156	.047 ±.003	.062 ±.004	.00059	3.95	1.20	1.55
39-79	.157	.039 ±.003	.079 ±.005	.00044	4.00	1.00	2.00
30-98	.158	.030 ±.003	.098 ±.005	.00028	4.00	.75	2.50
36-89	.161	.036 ±.003	.089 ±.005	.00040	4.10	.90	2.25
30-103	.163	.030 ±.003	.103 ±.005	.00030	4.15	.75	2.60
20-125VS	.166	.020 ±.003	.126 ±.005	.00014	4.20	.50	3.20
28-110	.166	.028 ±.003	.110 ±.005	.00027	4.20	.70	2.80
42-82	.166	.042 ±.003	.082 ±.005	.00054	4.20	1.05	2.10
40-87	.167	.040 ±.003	.087 ±.005	.00050	4.25	1.00	2.20
25-117VS	.168	.025 ±.003	.118 ±.005	.00022	4.25	.65	3.00
12-145	.169	.012 ±.002	.145 ±.005	.00006	4.30	.30	3.70
47-71VS	.169	.047 ±.003	.075 ±.005	.00066	4.30	1.20	1.90
39-91ES	.170	.039 ±.003	.092 ±.005	.00049	4.30	1.00	2.35
59-49VS	.170	.060 ±.003	.050 ±.005	.00098	4.30	1.50	1.25
35-100SS	.171	.035 ±.003	.101 ±.005	.00041	4.35	.90	2.55
56-60	.172	.056 ±.003	.060 ±.004	.00090	4.35	1.40	1.50
34-106	.174	.034 ±.003	.106 ±.005	.00040	4.40	.85	2.70
56-61VS	.174	.056 ±.003	.062 ±.004	.00091	4.40	1.40	1.55
62-50	.174	.062 ±.003	.050 ±.004	.00106	4.40	1.55	1.25
32-110VS	.175	.032 ±.003	.111 ±.005	.00036	4.45	.80	2.80
38-100	.176	.038 ±.003	.100 ±.005	.00049	4.45	.95	2.55
49-78	.176	.049 ±.003	.078 ±.005	.00075	4.45	1.25	2.00
1-003	.176	.060 ±.003	.056 ±.004	.00103	4.45	1.50	1.40
25-130	.180	.025 ±.003	.130 ±.005	.00024	4.55	.65	3.30
30-118VS	.180	.030 ±.003	.120 ±.005	.00033	4.55	.75	3.05
48-84	.180	.048 ±.003	.084 ±.005	.00075	4.55	1.20	2.15
53-74	.180	.053 ±.003	.074 ±.005	.00088	4.55	1.35	1.90
47-87	.181	.047 ±.003	.087 ±.005	.00073	4.60	1.20	2.20
64-53	.181	.064 ±.003	.053 ±.004	.00118	4.60	1.65	1.35
12-158SS	.184	.012 ±.002	.160 ±.005	.00006	4.65	.30	4.05
44-97	.185	.044 ±.003	.097 ±.005	.00067	4.70	1.10	2.45
73-40	.186	.073 ±.003	.040 ±.004	.00149	4.70	1.85	1.00
31-125	.187	.031 ±.003	.125 ±.005	.00037	4.75	.80	3.20
25-137SS	.188	.025 ±.003	.138 ±.005	.00025	4.80	.65	3.50



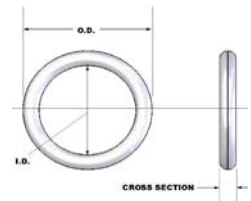
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
40-109	.189	.040 ±.003	.109 ±.005	.00059	4.80	1.00	2.75
63-63ES	.189	.063 ±.003	.063 ±.003	.00123	4.80	1.60	1.60
20-150	.190	.020 ±.003	.150 ±.005	.00017	4.85	.50	3.80
34-118SS	.190	.035 ±.003	.120 ±.005	.00047	4.85	.90	3.05
42-105ES	.190	.042 ±.003	.106 ±.005	.00064	4.85	1.05	2.70
56-78	.190	.056 ±.003	.078 ±.005	.00104	4.85	1.40	2.00
23-144	.191	.023 ±.003	.145 ±.005	.00022	4.85	.60	3.70
18-156	.192	.018 ±.003	.156 ±.005	.00014	4.90	.45	3.95
29-134	.192	.029 ±.003	.134 ±.005	.00034	4.90	.75	3.40
65-60SS	.193	.066 ±.003	.061 ±.004	.00136	4.90	1.70	1.55
25-144	.194	.025 ±.003	.144 ±.005	.00026	4.95	.65	3.65
50-94	.194	.050 ±.003	.094 ±.005	.00089	4.95	1.25	2.40
22-150ES	.195	.022 ±.003	.151 ±.005	.00021	4.95	.55	3.85
45-105	.195	.045 ±.003	.105 ±.005	.00075	4.95	1.15	2.65
55-85	.195	.055 ±.003	.085 ±.005	.00104	4.95	1.40	2.15
74-47NS	.195	.074 ±.003	.048 ±.005	.00163	4.95	1.90	1.20
66-61VS	.196	.067 ±.003	.062 ±.004	.00143	5.00	1.70	1.55
23-150ES	.197	.023 ±.003	.151 ±.005	.00023	5.00	.60	3.85
27-143	.197	.027 ±.003	.143 ±.005	.00031	5.00	.70	3.65
36-125	.197	.036 ±.003	.125 ±.005	.00051	5.00	.90	3.20
40-117	.197	.040 ±.003	.117 ±.005	.00062	5.00	1.00	2.95
32-133SS	.198	.032 ±.003	.134 ±.005	.00042	5.05	.80	3.40
50-94VS	.198	.051 ±.003	.096 ±.005	.00094	5.05	1.30	2.45
93-10ES	.198	.094 ±.003	.010 ±.003	.00227	5.05	2.40	.25
40-118VS	.199	.040 ±.003	.119 ±.005	.00063	5.05	1.00	3.00
35-130	.200	.035 ±.003	.130 ±.005	.00050	5.10	.90	3.30
30-140SS	.201	.030 ±.003	.141 ±.005	.00038	5.10	.75	3.60
59-79VS	.201	.060 ±.003	.081 ±.005	.00125	5.10	1.50	2.05
42-117	.202	.042 ±.003	.118 ±.005	.00070	5.15	1.05	3.00
16-171	.203	.016 ±.003	.171 ±.005	.00012	5.15	.40	4.35
51-102	.204	.051 ±.003	.102 ±.005	.00098	5.20	1.30	2.60
93-15ES	.205	.095 ±.003	.015 ±.005	.00245	5.20	2.40	.40
16-175	.207	.016 ±.003	.175 ±.005	.00012	5.25	.40	4.45
40-126SS	.207	.040 ±.003	.127 ±.005	.00066	5.25	1.00	3.25
21-165VS	.208	.021 ±.003	.166 ±.005	.00020	5.30	.55	4.20
31-146	.208	.031 ±.003	.146 ±.005	.00042	5.30	.80	3.70
47-114	.208	.047 ±.003	.114 ±.005	.00088	5.30	1.20	2.90
86-37	.209	.086 ±.003	.037 ±.005	.00224	5.30	2.20	.95
87-33VS	.209	.088 ±.003	.033 ±.005	.00231	5.30	2.25	.85
20-170	.210	.020 ±.003	.170 ±.005	.00019	5.35	.50	4.30
36-138	.210	.036 ±.003	.138 ±.005	.00056	5.35	.90	3.50
1-004	.210	.070 ±.003	.070 ±.005	.00169	5.35	1.80	1.80
20-170VS	.212	.020 ±.003	.172 ±.005	.00019	5.40	.50	4.35
51-110	.212	.051 ±.003	.110 ±.005	.00103	5.40	1.30	2.80
76-60	.212	.076 ±.003	.060 ±.005	.00194	5.40	1.95	1.50



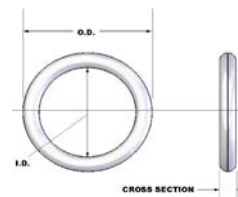
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
80-54	.214	.080 ±.003	.054 ±.005	.00212	5.45	2.05	1.35
40-136	.216	.040 ±.003	.136 ±.005	.00069	5.50	1.00	3.45
24-169	.217	.024 ±.003	.169 ±.005	.00027	5.50	.60	4.30
30-157VS	.218	.030 ±.003	.158 ±.005	.00042	5.55	.75	4.00
32-154	.218	.032 ±.003	.154 ±.005	.00047	5.55	.80	3.90
50-120	.220	.050 ±.003	.120 ±.005	.00105	5.60	1.25	3.05
60-100	.220	.060 ±.003	.100 ±.005	.00142	5.60	1.50	2.55
63-94	.220	.063 ±.003	.094 ±.005	.00154	5.60	1.60	2.40
36-152	.224	.036 ±.003	.152 ±.005	.00060	5.70	.90	3.85
32-160VS	.226	.032 ±.003	.162 ±.005	.00049	5.75	.80	4.10
40-147	.227	.040 ±.003	.147 ±.005	.00074	5.75	1.00	3.75
50-129	.229	.050 ±.003	.129 ±.005	.00110	5.80	1.25	3.30
39-150SS	.230	.039 ±.003	.152 ±.005	.00072	5.85	1.00	3.85
70-87	.230	.071 ±.003	.088 ±.005	.00198	5.85	1.80	2.25
60-111	.231	.060 ±.003	.111 ±.005	.00152	5.85	1.50	2.80
38-157	.233	.038 ±.003	.157 ±.005	.00069	5.90	.95	4.00
39-154SS	.234	.039 ±.003	.156 ±.005	.00073	5.95	1.00	3.95
75-85	.235	.075 ±.003	.085 ±.005	.00222	5.95	1.90	2.15
30-176	.236	.030 ±.003	.176 ±.005	.00046	6.00	.75	4.45
43-150	.236	.043 ±.003	.150 ±.005	.00088	6.00	1.10	3.80
48-140	.236	.048 ±.003	.140 ±.005	.00107	6.00	1.20	3.55
23-191	.237	.023 ±.003	.191 ±.005	.00028	6.00	.60	4.85
28-181VS	.239	.028 ±.003	.183 ±.005	.00041	6.05	.70	4.65
50-140	.240	.050 ±.003	.140 ±.005	.00117	6.10	1.25	3.55
56-125VS	.241	.057 ±.003	.127 ±.005	.00148	6.10	1.45	3.25
1-005	.241	.070 ±.003	.101 ±.005	.00207	6.10	1.80	2.55
70-98SS	.241	.071 ±.003	.099 ±.005	.00211	6.10	1.80	2.50
40-162	.242	.040 ±.003	.162 ±.005	.00080	6.15	1.00	4.10
72-97VS	.242	.072 ±.003	.098 ±.005	.00217	6.15	1.85	2.50
46-152	.244	.046 ±.003	.152 ±.005	.00103	6.20	1.15	3.85
94-57	.245	.094 ±.003	.057 ±.005	.00329	6.20	2.40	1.45
25-190SS	.246	.025 ±.003	.196 ±.005	.00034	6.25	.65	5.00
37-172	.246	.037 ±.003	.172 ±.005	.00071	6.25	.95	4.35
23-200	.248	.023 ±.003	.202 ±.005	.00029	6.30	.60	5.15
70-108	.248	.070 ±.003	.108 ±.005	.00215	6.30	1.80	2.75
31-187	.249	.031 ±.003	.187 ±.005	.00052	6.30	.80	4.75
62-125	.249	.062 ±.003	.125 ±.005	.00177	6.30	1.55	3.20
81-87	.249	.081 ±.003	.087 ±.005	.00272	6.30	2.05	2.20
68-113VS	.250	.068 ±.003	.114 ±.005	.00208	6.35	1.75	2.90
85-80	.250	.085 ±.003	.080 ±.005	.00294	6.35	2.15	2.05
18-214VS	.252	.018 ±.002	.216 ±.005	.00019	6.40	.45	5.50
63-122VS	.252	.064 ±.003	.124 ±.005	.00190	6.40	1.65	3.15
75-102	.252	.075 ±.003	.102 ±.005	.00246	6.40	1.90	2.60
12-227VS	.253	.012 ±.002	.229 ±.005	.00009	6.45	.30	5.80
24-205	.253	.024 ±.003	.205 ±.005	.00033	6.45	.60	5.20



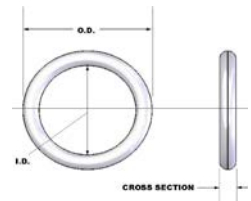
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
70-113ES	.253	.070 ±.003	.113 ±.005	.00221	6.45	1.80	2.85
35-182VS	.254	.035 ±.003	.184 ±.005	.00066	6.45	.90	4.65
50-154	.254	.050 ±.003	.154 ±.005	.00126	6.45	1.25	3.90
58-133SS	.254	.059 ±.003	.136 ±.005	.00167	6.45	1.50	3.45
60-134	.254	.060 ±.003	.134 ±.005	.00172	6.45	1.50	3.40
1-006	.254	.070 ±.003	.114 ±.005	.00222	6.45	1.80	2.90
40-176	.256	.040 ±.003	.176 ±.005	.00085	6.50	1.00	4.45
59-138	.256	.059 ±.003	.138 ±.005	.00169	6.50	1.50	3.50
1-102	.256	.103 ±.003	.049 ±.005	.00401	6.50	2.60	1.25
28-201	.257	.028 ±.003	.201 ±.005	.00044	6.55	.70	5.10
30-199ES	.259	.030 ±.003	.199 ±.005	.00051	6.60	.75	5.05
50-158VS	.259	.050 ±.003	.159 ±.005	.00129	6.60	1.25	4.05
35-188VS	.260	.035 ±.003	.190 ±.005	.00068	6.60	.90	4.85
35-190	.260	.035 ±.003	.190 ±.005	.00068	6.60	.90	4.85
40-180	.260	.040 ±.003	.180 ±.005	.00087	6.60	1.00	4.55
45-165SS	.262	.046 ±.003	.170 ±.005	.00113	6.65	1.15	4.30
70-125	.265	.070 ±.003	.125 ±.005	.00236	6.75	1.80	3.20
40-184SS	.266	.040 ±.003	.186 ±.005	.00089	6.75	1.00	4.70
48-170	.266	.048 ±.003	.170 ±.005	.00124	6.75	1.20	4.30
54-158	.266	.054 ±.003	.158 ±.005	.00153	6.75	1.35	4.00
25-218	.268	.025 ±.003	.218 ±.005	.00037	6.80	.65	5.55
30-208	.268	.030 ±.003	.208 ±.005	.00053	6.80	.75	5.30
28-210SS	.269	.028 ±.003	.213 ±.005	.00047	6.85	.70	5.40
39-189SS	.269	.039 ±.003	.191 ±.005	.00086	6.85	1.00	4.85
70-127SS	.271	.071 ±.003	.129 ±.005	.00249	6.90	1.80	3.30
93-085	.271	.093 ±.003	.085 ±.005	.00380	6.90	2.35	2.15
121-029	.271	.121 ±.004	.029 ±.005	.00542	6.90	3.05	.75
30-212SS	.274	.030 ±.003	.214 ±.005	.00054	6.95	.75	5.45
33-210	.276	.033 ±.003	.210 ±.005	.00065	7.00	.85	5.35
39-197ES	.276	.039 ±.003	.198 ±.005	.00089	7.00	1.00	5.05
50-176	.276	.050 ±.003	.176 ±.005	.00139	7.00	1.25	4.45
59-158	.276	.059 ±.003	.158 ±.005	.00186	7.00	1.50	4.00
40-200	.280	.040 ±.003	.200 ±.005	.00095	7.10	1.00	5.10
80-120	.280	.080 ±.003	.120 ±.005	.00316	7.10	2.05	3.05
48-185	.281	.048 ±.003	.185 ±.005	.00132	7.15	1.20	4.70
33-210SS	.282	.034 ±.003	.214 ±.005	.00071	7.15	.85	5.45
14-256	.284	.014 ±.002	.256 ±.005	.00013	7.20	.35	6.50
32-220	.284	.032 ±.003	.220 ±.005	.00064	7.20	.80	5.60
75-134	.284	.075 ±.003	.134 ±.005	.00290	7.20	1.90	3.40
5-275ES	.285	.005 ±.001	.275 ±.005	.00002	7.25	.15	7.00
1-007	.285	.070 ±.003	.145 ±.005	.00260	7.25	1.80	3.70
39-208	.286	.039 ±.003	.208 ±.005	.00093	7.25	1.00	5.30
60-166	.286	.060 ±.003	.166 ±.005	.00201	7.25	1.50	4.20
6-275ES	.287	.006 ±.001	.275 ±.005	.00002	7.30	.15	7.00
25-237	.287	.025 ±.003	.237 ±.005	.00040	7.30	.65	6.00



# Engineers Guide for O-Rings

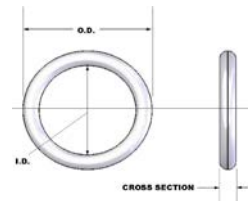


Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
50-187	.287	.050 ±.003	.187 ±.005	.00146	7.30	1.25	4.75
1-103	.287	.103 ±.003	.081 ±.005	.00482	7.30	2.60	2.05
20-248	.288	.020 ±.003	.248 ±.005	.00026	7.30	.50	6.30
56-176	.288	.056 ±.003	.176 ±.005	.00180	7.30	1.40	4.45
109-70	.288	.109 ±.004	.070 ±.005	.00525	7.30	2.75	1.80
7-275ES	.289	.007 ±.001	.275 ±.005	.00003	7.35	.20	7.00
71-147	.289	.071 ±.003	.147 ±.005	.00271	7.35	1.80	3.75
40-210	.290	.040 ±.003	.210 ±.005	.00099	7.35	1.00	5.35
37-220	.294	.037 ±.003	.220 ±.005	.00087	7.45	.95	5.60
79-138	.296	.079 ±.003	.138 ±.004	.00334	7.50	2.00	3.50
1-901	.297	.056 ±.003	.185 ±.005	.00186	7.55	1.40	4.70
76-145	.297	.076 ±.003	.145 ±.005	.00315	7.55	1.95	3.70
41-216	.298	.041 ±.003	.216 ±.005	.00107	7.55	1.05	5.50
70-145SS	.298	.073 ±.003	.152 ±.005	.00296	7.55	1.85	3.85
31-238	.300	.031 ±.003	.238 ±.005	.00064	7.60	.80	6.05
45-209ES	.300	.045 ±.003	.210 ±.005	.00127	7.60	1.15	5.35
30-239VS	.301	.030 ±.003	.241 ±.005	.00060	7.65	.75	6.10
21-260	.302	.021 ±.003	.260 ±.005	.00031	7.65	.55	6.60
51-199ES	.302	.051 ±.003	.200 ±.005	.00161	7.65	1.30	5.10
70-161ES	.302	.070 ±.003	.162 ±.005	.00280	7.65	1.80	4.10
34-232SS	.303	.034 ±.003	.235 ±.005	.00077	7.70	.85	5.95
80-145NS	.304	.080 ±.003	.144 ±.005	.00354	7.70	2.05	3.65
55-195	.305	.055 ±.003	.195 ±.005	.00187	7.75	1.40	4.95
80-145	.305	.080 ±.003	.145 ±.005	.00355	7.75	2.05	3.70
40-228	.308	.040 ±.003	.228 ±.005	.00106	7.80	1.00	5.80
50-208	.308	.050 ±.003	.208 ±.005	.00159	7.80	1.25	5.30
70-170NS	.309	.070 ±.003	.169 ±.005	.00289	7.85	1.80	4.30
88-135	.311	.088 ±.003	.135 ±.005	.00426	7.90	2.25	3.45
62-188	.312	.062 ±.003	.188 ±.005	.00237	7.90	1.55	4.80
68-176	.312	.068 ±.003	.176 ±.005	.00278	7.90	1.75	4.45
47-217VS	.313	.047 ±.003	.219 ±.005	.00145	7.95	1.20	5.55
32-250	.314	.032 ±.003	.250 ±.005	.00071	8.00	.80	6.35
40-228SS	.314	.041 ±.003	.232 ±.005	.00113	8.00	1.05	5.90
54-210NS	.315	.053 ±.003	.209 ±.005	.00182	8.00	1.35	5.30
75-165	.315	.075 ±.003	.165 ±.005	.00333	8.00	1.90	4.20
46-224	.316	.046 ±.003	.224 ±.005	.00141	8.05	1.15	5.70
1-008	.316	.070 ±.003	.176 ±.005	.00297	8.05	1.80	4.45
78-157SS	.316	.079 ±.003	.158 ±.005	.00365	8.05	2.00	4.00
40-238	.318	.040 ±.003	.238 ±.005	.00110	8.10	1.00	6.05
1-104	.318	.103 ±.003	.112 ±.005	.00563	8.10	2.60	2.85
40-239	.319	.040 ±.003	.239 ±.005	.00110	8.10	1.00	6.05
35-250	.320	.035 ±.003	.250 ±.005	.00086	8.15	.90	6.35
71-178	.320	.071 ±.003	.178 ±.005	.00310	8.15	1.80	4.50
95-130	.320	.095 ±.003	.130 ±.005	.00501	8.15	2.40	3.30
53-216	.322	.053 ±.003	.216 ±.005	.00186	8.20	1.35	5.50





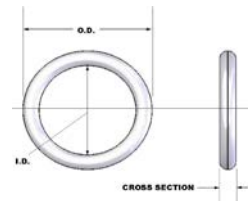
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
42-239	.323	.042 ±.003	.239 ±.005	.00122	8.20	1.05	6.05
59-200VS	.323	.060 ±.003	.203 ±.005	.00234	8.20	1.50	5.15
63-193VS	.323	.064 ±.003	.195 ±.005	.00262	8.20	1.65	4.95
34-256	.324	.034 ±.003	.256 ±.005	.00083	8.25	.85	6.50
70-187	.327	.070 ±.003	.187 ±.005	.00311	8.30	1.80	4.75
73-182	.328	.073 ±.003	.182 ±.005	.00335	8.35	1.85	4.60
94-142	.330	.094 ±.003	.142 ±.005	.00515	8.40	2.40	3.60
32-264VS	.331	.032 ±.003	.267 ±.005	.00076	8.40	.80	6.80
52-229	.333	.052 ±.003	.229 ±.005	.00187	8.45	1.30	5.80
24-285VS	.335	.024 ±.003	.287 ±.005	.00044	8.50	.60	7.30
25-285	.335	.025 ±.003	.285 ±.005	.00048	8.50	.65	7.25
30-272SS	.335	.030 ±.003	.275 ±.005	.00068	8.50	.75	7.00
40-248SS	.335	.041 ±.003	.253 ±.005	.00122	8.50	1.05	6.45
45-245	.335	.045 ±.003	.245 ±.005	.00145	8.50	1.15	6.20
48-239	.335	.048 ±.003	.239 ±.005	.00163	8.50	1.20	6.05
60-215	.335	.060 ±.003	.215 ±.005	.00244	8.50	1.50	5.45
70-195	.335	.070 ±.003	.195 ±.005	.00320	8.50	1.80	4.95
133-70	.336	.133 ±.004	.070 ±.005	.00886	8.55	3.40	1.80
40-258	.338	.040 ±.003	.258 ±.005	.00118	8.60	1.00	6.55
51-232SS	.338	.052 ±.003	.234 ±.005	.00191	8.60	1.30	5.95
87-158SS	.339	.089 ±.003	.161 ±.005	.00489	8.60	2.25	4.10
51-239	.341	.051 ±.003	.239 ±.005	.00186	8.65	1.30	6.05
60-217ES	.341	.061 ±.003	.219 ±.005	.00257	8.65	1.55	5.55
70-202	.342	.070 ±.003	.202 ±.005	.00329	8.70	1.80	5.15
48-248	.344	.048 ±.003	.248 ±.005	.00168	8.75	1.20	6.30
20-305	.345	.020 ±.003	.305 ±.005	.00032	8.75	.50	7.75
69-208	.346	.069 ±.003	.208 ±.005	.00325	8.80	1.75	5.30
1-009	.348	.070 ±.003	.208 ±.005	.00336	8.85	1.80	5.30
46-257	.349	.046 ±.003	.257 ±.005	.00158	8.85	1.15	6.55
1-105	.349	.103 ±.003	.143 ±.005	.00644	8.85	2.60	3.65
25-301	.351	.025 ±.003	.301 ±.005	.00050	8.90	.65	7.65
36-272SS	.351	.037 ±.003	.277 ±.005	.00106	8.90	.95	7.05
51-249	.351	.051 ±.003	.249 ±.005	.00193	8.90	1.30	6.30
71-210	.352	.071 ±.003	.210 ±.005	.00350	8.95	1.80	5.35
93-166	.352	.093 ±.003	.166 ±.005	.00553	8.95	2.35	4.20
71-211ES	.354	.071 ±.003	.212 ±.005	.00352	9.00	1.80	5.40
35-283SS	.356	.035 ±.003	.286 ±.005	.00097	9.05	.90	7.25
59-236VS	.356	.059 ±.003	.238 ±.005	.00259	9.05	1.50	6.05
56-239VS	.357	.057 ±.003	.243 ±.005	.00240	9.05	1.45	6.15
62-230SS	.358	.063 ±.003	.232 ±.005	.00289	9.10	1.60	5.90
70-219	.359	.070 ±.003	.219 ±.005	.00349	9.10	1.80	5.55
40-275SS	.361	.041 ±.003	.279 ±.005	.00133	9.15	1.05	7.10
32-295VS	.362	.032 ±.003	.297 ±.005	.00083	9.20	.80	7.55
44-277	.365	.044 ±.003	.277 ±.005	.00153	9.25	1.10	7.05
44-278	.365	.044 ±.003	.277 ±.005	.00153	9.25	1.10	7.05



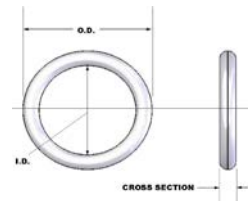
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
60-246	.366	.060 ±.003	.246 ±.005	.00272	9.30	1.50	6.25
63-240	.366	.063 ±.003	.240 ±.005	.00297	9.30	1.60	6.10
1-902	.367	.064 ±.003	.239 ±.005	.00306	9.30	1.65	6.05
74-224	.372	.074 ±.003	.224 ±.005	.00403	9.45	1.90	5.70
80-208VS	.372	.081 ±.003	.210 ±.005	.00471	9.45	2.05	5.35
39-295	.373	.039 ±.003	.295 ±.005	.00125	9.45	1.00	7.50
31-312	.374	.031 ±.003	.312 ±.005	.00081	9.50	.80	7.90
34-306	.374	.034 ±.003	.306 ±.005	.00097	9.50	.85	7.75
35-301VS	.374	.035 ±.003	.304 ±.005	.00102	9.50	.90	7.70
133-109	.375	.133 ±.004	.109 ±.005	.01056	9.55	3.40	2.75
53-270	.376	.053 ±.003	.270 ±.005	.00224	9.55	1.35	6.85
38-301	.377	.038 ±.003	.301 ±.005	.00121	9.60	.95	7.65
46-278VS	.377	.047 ±.003	.283 ±.005	.00180	9.60	1.20	7.20
35-307ES	.378	.035 ±.003	.308 ±.005	.00104	9.60	.90	7.80
62-250VS	.378	.063 ±.003	.252 ±.005	.00308	9.60	1.60	6.40
28-320VS	.379	.028 ±.003	.323 ±.005	.00068	9.65	.70	8.20
59-256VS	.379	.060 ±.003	.259 ±.005	.00283	9.65	1.50	6.60
1-010	.379	.070 ±.003	.239 ±.005	.00374	9.65	1.80	6.05
45-290	.380	.045 ±.003	.290 ±.005	.00167	9.65	1.15	7.35
70-240	.380	.070 ±.003	.240 ±.005	.00375	9.65	1.80	6.10
1-106	.381	.103 ±.003	.175 ±.005	.00728	9.70	2.60	4.45
68-246	.382	.068 ±.003	.246 ±.005	.00358	9.70	1.75	6.25
79-224	.382	.079 ±.003	.224 ±.005	.00467	9.70	2.00	5.70
53-276ES	.384	.053 ±.003	.278 ±.005	.00229	9.75	1.35	7.05
104-176	.384	.104 ±.003	.176 ±.005	.00747	9.75	2.65	4.45
42-301	.385	.042 ±.003	.301 ±.005	.00149	9.80	1.05	7.65
60-265	.385	.060 ±.003	.265 ±.005	.00289	9.80	1.50	6.75
71-243	.385	.071 ±.003	.243 ±.005	.00391	9.80	1.80	6.15
36-312SS	.387	.036 ±.003	.315 ±.005	.00112	9.85	.90	8.00
50-287	.387	.050 ±.003	.287 ±.005	.00208	9.85	1.25	7.30
139-109	.387	.139 ±.004	.109 ±.005	.01182	9.85	3.55	2.75
8-372	.388	.008 ±.002	.372 ±.005	.00006	9.85	.20	9.45
73-239SS	.389	.074 ±.003	.241 ±.005	.00426	9.90	1.90	6.10
71-248	.390	.071 ±.003	.248 ±.005	.00397	9.90	1.80	6.30
35-322	.392	.035 ±.003	.322 ±.005	.00108	9.95	.90	8.20
40-310VS	.392	.040 ±.003	.312 ±.005	.00139	9.95	1.00	7.90
74-244	.392	.074 ±.003	.244 ±.005	.00430	9.95	1.90	6.20
78-236	.392	.078 ±.003	.236 ±.005	.00471	9.95	2.00	6.00
90-208VS	.392	.091 ±.003	.210 ±.005	.00615	9.95	2.30	5.35
35-318VS	.393	.035 ±.003	.323 ±.005	.00108	10.00	.90	8.20
98-197	.393	.098 ±.003	.197 ±.005	.00699	10.00	2.50	5.00
31-332	.394	.031 ±.003	.332 ±.005	.00086	10.00	.80	8.45
77-240	.394	.077 ±.003	.240 ±.005	.00464	10.00	1.95	6.10
35-318VS	.395	.036 ±.003	.323 ±.005	.00115	10.05	.90	8.20
49-295ES	.395	.049 ±.003	.297 ±.005	.00205	10.05	1.25	7.55



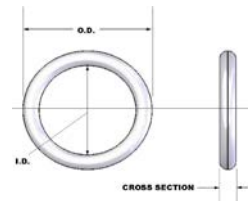
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
20-354VS	.397	.020 ±.003	.357 ±.005	.00037	10.10	.50	9.05
59-279	.397	.059 ±.003	.279 ±.005	.00290	10.10	1.50	7.10
39-317VS	.398	.039 ±.003	.320 ±.005	.00135	10.10	1.00	8.15
46-307	.399	.046 ±.003	.307 ±.005	.00184	10.15	1.15	7.80
50-300	.400	.050 ±.003	.300 ±.005	.00216	10.15	1.25	7.60
43-315	.401	.043 ±.003	.315 ±.005	.00163	10.20	1.10	8.00
55-287VS	.402	.056 ±.003	.290 ±.005	.00268	10.20	1.40	7.35
71-256VS	.403	.072 ±.003	.259 ±.005	.00423	10.25	1.85	6.60
70-258SS	.404	.071 ±.003	.262 ±.005	.00414	10.25	1.80	6.65
39-327	.405	.039 ±.003	.327 ±.005	.00137	10.30	1.00	8.30
28-347VS	.406	.028 ±.003	.350 ±.005	.00073	10.30	.70	8.90
94-218NS	.406	.094 ±.003	.218 ±.005	.00680	10.30	2.40	5.55
28-346VS	.407	.028 ±.003	.351 ±.005	.00073	10.35	.70	8.90
45-315ES	.407	.045 ±.003	.317 ±.005	.00181	10.35	1.15	8.05
52-306	.410	.052 ±.003	.306 ±.005	.00239	10.40	1.30	7.75
70-270	.410	.070 ±.003	.270 ±.005	.00411	10.40	1.80	6.85
80-250	.410	.080 ±.003	.250 ±.005	.00521	10.40	2.05	6.35
63-281SS	.411	.063 ±.003	.285 ±.005	.00341	10.45	1.60	7.25
77-250SS	.411	.078 ±.003	.255 ±.005	.00500	10.45	2.00	6.50
1-107	.412	.103 ±.003	.206 ±.005	.00809	10.45	2.60	5.25
59-295	.413	.059 ±.003	.295 ±.005	.00304	10.50	1.50	7.50
24-362VS	.414	.024 ±.003	.366 ±.005	.00055	10.50	.60	9.30
54-301VS	.414	.055 ±.003	.304 ±.005	.00268	10.50	1.40	7.70
51-313	.415	.051 ±.003	.313 ±.005	.00234	10.55	1.30	7.95
70-275	.415	.070 ±.003	.275 ±.005	.00417	10.55	1.80	7.00
70-270SS	.417	.071 ±.003	.275 ±.005	.00430	10.60	1.80	7.00
25-356SS	.418	.026 ±.003	.366 ±.005	.00065	10.60	.65	9.30
75-262SS	.418	.076 ±.003	.266 ±.005	.00487	10.60	1.95	6.75
42-335	.419	.042 ±.003	.335 ±.005	.00164	10.65	1.05	8.50
51-313VS	.420	.052 ±.003	.316 ±.005	.00246	10.65	1.30	8.05
60-301	.421	.060 ±.003	.301 ±.005	.00321	10.70	1.50	7.65
75-268SS	.423	.076 ±.003	.271 ±.005	.00495	10.75	1.95	6.90
1-903	.429	.064 ±.003	.301 ±.005	.00369	10.90	1.65	7.65
76-277	.429	.076 ±.003	.277 ±.005	.00503	10.90	1.95	7.05
50-330	.430	.050 ±.003	.330 ±.005	.00234	10.90	1.25	8.40
139-152	.430	.139 ±.004	.152 ±.005	.01387	10.90	3.55	3.85
35-361	.431	.035 ±.003	.361 ±.005	.00120	10.95	.90	9.15
70-291	.431	.070 ±.003	.291 ±.005	.00436	10.95	1.80	7.40
35-362	.432	.035 ±.003	.362 ±.005	.00120	10.95	.90	9.20
39-354	.432	.039 ±.003	.354 ±.005	.00147	10.95	1.00	9.00
70-285SS	.432	.071 ±.003	.290 ±.005	.00449	10.95	1.80	7.35
30-368VS	.433	.030 ±.003	.373 ±.005	.00089	11.00	.75	9.45
118-197	.433	.118 ±.004	.197 ±.005	.01082	11.00	3.00	5.00
59-311SS	.434	.060 ±.003	.314 ±.005	.00332	11.00	1.50	8.00
45-346	.436	.045 ±.003	.346 ±.005	.00195	11.05	1.15	8.80



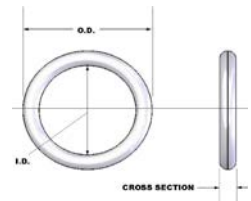
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
93-250	.436	.093 ±.003	.250 ±.005	.00732	11.05	2.35	6.35
89-255SS	.439	.090 ±.003	.259 ±.005	.00698	11.15	2.30	6.60
30-380	.440	.030 ±.003	.380 ±.005	.00091	11.20	.75	9.65
1-011	.441	.070 ±.003	.301 ±.005	.00449	11.20	1.80	7.65
94-248VS	.441	.095 ±.003	.251 ±.005	.00770	11.20	2.40	6.40
1-108	.443	.103 ±.003	.237 ±.005	.00890	11.25	2.60	6.00
31-378VS	.444	.031 ±.003	.382 ±.005	.00098	11.30	.80	9.70
122-200	.444	.122 ±.004	.200 ±.005	.01183	11.30	3.10	5.10
63-319	.445	.063 ±.003	.319 ±.005	.00374	11.30	1.60	8.10
47-350VS	.446	.047 ±.003	.352 ±.005	.00217	11.35	1.20	8.95
71-304	.446	.071 ±.003	.304 ±.005	.00466	11.35	1.80	7.70
150-145SVS	.448	.151 ±.005	.146 ±.005	.01671	11.40	3.85	3.70
1-201	.449	.139 ±.004	.171 ±.005	.01478	11.40	3.55	4.35
40-370	.450	.040 ±.003	.370 ±.005	.00162	11.45	1.00	9.40
63-319VS	.450	.064 ±.003	.322 ±.005	.00390	11.45	1.65	8.20
38-377	.453	.038 ±.003	.377 ±.005	.00148	11.50	.95	9.60
72-309	.453	.072 ±.003	.309 ±.005	.00487	11.50	1.85	7.85
45-364	.454	.045 ±.003	.364 ±.005	.00204	11.55	1.15	9.25
78-298	.454	.078 ±.003	.298 ±.005	.00564	11.55	2.00	7.55
70-313ES	.455	.070 ±.003	.315 ±.005	.00465	11.55	1.80	8.00
70-313VS	.459	.071 ±.003	.317 ±.005	.00483	11.65	1.80	8.05
60-340	.460	.060 ±.003	.340 ±.005	.00355	11.70	1.50	8.65
70-320	.460	.070 ±.003	.320 ±.005	.00472	11.70	1.80	8.15
37-384VS	.461	.037 ±.003	.387 ±.005	.00143	11.70	.95	9.85
54-344SS	.461	.055 ±.003	.351 ±.005	.00303	11.70	1.40	8.90
86-290	.462	.086 ±.003	.290 ±.005	.00686	11.75	2.20	7.35
39-386	.464	.039 ±.003	.386 ±.005	.00159	11.80	1.00	9.80
74-317	.465	.074 ±.003	.317 ±.005	.00528	11.80	1.90	8.05
139-187	.465	.139 ±.004	.187 ±.005	.01554	11.80	3.55	4.75
46-375	.467	.046 ±.003	.375 ±.005	.00220	11.85	1.15	9.55
78-312	.468	.078 ±.003	.312 ±.005	.00585	11.90	2.00	7.90
50-366SS	.469	.050 ±.003	.369 ±.005	.00258	11.90	1.25	9.35
125-219	.469	.125 ±.004	.219 ±.005	.01326	11.90	3.20	5.55
16-438	.470	.016 ±.003	.438 ±.005	.00029	11.95	.40	11.15
52-364SS	.471	.052 ±.003	.367 ±.005	.00280	11.95	1.30	9.30
31-410	.472	.031 ±.003	.410 ±.005	.00105	12.00	.80	10.40
56-355VS	.472	.057 ±.003	.358 ±.005	.00333	12.00	1.45	9.10
70-334	.474	.070 ±.003	.334 ±.005	.00488	12.05	1.80	8.50
31-409SS	.475	.031 ±.003	.413 ±.005	.00105	12.05	.80	10.50
40-395	.475	.040 ±.003	.395 ±.005	.00172	12.05	1.00	10.05
160-155	.475	.160 ±.005	.155 ±.005	.01990	12.05	4.05	3.95
20-433VS	.477	.020 ±.002	.437 ±.005	.00045	12.10	.50	11.10
32-409SS	.477	.032 ±.003	.413 ±.005	.00112	12.10	.80	10.50
59-354SS	.480	.060 ±.003	.360 ±.005	.00373	12.20	1.50	9.15
43-393ES	.481	.043 ±.003	.395 ±.005	.00200	12.20	1.10	10.05



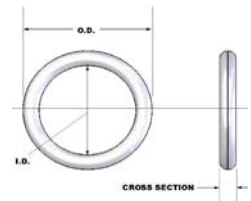
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
94-287VS	.481	.095 ±.003	.291 ±.005	.00860	12.20	2.40	7.40
43-395ES	.483	.043 ±.003	.397 ±.005	.00201	12.25	1.10	10.10
110-265NS	.484	.110 ±.004	.264 ±.005	.01117	12.30	2.80	6.70
104-272VS	.485	.105 ±.003	.275 ±.005	.01034	12.30	2.65	7.00
39-408	.486	.039 ±.003	.408 ±.005	.00168	12.35	1.00	10.35
62-358SS	.491	.063 ±.003	.365 ±.005	.00419	12.45	1.60	9.25
70-344SS	.491	.071 ±.003	.349 ±.005	.00522	12.45	1.80	8.85
50-386SS	.492	.051 ±.003	.390 ±.005	.00283	12.50	1.30	9.90
60-364SS	.492	.061 ±.003	.370 ±.005	.00396	12.50	1.55	9.40
45-405	.495	.045 ±.003	.405 ±.005	.00225	12.55	1.15	10.30
1-904	.495	.072 ±.003	.351 ±.005	.00541	12.55	1.85	8.90
35-426	.496	.035 ±.003	.426 ±.005	.00139	12.60	.90	10.80
26-445	.497	.026 ±.002	.445 ±.005	.00079	12.60	.65	11.30
31-435	.497	.031 ±.003	.435 ±.005	.00110	12.60	.80	11.05
125-247	.497	.125 ±.004	.247 ±.005	.01434	12.60	3.20	6.25
74-350	.498	.074 ±.003	.350 ±.005	.00573	12.65	1.90	8.90
62-375	.499	.062 ±.003	.375 ±.005	.00414	12.65	1.55	9.55
34-432	.500	.034 ±.003	.432 ±.005	.00133	12.70	.85	10.95
50-397SS	.501	.050 ±.003	.401 ±.005	.00278	12.75	1.25	10.20
54-394	.502	.054 ±.003	.394 ±.005	.00322	12.75	1.35	10.00
73-357	.503	.073 ±.003	.357 ±.005	.00565	12.80	1.85	9.05
79-335SS	.503	.081 ±.003	.341 ±.005	.00683	12.80	2.05	8.65
1-012	.504	.070 ±.003	.364 ±.005	.00525	12.80	1.80	9.25
68-364SS	.505	.069 ±.003	.367 ±.005	.00512	12.85	1.75	9.30
1-109	.505	.103 ±.003	.299 ±.005	.01052	12.85	2.60	7.60
40-426	.506	.040 ±.003	.426 ±.005	.00184	12.85	1.00	10.80
97-312	.506	.097 ±.003	.312 ±.005	.00950	12.85	2.45	7.90
187-130ES	.506	.188 ±.005	.130 ±.005	.02773	12.85	4.80	3.30
86-336	.508	.086 ±.003	.336 ±.005	.00770	12.90	2.20	8.55
71-367	.509	.071 ±.003	.367 ±.005	.00545	12.95	1.80	9.30
72-364VS	.509	.072 ±.003	.365 ±.005	.00559	12.95	1.85	9.25
90-324VS	.510	.091 ±.003	.328 ±.005	.00856	12.95	2.30	8.35
39-433	.511	.039 ±.003	.433 ±.005	.00177	13.00	1.00	11.00
1-202	.512	.139 ±.004	.234 ±.005	.01778	13.00	3.55	5.95
28-457	.513	.028 ±.003	.457 ±.005	.00094	13.05	.70	11.60
140-230ES	.513	.141 ±.004	.231 ±.005	.01825	13.05	3.60	5.85
70-373ES	.514	.070 ±.003	.374 ±.005	.00537	13.05	1.80	9.50
45-426	.516	.045 ±.003	.426 ±.005	.00235	13.10	1.15	10.80
74-362VS	.517	.075 ±.003	.367 ±.005	.00613	13.15	1.90	9.30
45-425ES	.518	.045 ±.003	.428 ±.005	.00236	13.15	1.15	10.85
103-312	.518	.103 ±.003	.312 ±.005	.01086	13.15	2.60	7.90
28-457VS	.519	.028 ±.003	.463 ±.005	.00095	13.20	.70	11.75
110-299	.519	.110 ±.004	.299 ±.005	.01221	13.20	2.80	7.60
24-472	.520	.024 ±.003	.472 ±.005	.00070	13.20	.60	12.00
40-440	.520	.040 ±.003	.440 ±.005	.00189	13.20	1.00	11.20



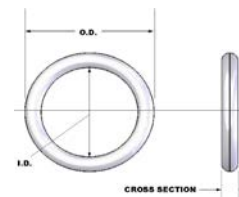
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Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
95-320SS	.520	.097 ±.003	.326 ±.005	.00982	13.20	2.45	8.30
108-305	.521	.108 ±.004	.305 ±.005	.01189	13.25	2.75	7.75
178-165	.521	.178 ±.005	.165 ±.005	.02681	13.25	4.50	4.20
79-354SS	.523	.081 ±.003	.361 ±.005	.00716	13.30	2.05	9.15
62-400	.524	.062 ±.003	.400 ±.005	.00438	13.30	1.55	10.15
80-364	.524	.080 ±.003	.364 ±.005	.00701	13.30	2.05	9.25
50-426	.526	.050 ±.003	.426 ±.005	.00294	13.35	1.25	10.80
30-468	.528	.030 ±.003	.468 ±.005	.00111	13.40	.75	11.90
40-445SS	.529	.040 ±.003	.449 ±.005	.00193	13.45	1.00	11.40
74-375VS	.529	.075 ±.003	.379 ±.005	.00630	13.45	1.90	9.65
156-218	.530	.156 ±.005	.218 ±.005	.02246	13.45	3.95	5.55
80-364VS	.531	.081 ±.003	.369 ±.005	.00728	13.50	2.05	9.35
56-414SS	.532	.057 ±.003	.418 ±.005	.00381	13.50	1.45	10.60
103-326	.532	.103 ±.003	.326 ±.005	.01123	13.50	2.60	8.30
76-382	.534	.076 ±.003	.382 ±.005	.00653	13.55	1.95	9.70
40-445RS	.535	.041 ±.003	.453 ±.005	.00205	13.60	1.05	11.50
59-416ES	.535	.059 ±.003	.417 ±.005	.00409	13.60	1.50	10.60
70-395	.535	.070 ±.003	.395 ±.005	.00562	13.60	1.80	10.05
69-392VS	.535	.070 ±.003	.395 ±.005	.00562	13.60	1.80	10.05
79-370SS	.535	.080 ±.003	.375 ±.005	.00719	13.60	2.05	9.55
36-465	.537	.036 ±.003	.465 ±.005	.00160	13.65	.90	11.80
42-451ES	.538	.042 ±.003	.454 ±.005	.00216	13.65	1.05	11.55
74-382SS	.538	.075 ±.003	.388 ±.005	.00643	13.65	1.90	9.85
40-459	.539	.040 ±.003	.459 ±.005	.00197	13.70	1.00	11.65
53-429SS	.539	.053 ±.003	.433 ±.005	.00337	13.70	1.35	11.00
87-366	.540	.087 ±.003	.366 ±.005	.00846	13.70	2.20	9.30
46-450	.542	.046 ±.003	.450 ±.005	.00259	13.75	1.15	11.45
75-386VS	.542	.076 ±.003	.390 ±.005	.00664	13.75	1.95	9.90
46-453	.545	.046 ±.003	.453 ±.005	.00261	13.85	1.15	11.50
26-492VS	.549	.026 ±.003	.497 ±.004	.00087	13.95	.65	12.60
39-472	.550	.039 ±.003	.472 ±.005	.00192	13.95	1.00	12.00
52-447	.551	.052 ±.003	.447 ±.005	.00333	14.00	1.30	11.35
59-433	.551	.059 ±.033	.433 ±.005	.00423	14.00	1.50	11.00
20-515	.555	.020 ±.003	.515 ±.005	.00053	14.10	.50	13.10
74-401VS	.555	.075 ±.003	.405 ±.005	.00666	14.10	1.90	10.30
30-496	.556	.030 ±.003	.496 ±.005	.00117	14.10	.75	12.60
25-507	.557	.025 ±.003	.507 ±.005	.00082	14.15	.65	12.90
1-905	.558	.072 ±.003	.414 ±.005	.00622	14.15	1.85	10.50
94-366SS	.559	.095 ±.003	.369 ±.005	.01033	14.20	2.40	9.35
80-400	.560	.080 ±.003	.400 ±.005	.00758	14.20	2.05	10.15
93-375	.561	.093 ±.003	.375 ±.005	.00999	14.25	2.35	9.55
140-281	.561	.140 ±.004	.281 ±.005	.02036	14.25	3.55	7.15
91-380	.562	.091 ±.003	.380 ±.005	.00962	14.25	2.30	9.65
40-484	.564	.040 ±.003	.484 ±.005	.00207	14.35	1.00	12.30
53-458	.564	.053 ±.003	.458 ±.005	.00354	14.35	1.35	11.65



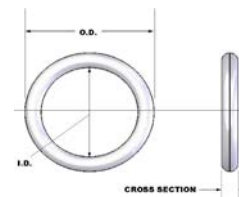
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Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
1-013	.566	.070 ±.003	.426 ±.005	.00600	14.40	1.80	10.80
80-406	.566	.080 ±.003	.406 ±.005	.00767	14.40	2.05	10.30
70-418SS	.567	.071 ±.003	.425 ±.005	.00617	14.40	1.80	10.80
50-468	.568	.050 ±.003	.468 ±.005	.00320	14.45	1.25	11.90
1-110	.568	.103 ±.003	.362 ±.005	.01217	14.45	2.60	9.20
21-524VS	.570	.021 ±.003	.528 ±.005	.00060	14.50	.55	13.40
39-492	.570	.039 ±.003	.492 ±.005	.00199	14.50	1.00	12.50
164-242	.570	.164 ±.005	.242 ±.005	.02694	14.50	4.15	6.15
41-490	.572	.041 ±.003	.490 ±.005	.00220	14.55	1.05	12.45
71-430	.572	.071 ±.003	.430 ±.005	.00623	14.55	1.80	10.90
108-352VS	.573	.109 ±.004	.355 ±.005	.01360	14.55	2.75	9.00
104-366	.574	.104 ±.003	.366 ±.005	.01254	14.60	2.65	9.30
125-327	.576	.125 ±.004	.326 ±.005	.01739	14.65	3.20	8.30
59-453VS	.577	.060 ±.003	.457 ±.005	.00459	14.65	1.50	11.60
70-437	.577	.070 ±.003	.437 ±.005	.00613	14.65	1.80	11.10
1-203	.579	.139 ±.004	.296 ±.005	.02098	14.70	3.55	7.50
50-475SS	.580	.050 ±.003	.480 ±.005	.00327	14.70	1.25	12.20
60-460	.580	.060 ±.003	.460 ±.005	.00462	14.75	1.50	11.70
68-438SS	.582	.069 ±.003	.444 ±.005	.00603	14.80	1.75	11.30
135-312	.582	.135 ±.004	.312 ±.005	.02010	14.80	3.45	7.90
43-495TS	.583	.043 ±.003	.497 ±.005	.00246	14.80	1.10	12.60
76-432	.584	.076 ±.003	.432 ±.005	.00724	14.85	1.95	10.95
92-400	.584	.092 ±.003	.400 ±.005	.01027	14.85	2.35	10.15
40-504ES	.586	.040 ±.003	.506 ±.005	.00216	14.90	1.00	12.85
40-508NS	.586	.040 ±.003	.506 ±.005	.00216	14.90	1.00	12.85
103-374VS	.586	.104 ±.003	.378 ±.005	.01286	14.90	2.65	9.60
35-512SS	.587	.035 ±.003	.517 ±.005	.00167	14.90	.90	13.15
106-375	.587	.106 ±.003	.375 ±.005	.01334	14.90	2.70	9.55
174-239	.587	.174 ±.005	.239 ±.005	.03085	14.90	4.40	6.05
31-526	.588	.031 ±.003	.526 ±.005	.00132	14.95	.80	13.35
118-352	.588	.118 ±.004	.352 ±.005	.01615	14.95	3.00	8.95
59-472	.590	.059 ±.003	.472 ±.005	.00456	15.00	1.50	12.00
47-490SS	.592	.048 ±.003	.496 ±.005	.00309	15.05	1.20	12.60
90-401SS	.593	.092 ±.003	.409 ±.005	.01046	15.05	2.35	10.40
188-218	.594	.188 ±.005	.218 ±.005	.03541	15.10	4.80	5.55
70-455	.595	.070 ±.003	.455 ±.005	.00635	15.10	1.80	11.55
103-391	.597	.103 ±.003	.391 ±.005	.01293	15.15	2.60	9.95
125-348	.598	.125 ±.004	.348 ±.005	.01824	15.20	3.20	8.85
55-489	.599	.055 ±.003	.489 ±.005	.00406	15.20	1.40	12.40
70-460	.600	.070 ±.003	.460 ±.005	.00641	15.25	1.80	11.70
125-343SS	.604	.126 ±.004	.352 ±.005	.01872	15.35	3.20	8.95
31-539SS	.606	.031 ±.003	.544 ±.005	.00136	15.40	.80	13.80
49-508	.606	.049 ±.003	.508 ±.005	.00330	15.40	1.25	12.90
70-466	.606	.070 ±.003	.466 ±.005	.00648	15.40	1.80	11.85
95-418	.608	.095 ±.003	.418 ±.005	.01142	15.45	2.40	10.60



# Engineers Guide for O-Rings

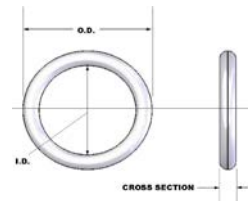


Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
150-310	.610	.150 ±.005	.310 ±.005	.02554	15.50	3.80	7.85
119-374	.612	.119 ±.004	.374 ±.005	.01723	15.55	3.00	9.50
39-535	.613	.039 ±.003	.535 ±.005	.00215	15.55	1.00	13.60
70-468SS	.614	.071 ±.003	.472 ±.005	.00675	15.60	1.80	12.00
84-446	.614	.084 ±.003	.446 ±.005	.00923	15.60	2.15	11.35
80-443SS	.616	.082 ±.003	.452 ±.005	.00886	15.65	2.10	11.50
87-445	.619	.087 ±.003	.445 ±.005	.00994	15.70	2.20	11.30
32-551SS	.620	.032 ±.003	.556 ±.007	.00149	15.75	.80	14.10
32-551VS	.621	.032 ±.003	.557 ±.007	.00149	15.75	.80	14.15
79-450SS	.621	.081 ±.003	.459 ±.005	.00874	15.75	2.05	11.65
70-478VS	.624	.071 ±.003	.482 ±.005	.00688	15.85	1.80	12.25
1-906	.624	.078 ±.003	.468 ±.005	.00820	15.85	2.00	11.90
84-456	.624	.084 ±.003	.456 ±.005	.00940	15.85	2.15	11.60
93-437ES	.624	.093 ±.003	.438 ±.005	.01133	15.85	2.35	11.15
125-375	.625	.125 ±.004	.375 ±.005	.01928	15.90	3.20	9.55
195-235	.625	.195 ±.005	.235 ±.005	.04034	15.90	4.95	5.95
20-583ES	.627	.020 ±.003	.587 ±.007	.00060	15.95	.50	14.90
60-507	.627	.060 ±.003	.507 ±.005	.00504	15.95	1.50	12.90
1-014	.629	.070 ±.003	.489 ±.005	.00676	16.00	1.80	12.40
40-550	.630	.040 ±.003	.550 ±.005	.00233	16.00	1.00	13.95
70-487VS	.630	.070 ±.003	.490 ±.005	.00677	16.00	1.80	12.45
1-111	.630	.103 ±.003	.424 ±.005	.01380	16.00	2.60	10.75
60-507ES	.631	.060 ±.003	.511 ±.005	.00507	16.05	1.50	13.00
103-425	.631	.103 ±.003	.425 ±.005	.01382	16.05	2.60	10.80
104-417VS	.631	.105 ±.003	.421 ±.005	.01431	16.05	2.65	10.70
62-501SS	.634	.063 ±.003	.508 ±.005	.00559	16.10	1.60	12.90
79-472VS	.634	.079 ±.003	.476 ±.005	.00855	16.10	2.00	12.10
20-595	.635	.020 ±.003	.595 ±.007	.00061	16.15	.50	15.10
32-566VS	.635	.032 ±.003	.571 ±.007	.00152	16.15	.80	14.50
77-468SS	.636	.079 ±.003	.478 ±.005	.00858	16.15	2.00	12.15
30-577	.637	.030 ±.003	.577 ±.007	.00135	16.20	.75	14.65
39-550VS	.637	.040 ±.003	.557 ±.007	.00236	16.20	1.00	14.15
71-495	.637	.071 ±.003	.495 ±.005	.00704	16.20	1.80	12.55
1-204	.637	.139 ±.004	.359 ±.005	.02374	16.20	3.55	9.10
55-530	.640	.055 ±.003	.530 ±.005	.00437	16.25	1.40	13.45
51-531ES	.641	.052 ±.003	.537 ±.005	.00393	16.30	1.30	13.65
94-445VS	.641	.095 ±.003	.451 ±.005	.01216	16.30	2.40	11.45
70-505	.645	.070 ±.003	.505 ±.005	.00695	16.40	1.80	12.85
70-495SS	.645	.071 ±.003	.503 ±.005	.00714	16.40	1.80	12.80
39-570	.648	.039 ±.003	.570 ±.007	.00229	16.45	1.00	14.50
51-547	.649	.051 ±.003	.547 ±.005	.00384	16.50	1.30	13.90
59-531	.649	.059 ±.003	.531 ±.008	.00507	16.50	1.50	13.50
75-489SS	.650	.076 ±.003	.498 ±.005	.00818	16.50	1.95	12.65
70-489SS	.654	.073 ±.003	.508 ±.005	.00764	16.60	1.85	12.90
51-551VS	.657	.051 ±.003	.555 ±.007	.00389	16.70	1.30	14.10





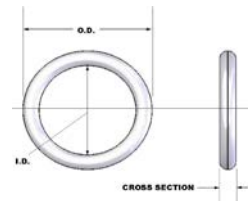
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
110-438	.658	.110 ±.004	.438 ±.005	.01636	16.70	2.80	11.15
190-280	.660	.190 ±.005	.280 ±.005	.04186	16.75	4.85	7.10
51-547VS	.661	.052 ±.003	.557 ±.007	.00406	16.80	1.30	14.15
103-456	.662	.103 ±.003	.456 ±.005	.01463	16.80	2.60	11.60
40-583VS	.667	.040 ±.003	.587 ±.005	.00248	16.95	1.00	14.90
197-276	.670	.197 ±.005	.276 ±.005	.04529	17.00	5.00	7.00
156-359	.671	.156 ±.005	.359 ±.005	.03092	17.05	3.95	9.10
70-518SS	.673	.072 ±.003	.529 ±.005	.00769	17.10	1.85	13.45
142-390NS	.673	.142 ±.004	.389 ±.005	.02642	17.10	3.60	9.90
71-525SS	.677	.072 ±.003	.533 ±.005	.00774	17.20	1.85	13.55
30-622	.682	.030 ±.003	.622 ±.009	.00145	17.30	.75	15.80
103-469VS	.682	.104 ±.003	.474 ±.005	.01543	17.30	2.65	12.05
34-611ES	.685	.034 ±.003	.617 ±.009	.00186	17.40	.85	15.65
120-445	.685	.120 ±.004	.445 ±.005	.02007	17.40	3.05	11.30
130-425	.685	.130 ±.004	.425 ±.005	.02314	17.40	3.30	10.80
93-500	.686	.093 ±.003	.500 ±.005	.01265	17.40	2.35	12.70
118-453	.689	.118 ±.004	.453 ±.005	.01962	17.50	3.00	11.50
50-590	.690	.050 ±.003	.590 ±.007	.00395	17.55	1.25	15.00
30-622SS	.691	.030 ±.003	.631 ±.009	.00147	17.55	.75	16.05
1-015	.691	.070 ±.003	.551 ±.007	.00751	17.55	1.80	14.00
40-612	.692	.040 ±.003	.612 ±.007	.00257	17.60	1.00	15.55
106-480	.692	.106 ±.003	.480 ±.005	.01625	17.60	2.70	12.20
1-112	.693	.103 ±.003	.487 ±.005	.01544	17.60	2.60	12.35
1-907	.694	.082 ±.003	.530 ±.005	.01015	17.65	2.10	13.45
60-575	.695	.060 ±.003	.575 ±.007	.00564	17.65	1.50	14.60
139-417	.695	.139 ±.004	.417 ±.005	.02651	17.65	3.55	10.60
104-482VS	.696	.105 ±.003	.486 ±.005	.01608	17.70	2.65	12.35
87-524	.698	.087 ±.003	.524 ±.005	.01141	17.75	2.20	13.30
32-630SS	.699	.032 ±.003	.635 ±.009	.00169	17.75	.80	16.15
71-557	.699	.071 ±.003	.557 ±.007	.00781	17.75	1.80	14.15
105-485PL	.699	.106 ±.003	.487 ±.005	.01644	17.75	2.70	12.35
1-205	.699	.139 ±.004	.421 ±.005	.02670	17.75	3.55	10.70
104-492	.700	.104 ±.003	.492 ±.005	.01591	17.80	2.65	12.50
113-477	.703	.113 ±.004	.477 ±.005	.01859	17.85	2.85	12.10
31-643	.705	.031 ±.003	.643 ±.009	.00160	17.90	.80	16.35
110-487	.707	.110 ±.004	.487 ±.005	.01782	17.95	2.80	12.35
39-630	.708	.039 ±.003	.630 ±.009	.00251	18.00	1.00	16.00
98-512	.708	.098 ±.003	.512 ±.005	.01446	18.00	2.50	13.00
79-551	.709	.079 ±.003	.551 ±.007	.00970	18.00	2.00	14.00
132-445	.709	.132 ±.004	.445 ±.005	.02481	18.00	3.35	11.30
39-636NS	.711	.039 ±.003	.633 ±.009	.00252	18.05	1.00	16.10
94-523	.711	.094 ±.003	.523 ±.005	.01345	18.05	2.40	13.30
47-618	.712	.047 ±.003	.618 ±.009	.00362	18.10	1.20	15.70
100-514	.715	.100 ±.003	.515 ±.006	.01517	18.15	2.55	13.10
59-602	.720	.059 ±.003	.602 ±.007	.00568	18.30	1.50	15.30



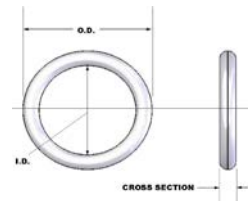
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
100-520	.720	.100 ±.003	.520 ±.005	.01530	18.30	2.55	13.20
45-632	.722	.045 ±.003	.632 ±.009	.00338	18.35	1.15	16.05
70-583	.723	.070 ±.003	.583 ±.007	.00789	18.35	1.80	14.80
50-625	.725	.050 ±.003	.625 ±.009	.00416	18.40	1.25	15.90
47-632	.726	.047 ±.003	.632 ±.009	.00370	18.45	1.20	16.05
58-610	.726	.058 ±.003	.610 ±.007	.00554	18.45	1.45	15.50
80-551SS	.726	.082 ±.003	.562 ±.007	.01068	18.45	2.10	14.25
70-575SS	.727	.071 ±.003	.585 ±.007	.00816	18.45	1.80	14.85
121-485	.727	.121 ±.004	.485 ±.005	.02189	18.45	3.05	12.30
20-685VS	.729	.020 ±.003	.689 ±.009	.00070	18.50	.50	17.50
98-520SS	.730	.100 ±.003	.530 ±.005	.01554	18.55	2.55	13.45
43-642SS	.732	.043 ±.003	.646 ±.009	.00314	18.60	1.10	16.40
139-452	.732	.140 ±.004	.452 ±.005	.02863	18.60	3.55	11.50
63-594SS	.733	.064 ±.003	.605 ±.007	.00676	18.60	1.65	15.35
68-598	.734	.068 ±.003	.598 ±.007	.00760	18.65	1.75	15.20
180-375	.735	.180 ±.005	.375 ±.005	.04437	18.65	4.55	9.55
52-632	.736	.052 ±.003	.632 ±.009	.00456	18.70	1.30	16.05
70-590VS	.738	.071 ±.003	.596 ±.007	.00830	18.75	1.80	15.15
40-660	.740	.040 ±.003	.660 ±.009	.00276	18.80	1.00	16.75
50-640ES	.744	.050 ±.003	.644 ±.009	.00428	18.90	1.25	16.35
56-632	.744	.056 ±.003	.632 ±.009	.00532	18.90	1.40	16.05
79-591NS	.747	.079 ±.003	.589 ±.007	.01029	18.95	2.00	14.95
46-656	.748	.046 ±.003	.656 ±.009	.00367	19.00	1.15	16.65
34-669SS	.749	.035 ±.003	.679 ±.009	.00216	19.00	.90	17.25
148-453	.749	.148 ±.005	.453 ±.005	.03248	19.00	3.75	11.50
30-690	.750	.030 ±.003	.690 ±.009	.00160	19.05	.75	17.55
125-500	.750	.125 ±.004	.500 ±.005	.02410	19.05	3.20	12.70
1-016	.754	.070 ±.003	.614 ±.009	.00827	19.15	1.80	15.60
174-406	.754	.174 ±.005	.406 ±.005	.04333	19.15	4.40	10.30
1-113	.755	.103 ±.003	.549 ±.007	.01707	19.20	2.60	13.95
62-638	.762	.062 ±.003	.638 ±.009	.00664	19.35	1.55	16.20
71-620	.762	.071 ±.003	.620 ±.009	.00859	19.35	1.80	15.75
74-614	.762	.074 ±.003	.614 ±.009	.00930	19.35	1.90	15.60
1-206	.762	.139 ±.004	.484 ±.005	.02970	19.35	3.55	12.30
104-557	.765	.104 ±.003	.557 ±.007	.01764	19.45	2.65	14.15
104-557	.765	.104 ±.003	.557 ±.007	.01764	19.45	2.65	14.15
113-539	.765	.113 ±.004	.539 ±.005	.02054	19.45	2.85	13.70
77-614	.768	.077 ±.003	.614 ±.009	.01011	19.50	1.95	15.60
1-308	.770	.210 ±.005	.350 ±.005	.06093	19.55	5.35	8.90
57-658	.772	.057 ±.003	.658 ±.009	.00573	19.60	1.45	16.70
83-606	.772	.083 ±.003	.606 ±.007	.01171	19.60	2.10	15.40
92-590	.774	.092 ±.003	.590 ±.007	.01424	19.65	2.35	15.00
112-549ES	.774	.112 ±.004	.550 ±.007	.02049	19.65	2.85	13.95
87-602	.776	.087 ±.003	.602 ±.007	.01287	19.70	2.20	15.30
139-496VS	.778	.140 ±.004	.498 ±.005	.03085	19.75	3.55	12.65



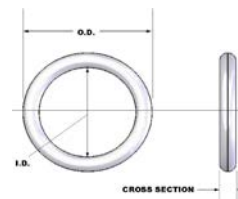
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
151-477	.779	.151 ±.005	.477 ±.005	.03533	19.80	3.85	12.10
109-562	.780	.109 ±.004	.562 ±.007	.01967	19.80	2.75	14.25
40-701	.781	.040 ±.003	.701 ±.009	.00293	19.85	1.00	17.80
106-570	.782	.106 ±.003	.570 ±.007	.01874	19.85	2.70	14.50
210-362	.782	.210 ±.005	.362 ±.005	.06224	19.85	5.35	9.20
46-691	.783	.046 ±.003	.691 ±.009	.00385	19.90	1.15	17.55
184-417	.785	.184 ±.005	.417 ±.005	.05021	19.95	4.65	10.60
70-646	.786	.070 ±.003	.646 ±.009	.00866	19.95	1.80	16.40
165-456	.786	.165 ±.005	.456 ±.005	.04172	19.95	4.20	11.60
59-669	.787	.059 ±.003	.669 ±.009	.00625	20.00	1.50	17.00
98-591	.787	.098 ±.003	.591 ±.007	.01633	20.00	2.50	15.00
64-660	.788	.064 ±.003	.660 ±.009	.00732	20.00	1.65	16.75
92-590SS	.789	.094 ±.003	.601 ±.007	.01515	20.05	2.40	15.25
180-429	.789	.180 ±.005	.429 ±.005	.04869	20.05	4.55	10.90
56-670SS	.790	.057 ±.003	.676 ±.009	.00588	20.05	1.45	17.15
70-652	.792	.070 ±.003	.652 ±.009	.00873	20.10	1.80	16.55
160-472	.792	.160 ±.005	.472 ±.005	.03992	20.10	4.05	12.00
79-623SS	.794	.080 ±.003	.634 ±.009	.01128	20.15	2.05	16.10
95-590SS	.795	.097 ±.003	.601 ±.007	.01620	20.20	2.45	15.25
139-515	.795	.140 ±.004	.515 ±.005	.03168	20.20	3.55	13.10
103-590	.796	.103 ±.003	.590 ±.007	.01814	20.20	2.60	15.00
46-705	.797	.046 ±.003	.705 ±.009	.00392	20.25	1.15	17.90
79-630SS	.797	.080 ±.003	.637 ±.009	.01132	20.25	2.05	16.20
138-523	.799	.138 ±.004	.523 ±.005	.03106	20.30	3.50	13.30
70-646SS	.800	.071 ±.003	.658 ±.009	.00907	20.30	1.80	16.70
36-732	.802	.036 ±.003	.730 ±.009	.00245	20.35	.90	18.55
169-465	.803	.169 ±.005	.465 ±.005	.04468	20.40	4.30	11.80
63-670SS	.804	.064 ±.003	.676 ±.009	.00748	20.40	1.65	17.15
40-725	.805	.040 ±.003	.725 ±.009	.00302	20.45	1.00	18.40
95-618	.808	.095 ±.003	.618 ±.009	.01588	20.50	2.40	15.70
105-605	.815	.105 ±.003	.605 ±.007	.01931	20.70	2.65	15.35
57-690VS	.816	.058 ±.003	.700 ±.009	.00629	20.75	1.45	17.80
1-017	.816	.070 ±.003	.676 ±.009	.00902	20.75	1.80	17.15
70-675ES	.816	.070 ±.003	.676 ±.009	.00902	20.75	1.80	17.15
94-614SS	.816	.096 ±.003	.624 ±.009	.01637	20.75	2.45	15.85
1-908	.818	.087 ±.003	.644 ±.009	.01365	20.80	2.20	16.35
87-644	.818	.087 ±.003	.644 ±.009	.01365	20.80	2.20	16.35
1-114	.818	.103 ±.003	.612 ±.009	.01872	20.80	2.60	15.55
50-720	.820	.050 ±.003	.720 ±.009	.00475	20.85	1.25	18.30
172-480	.824	.172 ±.005	.480 ±.005	.04759	20.95	4.35	12.20
71-683	.825	.071 ±.003	.683 ±.009	.00938	20.95	1.80	17.35
104-618	.826	.104 ±.003	.618 ±.009	.01927	21.00	2.65	15.70
59-709	.827	.059 ±.003	.709 ±.009	.00660	21.00	1.50	18.00
1-207	.827	.139 ±.004	.549 ±.007	.03280	21.00	3.55	13.95
40-750	.830	.040 ±.003	.750 ±.009	.00312	21.10	1.00	19.05



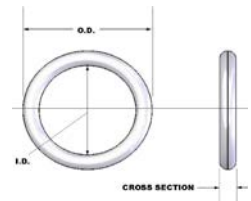
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
92-635SS	.830	.093 ±.003	.644 ±.009	.01573	21.10	2.35	16.35
50-720SS	.832	.051 ±.003	.730 ±.009	.00501	21.15	1.30	18.55
103-612SS	.832	.105 ±.003	.622 ±.009	.01978	21.15	2.65	15.80
1-309	.832	.210 ±.005	.412 ±.005	.06768	21.15	5.35	10.45
79-669VS	.833	.080 ±.003	.673 ±.009	.01189	21.15	2.05	17.10
140-555	.835	.140 ±.004	.555 ±.007	.03361	21.20	3.55	14.10
93-634SS	.838	.095 ±.003	.648 ±.009	.01655	21.30	2.40	16.45
31-779	.841	.031 ±.003	.779 ±.009	.00192	21.35	.80	19.80
94-656	.844	.094 ±.003	.656 ±.007	.01635	21.45	2.40	16.65
70-706	.846	.070 ±.003	.706 ±.009	.00938	21.50	1.80	17.95
70-688SS	.847	.072 ±.003	.703 ±.009	.00991	21.50	1.85	17.85
86-675	.847	.086 ±.003	.675 ±.009	.01389	21.50	2.20	17.15
103-643	.849	.103 ±.003	.643 ±.009	.01953	21.55	2.60	16.35
139-576	.854	.139 ±.004	.576 ±.007	.03409	21.70	3.55	14.65
87-681	.855	.087 ±.003	.681 ±.009	.01434	21.70	2.20	17.30
70-720	.860	.070 ±.003	.720 ±.009	.00955	21.85	1.80	18.30
75-710	.860	.075 ±.003	.710 ±.009	.01090	21.85	1.90	18.05
83-676SS	.860	.085 ±.003	.690 ±.009	.01382	21.85	2.15	17.55
168-524	.860	.168 ±.005	.524 ±.005	.04819	21.85	4.25	13.30
70-724	.864	.070 ±.003	.724 ±.009	.00960	21.95	1.80	18.40
40-785	.865	.040 ±.003	.785 ±.009	.00326	21.95	1.00	19.95
30-810ES	.872	.030 ±.003	.812 ±.009	.00187	22.15	.75	20.60
62-750	.874	.062 ±.003	.750 ±.009	.00770	22.20	1.55	19.05
125-625	.875	.125 ±.004	.625 ±.009	.02891	22.25	3.20	15.90
1-018	.879	.070 ±.003	.739 ±.009	.00978	22.35	1.80	18.75
87-705	.879	.087 ±.003	.705 ±.009	.01479	22.35	2.20	17.90
1-115	.880	.103 ±.003	.674 ±.009	.02034	22.35	2.60	17.10
73-735	.881	.073 ±.003	.735 ±.009	.01062	22.40	1.85	18.65
47-780SS	.882	.047 ±.003	.788 ±.009	.00455	22.40	1.20	20.00
70-742	.882	.070 ±.003	.742 ±.009	.00982	22.40	1.80	18.85
45-787VS	.884	.045 ±.003	.794 ±.009	.00419	22.45	1.15	20.15
47-780SS	.884	.048 ±.003	.788 ±.009	.00475	22.45	1.20	20.00
91-702	.884	.091 ±.003	.702 ±.009	.01620	22.45	2.30	17.85
1-208	.887	.139 ±.004	.609 ±.009	.03566	22.55	3.55	15.45
71-746	.888	.071 ±.003	.746 ±.009	.01016	22.55	1.80	18.95
106-665VS	.888	.107 ±.004	.674 ±.009	.02206	22.55	2.70	17.10
104-681	.889	.104 ±.003	.681 ±.009	.02095	22.60	2.65	17.30
120-636SS	.889	.122 ±.004	.645 ±.009	.02817	22.60	3.10	16.40
70-739VS	.890	.071 ±.003	.748 ±.009	.01019	22.60	1.80	19.00
1-310	.895	.210 ±.005	.475 ±.005	.07454	22.75	5.35	12.05
49-782SS	.897	.050 ±.003	.797 ±.009	.00522	22.80	1.25	20.25
30-840	.900	.030 ±.003	.840 ±.009	.00193	22.85	.75	21.35
40-820	.900	.040 ±.003	.820 ±.009	.00340	22.85	1.00	20.85
1-909	.900	.097 ±.003	.706 ±.009	.01864	22.85	2.45	17.95
113-674	.900	.113 ±.004	.674 ±.009	.02480	22.85	2.85	17.10



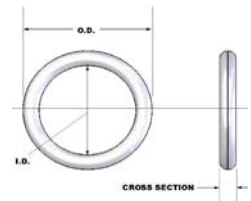
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
70-739SS	.904	.072 ±.003	.760 ±.009	.01064	22.95	1.85	19.30
40-825	.905	.040 ±.003	.825 ±.009	.00341	23.00	1.00	20.95
103-700	.906	.103 ±.003	.700 ±.009	.02102	23.00	2.60	17.80
70-769	.909	.070 ±.003	.769 ±.009	.01014	23.10	1.80	19.55
285-340	.910	.285 ±.006	.340 ±.005	.12526	23.10	7.25	8.65
82-750	.914	.082 ±.003	.750 ±.009	.01380	23.20	2.10	19.05
158-605	.921	.158 ±.005	.605 ±.009	.04700	23.40	4.00	15.35
63-787VS	.922	.064 ±.003	.794 ±.009	.00867	23.40	1.65	20.15
32-860	.924	.032 ±.003	.860 ±.009	.00225	23.45	.80	21.85
139-640	.926	.140 ±.004	.646 ±.009	.03801	23.50	3.55	16.40
80-758SS	.931	.081 ±.003	.769 ±.009	.01376	23.65	2.05	19.55
87-760	.934	.087 ±.003	.760 ±.009	.01582	23.70	2.20	19.30
63-799VS	.935	.064 ±.003	.807 ±.009	.00880	23.75	1.65	20.50
171-595	.937	.171 ±.005	.595 ±.007	.05527	23.80	4.35	15.10
63-813	.939	.063 ±.003	.813 ±.009	.00858	23.85	1.60	20.65
45-850	.940	.045 ±.003	.850 ±.009	.00447	23.90	1.15	21.60
103-734PL	.940	.103 ±.003	.734 ±.009	.02191	23.90	2.60	18.65
1-019	.941	.070 ±.003	.801 ±.009	.01053	23.90	1.80	20.35
140-741	.942	.104 ±.004	.734 ±.010	.02236	23.95	2.65	18.65
1-116	.943	.103 ±.003	.737 ±.009	.02199	23.95	2.60	18.70
166-612	.944	.166 ±.005	.612 ±.009	.05290	24.00	4.20	15.55
118-709	.945	.118 ±.004	.709 ±.009	.02841	24.00	3.00	18.00
45-850VS	.947	.045 ±.003	.857 ±.009	.00451	24.05	1.15	21.75
1-910	.949	.097 ±.003	.755 ±.009	.01978	24.10	2.45	19.20
1-209	.950	.139 ±.004	.672 ±.009	.03866	24.15	3.55	17.05
71-810	.952	.071 ±.003	.810 ±.009	.01096	24.20	1.80	20.55
170-612	.952	.170 ±.005	.612 ±.009	.05576	24.20	4.30	15.55
104-745	.953	.104 ±.003	.745 ±.009	.02266	24.20	2.65	18.90
140-675	.955	.140 ±.004	.675 ±.009	.03941	24.25	3.55	17.15
80-796	.956	.080 ±.003	.796 ±.009	.01383	24.30	2.05	20.20
40-879	.959	.040 ±.003	.879 ±.009	.00363	24.35	1.00	22.35
59-836SS	.959	.059 ±.003	.841 ±.009	.00773	24.35	1.50	21.35
91-760SS	.959	.093 ±.003	.773 ±.009	.01848	24.35	2.35	19.65
1-311	.959	.210 ±.005	.537 ±.007	.08150	24.35	5.35	13.65
31-898	.960	.031 ±.003	.898 ±.009	.00220	24.40	.80	22.80
100-760	.960	.100 ±.003	.760 ±.009	.02122	24.40	2.55	19.30
98-765	.961	.098 ±.003	.765 ±.009	.02045	24.40	2.50	19.45
52-864	.968	.052 ±.003	.864 ±.009	.00611	24.60	1.30	21.95
59-850	.968	.059 ±.003	.850 ±.009	.00781	24.60	1.50	21.60
234-500	.968	.234 ±.006	.500 ±.010	.09917	24.60	5.95	12.70
250-469	.969	.250 ±.006	.469 ±.010	.11088	24.60	6.35	11.90
118-728SS	.973	.119 ±.004	.735 ±.010	.02984	24.70	3.00	18.65
103-768	.974	.103 ±.003	.768 ±.009	.02280	24.75	2.60	19.50
50-875	.975	.050 ±.003	.875 ±.009	.00571	24.75	1.25	22.25
31-915	.977	.031 ±.003	.915 ±.009	.00224	24.80	.80	23.25



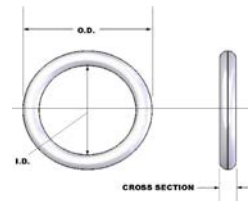
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
187-609	.983	.187 ±.005	.609 ±.009	.06868	24.95	4.75	15.45
59-866	.984	.059 ±.003	.866 ±.009	.00794	25.00	1.50	22.00
138-708	.984	.138 ±.004	.708 ±.009	.03975	25.00	3.50	18.00
98-787ES	.985	.098 ±.003	.789 ±.009	.02102	25.00	2.50	20.05
140-692SS	.985	.142 ±.004	.701 ±.009	.04194	25.00	3.60	17.80
243-500	.986	.243 ±.006	.500 ±.010	.10825	25.05	6.15	12.70
87-817	.991	.087 ±.003	.817 ±.010	.01688	25.15	2.20	20.75
24-945	.993	.024 ±.003	.945 ±.009	.00138	25.20	.60	24.00
118-748VS	.993	.119 ±.004	.755 ±.010	.03054	25.20	3.00	19.20
68-843SS	.994	.069 ±.003	.856 ±.009	.01087	25.25	1.75	21.75
70-831SS	.994	.072 ±.003	.850 ±.009	.01179	25.25	1.85	21.60
47-894SS	.999	.048 ±.003	.903 ±.009	.00541	25.35	1.20	22.95
70-850VS	1.000	.071 ±.003	.858 ±.009	.01156	25.40	1.80	21.80
1-020	1.004	.070 ±.003	.864 ±.009	.01129	25.50	1.80	21.95
104-787VS	1.004	.105 ±.003	.794 ±.009	.02446	25.50	2.65	20.15
1-117	1.005	.103 ±.003	.799 ±.010	.02361	25.55	2.60	20.30
159-688	1.006	.159 ±.005	.688 ±.009	.05283	25.55	4.05	17.50
185-625SS	1.006	.187 ±.005	.632 ±.009	.07067	25.55	4.75	16.05
70-868	1.008	.070 ±.003	.868 ±.009	.01134	25.60	1.80	22.05
40-929	1.009	.040 ±.003	.929 ±.009	.00383	25.65	1.00	23.60
40-930	1.010	.040 ±.003	.930 ±.009	.00383	25.65	1.00	23.60
70-843SSS	1.010	.072 ±.003	.866 ±.009	.01200	25.65	1.85	22.00
270-470	1.010	.270 ±.006	.470 ±.010	.13311	25.65	6.85	11.95
1-210	1.012	.139 ±.004	.734 ±.010	.04162	25.70	3.55	18.65
52-910	1.014	.052 ±.003	.910 ±.009	.00642	25.75	1.30	23.10
218-578	1.014	.218 ±.006	.578 ±.010	.09334	25.75	5.55	14.70
104-809	1.017	.104 ±.003	.809 ±.010	.02437	25.85	2.65	20.55
71-876	1.018	.071 ±.003	.876 ±.009	.01178	25.85	1.80	22.25
190-638	1.018	.190 ±.005	.638 ±.009	.07375	25.85	4.85	16.20
39-945NS	1.020	.039 ±.003	.942 ±.009	.00368	25.90	1.00	23.95
103-814	1.020	.103 ±.003	.814 ±.010	.02400	25.90	2.60	20.70
70-879ES	1.022	.070 ±.003	.882 ±.009	.01151	25.95	1.80	22.40
80-850SS	1.022	.081 ±.003	.860 ±.010	.01523	25.95	2.05	21.85
1-312	1.022	.210 ±.005	.600 ±.009	.08836	25.95	5.35	15.25
59-905	1.023	.059 ±.003	.905 ±.009	.00828	26.00	1.50	23.00
54-908SS	1.027	.055 ±.003	.917 ±.009	.00725	26.10	1.40	23.30
79-866ES	1.028	.079 ±.003	.870 ±.010	.01461	26.10	2.00	22.10
35-950SS	1.029	.035 ±.003	.959 ±.009	.00300	26.15	.90	24.35
40-950	1.030	.040 ±.003	.950 ±.009	.00391	26.15	1.00	24.15
118-787VS	1.032	.119 ±.004	.794 ±.010	.03190	26.20	3.00	20.15
70-879SS	1.038	.071 ±.003	.896 ±.009	.01203	26.35	1.80	22.75
45-945ES	1.040	.045 ±.003	.950 ±.009	.00497	26.40	1.15	24.15
157-715VS	1.040	.159 ±.005	.722 ±.009	.05496	26.40	4.05	18.35
139-765	1.043	.139 ±.004	.765 ±.010	.04310	26.50	3.55	19.45
158-730	1.046	.158 ±.005	.730 ±.009	.05470	26.55	4.00	18.55



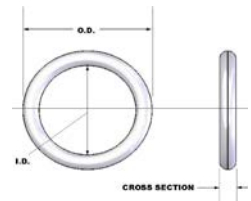
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
118-795SS	1.050	.120 ±.004	.810 ±.010	.03304	26.65	3.05	20.55
104-835VS	1.053	.105 ±.003	.843 ±.010	.02579	26.75	2.65	21.40
30-980SS	1.054	.030 ±.003	.994 ±.010	.00227	26.75	.75	25.25
103-850	1.054	.103 ±.003	.848 ±.010	.02489	26.75	2.60	21.55
80-880SS	1.055	.081 ±.003	.893 ±.010	.01577	26.80	2.05	22.70
90-854SS	1.056	.092 ±.003	.872 ±.010	.02013	26.80	2.35	22.15
32-995	1.059	.032 ±.003	.995 ±.010	.00259	26.90	.80	25.25
39-984NS	1.059	.039 ±.003	.981 ±.009	.00383	26.90	1.00	24.90
1-021	1.066	.070 ±.003	.926 ±.009	.01204	27.10	1.80	23.50
46-967VS	1.068	.046 ±.003	.976 ±.009	.00534	27.15	1.15	24.80
1-118	1.068	.103 ±.003	.862 ±.010	.02526	27.15	2.60	21.90
72-926	1.070	.072 ±.003	.926 ±.009	.01277	27.20	1.85	23.50
83-906	1.072	.083 ±.003	.906 ±.010	.01681	27.25	2.10	23.00
59-945SS	1.074	.060 ±.003	.954 ±.009	.00901	27.30	1.50	24.25
1-211	1.074	.139 ±.004	.796 ±.010	.04457	27.30	3.55	20.20
55-690VS	1.075	.055 ±.003	.965 ±.009	.00761	27.30	1.40	24.50
71-935	1.077	.071 ±.003	.935 ±.009	.01251	27.35	1.80	23.75
125-827	1.077	.125 ±.004	.827 ±.010	.03670	27.35	3.20	21.00
104-870	1.078	.104 ±.003	.870 ±.010	.02599	27.40	2.65	22.10
30-1.010VS	1.079	.030 ±.003	1.019 ±.010	.00233	27.40	.75	25.90
45-990	1.080	.045 ±.003	.990 ±.010	.00517	27.45	1.15	25.15
140-800	1.080	.140 ±.004	.800 ±.010	.04546	27.45	3.55	20.30
50-970SS	1.082	.051 ±.003	.980 ±.009	.00662	27.50	1.30	24.90
70-943	1.083	.070 ±.003	.943 ±.009	.01225	27.50	1.80	23.95
50-984	1.084	.050 ±.003	.984 ±.009	.00638	27.55	1.25	25.00
1-313	1.084	.210 ±.005	.662 ±.009	.09510	27.55	5.35	16.80
81-925	1.087	.081 ±.003	.925 ±.010	.01629	27.60	2.05	23.50
63-962	1.088	.063 ±.003	.962 ±.009	.01004	27.65	1.60	24.45
39-1.010ES	1.093	.039 ±.003	1.015 ±.010	.00396	27.75	1.00	25.80
1-911	1.095	.116 ±.004	.863 ±.010	.03250	27.80	2.95	21.90
155-790	1.100	.155 ±.005	.790 ±.010	.05602	27.95	3.95	20.05
32-1.039	1.103	.032 ±.003	1.039 ±.010	.00271	28.00	.80	26.40
79-945	1.103	.079 ±.003	.945 ±.010	.01577	28.00	2.00	24.00
58-989	1.105	.058 ±.003	.989 ±.010	.00869	28.05	1.45	25.10
63-970ES	1.107	.064 ±.003	.979 ±.009	.01054	28.10	1.65	24.85
55-1.000	1.110	.055 ±.003	1.000 ±.010	.00787	28.20	1.40	25.40
88-910SS	1.111	.090 ±.003	.931 ±.010	.02041	28.20	2.30	23.65
118-866SS	1.111	.119 ±.004	.873 ±.010	.03466	28.20	3.00	22.15
32-1.050	1.114	.032 ±.003	1.050 ±.010	.00273	28.30	.80	26.65
40-1.040	1.120	.040 ±.003	1.040 ±.010	.00426	28.45	1.00	26.40
178-767	1.123	.178 ±.005	.767 ±.010	.07388	28.50	4.50	19.50
150-825	1.125	.150 ±.005	.825 ±.010	.05413	28.60	3.80	20.95
1-022	1.129	.070 ±.003	.989 ±.010	.01280	28.70	1.80	25.10
135-859	1.129	.135 ±.004	.859 ±.010	.04470	28.70	3.45	21.80
47-1.024SS	1.130	.048 ±.003	1.034 ±.010	.00615	28.70	1.20	26.25



# Engineers Guide for O-Rings

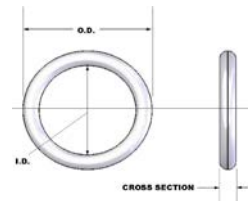


Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
59-1.012	1.130	.059 ±.003	1.012 ±.010	.00920	28.70	1.50	25.70
1-119	1.130	.103 ±.003	.924 ±.010	.02688	28.70	2.60	23.45
156-800SS	1.131	.159 ±.005	.813 ±.010	.06063	28.75	4.05	20.65
26-1.080	1.132	.026 ±.003	1.080 ±.010	.00184	28.75	.65	27.45
31-1.071	1.133	.031 ±.003	1.071 ±.010	.00261	28.80	.80	27.20
70-985SS	1.134	.071 ±.003	.992 ±.010	.01322	28.80	1.80	25.20
1-212	1.137	.139 ±.004	.859 ±.010	.04758	28.90	3.55	21.80
71-998	1.140	.071 ±.003	.998 ±.010	.01330	28.95	1.80	25.35
104-933	1.141	.104 ±.003	.933 ±.010	.02767	29.00	2.65	23.70
40-1.062	1.142	.040 ±.003	1.062 ±.010	.00435	29.00	1.00	26.95
79-984	1.142	.079 ±.003	.984 ±.010	.01637	29.00	2.00	25.00
249-635SS	1.142	.251 ±.005	.640 ±.008	.13850	29.00	6.40	16.25
103-940	1.146	.103 ±.003	.940 ±.010	.02730	29.10	2.60	23.90
39-1.063VS	1.147	.039 ±.003	1.069 ±.010	.00416	29.15	1.00	27.15
1-314	1.147	.210 ±.005	.725 ±.010	.10196	29.15	5.35	18.40
53-1.037ES	1.148	.053 ±.003	1.042 ±.010	.00759	29.15	1.35	26.45
53-1.037ES	1.148	.053 ±.003	1.042 ±.010	.00759	29.15	1.35	26.45
130-888	1.148	.130 ±.004	.888 ±.010	.04245	29.15	3.30	22.55
125-900	1.150	.125 ±.004	.900 ±.010	.03952	29.20	3.20	22.85
37-1.080	1.156	.037 ±.003	1.082 ±.010	.00378	29.35	.95	27.50
1-912	1.156	.116 ±.004	.924 ±.010	.03453	29.35	2.95	23.45
156-844	1.156	.156 ±.005	.844 ±.010	.06005	29.35	3.95	21.45
156-837ES	1.156	.157 ±.003	.842 ±.010	.06076	29.35	4.00	21.40
70-1.015ES	1.157	.070 ±.003	1.017 ±.010	.01314	29.40	1.80	25.85
114-929	1.157	.114 ±.004	.929 ±.010	.03345	29.40	2.90	23.60
176-787SS	1.157	.179 ±.005	.799 ±.010	.07732	29.40	4.55	20.30
150-850VS	1.158	.151 ±.005	.856 ±.010	.05665	29.40	3.85	21.75
25-1.110	1.160	.025 ±.003	1.110 ±.010	.00175	29.45	.65	28.20
65-1.030	1.160	.065 ±.003	1.030 ±.010	.01142	29.45	1.65	26.15
360-440	1.160	.360 ±.007	.440 ±.005	.25582	29.45	9.15	11.20
32-1.100	1.164	.032 ±.003	1.100 ±.010	.00286	29.55	.80	27.95
25-1.115	1.165	.025 ±.003	1.115 ±.010	.00176	29.60	.65	28.30
65-1.030ES	1.165	.065 ±.003	1.035 ±.010	.01147	29.60	1.65	26.30
40-1.086	1.166	.040 ±.003	1.086 ±.010	.00445	29.60	1.00	27.60
80-1.000SS	1.170	.080 ±.003	1.010 ±.010	.01721	29.70	2.05	25.65
123-924	1.170	.123 ±.004	.924 ±.010	.03908	29.70	3.10	23.45
31-1.109	1.171	.031 ±.003	1.109 ±.010	.00270	29.75	.80	28.15
60-1.051	1.171	.060 ±.003	1.051 ±.010	.00987	29.75	1.50	26.70
158-855SS	1.176	.159 ±.005	.858 ±.010	.06344	29.85	4.05	21.80
59-1.063	1.181	.059 ±.003	1.063 ±.010	.00964	30.00	1.50	27.00
100-984	1.184	.100 ±.003	.984 ±.010	.02675	30.05	2.55	25.00
40-1.105	1.185	.040 ±.003	1.105 ±.010	.00452	30.10	1.00	28.05
150-886	1.186	.150 ±.005	.886 ±.010	.05752	30.10	3.80	22.50
43-1.101	1.187	.043 ±.003	1.101 ±.010	.00522	30.15	1.10	27.95
141-905	1.187	.141 ±.004	.905 ±.010	.05131	30.15	3.60	23.00





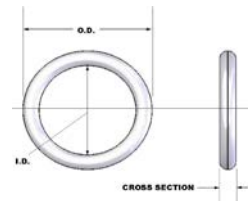
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
63-1.063	1.189	.063 ±.003	1.063 ±.010	.01103	30.20	1.60	27.00
118-953	1.189	.118 ±.004	.953 ±.010	.03680	30.20	3.00	24.20
1-023	1.191	.070 ±.003	1.051 ±.010	.01355	30.25	1.80	26.70
36-1.118	1.192	.036 ±.003	1.120 ±.010	.00370	30.30	.90	28.45
62-1.069	1.193	.062 ±.003	1.069 ±.010	.01073	30.30	1.55	27.15
1-120	1.193	.103 ±.003	.987 ±.010	.02853	30.30	2.60	25.05
43-1.101SS	1.196	.043 ±.003	1.110 ±.010	.00526	30.40	1.10	28.20
1-213	1.199	.139 ±.004	.921 ±.010	.05053	30.45	3.55	23.40
71-1.061	1.203	.071 ±.003	1.061 ±.010	.01408	30.55	1.80	26.95
47-1.106ES	1.205	.047 ±.003	1.111 ±.010	.00631	30.60	1.20	28.20
40-1.116VS	1.206	.040 ±.003	1.126 ±.010	.00460	30.65	1.00	28.60
156-875SS	1.207	.159 ±.005	.889 ±.010	.06537	30.65	4.05	22.60
71-1.046SS	1.209	.072 ±.003	1.065 ±.010	.01454	30.70	1.85	27.05
1-315	1.209	.210 ±.005	.787 ±.010	.10870	30.70	5.35	20.00
185-840	1.210	.185 ±.005	.840 ±.010	.08656	30.75	4.70	21.35
125-950SS	1.212	.126 ±.004	.960 ±.010	.04254	30.80	3.20	24.40
1-913	1.218	.116 ±.004	.986 ±.010	.03659	30.95	2.95	25.05
50-1.106SS	1.219	.051 ±.003	1.117 ±.010	.00750	30.95	1.30	28.35
210-799	1.219	.210 ±.005	.799 ±.010	.10979	30.95	5.35	20.30
65-1.090	1.220	.065 ±.003	1.090 ±.015	.01204	31.00	1.65	27.70
141-938	1.220	.141 ±.004	.938 ±.010	.05293	31.00	3.60	23.85
79-1.063	1.221	.079 ±.003	1.063 ±.010	.01759	31.00	2.00	27.00
103-1.008ES	1.222	.104 ±.003	1.014 ±.010	.02984	31.05	2.65	25.75
72-1.081	1.225	.072 ±.003	1.081 ±.010	.01475	31.10	1.85	27.45
93-1.040	1.226	.093 ±.003	1.040 ±.010	.02418	31.15	2.35	26.40
49-1.130	1.228	.049 ±.003	1.130 ±.010	.00698	31.20	1.25	28.70
139-953	1.231	.139 ±.004	.953 ±.010	.05206	31.25	3.55	24.20
28-1.181	1.237	.028 ±.003	1.181 ±.011	.00234	31.40	.70	30.00
275-687	1.237	.275 ±.006	.687 ±.010	.17951	31.40	7.00	17.45
70-1.082SS	1.242	.071 ±.003	1.100 ±.010	.01457	31.55	1.80	27.95
45-1.153	1.243	.045 ±.003	1.153 ±.010	.00599	31.55	1.15	29.30
46-1.130SS	1.243	.047 ±.003	1.149 ±.010	.00652	31.55	1.20	29.20
30-1.190	1.250	.030 ±.003	1.190 ±.011	.00271	31.75	.75	30.25
250-750	1.250	.250 ±.006	.750 ±.010	.15421	31.75	6.35	19.05
93-1.065	1.251	.093 ±.003	1.065 ±.010	.02471	31.80	2.35	27.05
1-024	1.254	.070 ±.003	1.114 ±.010	.01431	31.85	1.80	28.30
1-121	1.255	.103 ±.003	1.049 ±.010	.03016	31.90	2.60	26.65
78-1.102	1.258	.078 ±.003	1.102 ±.010	.01771	31.95	2.00	28.00
98-1.063	1.259	.098 ±.003	1.063 ±.010	.02751	32.00	2.50	27.00
56-1.148	1.260	.056 ±.003	1.148 ±.010	.00932	32.00	1.40	29.15
47-1.161ES	1.261	.047 ±.003	1.167 ±.010	.00662	32.05	1.20	29.65
54-1.153	1.261	.054 ±.003	1.153 ±.010	.00868	32.05	1.35	29.30
1-214	1.262	.139 ±.004	.984 ±.010	.05354	32.05	3.55	25.00
223-813SS	1.263	.224 ±.006	.815 ±.010	.12863	32.10	5.70	20.70
197-866	1.265	.198 ±.005	.869 ±.010	.10321	32.15	5.05	22.05



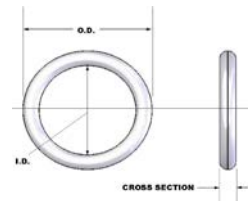
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
39-1.189	1.267	.039 ±.003	1.189 ±.011	.00461	32.20	1.00	30.20
90-1.091SS	1.267	.090 ±.003	1.087 ±.010	.02352	32.20	2.30	27.60
104-1.059	1.267	.104 ±.003	1.059 ±.010	.03104	32.20	2.65	26.90
140-988	1.268	.140 ±.004	.988 ±.010	.05455	32.20	3.55	25.10
156-938SS	1.269	.158 ±.005	.953 ±.010	.06843	32.25	4.00	24.20
1-316	1.270	.210 ±.005	.850 ±.010	.11534	32.25	5.35	21.60
345-580	1.270	.345 ±.007	.580 ±.007	.27166	32.25	8.75	14.75
70-1.114SS	1.272	.071 ±.003	1.130 ±.010	.01494	32.30	1.80	28.70
190-870SS	1.275	.194 ±.005	.887 ±.010	.10039	32.40	4.95	22.55
81-1.114	1.276	.081 ±.003	1.114 ±.010	.01935	32.40	2.05	28.30
1-914	1.279	.116 ±.004	1.047 ±.010	.03861	32.50	2.95	26.60
70-1.135ES	1.281	.070 ±.003	1.141 ±.010	.01464	32.55	1.80	29.00
203-875	1.281	.203 ±.005	.875 ±.010	.10961	32.55	5.15	22.25
141-1.005	1.287	.141 ±.004	1.005 ±.010	.05622	32.70	3.60	25.55
31-1.226	1.288	.031 ±.003	1.226 ±.011	.00298	32.70	.80	31.15
65-1.140SS	1.291	.066 ±.003	1.159 ±.010	.01317	32.80	1.70	29.45
60-1.173	1.293	.060 ±.003	1.173 ±.010	.01095	32.85	1.50	29.80
31-1.226ES	1.294	.031 ±.003	1.232 ±.010	.00299	32.85	.80	31.30
40-1.220	1.300	.040 ±.003	1.220 ±.011	.00497	33.00	1.00	31.00
52-1.176SS	1.300	.053 ±.003	1.194 ±.011	.00864	33.00	1.35	30.35
62-1.176	1.300	.062 ±.003	1.176 ±.011	.01174	33.00	1.55	29.85
69-1.157VS	1.308	.070 ±.003	1.168 ±.010	.01497	33.20	1.80	29.65
47-1.201SS	1.309	.048 ±.003	1.213 ±.011	.00717	33.25	1.20	30.80
281-750	1.312	.281 ±.006	.750 ±.010	.20087	33.30	7.15	19.05
1-025	1.316	.070 ±.003	1.176 ±.011	.01506	33.45	1.80	29.85
50-1.204SS	1.318	.051 ±.003	1.216 ±.011	.00813	33.50	1.30	30.90
1-122	1.318	.103 ±.003	1.112 ±.010	.03180	33.50	2.60	28.25
1-215	1.324	.139 ±.004	1.046 ±.010	.05649	33.65	3.55	26.55
60-1.214NS	1.325	.060 ±.003	1.205 ±.011	.01124	33.65	1.50	30.60
176-975	1.327	.176 ±.005	.975 ±.010	.08797	33.70	4.45	24.75
195-938	1.328	.195 ±.005	.938 ±.010	.10630	33.75	4.95	23.85
71-1.188	1.330	.071 ±.003	1.188 ±.011	.01566	33.80	1.80	30.20
30-1.272	1.332	.030 ±.003	1.272 ±.011	.00289	33.85	.75	32.30
60-1.203ES	1.332	.060 ±.003	1.212 ±.011	.01130	33.85	1.50	30.80
104-1.125	1.333	.104 ±.003	1.125 ±.010	.03280	33.85	2.65	28.60
60-1.190SS	1.334	.060 ±.003	1.214 ±.011	.01132	33.90	1.50	30.85
156-1.000SS	1.334	.159 ±.005	1.016 ±.010	.07329	33.90	4.05	25.80
1-317	1.334	.210 ±.005	.912 ±.010	.12231	33.90	5.35	23.15
140-1.056	1.336	.140 ±.004	1.056 ±.010	.05784	33.95	3.55	26.80
76-1.188	1.340	.076 ±.003	1.188 ±.012	.01801	34.05	1.95	30.20
40-1.249VS	1.341	.040 ±.003	1.261 ±.011	.00514	34.05	1.00	32.05
1-915	1.341	.116 ±.004	1.109 ±.012	.04067	34.05	2.95	28.15
52-1.245	1.349	.052 ±.003	1.245 ±.011	.00865	34.25	1.30	31.60
50-1.250	1.350	.050 ±.003	1.250 ±.011	.00802	34.30	1.25	31.75
54-1.228SS	1.350	.055 ±.003	1.240 ±.011	.00967	34.30	1.40	31.50



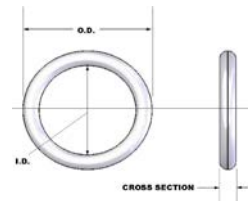
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
47-1.245SS	1.351	.047 ±.003	1.257 ±.011	.00711	34.30	1.20	31.95
47-1.257VS	1.360	.047 ±.003	1.266 ±.011	.00716	34.55	1.20	32.15
70-1.220ES	1.362	.070 ±.003	1.222 ±.011	.01562	34.60	1.80	31.05
53-1.257	1.363	.053 ±.003	1.257 ±.011	.00908	34.60	1.35	31.95
50-1.257SS	1.364	.050 ±.003	1.264 ±.011	.00811	34.65	1.25	32.10
118-1.121ES	1.367	.119 ±.004	1.129 ±.012	.04361	34.70	3.00	28.70
39-1.290	1.368	.039 ±.003	1.290 ±.011	.00499	34.75	1.00	32.75
174-1.020	1.368	.174 ±.005	1.020 ±.010	.08920	34.75	4.40	25.90
94-1.188	1.376	.094 ±.003	1.188 ±.012	.02795	34.95	2.40	30.20
1-026	1.379	.070 ±.003	1.239 ±.011	.01583	35.05	1.80	31.45
1-123	1.380	.103 ±.003	1.174 ±.012	.03343	35.05	2.60	29.80
215-950	1.380	.215 ±.005	.950 ±.010	.13287	35.05	5.45	24.15
197-984VS	1.384	.198 ±.005	.988 ±.010	.11472	35.15	5.05	25.10
1-216	1.387	.139 ±.004	1.109 ±.012	.05950	35.25	3.55	28.15
40-1.310	1.390	.040 ±.003	1.310 ±.011	.00533	35.30	1.00	33.25
78-1.234	1.390	.078 ±.003	1.234 ±.012	.01970	35.30	2.00	31.35
31-1.331	1.393	.031 ±.003	1.331 ±.011	.00323	35.40	.80	33.80
71-1.251	1.393	.071 ±.003	1.251 ±.011	.01644	35.40	1.80	31.80
114-1.165	1.393	.114 ±.004	1.165 ±.012	.04101	35.40	2.90	29.60
60-1.274	1.394	.060 ±.003	1.274 ±.011	.01185	35.40	1.50	32.35
104-1.186	1.394	.104 ±.003	1.186 ±.012	.03443	35.40	2.65	30.10
1-318	1.395	.210 ±.005	.975 ±.010	.12894	35.45	5.35	24.75
70-1.240VS	1.397	.071 ±.003	1.255 ±.011	.01649	35.50	1.80	31.90
65-1.262ES	1.398	.065 ±.003	1.268 ±.011	.01390	35.50	1.65	32.20
140-1.119	1.399	.140 ±.004	1.119 ±.012	.06089	35.55	3.55	28.40
55-1.290	1.400	.055 ±.003	1.290 ±.011	.01004	35.55	1.40	32.75
1-916	1.403	.116 ±.004	1.171 ±.012	.04273	35.65	2.95	29.75
275-859	1.409	.275 ±.006	.859 ±.010	.21160	35.80	7.00	21.80
415-580	1.410	.415 ±.009	.580 ±.007	.42282	35.80	10.55	14.75
70-1.240SS	1.411	.072 ±.003	1.267 ±.011	.01713	35.85	1.85	32.20
157-1.102	1.416	.157 ±.005	1.102 ±.012	.07657	35.95	4.00	28.00
40-1.310SS	1.417	.041 ±.003	1.335 ±.011	.00571	36.00	1.05	33.90
39-1.340	1.418	.039 ±.003	1.340 ±.011	.00518	36.00	1.00	34.05
125-1.160ES	1.420	.126 ±.004	1.168 ±.012	.05069	36.05	3.20	29.65
55-1.307ES	1.423	.055 ±.003	1.313 ±.011	.01021	36.15	1.40	33.35
60-1.304	1.424	.060 ±.003	1.304 ±.011	.01212	36.15	1.50	33.10
50-1.325	1.425	.050 ±.003	1.325 ±.011	.00848	36.20	1.25	33.65
158-1.105SS	1.427	.159 ±.005	1.109 ±.012	.07910	36.25	4.05	28.15
176-1.077	1.429	.176 ±.005	1.077 ±.010	.09577	36.30	4.45	27.35
45-1.340	1.430	.045 ±.003	1.340 ±.011	.00692	36.30	1.15	34.05
104-1.222	1.430	.104 ±.003	1.222 ±.012	.03539	36.30	2.65	31.05
71-1.280VS	1.437	.072 ±.003	1.293 ±.011	.01746	36.50	1.85	32.85
30-1.377ES	1.439	.030 ±.003	1.379 ±.013	.00313	36.55	.75	35.05
167-1.105	1.439	.167 ±.005	1.105 ±.012	.08753	36.55	4.25	28.05
151-1.138	1.440	.151 ±.005	1.138 ±.012	.07252	36.60	3.85	28.90



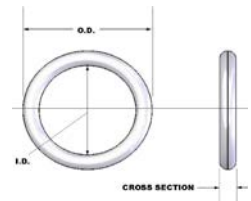
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
1-027	1.441	.070 ±.003	1.301 ±.011	.01658	36.60	1.80	33.05
70-1.281SS	1.443	.071 ±.003	1.301 ±.011	.01707	36.65	1.80	33.05
92-1.259	1.443	.092 ±.003	1.259 ±.012	.02821	36.65	2.35	32.00
1-124	1.443	.103 ±.003	1.237 ±.012	.03508	36.65	2.60	31.40
149-1.136SS	1.445	.149 ±.005	1.147 ±.012	.07099	36.70	3.80	29.15
235-975	1.445	.235 ±.006	.975 ±.010	.16488	36.70	5.95	24.75
1-217	1.449	.139 ±.004	1.171 ±.012	.06245	36.80	3.55	29.75
176-1.100	1.452	.176 ±.005	1.100 ±.012	.09752	36.90	4.45	27.95
40-1.350SS	1.453	.041 ±.003	1.371 ±.013	.00586	36.90	1.05	34.80
71-1.314	1.456	.071 ±.003	1.314 ±.011	.01723	37.00	1.80	33.40
140-1.176	1.456	.140 ±.004	1.176 ±.012	.06364	37.00	3.55	29.85
104-1.249	1.457	.104 ±.003	1.249 ±.012	.03611	37.00	2.65	31.70
1-319	1.457	.210 ±.005	1.037 ±.010	.13569	37.00	5.35	26.35
187-1.088	1.462	.187 ±.005	1.088 ±.010	.11001	37.15	4.75	27.65
48-1.375	1.471	.048 ±.003	1.375 ±.013	.00809	37.35	1.20	34.95
149-1.180	1.478	.149 ±.005	1.180 ±.012	.07280	37.55	3.80	29.95
250-980	1.480	.250 ±.006	.980 ±.010	.18968	37.60	6.35	24.90
213-1.057	1.483	.213 ±.005	1.057 ±.010	.14217	37.65	5.40	26.85
45-1.395	1.485	.045 ±.003	1.395 ±.013	.00719	37.70	1.15	35.45
395-677SS	1.485	.400 ±.009	.685 ±.010	.42834	37.70	10.15	17.40
212-1.060VS	1.491	.213 ±.005	1.065 ±.010	.14306	37.85	5.40	27.05
275-945	1.495	.275 ±.006	.945 ±.010	.22765	37.95	7.00	24.00
312-875	1.499	.312 ±.006	.875 ±.010	.28510	38.05	7.90	22.25
1-028	1.504	.070 ±.003	1.364 ±.013	.01734	38.20	1.80	34.65
1-125	1.505	.103 ±.003	1.299 ±.012	.03670	38.25	2.60	33.00
157-1.181	1.507	.158 ±.005	1.191 ±.012	.08309	38.30	4.00	30.25
141-1.226	1.508	.141 ±.004	1.226 ±.012	.06706	38.30	3.60	31.15
176-1.156	1.508	.176 ±.005	1.156 ±.012	.10181	38.30	4.45	29.35
50-1.406	1.511	.050 ±.003	1.411 ±.013	.00901	38.40	1.25	35.85
149-1.213	1.511	.149 ±.005	1.213 ±.012	.07461	38.40	3.80	30.80
1-218	1.512	.139 ±.004	1.234 ±.012	.06545	38.40	3.55	31.35
39-1.437	1.515	.039 ±.003	1.437 ±.013	.00554	38.50	1.00	36.50
70-1.370ES	1.516	.070 ±.003	1.376 ±.013	.01748	38.50	1.80	34.95
93-1.320SS	1.518	.094 ±.003	1.330 ±.012	.03105	38.55	2.40	33.80
104-1.311	1.519	.104 ±.003	1.311 ±.012	.03776	38.60	2.65	33.30
50-1.420	1.520	.050 ±.003	1.420 ±.013	.00907	38.60	1.25	36.05
120-1.280	1.520	.120 ±.004	1.280 ±.012	.04974	38.60	3.05	32.50
1-320	1.520	.210 ±.005	1.100 ±.012	.14254	38.60	5.35	27.95
92-1.338	1.522	.092 ±.003	1.338 ±.012	.02986	38.65	2.35	34.00
50-1.419ES	1.526	.050 ±.003	1.426 ±.013	.00910	38.75	1.25	36.20
140-1.246	1.526	.140 ±.004	1.246 ±.012	.06703	38.75	3.55	31.65
71-1.387	1.529	.071 ±.003	1.387 ±.013	.01813	38.85	1.80	35.25
60-1.403ES	1.530	.060 ±.003	1.410 ±.013	.01306	38.85	1.50	35.80
80-1.370	1.530	.080 ±.003	1.370 ±.012	.02290	38.85	2.05	34.80
157-1.220	1.534	.157 ±.005	1.220 ±.012	.08375	38.95	4.00	31.00



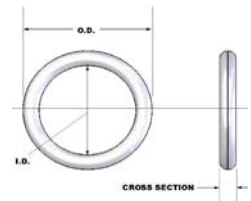
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
60-1.415	1.535	.060 ±.003	1.415 ±.013	.01310	39.00	1.50	35.95
212-1.111	1.535	.212 ±.005	1.111 ±.012	.14671	39.00	5.40	28.20
63-1.394SS	1.536	.064 ±.003	1.408 ±.013	.01488	39.00	1.65	35.75
70-1.378VS	1.539	.071 ±.003	1.397 ±.013	.01826	39.10	1.80	35.50
77-1.362VS	1.543	.078 ±.003	1.387 ±.012	.02199	39.20	2.00	35.25
193-1.158	1.544	.193 ±.005	1.158 ±.012	.12417	39.20	4.90	29.40
47-1.453	1.547	.047 ±.003	1.453 ±.013	.00818	39.30	1.20	36.90
31-1.491	1.553	.031 ±.003	1.491 ±.013	.00361	39.45	.80	37.85
39-1.476	1.554	.039 ±.003	1.476 ±.013	.00569	39.45	1.00	37.50
250-1.062NS	1.554	.249 ±.006	1.056 ±.010	.19964	39.45	6.30	26.80
300-957	1.557	.300 ±.006	.957 ±.010	.27914	39.55	7.60	24.30
38-1.463SS	1.563	.039 ±.003	1.485 ±.013	.00572	39.70	1.00	37.70
229-1.099SS	1.563	.230 ±.006	1.103 ±.012	.17399	39.70	5.85	28.00
70-1.424	1.564	.070 ±.003	1.424 ±.013	.01806	39.75	1.80	36.15
75-1.414	1.564	.075 ±.003	1.414 ±.012	.02067	39.75	1.90	35.90
139-1.265SS	1.565	.141 ±.004	1.283 ±.012	.06985	39.75	3.60	32.60
70-1.427	1.567	.070 ±.003	1.427 ±.013	.01810	39.80	1.80	36.25
1-126	1.568	.103 ±.003	1.362 ±.012	.03835	39.85	2.60	34.60
173-1.225	1.571	.173 ±.005	1.225 ±.012	.10324	39.90	4.40	31.10
70-1.424SS	1.572	.070 ±.003	1.432 ±.013	.01816	39.95	1.80	36.35
78-1.417	1.573	.078 ±.003	1.417 ±.012	.02244	39.95	2.00	36.00
1-219	1.574	.139 ±.004	1.296 ±.012	.06841	40.00	3.55	32.90
176-1.225	1.577	.176 ±.005	1.225 ±.012	.10708	40.05	4.45	31.10
215-1.147	1.577	.215 ±.005	1.147 ±.012	.15534	40.05	5.45	29.15
321-937	1.579	.321 ±.007	.937 ±.010	.31984	40.10	8.15	23.80
1-321	1.582	.210 ±.005	1.162 ±.012	.14929	40.20	5.35	29.50
1-918	1.587	.116 ±.004	1.355 ±.012	.04884	40.30	2.95	34.40
176-1.236	1.588	.176 ±.005	1.236 ±.012	.10792	40.35	4.45	31.40
140-1.309	1.589	.140 ±.004	1.309 ±.012	.07008	40.35	3.55	33.25
90-1.387SS	1.595	.092 ±.003	1.411 ±.012	.03139	40.50	2.35	35.85
70-1.437SS	1.596	.071 ±.003	1.454 ±.013	.01897	40.55	1.80	36.95
47-1.484SS	1.597	.048 ±.003	1.501 ±.013	.00881	40.55	1.20	38.15
45-1.510	1.600	.045 ±.003	1.510 ±.013	.00777	40.65	1.15	38.35
50-1.500	1.600	.050 ±.003	1.500 ±.013	.00956	40.65	1.25	38.10
275-1.050	1.600	.275 ±.006	1.050 ±.010	.24724	40.65	7.00	26.65
93-1.415	1.601	.093 ±.003	1.415 ±.012	.03218	40.65	2.35	35.95
65-1.465ES	1.602	.065 ±.003	1.472 ±.013	.01602	40.70	1.65	37.40
70-1.465	1.605	.070 ±.003	1.465 ±.013	.01856	40.75	1.80	37.20
210-1.187	1.607	.210 ±.005	1.187 ±.012	.15201	40.80	5.35	30.15
62-1.485	1.609	.062 ±.003	1.485 ±.013	.01467	40.85	1.55	37.70
55-1.500	1.610	.055 ±.003	1.500 ±.013	.01161	40.90	1.40	38.10
63-1.472ES	1.614	.064 ±.003	1.486 ±.013	.01567	41.00	1.65	37.75
40-1.520VS	1.616	.040 ±.003	1.536 ±.013	.00622	41.05	1.00	39.00
210-1.200	1.620	.210 ±.005	1.200 ±.012	.15343	41.15	5.35	30.50
98-1.417VS	1.624	.099 ±.003	1.426 ±.012	.03688	41.25	2.50	36.20



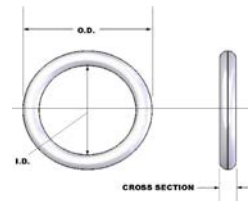
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
197-1.230	1.624	.197 ±.005	1.230 ±.012	.13665	41.25	5.00	31.25
94-1.437	1.625	.094 ±.003	1.437 ±.012	.03338	41.30	2.40	36.50
79-1.457ES	1.626	.080 ±.003	1.466 ±.012	.02441	41.30	2.05	37.25
1-029	1.629	.070 ±.003	1.489 ±.013	.01885	41.40	1.80	37.80
45-1.540	1.630	.045 ±.003	1.540 ±.013	.00792	41.40	1.15	39.10
1-127	1.630	.103 ±.003	1.424 ±.012	.03997	41.40	2.60	36.15
56-1.506SS	1.634	.057 ±.003	1.520 ±.013	.01264	41.50	1.45	38.60
50-1.527ES	1.636	.050 ±.003	1.536 ±.013	.00978	41.55	1.25	39.00
1-220	1.637	.139 ±.004	1.359 ±.012	.07141	41.60	3.55	34.50
32-1.559SS	1.638	.032 ±.003	1.574 ±.013	.00406	41.60	.80	40.00
74-1.489ES	1.641	.074 ±.003	1.493 ±.012	.02117	41.70	1.90	37.90
140-1.365	1.645	.140 ±.004	1.365 ±.012	.07278	41.80	3.55	34.65
1-322	1.645	.210 ±.005	1.225 ±.012	.15615	41.80	5.35	31.10
111-1.424	1.646	.111 ±.004	1.424 ±.012	.04667	41.80	2.80	36.15
39-1.574NS	1.647	.039 ±.003	1.569 ±.013	.00603	41.85	1.00	39.85
275-1.100	1.650	.275 ±.006	1.100 ±.012	.25657	41.90	7.00	27.95
81-1.489	1.651	.081 ±.003	1.489 ±.012	.02542	41.95	2.05	37.80
71-1.510	1.652	.071 ±.003	1.510 ±.013	.01966	41.95	1.80	38.35
59-1.535	1.653	.059 ±.003	1.535 ±.013	.01369	42.00	1.50	39.00
406-844	1.656	.406 ±.009	.844 ±.010	.50840	42.05	10.30	21.45
212-1.237	1.661	.212 ±.005	1.237 ±.012	.16069	42.20	5.40	31.40
105-1.452	1.662	.105 ±.003	1.452 ±.012	.04236	42.20	2.65	36.90
275-1.100VS	1.664	.275 ±.006	1.114 ±.012	.25918	42.25	7.00	28.30
47-1.575	1.669	.047 ±.003	1.575 ±.013	.00884	42.40	1.20	40.00
55-1.560	1.670	.055 ±.003	1.560 ±.013	.01205	42.40	1.40	39.60
210-1.260	1.680	.210 ±.005	1.260 ±.012	.15995	42.65	5.35	32.00
148-1.385	1.681	.148 ±.005	1.385 ±.012	.08285	42.70	3.75	35.20
70-1.545	1.685	.070 ±.003	1.545 ±.013	.01953	42.80	1.80	39.25
45-1.600	1.690	.045 ±.003	1.600 ±.013	.00822	42.95	1.15	40.65
157-1.388SS	1.692	.156 ±.005	1.380 ±.012	.09223	43.00	3.95	35.05
29-1.620SS	1.693	.029 ±.003	1.635 ±.013	.00345	43.00	.75	41.55
1-128	1.693	.103 ±.003	1.487 ±.012	.04162	43.00	2.60	37.75
30-1.635	1.695	.030 ±.003	1.635 ±.013	.00370	43.05	.75	41.55
1-221	1.699	.139 ±.004	1.421 ±.012	.07437	43.15	3.55	36.10
176-1.350	1.702	.176 ±.005	1.350 ±.012	.11663	43.25	4.45	34.30
1-323	1.707	.210 ±.005	1.287 ±.012	.16289	43.35	5.35	32.70
104-1.501	1.709	.104 ±.003	1.501 ±.012	.04283	43.40	2.65	38.15
67-1.541SS	1.710	.068 ±.003	1.574 ±.013	.01873	43.45	1.75	40.00
1-920	1.711	.118 ±.004	1.475 ±.012	.05473	43.45	3.00	37.45
140-1.434	1.714	.140 ±.004	1.434 ±.012	.07612	43.55	3.55	36.40
76-1.580	1.732	.076 ±.003	1.580 ±.015	.02360	44.00	1.95	40.15
92-1.550	1.734	.092 ±.003	1.550 ±.015	.03429	44.05	2.35	39.35
45-1.650	1.740	.045 ±.003	1.650 ±.013	.00847	44.20	1.15	41.90
250-1.240	1.740	.250 ±.006	1.240 ±.012	.22978	44.20	6.35	31.50
59-1.623	1.741	.059 ±.003	1.623 ±.013	.01445	44.20	1.50	41.20



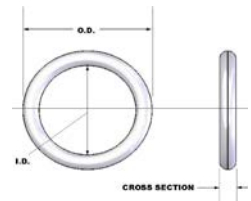
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
114-1.520	1.748	.114 ±.004	1.520 ±.015	.05240	44.40	2.90	38.60
50-1.640VS	1.751	.050 ±.003	1.651 ±.013	.01049	44.50	1.25	41.95
1-030	1.754	.070 ±.003	1.614 ±.013	.02036	44.55	1.80	41.00
210-1.335	1.754	.210 ±.005	1.334 ±.012	.16801	44.55	5.35	33.90
1-129	1.755	.103 ±.003	1.549 ±.015	.04324	44.60	2.60	39.35
1-222	1.762	.139 ±.004	1.484 ±.015	.07737	44.75	3.55	37.70
180-1.402	1.762	.180 ±.005	1.402 ±.012	.12647	44.75	4.55	35.60
78-1.609	1.765	.078 ±.003	1.609 ±.015	.02532	44.85	2.00	40.85
125-1.515	1.765	.125 ±.004	1.515 ±.015	.06323	44.85	3.20	38.50
47-1.672	1.766	.047 ±.003	1.672 ±.013	.00937	44.85	1.20	42.45
29-1.692SS	1.767	.029 ±.003	1.709 ±.013	.00361	44.90	.75	43.40
138-1.491ES	1.769	.138 ±.004	1.493 ±.015	.07664	44.95	3.50	37.90
1-324	1.770	.210 ±.005	1.350 ±.012	.16975	44.95	5.35	34.30
71-1.629	1.771	.071 ±.003	1.629 ±.013	.02114	45.00	1.80	41.40
140-1.491	1.771	.140 ±.004	1.491 ±.015	.07888	45.00	3.55	37.85
144-1.484	1.772	.144 ±.005	1.484 ±.015	.08330	45.00	3.65	37.70
50-1.675	1.775	.050 ±.003	1.675 ±.013	.01064	45.10	1.25	42.55
275-1.225	1.775	.275 ±.006	1.225 ±.012	.27990	45.10	7.00	31.10
70-1.614SS	1.776	.071 ±.003	1.634 ±.013	.02121	45.10	1.80	41.50
73-1.639	1.785	.073 ±.003	1.639 ±.013	.02251	45.35	1.85	41.65
31-1.718	1.786	.031 ±.003	1.724 ±.013	.00416	45.35	.80	43.80
50-1.690	1.790	.050 ±.003	1.690 ±.013	.01073	45.45	1.25	42.95
215-1.364	1.794	.215 ±.005	1.364 ±.012	.18009	45.55	5.45	34.65
168-1.460	1.796	.168 ±.005	1.460 ±.012	.11337	45.60	4.25	37.10
213-1.372	1.798	.213 ±.005	1.372 ±.012	.17743	45.65	5.40	34.85
118-1.543VS	1.801	.119 ±.004	1.563 ±.015	.05877	45.75	3.00	39.70
210-1.373VS	1.801	.211 ±.005	1.379 ±.012	.17466	45.75	5.35	35.05
70-1.662	1.802	.070 ±.003	1.662 ±.013	.02094	45.75	1.80	42.20
39-1.732	1.810	.039 ±.003	1.732 ±.013	.00665	45.95	1.00	44.00
62-1.686	1.810	.062 ±.003	1.686 ±.013	.01658	45.95	1.55	42.80
70-1.670	1.810	.070 ±.003	1.670 ±.013	.02104	45.95	1.80	42.40
1-130	1.818	.103 ±.003	1.612 ±.015	.04489	46.20	2.60	40.95
281-1.250NS	1.820	.282 ±.006	1.256 ±.012	.30178	46.25	7.15	31.90
300-1.220	1.820	.300 ±.006	1.220 ±.012	.33754	46.25	7.60	31.00
139-1.546	1.824	.139 ±.004	1.546 ±.015	.08033	46.35	3.55	39.25
125-1.575	1.825	.125 ±.004	1.575 ±.015	.06554	46.35	3.20	40.00
70-1.687	1.827	.070 ±.003	1.687 ±.013	.02124	46.40	1.80	42.85
70-1.690NS	1.827	.070 ±.003	1.687 ±.013	.02124	46.40	1.80	42.85
176-1.475	1.827	.176 ±.005	1.475 ±.015	.12619	46.40	4.45	37.45
237-1.347SS	1.828	.238 ±.006	1.352 ±.012	.22222	46.45	6.05	34.35
118-1.583SS	1.831	.119 ±.004	1.593 ±.015	.05982	46.50	3.00	40.45
104-1.628	1.836	.104 ±.003	1.628 ±.015	.04622	46.65	2.65	41.35
118-1.595VS	1.840	.119 ±.004	1.602 ±.015	.06013	46.75	3.00	40.70
103-1.612SS	1.847	.105 ±.003	1.637 ±.015	.04739	46.90	2.65	41.60
59-1.732	1.850	.059 ±.003	1.732 ±.013	.01538	47.00	1.50	44.00



# Engineers Guide for O-Rings

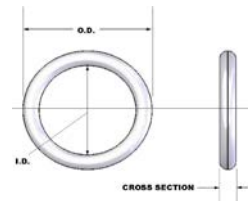


Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
32-1.790	1.854	.032 ±.003	1.790 ±.015	.00460	47.10	.80	45.45
62-1.740	1.864	.062 ±.003	1.740 ±.015	.01709	47.35	1.55	44.20
39-1.772SS	1.865	.039 ±.003	1.787 ±.015	.00685	47.35	1.00	45.40
93-1.689NS	1.871	.093 ±.003	1.685 ±.015	.03794	47.50	2.35	42.80
50-1.764ES	1.874	.050 ±.003	1.774 ±.015	.01125	47.60	1.25	45.05
50-1.750SS	1.877	.051 ±.003	1.775 ±.015	.01172	47.70	1.30	45.10
1-031	1.879	.070 ±.003	1.739 ±.015	.02187	47.75	1.80	44.15
1-131	1.880	.103 ±.003	1.674 ±.015	.04652	47.75	2.60	42.50
374-1.102VS	1.881	.380 ±.007	1.121 ±.012	.53480	47.80	9.65	28.45
55-1.775	1.885	.055 ±.003	1.775 ±.015	.01366	47.90	1.40	45.10
1-223	1.887	.139 ±.004	1.609 ±.015	.08333	47.95	3.55	40.85
107-1.675	1.889	.107 ±.004	1.675 ±.015	.05034	48.00	2.70	42.55
157-1.575	1.889	.157 ±.005	1.575 ±.015	.10534	48.00	4.00	40.00
108-1.674	1.890	.108 ±.004	1.674 ±.015	.05129	48.00	2.75	42.50
259-1.375	1.893	.259 ±.006	1.375 ±.012	.27045	48.10	6.60	34.95
1-325	1.895	.210 ±.005	1.475 ±.015	.18335	48.15	5.35	37.45
50-1.796	1.896	.050 ±.003	1.796 ±.015	.01139	48.15	1.25	45.60
62-1.772	1.896	.062 ±.003	1.772 ±.015	.01739	48.15	1.55	45.00
140-1.616	1.896	.140 ±.004	1.616 ±.015	.08492	48.15	3.55	41.05
71-1.756	1.898	.071 ±.003	1.756 ±.015	.02272	48.20	1.80	44.60
46-1.800	1.899	.046 ±.003	1.807 ±.015	.00967	48.25	1.15	45.90
1-400	1.900	.275 ±.006	1.350 ±.012	.30322	48.25	7.00	34.30
176-1.550	1.902	.176 ±.005	1.550 ±.015	.13192	48.30	4.45	39.35
70-1.738VS	1.903	.071 ±.003	1.761 ±.015	.02279	48.35	1.80	44.75
40-1.828	1.908	.040 ±.003	1.828 ±.015	.00737	48.45	1.00	46.45
141-1.629	1.911	.141 ±.004	1.629 ±.015	.08683	48.55	3.60	41.40
70-1.775	1.915	.070 ±.003	1.775 ±.015	.02231	48.65	1.80	45.10
28-1.844SS	1.920	.028 ±.003	1.864 ±.015	.00366	48.75	.70	47.35
103-1.718	1.924	.103 ±.003	1.718 ±.015	.04767	48.85	2.60	43.65
118-1.673VS	1.927	.119 ±.004	1.689 ±.015	.06317	48.95	3.00	42.90
79-1.772	1.930	.079 ±.003	1.772 ±.015	.02850	49.00	2.00	45.00
93-1.750	1.930	.093 ±.003	1.744 ±.015	.03920	49.00	2.35	44.30
264-1.406	1.934	.264 ±.006	1.406 ±.012	.28719	49.10	6.70	35.70
40-1.856	1.936	.040 ±.003	1.856 ±.015	.00749	49.15	1.00	47.15
125-1.688	1.938	.125 ±.004	1.688 ±.015	.06990	49.25	3.20	42.90
250-1.438	1.938	.250 ±.006	1.438 ±.012	.26031	49.25	6.35	36.55
70-1.799	1.939	.070 ±.003	1.799 ±.015	.02260	49.25	1.80	45.70
40-1.860	1.940	.040 ±.003	1.860 ±.015	.00750	49.30	1.00	47.25
1-132	1.943	.103 ±.003	1.737 ±.015	.04817	49.35	2.60	44.10
176-1.600	1.952	.176 ±.005	1.600 ±.015	.13574	49.60	4.45	40.65
1-924	1.956	.118 ±.004	1.720 ±.015	.06315	49.70	3.00	43.70
210-1.537	1.957	.210 ±.005	1.537 ±.015	.19010	49.70	5.35	39.05
180-1.600	1.960	.180 ±.005	1.600 ±.015	.14230	49.80	4.55	40.65
39-1.889NS	1.961	.039 ±.003	1.883 ±.015	.00721	49.80	1.00	47.85
234-1.493	1.961	.234 ±.006	1.493 ±.015	.23333	49.80	5.95	37.90





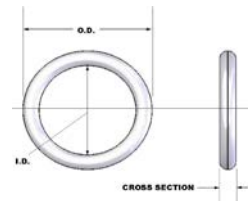
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
104-1.754	1.962	.104 ±.003	1.754 ±.015	.04959	49.85	2.65	44.55
50-1.864	1.964	.050 ±.003	1.864 ±.015	.01181	49.90	1.25	47.35
98-1.772	1.968	.098 ±.003	1.772 ±.015	.04431	50.00	2.50	45.00
70-1.830	1.970	.070 ±.003	1.830 ±.015	.02297	50.05	1.80	46.50
286-1.407	1.979	.286 ±.006	1.407 ±.012	.34169	50.25	7.25	35.75
114-1.756	1.984	.114 ±.004	1.756 ±.015	.05996	50.40	2.90	44.60
47-1.891	1.985	.047 ±.003	1.891 ±.015	.01056	50.40	1.20	48.05
31-1.895SS	1.987	.031 ±.003	1.925 ±.015	.00464	50.45	.80	48.90
231-1.500VS	1.987	.234 ±.006	1.519 ±.015	.23684	50.45	5.95	38.60
75-1.840	1.990	.075 ±.003	1.840 ±.015	.02658	50.55	1.90	46.75
1-032	2.004	.070 ±.003	1.864 ±.015	.02338	50.90	1.80	47.35
1-133	2.005	.103 ±.003	1.799 ±.015	.04979	50.95	2.60	45.70
79-1.850	2.008	.079 ±.003	1.850 ±.015	.02970	51.00	2.00	47.00
299-1.410	2.008	.299 ±.006	1.410 ±.012	.37699	51.00	7.60	35.80
1-224	2.012	.139 ±.004	1.734 ±.015	.08929	51.10	3.55	44.05
104-1.808	2.016	.104 ±.003	1.808 ±.015	.05103	51.20	2.65	45.90
103-1.812	2.018	.103 ±.003	1.812 ±.015	.05013	51.25	2.60	46.00
43-1.934	2.020	.043 ±.003	1.934 ±.015	.00902	51.30	1.10	49.10
1-326	2.020	.210 ±.005	1.600 ±.015	.19695	51.30	5.35	40.65
1-401	2.025	.275 ±.006	1.475 ±.015	.32655	51.45	7.00	37.45
167-1.693	2.027	.167 ±.005	1.693 ±.015	.12799	51.50	4.25	43.00
47-1.934	2.028	.047 ±.003	1.934 ±.015	.01080	51.50	1.20	49.10
140-1.750	2.030	.140 ±.004	1.750 ±.015	.09140	51.55	3.55	44.45
40-1.958	2.038	.040 ±.003	1.958 ±.015	.00789	51.75	1.00	49.75
212-1.616	2.040	.212 ±.005	1.616 ±.015	.20272	51.80	5.40	41.05
70-1.864SS	2.042	.071 ±.003	1.900 ±.015	.02452	51.85	1.80	48.25
225-1.595PL	2.045	.225 ±.006	1.595 ±.015	.22734	51.95	5.70	40.50
39-1.969	2.047	.039 ±.003	1.969 ±.015	.00754	52.00	1.00	50.00
25-2.000	2.050	.025 ±.003	2.000 ±.018	.00312	52.05	.65	50.80
39-1.969SS	2.055	.039 ±.003	1.977 ±.015	.00757	52.20	1.00	50.20
47-1.954	2.055	.047 ±.003	1.961 ±.015	.01094	52.20	1.20	49.80
47-1.954SS	2.055	.047 ±.003	1.961 ±.015	.01094	52.20	1.20	49.80
38-1.984	2.060	.038 ±.003	1.984 ±.015	.00720	52.30	.95	50.40
38-1.980ES	2.061	.038 ±.003	1.985 ±.015	.00725	52.35	.95	50.40
125-1.812	2.062	.125 ±.004	1.812 ±.015	.07468	52.35	3.20	46.00
250-1.562	2.062	.250 ±.006	1.562 ±.015	.27943	52.35	6.35	39.65
70-1.927	2.067	.070 ±.003	1.927 ±.015	.02414	52.50	1.80	48.95
1-134	2.068	.103 ±.003	1.862 ±.015	.05144	52.55	2.60	47.30
139-1.790	2.068	.139 ±.004	1.790 ±.015	.09196	52.55	3.55	45.45
93-1.888	2.074	.093 ±.003	1.888 ±.015	.04228	52.70	2.35	47.95
176-1.725	2.077	.176 ±.005	1.725 ±.015	.14529	52.75	4.45	43.80
237-1.597SS	2.079	.238 ±.006	1.603 ±.015	.25730	52.80	6.05	40.70
80-1.921	2.081	.080 ±.003	1.921 ±.015	.03160	52.85	2.05	48.80
70-1.927VS	2.088	.071 ±.003	1.946 ±.015	.02509	53.05	1.80	49.45
63-1.969	2.095	.063 ±.003	1.969 ±.015	.01990	53.20	1.60	50.00



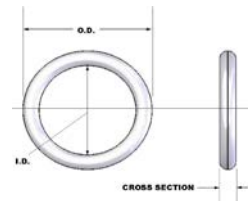
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
93-1.888ES	2.098	.094 ±.003	1.910 ±.015	.04369	53.30	2.40	48.50
176-1.747	2.099	.176 ±.005	1.747 ±.015	.14698	53.30	4.45	44.35
103-1.889SS	2.117	.104 ±.003	1.909 ±.015	.05372	53.75	2.65	48.50
60-1.993ES	2.118	.060 ±.003	1.998 ±.018	.01828	53.80	1.50	50.75
119-1.888	2.126	.119 ±.004	1.888 ±.018	.07013	54.00	3.00	47.95
1-033	2.129	.070 ±.003	1.989 ±.018	.02489	54.10	1.80	50.50
1-135	2.131	.103 ±.003	1.925 ±.017	.05309	54.15	2.60	48.90
1-225	2.137	.139 ±.004	1.859 ±.018	.09525	54.30	3.55	47.20
60-1.993SS	2.143	.061 ±.003	2.021 ±.018	.01912	54.45	1.55	51.35
1-327	2.145	.210 ±.005	1.725 ±.015	.21055	54.50	5.35	43.80
1-402	2.150	.275 ±.006	1.600 ±.015	.34987	54.60	7.00	40.65
104-1.943	2.151	.104 ±.003	1.943 ±.017	.05463	54.65	2.65	49.35
104-1.943	2.151	.104 ±.003	1.943 ±.017	.05463	54.65	2.65	49.35
71-2.014	2.156	.071 ±.003	2.014 ±.018	.02593	54.75	1.80	51.15
140-1.878	2.158	.140 ±.004	1.878 ±.018	.09759	54.80	3.55	47.70
80-2.000	2.160	.080 ±.003	2.000 ±.017	.03285	54.85	2.05	50.80
250-1.660	2.160	.250 ±.006	1.660 ±.015	.29455	54.85	6.35	42.15
36-2.050SS	2.163	.037 ±.003	2.089 ±.018	.00718	54.95	.95	53.05
40-2.044SS	2.169	.041 ±.003	2.087 ±.018	.00883	55.10	1.05	53.00
50-2.070	2.170	.050 ±.003	2.070 ±.018	.01308	55.10	1.25	52.60
70-2.030	2.170	.070 ±.003	2.030 ±.018	.02539	55.10	1.80	51.55
103-1.968	2.174	.103 ±.003	1.968 ±.017	.05421	55.20	2.60	50.00
63-2.050	2.176	.063 ±.003	2.050 ±.018	.02069	55.25	1.60	52.05
70-2.050	2.190	.070 ±.003	2.050 ±.018	.02563	55.65	1.80	52.05
210-1.772	2.192	.210 ±.005	1.772 ±.015	.21567	55.70	5.35	45.00
1-136	2.193	.103 ±.003	1.987 ±.017	.05471	55.70	2.60	50.45
225-1.745	2.195	.225 ±.006	1.745 ±.015	.24608	55.75	5.70	44.30
70-2.057ES	2.200	.070 ±.003	2.060 ±.018	.02575	55.90	1.80	52.30
125-1.950	2.200	.125 ±.004	1.950 ±.018	.08000	55.90	3.20	49.55
176-1.850	2.202	.176 ±.005	1.850 ±.015	.15485	55.95	4.45	47.00
104-1.997	2.205	.104 ±.003	1.997 ±.017	.05607	56.00	2.65	50.70
275-1.655	2.205	.275 ±.006	1.655 ±.015	.36013	56.00	7.00	42.05
210-1.787	2.207	.210 ±.005	1.787 ±.015	.21730	56.05	5.35	45.40
75-2.066	2.216	.075 ±.003	2.066 ±.017	.02972	56.30	1.90	52.50
125-1.968	2.217	.125 ±.004	1.967 ±.018	.08065	56.30	3.20	49.95
47-2.115SS	2.218	.047 ±.003	2.124 ±.018	.01183	56.35	1.20	53.95
312-1.594	2.218	.312 ±.006	1.594 ±.015	.45780	56.35	7.90	40.50
118-1.969SS	2.224	.119 ±.004	1.986 ±.018	.07355	56.50	3.00	50.45
40-2.152	2.232	.040 ±.003	2.152 ±.018	.00865	56.70	1.00	54.65
101-2.015SS	2.234	.102 ±.003	2.030 ±.017	.05473	56.75	2.60	51.55
47-2.141	2.235	.047 ±.003	2.141 ±.018	.01193	56.75	1.20	54.40
118-2.008NS	2.236	.118 ±.004	2.000 ±.018	.07277	56.80	3.00	50.80
105-2.028	2.238	.105 ±.003	2.028 ±.017	.05802	56.85	2.65	51.50
47-2.141ES	2.240	.047 ±.003	2.146 ±.008	.01195	56.90	1.20	54.50
70-2.093SS	2.242	.070 ±.003	2.102 ±.018	.02626	56.95	1.80	53.40



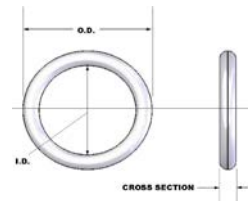
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
59-2.126	2.244	.059 ±.003	2.126 ±.018	.01877	57.00	1.50	54.00
250-1.750	2.250	.250 ±.006	1.750 ±.015	.30843	57.15	6.35	44.45
1-034	2.254	.070 ±.003	2.114 ±.018	.02641	57.25	1.80	53.70
93-2.065VS	2.256	.093 ±.003	2.070 ±.017	.04616	57.30	2.35	52.60
1-137	2.256	.103 ±.003	2.050 ±.017	.05636	57.30	2.60	52.05
40-2.177	2.257	.040 ±.003	2.177 ±.018	.00875	57.35	1.00	55.30
1-226	2.262	.139 ±.004	1.984 ±.018	.10121	57.45	3.55	50.40
70-2.124	2.264	.070 ±.003	2.124 ±.018	.02653	57.50	1.80	53.95
147-1.976	2.270	.147 ±.005	1.976 ±.018	.11319	57.65	3.75	50.20
1-328	2.270	.210 ±.005	1.850 ±.015	.22415	57.65	5.35	47.00
1-403	2.275	.275 ±.006	1.725 ±.015	.37319	57.80	7.00	43.80
139-1.954SS	2.280	.142 ±.004	1.996 ±.018	.10637	57.90	3.60	50.70
78-2.125	2.281	.078 ±.003	2.125 ±.017	.03307	57.95	2.00	54.00
157-1.968	2.282	.157 ±.005	1.968 ±.015	.12924	57.95	4.00	50.00
42-2.199	2.283	.042 ±.003	2.199 ±.018	.00975	58.00	1.05	55.85
140-2.003	2.283	.140 ±.004	2.003 ±.018	.10364	58.00	3.55	50.90
70-2.156	2.296	.070 ±.003	2.156 ±.018	.02691	58.30	1.80	54.75
79-2.135ES	2.298	.079 ±.003	2.140 ±.017	.03417	58.35	2.00	54.35
430-1.438	2.298	.430 ±.009	1.438 ±.012	.85222	58.35	10.90	36.55
275-1.745VS	2.303	.276 ±.006	1.751 ±.015	.38099	58.50	7.00	44.50
70-2.146VS	2.309	.071 ±.003	2.167 ±.018	.02784	58.65	1.80	55.05
62-2.187	2.311	.062 ±.003	2.187 ±.018	.02133	58.70	1.55	55.55
156-2.000	2.312	.156 ±.005	2.000 ±.018	.12946	58.70	3.95	50.80
285-1.735VS	2.313	.286 ±.006	1.741 ±.015	.40910	58.75	7.25	44.20
70-2.175	2.315	.070 ±.003	2.175 ±.018	.02714	58.80	1.80	55.25
1-138	2.318	.103 ±.003	2.112 ±.017	.05798	58.90	2.60	53.65
237-1.848	2.322	.237 ±.006	1.848 ±.015	.28896	59.00	6.00	46.95
139-2.046	2.324	.139 ±.004	2.046 ±.018	.10416	59.05	3.55	51.95
176-1.944SS	2.324	.178 ±.005	1.968 ±.015	.16777	59.05	4.50	50.00
1-928	2.326	.118 ±.004	2.090 ±.018	.07586	59.10	3.00	53.10
176-1.975	2.327	.176 ±.005	1.975 ±.018	.16440	59.10	4.45	50.15
40-2.249	2.329	.040 ±.003	2.249 ±.018	.00904	59.15	1.00	57.10
104-2.122	2.330	.104 ±.003	2.122 ±.017	.05941	59.20	2.65	53.90
210-1.912	2.332	.210 ±.005	1.912 ±.015	.23090	59.25	5.35	48.55
50-2.220VS	2.335	.050 ±.003	2.235 ±.015	.01410	59.30	1.25	56.75
108-2.100VS	2.335	.109 ±.004	2.117 ±.020	.06526	59.30	2.75	53.75
70-2.175VS	2.337	.071 ±.003	2.195 ±.018	.02818	59.35	1.80	55.75
215-1.890VS	2.339	.217 ±.006	1.905 ±.015	.24655	59.40	5.50	48.40
70-2.180VS	2.343	.071 ±.003	2.201 ±.018	.02826	59.50	1.80	55.90
235-1.845SS	2.345	.238 ±.006	1.869 ±.015	.29448	59.55	6.05	47.45
80-2.200NS	2.350	.079 ±.003	2.192 ±.017	.03497	59.70	2.00	55.70
48-2.236SS	2.356	.048 ±.003	2.260 ±.018	.01312	59.85	1.20	57.40
250-1.860	2.360	.250 ±.006	1.860 ±.015	.32539	59.95	6.35	47.25
32-2.284SS	2.370	.032 ±.003	2.306 ±.018	.00591	60.20	.80	58.55
32-2.248SS	2.370	.032 ±.003	2.306 ±.018	.00591	60.20	.80	58.55



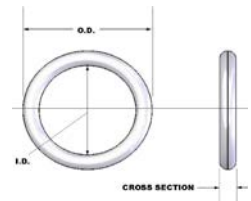
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
210-1.950	2.370	.210 ±.005	1.950 ±.015	.23503	60.20	5.35	49.55
437-1.500	2.374	.437 ±.009	1.500 ±.015	.91271	60.30	11.10	38.10
375-1.625	2.375	.375 ±.007	1.625 ±.015	.69396	60.35	9.55	41.30
1-035	2.379	.070 ±.003	2.239 ±.018	.02792	60.45	1.80	56.85
1-139	2.381	.103 ±.003	2.175 ±.017	.05963	60.50	2.60	55.25
1-227	2.387	.139 ±.004	2.109 ±.018	.10717	60.65	3.55	53.55
70-2.249	2.389	.070 ±.003	2.249 ±.018	.02804	60.70	1.80	57.10
70-2.250	2.390	.070 ±.003	2.250 ±.018	.02805	60.70	1.80	57.15
125-2.140	2.390	.125 ±.004	2.140 ±.018	.08732	60.70	3.20	54.35
83-2.226	2.392	.083 ±.003	2.226 ±.017	.03925	60.75	2.10	56.55
1-329	2.395	.210 ±.005	1.975 ±.018	.23776	60.85	5.35	50.15
210-1.975PL	2.395	.210 ±.005	1.975 ±.018	.23776	60.85	5.35	50.15
1-404	2.400	.275 ±.006	1.850 ±.015	.39652	60.95	7.00	47.00
104-2.196	2.404	.104 ±.003	2.196 ±.017	.06138	61.05	2.65	55.80
60-2.287	2.407	.060 ±.003	2.287 ±.018	.02085	61.15	1.50	58.10
140-2.131	2.411	.140 ±.004	2.131 ±.018	.10983	61.25	3.55	54.15
211-1.989	2.411	.211 ±.005	1.989 ±.018	.24167	61.25	5.35	50.50
224-1.941VS	2.411	.226 ±.006	1.959 ±.015	.27536	61.25	5.75	49.75
40-2.342	2.422	.040 ±.003	2.342 ±.018	.00940	61.50	1.00	59.50
357-1.719	2.433	.357 ±.007	1.719 ±.015	.65284	61.80	9.05	43.65
17-2.400	2.434	.017 ±.003	2.400 ±.018	.00172	61.80	.45	60.95
176-2.085	2.437	.176 ±.005	2.085 ±.018	.17281	61.90	4.45	52.95
118-2.175VS	2.439	.119 ±.004	2.201 ±.018	.08106	61.95	3.00	55.90
1-140	2.443	.103 ±.003	2.237 ±.017	.06125	62.05	2.60	56.80
47-2.350	2.444	.047 ±.003	2.350 ±.018	.01306	62.10	1.20	59.70
70-2.307	2.447	.070 ±.003	2.307 ±.018	.02874	62.15	1.80	58.60
176-2.100	2.452	.176 ±.005	2.100 ±.018	.17396	62.30	4.45	53.35
158-2.126ES	2.455	.159 ±.005	2.137 ±.018	.14322	62.35	4.05	54.30
104-2.248	2.456	.104 ±.003	2.248 ±.017	.06277	62.40	2.65	57.10
114-2.228	2.456	.114 ±.004	2.228 ±.020	.07510	62.40	2.90	56.60
93-2.277	2.463	.093 ±.003	2.277 ±.017	.05058	62.55	2.35	57.85
79-2.283ES	2.464	.080 ±.003	2.304 ±.020	.03765	62.60	2.05	58.50
98-2.283	2.479	.098 ±.003	2.283 ±.017	.05642	62.95	2.50	58.00
40-2.400	2.480	.040 ±.003	2.400 ±.018	.00963	63.00	1.00	60.95
187-2.125	2.499	.187 ±.005	2.125 ±.018	.19949	63.45	4.75	54.00
53-2.394	2.500	.053 ±.003	2.394 ±.018	.01696	63.50	1.35	60.80
125-2.250	2.500	.125 ±.004	2.250 ±.020	.09156	63.50	3.20	57.15
224-2.052	2.500	.224 ±.006	2.052 ±.018	.28178	63.50	5.70	52.10
500-1.500	2.500	.500 ±.010	1.500 ±.015	1.23370	63.50	12.70	38.10
1-036	2.504	.070 ±.003	2.364 ±.018	.02943	63.60	1.80	60.05
1-141	2.506	.103 ±.003	2.300 ±.020	.06290	63.65	2.60	58.40
1-228	2.512	.139 ±.004	2.234 ±.020	.11313	63.80	3.55	56.75
104-2.311	2.519	.104 ±.003	2.311 ±.020	.06445	64.00	2.65	58.70
79-2.362	2.520	.079 ±.003	2.362 ±.020	.03759	64.00	2.00	60.00
1-330	2.520	.210 ±.005	2.100 ±.018	.25136	64.00	5.35	53.35



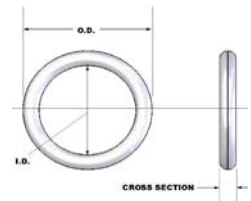
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
176-2.145VS	2.525	.178 ±.005	2.169 ±.018	.18348	64.15	4.50	55.10
1-405	2.525	.275 ±.006	1.975 ±.018	.41984	64.15	7.00	50.15
140-2.256	2.536	.140 ±.004	2.256 ±.020	.11587	64.40	3.55	57.30
30-2.472SS	2.542	.030 ±.003	2.482 ±.018	.00558	64.55	.75	63.05
103-2.340	2.546	.103 ±.003	2.340 ±.020	.06395	64.65	2.60	59.45
185-2.187	2.557	.185 ±.005	2.187 ±.018	.20031	64.95	4.70	55.55
282-1.986VS	2.561	.283 ±.006	1.995 ±.018	.45016	65.05	7.20	50.65
70-2.425	2.565	.070 ±.003	2.425 ±.018	.03017	65.15	1.80	61.60
243-2.060VS	2.567	.245 ±.006	2.077 ±.018	.34390	65.20	6.20	52.75
1-142	2.568	.103 ±.003	2.362 ±.020	.06453	65.25	2.60	60.00
1-932	2.573	.118 ±.004	2.337 ±.020	.08434	65.35	3.00	59.35
176-2.225	2.577	.176 ±.005	2.225 ±.018	.18351	65.45	4.45	56.50
118-2.342	2.578	.118 ±.004	2.342 ±.020	.08452	65.50	3.00	59.50
70-2.440	2.580	.070 ±.003	2.440 ±.018	.03035	65.55	1.80	62.00
104-2.374	2.582	.104 ±.003	2.374 ±.020	.06613	65.60	2.65	60.30
210-2.162	2.582	.210 ±.005	2.162 ±.018	.25810	65.60	5.35	54.90
32-2.500SS	2.588	.032 ±.003	2.524 ±.018	.00646	65.75	.80	64.10
70-2.410SS	2.589	.071 ±.003	2.447 ±.018	.03132	65.75	1.80	62.15
285-2.027	2.597	.285 ±.006	2.027 ±.018	.46336	65.95	7.25	51.50
103-2.394	2.600	.103 ±.003	2.394 ±.020	.06536	66.05	2.60	60.80
105-2.396	2.606	.105 ±.003	2.396 ±.020	.06803	66.20	2.65	60.85
47-2.495SS	2.620	.048 ±.003	2.524 ±.018	.01462	66.55	1.20	64.10
1-037	2.629	.070 ±.003	2.489 ±.018	.03094	66.80	1.80	63.20
40-2.550	2.630	.040 ±.003	2.550 ±.018	.01022	66.80	1.00	64.75
1-143	2.631	.103 ±.003	2.425 ±.020	.06617	66.85	2.60	61.60
50-2.520VS	2.634	.050 ±.003	2.534 ±.018	.01594	66.90	1.25	64.35
1-229	2.637	.139 ±.004	2.359 ±.020	.11909	67.00	3.55	59.90
1-331	2.645	.210 ±.005	2.225 ±.018	.26496	67.20	5.35	56.50
187-2.272	2.646	.187 ±.005	2.272 ±.018	.21217	67.20	4.75	57.70
1-406	2.650	.275 ±.006	2.100 ±.018	.44317	67.30	7.00	53.35
103-2.450	2.656	.103 ±.003	2.450 ±.020	.06683	67.45	2.60	62.25
375-1.906	2.656	.375 ±.007	1.906 ±.018	.79146	67.45	9.55	48.40
104-2.449	2.657	.104 ±.003	2.449 ±.020	.06813	67.50	2.65	62.20
140-2.381	2.661	.140 ±.004	2.381 ±.020	.12192	67.60	3.55	60.50
168-2.328	2.664	.168 ±.005	2.328 ±.018	.17382	67.65	4.25	59.15
79-2.480SS	2.668	.080 ±.003	2.508 ±.020	.04087	67.75	2.05	63.70
215-2.231ES	2.673	.216 ±.006	2.241 ±.018	.28285	67.90	5.50	56.90
1-144	2.693	.103 ±.003	2.487 ±.020	.06780	68.40	2.60	63.15
118-2.441VS	2.693	.119 ±.004	2.455 ±.020	.08994	68.40	3.00	62.35
335-2.027	2.697	.335 ±.007	2.027 ±.018	.65405	68.50	8.50	51.50
70-2.560	2.700	.070 ±.003	2.560 ±.018	.03180	68.60	1.80	65.00
150-2.400	2.700	.150 ±.005	2.400 ±.018	.14157	68.60	3.80	60.95
250-2.200	2.700	.250 ±.006	2.200 ±.018	.37782	68.60	6.35	55.90
176-2.350	2.702	.176 ±.005	2.350 ±.018	.19306	68.65	4.45	59.70
108-2.487	2.703	.108 ±.004	2.487 ±.020	.07468	68.65	2.75	63.15



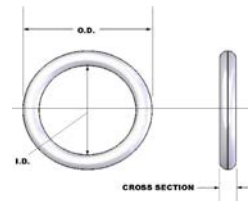
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
139-2.425	2.703	.139 ±.004	2.425 ±.020	.12223	68.65	3.55	61.60
105-2.500	2.710	.105 ±.003	2.500 ±.020	.07086	68.85	2.65	63.50
104-2.511	2.719	.104 ±.003	2.511 ±.020	.06979	69.05	2.65	63.80
245-2.235	2.725	.245 ±.006	2.235 ±.018	.36730	69.20	6.20	56.75
47-2.641	2.735	.047 ±.003	2.641 ±.020	.01465	69.45	1.20	67.10
80-2.585	2.745	.080 ±.003	2.585 ±.020	.04208	69.70	2.05	65.65
187-2.375	2.749	.187 ±.005	2.375 ±.018	.22106	69.80	4.75	60.35
1-038	2.754	.070 ±.003	2.614 ±.020	.03245	69.95	1.80	66.40
1-145	2.756	.103 ±.003	2.550 ±.020	.06945	70.00	2.60	64.75
48-2.666	2.762	.048 ±.003	2.666 ±.020	.01543	70.15	1.20	67.70
1-230	2.762	.139 ±.004	2.484 ±.020	.12505	70.15	3.55	63.10
70-2.627	2.767	.070 ±.003	2.627 ±.020	.03261	70.30	1.80	66.75
1-332	2.770	.210 ±.005	2.350 ±.018	.27856	70.35	5.35	59.70
104-2.563	2.771	.104 ±.003	2.563 ±.020	.07118	70.40	2.65	65.10
1-407	2.775	.275 ±.006	2.225 ±.018	.46649	70.50	7.00	56.50
104-2.575	2.783	.104 ±.003	2.575 ±.020	.07150	70.70	2.65	65.40
118-2.520VS	2.791	.120 ±.004	2.551 ±.020	.09490	70.90	3.05	64.80
217-2.362	2.796	.217 ±.006	2.362 ±.018	.29965	71.00	5.50	60.00
275-2.250	2.800	.275 ±.006	2.250 ±.018	.47116	71.10	7.00	57.15
215-2.373	2.803	.215 ±.005	2.373 ±.018	.29518	71.20	5.45	60.25
71-2.638VS	2.810	.072 ±.003	2.666 ±.020	.03502	71.35	1.85	67.70
224-2.362	2.810	.224 ±.006	2.362 ±.018	.32016	71.35	5.70	60.00
70-2.677	2.817	.070 ±.003	2.677 ±.020	.03321	71.55	1.80	68.00
179-2.459	2.817	.179 ±.005	2.459 ±.018	.20856	71.55	4.55	62.45
1-146	2.818	.103 ±.003	2.612 ±.020	.07107	71.60	2.60	66.35
50-2.719	2.819	.050 ±.003	2.719 ±.020	.01708	71.60	1.25	69.05
176-2.475	2.827	.176 ±.005	2.475 ±.020	.20262	71.80	4.45	62.85
118-2.584ES	2.834	.119 ±.004	2.596 ±.020	.09486	72.00	3.00	65.95
450-1.937	2.837	.450 ±.010	1.937 ±.018	1.19266	72.05	11.45	49.20
104-2.637	2.845	.104 ±.003	2.637 ±.020	.07315	72.25	2.65	67.00
70-2.690VS	2.857	.071 ±.003	2.715 ±.020	.03465	72.55	1.80	68.95
84-2.661SS	2.872	.085 ±.003	2.702 ±.022	.04968	72.95	2.15	68.65
500-1.875	2.875	.500 ±.010	1.875 ±.015	1.46502	73.05	12.70	47.65
1-039	2.879	.070 ±.003	2.739 ±.020	.03396	73.15	1.80	69.55
139-2.601	2.879	.139 ±.004	2.601 ±.020	.13062	73.15	3.55	66.05
1-147	2.881	.103 ±.003	2.675 ±.022	.07272	73.20	2.60	67.95
1-231	2.887	.139 ±.004	2.609 ±.020	.13100	73.35	3.55	66.25
63-2.766	2.892	.063 ±.003	2.766 ±.020	.02770	73.45	1.60	70.25
70-2.753	2.893	.070 ±.003	2.753 ±.020	.03413	73.50	1.80	69.95
70-2.750ES	2.894	.070 ±.003	2.754 ±.020	.03414	73.50	1.80	69.95
1-333	2.895	.210 ±.005	2.475 ±.020	.29216	73.55	5.35	62.85
104-2.688	2.896	.104 ±.003	2.688 ±.022	.07451	73.55	2.65	68.30
1-408	2.900	.275 ±.006	2.350 ±.018	.48982	73.65	7.00	59.70
115-2.683	2.913	.115 ±.004	2.683 ±.020	.09130	74.00	2.90	68.15
144-2.629	2.917	.144 ±.005	2.629 ±.020	.14188	74.10	3.65	66.80



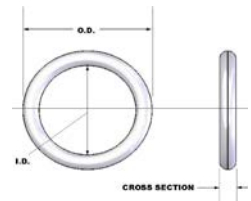
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
312-2.312	2.926	.311 ±.006	2.304 ±.020	.62407	74.30	7.90	58.50
176-2.534SS	2.931	.179 ±.005	2.573 ±.020	.21757	74.45	4.55	65.35
70-2.739SS	2.934	.071 ±.003	2.792 ±.020	.03561	74.50	1.80	70.90
238-2.458	2.934	.238 ±.006	2.458 ±.018	.37680	74.50	6.05	62.45
275-2.385	2.935	.275 ±.006	2.385 ±.018	.49635	74.55	7.00	60.60
103-2.675SS	2.936	.105 ±.003	2.726 ±.022	.07701	74.55	2.65	69.25
187-2.562	2.936	.187 ±.005	2.562 ±.020	.23719	74.55	4.75	65.05
70-2.800	2.940	.070 ±.003	2.800 ±.020	.03470	74.70	1.80	71.10
1-148	2.943	.103 ±.003	2.737 ±.022	.07434	74.75	2.60	69.50
176-2.596	2.948	.176 ±.005	2.596 ±.020	.21186	74.90	4.45	65.95
139-2.671	2.949	.139 ±.004	2.671 ±.020	.13396	74.90	3.55	67.85
281-2.391	2.953	.281 ±.006	2.391 ±.018	.52058	75.00	7.15	60.75
40-2.875	2.955	.040 ±.003	2.875 ±.020	.01151	75.05	1.00	73.05
59-2.835ES	2.957	.059 ±.003	2.839 ±.020	.02489	75.10	1.50	72.10
313-2.350	2.976	.313 ±.006	2.350 ±.020	.64372	75.60	7.95	59.70
176-2.600SS	2.978	.178 ±.005	2.622 ±.020	.21890	75.65	4.50	66.60
260-2.476	2.993	.260 ±.006	2.473 ±.020	.45585	76.00	6.60	62.80
1-040	3.004	.070 ±.003	2.864 ±.020	.03547	76.30	1.80	72.75
209-2.587	3.005	.209 ±.005	2.587 ±.020	.30135	76.35	5.30	65.70
1-149	3.006	.103 ±.003	2.800 ±.022	.07599	76.35	2.60	71.10
209-2.592	3.010	.209 ±.005	2.592 ±.020	.30189	76.45	5.30	65.85
90-2.832	3.012	.090 ±.003	2.832 ±.022	.05840	76.50	2.30	71.95
1-232	3.012	.139 ±.004	2.734 ±.024	.13696	76.50	3.55	69.45
70-2.878	3.018	.070 ±.003	2.878 ±.020	.03564	76.65	1.80	73.10
1-334	3.020	.210 ±.005	2.600 ±.020	.30576	76.70	5.35	66.05
104-2.814	3.022	.104 ±.003	2.814 ±.022	.07787	76.75	2.65	71.50
1-409	3.025	.275 ±.006	2.475 ±.020	.51314	76.85	7.00	62.85
125-2.750SS	3.028	.126 ±.004	2.776 ±.024	.11368	76.90	3.20	70.50
125-2.756SS	3.034	.126 ±.004	2.782 ±.024	.11391	77.05	3.20	70.65
103-2.830	3.036	.103 ±.003	2.830 ±.022	.07678	77.10	2.60	71.90
140-2.761	3.041	.140 ±.004	2.761 ±.024	.14030	77.25	3.55	70.15
85-2.875	3.045	.085 ±.003	2.875 ±.022	.05277	77.35	2.15	73.05
319-2.411	3.049	.319 ±.007	2.411 ±.020	.68546	77.45	8.10	61.25
70-2.921	3.061	.070 ±.003	2.921 ±.020	.03616	77.75	1.80	74.20
375-2.335NS	3.063	.372 ±.007	2.319 ±.020	.91884	77.80	9.45	58.90
282-2.490VS	3.065	.283 ±.006	2.499 ±.020	.54976	77.85	7.20	63.45
1-150	3.068	.103 ±.003	2.862 ±.022	.07761	77.95	2.60	72.70
78-2.919	3.075	.078 ±.003	2.919 ±.022	.04499	78.10	2.00	74.15
176-2.725	3.077	.176 ±.005	2.725 ±.020	.22172	78.15	4.45	69.20
40-3.000	3.080	.040 ±.003	3.000 ±.024	.01200	78.25	1.00	76.20
104-2.874	3.084	.104 ±.003	2.876 ±.022	.07953	78.35	2.65	73.05
70-2.950ES	3.094	.070 ±.003	2.954 ±.020	.03656	78.60	1.80	75.05
79-2.943ES	3.108	.079 ±.003	2.950 ±.022	.04664	78.95	2.00	74.95
375-2.375	3.125	.375 ±.007	2.375 ±.020	.95419	79.40	9.55	60.35
176-2.725VS	3.127	.179 ±.005	2.769 ±.020	.23306	79.45	4.55	70.35



# Engineers Guide for O-Rings

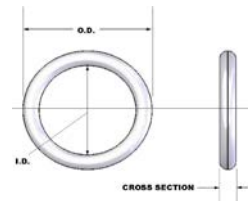


Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
1-041	3.129	.070 ±.003	2.989 ±.024	.03698	79.50	1.80	75.90
105-2.921	3.131	.105 ±.003	2.921 ±.022	.08232	79.55	2.65	74.20
1-233	3.137	.139 ±.004	2.859 ±.024	.14292	79.70	3.55	72.60
103-2.935ES	3.138	.103 ±.003	2.932 ±.022	.07945	79.70	2.60	74.45
1-335	3.145	.210 ±.005	2.725 ±.020	.31936	79.90	5.35	69.20
118-2.913	3.149	.118 ±.004	2.913 ±.024	.10413	80.00	3.00	74.00
1-410	3.150	.275 ±.006	2.600 ±.020	.53647	80.00	7.00	66.05
148-2.859	3.155	.148 ±.005	2.859 ±.020	.16252	80.15	3.75	72.60
141-2.874	3.156	.141 ±.004	2.874 ±.024	.14790	80.15	3.60	73.00
140-2.887	3.167	.140 ±.004	2.887 ±.024	.14639	80.45	3.55	73.35
157-2.835VS	3.175	.158 ±.005	2.859 ±.020	.18584	80.65	4.00	72.60
394-2.362SS	3.179	.397 ±.009	2.385 ±.020	1.08188	80.75	10.10	60.60
312-2.564	3.188	.312 ±.008	2.564 ±.020	.69078	81.00	7.90	65.15
750-1.690	3.190	.750 ±.013	1.690 ±.015	3.38651	81.05	19.05	42.95
1-151	3.193	.103 ±.003	2.987 ±.024	.08089	81.10	2.60	75.85
176-2.850	3.202	.176 ±.005	2.850 ±.020	.23128	81.35	4.45	72.40
30-3.145	3.205	.030 ±.003	3.145 ±.024	.00705	81.40	.75	79.90
103-3.000	3.206	.103 ±.003	3.000 ±.024	.08123	81.45	2.60	76.20
47-3.053SS	3.208	.048 ±.003	3.112 ±.024	.01796	81.50	1.20	79.05
44-3.038SS	3.212	.045 ±.003	3.122 ±.024	.01582	81.60	1.15	79.30
104-3.016	3.224	.104 ±.003	3.016 ±.024	.08326	81.90	2.65	76.60
70-3.085	3.225	.070 ±.003	3.085 ±.024	.03814	81.90	1.80	78.35
250-2.725	3.225	.250 ±.006	2.725 ±.020	.45878	81.90	6.35	69.20
147-2.935	3.229	.147 ±.005	2.935 ±.020	.16433	82.00	3.75	74.55
250-2.750	3.250	.250 ±.006	2.750 ±.020	.46264	82.55	6.35	69.85
375-2.500	3.250	.375 ±.007	2.500 ±.020	.99756	82.55	9.55	63.50
83-3.083	3.253	.083 ±.003	3.087 ±.024	.05388	82.65	2.10	78.40
1-234	3.262	.139 ±.004	2.984 ±.024	.14888	82.85	3.55	75.80
152-2.965	3.269	.152 ±.005	2.965 ±.020	.17769	83.05	3.85	75.30
1-336	3.270	.210 ±.005	2.850 ±.020	.33297	83.05	5.35	72.40
1-411	3.275	.275 ±.006	2.725 ±.020	.55979	83.20	7.00	69.20
60-3.156	3.276	.060 ±.003	3.156 ±.024	.02857	83.20	1.50	80.15
140-2.997	3.277	.140 ±.004	2.997 ±.024	.15171	83.25	3.55	76.10
177-2.925	3.279	.177 ±.005	2.925 ±.020	.23979	83.30	4.50	74.30
70-3.114VS	3.288	.071 ±.003	3.146 ±.024	.04001	83.50	1.80	79.90
60-3.115SS	3.297	.061 ±.003	3.175 ±.024	.02971	83.75	1.55	80.65
140-3.018	3.298	.140 ±.004	3.018 ±.024	.15272	83.75	3.55	76.65
268-2.763	3.303	.268 ±.006	2.767 ±.020	.53786	83.90	6.80	70.30
40-3.200SS	3.310	.040 ±.003	3.230 ±.024	.01291	84.05	1.00	82.05
103-3.109	3.315	.103 ±.003	3.109 ±.024	.08408	84.20	2.60	78.95
197-2.921	3.315	.197 ±.005	2.921 ±.020	.29857	84.20	5.00	74.20
130-3.062	3.322	.130 ±.004	3.062 ±.024	.13310	84.40	3.30	77.75
60-3.167SS	3.324	.061 ±.003	3.202 ±.015	.02996	84.45	1.55	81.35
176-2.975	3.327	.176 ±.005	2.975 ±.024	.24083	84.50	4.45	75.55
63-3.125VS	3.335	.066 ±.003	3.203 ±.024	.03514	84.70	1.70	81.35





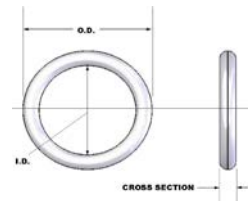
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
103-3.147	3.353	.103 ±.003	3.147 ±.024	.08507	85.15	2.60	79.95
375-2.608	3.358	.375 ±.007	2.608 ±.020	1.03504	85.30	9.55	66.25
118-3.130	3.366	.118 ±.004	3.130 ±.024	.11159	85.50	3.00	79.50
65-3.239	3.369	.065 ±.003	3.239 ±.024	.03444	85.55	1.65	82.25
375-2.625	3.375	.375 ±.007	2.625 ±.020	1.04093	85.75	9.55	66.70
1-042	3.379	.070 ±.003	3.239 ±.024	.04001	85.85	1.80	82.25
1-235	3.387	.139 ±.004	3.109 ±.024	.15484	86.05	3.55	78.95
1-337	3.395	.210 ±.005	2.975 ±.024	.34657	86.25	5.35	75.55
224-2.925	3.397	.226 ±.006	2.945 ±.020	.39963	86.30	5.75	74.80
1-412	3.400	.275 ±.006	2.850 ±.020	.58312	86.35	7.00	72.40
140-3.123	3.403	.140 ±.004	3.123 ±.024	.15780	86.45	3.55	79.30
158-3.071ES	3.404	.159 ±.005	3.086 ±.024	.20242	86.45	4.05	78.40
500-2.375SS	3.407	.505 ±.010	2.397 ±.020	1.82608	86.55	12.85	60.90
98-3.189VS	3.409	.099 ±.003	3.211 ±.024	.08005	86.60	2.50	81.55
71-3.269	3.411	.071 ±.003	3.269 ±.024	.04154	86.65	1.80	83.05
330-2.755	3.415	.330 ±.007	2.755 ±.024	.82894	86.75	8.40	70.00
79-3.218VS	3.417	.080 ±.003	3.257 ±.024	.05270	86.80	2.05	82.75
312-2.812	3.425	.311 ±.006	2.803 ±.024	.74315	87.00	7.90	71.20
103-3.185SS	3.430	.104 ±.003	3.222 ±.024	.08876	87.10	2.65	81.85
141-3.150	3.432	.141 ±.004	3.150 ±.024	.16144	87.15	3.60	80.00
1-152	3.443	.103 ±.003	3.237 ±.024	.08743	87.45	2.60	82.20
220-2.975VS	3.447	.222 ±.006	3.003 ±.024	.39217	87.55	5.65	76.30
176-3.100	3.452	.176 ±.005	3.100 ±.024	.25039	87.70	4.45	78.75
93-3.237ES	3.454	.094 ±.003	3.266 ±.024	.07325	87.75	2.40	82.95
104-3.253	3.461	.104 ±.003	3.253 ±.024	.08959	87.90	2.65	82.65
176-3.115	3.467	.176 ±.005	3.115 ±.024	.25153	88.05	4.45	79.10
87-3.307	3.481	.087 ±.003	3.307 ±.024	.06339	88.40	2.20	84.00
40-3.370VS	3.482	.040 ±.003	3.402 ±.024	.01359	88.45	1.00	86.40
103-3.290	3.496	.103 ±.003	3.290 ±.024	.08882	88.80	2.60	83.55
625-2.250	3.500	.625 ±.012	2.250 ±.020	2.77101	88.90	15.90	57.15
70-3.376NS	3.509	.070 ±.003	3.369 ±.024	.04158	89.15	1.80	85.55
1-236	3.512	.139 ±.004	3.234 ±.024	.16080	89.20	3.55	82.15
1-338	3.520	.210 ±.005	3.100 ±.024	.36017	89.40	5.35	78.75
1-413	3.525	.275 ±.006	2.975 ±.024	.60644	89.55	7.00	75.55
140-3.248	3.528	.140 ±.004	3.248 ±.024	.16385	89.60	3.55	82.50
80-3.375	3.535	.080 ±.003	3.375 ±.024	.05456	89.80	2.05	85.75
312-2.875SS	3.535	.315 ±.007	2.905 ±.024	.78835	89.80	8.00	73.80
46-3.455	3.547	.046 ±.003	3.455 ±.024	.01828	90.10	1.15	87.75
141-3.282	3.564	.141 ±.004	3.282 ±.024	.16791	90.55	3.60	83.35
103-3.359	3.565	.103 ±.003	3.359 ±.024	.09062	90.55	2.60	85.30
103-3.362	3.568	.103 ±.003	3.362 ±.024	.09070	90.65	2.60	85.40
176-3.225	3.577	.176 ±.005	3.225 ±.024	.25994	90.85	4.45	81.90
70-3.440	3.580	.070 ±.003	3.440 ±.024	.04244	90.95	1.80	87.40
170-3.253	3.593	.170 ±.005	3.253 ±.024	.24409	91.25	4.30	82.65
214-3.166	3.594	.214 ±.005	3.166 ±.024	.38193	91.30	5.45	80.40



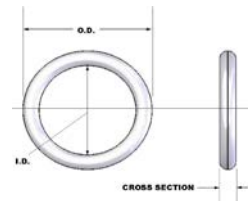
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
103-3.400	3.606	.103 ±.003	3.400 ±.024	.09170	91.60	2.60	86.35
70-3.474	3.614	.070 ±.003	3.474 ±.024	.04285	91.80	1.80	88.25
103-3.410ES	3.621	.103 ±.003	3.415 ±.024	.09209	91.95	2.60	86.75
375-2.875	3.625	.375 ±.007	2.875 ±.024	1.12768	92.10	9.55	73.05
1-043	3.629	.070 ±.003	3.489 ±.024	.04303	92.20	1.80	88.60
185-3.260	3.630	.185 ±.005	3.260 ±.024	.29092	92.20	4.70	82.80
1-237	3.637	.139 ±.004	3.359 ±.024	.16676	92.40	3.55	85.30
111-3.422	3.644	.111 ±.004	3.422 ±.024	.10741	92.55	2.80	86.90
1-339	3.645	.210 ±.005	3.225 ±.024	.37377	92.60	5.35	81.90
1-414	3.650	.275 ±.006	3.100 ±.024	.62977	92.70	7.00	78.75
140-3.374	3.654	.140 ±.004	3.374 ±.024	.16994	92.80	3.55	85.70
80-3.500	3.660	.080 ±.003	3.500 ±.024	.05653	92.95	2.05	88.90
71-3.523	3.665	.071 ±.003	3.523 ±.024	.04470	93.10	1.80	89.50
80-3.483VS	3.671	.081 ±.003	3.509 ±.009	.05812	93.25	2.05	89.15
84-3.506	3.674	.084 ±.003	3.506 ±.024	.06250	93.30	2.15	89.05
103-3.460ES	3.675	.103 ±.003	3.469 ±.024	.09350	93.35	2.60	88.10
212-3.255	3.679	.212 ±.005	3.255 ±.024	.38447	93.45	5.40	82.70
375-2.930	3.680	.375 ±.007	2.930 ±.024	1.14676	93.45	9.55	74.40
187-3.312	3.686	.187 ±.005	3.312 ±.024	.30190	93.60	4.75	84.10
1-153	3.693	.103 ±.003	3.487 ±.024	.09397	93.80	2.60	88.55
70-3.562	3.702	.070 ±.003	3.562 ±.024	.04391	94.05	1.80	90.45
176-3.350	3.702	.176 ±.005	3.350 ±.024	.26949	94.05	4.45	85.10
370-2.982	3.722	.370 ±.007	2.982 ±.024	1.13226	94.55	9.40	75.75
104-3.520	3.728	.104 ±.003	3.520 ±.024	.09672	94.70	2.65	89.40
32-3.638SS	3.738	.032 ±.003	3.674 ±.024	.00936	94.95	.80	93.30
437-2.875	3.749	.437 ±.009	2.875 ±.024	1.56060	95.20	11.10	73.05
75-3.600	3.750	.075 ±.003	3.600 ±.024	.05101	95.25	1.90	91.45
250-3.250	3.750	.250 ±.006	3.250 ±.024	.53974	95.25	6.35	82.55
152-3.420VS	3.755	.153 ±.005	3.449 ±.024	.20805	95.40	3.90	87.60
50-3.670	3.761	.050 ±.003	3.661 ±.024	.02289	95.55	1.25	93.00
58-3.645	3.761	.058 ±.003	3.645 ±.024	.03074	95.55	1.45	92.60
1-238	3.762	.139 ±.004	3.484 ±.024	.17272	95.55	3.55	88.50
122-3.520	3.764	.122 ±.004	3.520 ±.024	.13375	95.60	3.10	89.40
1-340	3.770	.210 ±.005	3.350 ±.024	.38737	95.75	5.35	85.10
1-415	3.775	.275 ±.006	3.225 ±.024	.65309	95.90	7.00	81.90
140-3.500	3.780	.140 ±.004	3.500 ±.024	.17603	96.00	3.55	88.90
211-3.366	3.788	.211 ±.005	3.366 ±.024	.39294	96.20	5.35	85.50
310-3.136SS	3.791	.313 ±.006	3.165 ±.024	.84073	96.30	7.95	80.40
203-3.375	3.792	.204 ±.005	3.384 ±.024	.36843	96.30	5.20	85.95
330-3.137	3.797	.330 ±.007	3.137 ±.024	.93158	96.45	8.40	79.70
50-3.670SS	3.804	.050 ±.003	3.704 ±.024	.02316	96.60	1.25	94.10
125-3.562	3.812	.125 ±.004	3.562 ±.024	.14215	96.80	3.20	90.45
156-3.500	3.812	.156 ±.005	3.500 ±.024	.21953	96.80	3.95	88.90
103-3.612	3.818	.103 ±.003	3.612 ±.024	.09725	97.00	2.60	91.75
176-3.475	3.827	.176 ±.005	3.475 ±.024	.27905	97.20	4.45	88.25



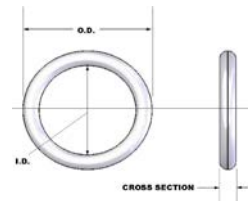
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
90-3.661	3.841	.090 ±.003	3.661 ±.024	.07497	97.55	2.30	93.00
125-3.543SS	3.851	.127 ±.004	3.597 ±.024	.14820	97.80	3.25	91.35
275-3.252SS	3.857	.279 ±.006	3.299 ±.024	.68721	97.95	7.10	83.80
179-3.522	3.866	.178 ±.005	3.510 ±.024	.28832	98.20	4.50	89.15
1-044	3.879	.070 ±.003	3.739 ±.027	.04605	98.55	1.80	94.95
1-239	3.887	.139 ±.004	3.609 ±.028	.17868	98.75	3.55	91.65
125-3.640	3.890	.125 ±.004	3.640 ±.028	.14515	98.80	3.20	92.45
1-341	3.895	.210 ±.005	3.475 ±.024	.40097	98.95	5.35	88.25
1-416	3.900	.275 ±.006	3.350 ±.024	.67641	99.05	7.00	85.10
140-3.625	3.905	.140 ±.004	3.625 ±.028	.18208	99.20	3.55	92.10
71-3.776	3.918	.071 ±.003	3.776 ±.027	.04785	99.50	1.80	95.90
95-3.744	3.934	.095 ±.003	3.744 ±.028	.08549	99.90	2.40	95.10
1-154	3.943	.103 ±.003	3.737 ±.028	.10052	100.15	2.60	94.90
147-3.656	3.950	.147 ±.005	3.656 ±.028	.20277	100.35	3.75	92.85
176-3.600	3.952	.176 ±.005	3.600 ±.028	.28860	100.40	4.45	91.45
312-3.300SS	3.961	.315 ±.006	3.331 ±.024	.89264	100.60	8.00	84.60
104-3.755	3.963	.104 ±.003	3.755 ±.028	.10299	100.65	2.65	95.40
70-3.833ES	3.985	.070 ±.003	3.845 ±.028	.04733	101.20	1.80	97.65
230-3.475VS	3.987	.233 ±.006	3.521 ±.024	.50286	101.25	5.90	89.45
70-3.840ES	3.991	.070 ±.003	3.851 ±.027	.04741	101.35	1.80	97.80
70-3.860	4.000	.070 ±.003	3.860 ±.027	.04751	101.60	1.80	98.05
1-240	4.012	.139 ±.004	3.734 ±.028	.18464	101.90	3.55	94.85
70-3.840VS	4.020	.071 ±.003	3.878 ±.027	.04912	102.10	1.80	98.50
1-342	4.020	.210 ±.005	3.600 ±.028	.41458	102.10	5.35	91.45
1-417	4.025	.275 ±.006	3.475 ±.024	.69974	102.25	7.00	88.25
150-3.734	4.034	.150 ±.005	3.734 ±.028	.21563	102.45	3.80	94.85
140-3.757	4.037	.140 ±.004	3.757 ±.028	.18846	102.55	3.55	95.45
103-3.837	4.043	.103 ±.003	3.837 ±.028	.10314	102.70	2.60	97.45
118-3.819	4.055	.118 ±.004	3.819 ±.028	.13526	103.00	3.00	97.00
212-3.635	4.059	.212 ±.005	3.635 ±.028	.42661	103.10	5.40	92.35
210-3.640	4.060	.210 ±.005	3.640 ±.028	.41893	103.10	5.35	92.45
212-3.641	4.065	.212 ±.005	3.641 ±.028	.42728	103.25	5.40	92.50
248-3.575	4.071	.248 ±.006	3.575 ±.024	.58016	103.40	6.30	90.80
300-3.475	4.075	.300 ±.006	3.475 ±.024	.83830	103.50	7.60	88.25
70-3.937	4.077	.070 ±.003	3.937 ±.027	.04845	103.55	1.80	100.00
176-3.725	4.077	.176 ±.005	3.725 ±.028	.29815	103.55	4.45	94.60
125-3.750SS	4.078	.127 ±.004	3.824 ±.028	.15724	103.60	3.25	97.15
103-3.875	4.097	.103 ±.003	3.891 ±.028	.10455	104.05	2.60	98.85
375-3.325SS	4.100	.377 ±.007	3.346 ±.024	1.30562	104.15	9.60	85.00
210-3.640SS	4.102	.212 ±.005	3.678 ±.028	.43138	104.20	5.40	93.40
158-3.780ES	4.117	.159 ±.005	3.799 ±.028	.24689	104.55	4.05	96.50
1-045	4.129	.070 ±.003	3.989 ±.027	.04907	104.90	1.80	101.30
256-3.563SS	4.134	.260 ±.006	3.614 ±.028	.64617	105.00	6.60	91.80
1-241	4.137	.139 ±.004	3.859 ±.028	.19060	105.10	3.55	98.00
1-343	4.145	.210 ±.005	3.725 ±.028	.42818	105.30	5.35	94.60



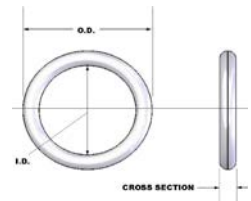
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
103-3.862	4.148	.105 ±.003	3.938 ±.028	.10998	105.35	2.65	100.05
1-418	4.150	.275 ±.006	3.600 ±.028	.72306	105.40	7.00	91.45
140-3.876	4.156	.140 ±.004	3.876 ±.028	.19422	105.55	3.55	98.45
150-3.859	4.159	.150 ±.005	3.859 ±.028	.22257	105.65	3.80	98.00
71-4.028	4.170	.071 ±.003	4.028 ±.027	.05098	105.90	1.80	102.30
224-3.724	4.172	.224 ±.006	3.724 ±.028	.48878	105.95	5.70	94.60
139-3.910	4.188	.139 ±.004	3.910 ±.028	.19303	106.40	3.55	99.30
1-155	4.193	.103 ±.003	3.987 ±.028	.10706	106.50	2.60	101.25
176-3.850	4.202	.176 ±.005	3.850 ±.028	.30771	106.75	4.45	97.80
104-4.028	4.236	.104 ±.003	4.028 ±.028	.11027	107.60	2.65	102.30
40-4.140VS	4.259	.040 ±.003	4.179 ±.027	.01666	108.20	1.00	106.15
1-242	4.262	.139 ±.004	3.984 ±.028	.19655	108.25	3.55	101.20
1-344	4.270	.210 ±.005	3.850 ±.028	.44178	108.45	5.35	97.80
1-419	4.275	.275 ±.006	3.725 ±.028	.74639	108.60	7.00	94.60
140-4.008	4.288	.140 ±.004	4.008 ±.028	.20060	108.90	3.55	101.80
70-4.107SS	4.289	.071 ±.003	4.147 ±.027	.05246	108.95	1.80	105.35
156-3.984	4.296	.156 ±.005	3.984 ±.028	.24859	109.10	3.95	101.20
103-4.093	4.299	.103 ±.003	4.093 ±.028	.10984	109.20	2.60	103.95
70-4.180NS	4.312	.070 ±.003	4.172 ±.027	.05129	109.55	1.80	105.95
139-4.046	4.314	.139 ±.004	4.036 ±.028	.19903	109.60	3.55	102.50
103-4.109	4.315	.103 ±.003	4.109 ±.028	.11026	109.60	2.60	104.35
139-4.020SS	4.317	.140 ±.004	4.037 ±.028	.20200	109.65	3.55	102.55
176-3.975	4.327	.176 ±.005	3.975 ±.028	.31726	109.90	4.45	100.95
103-4.150	4.356	.103 ±.003	4.150 ±.028	.11133	110.65	2.60	105.40
125-4.109	4.359	.125 ±.004	4.109 ±.028	.16323	110.70	3.20	104.35
118-4.134	4.370	.118 ±.004	4.134 ±.028	.14608	111.00	3.00	105.00
375-3.622	4.372	.375 ±.007	3.622 ±.024	1.38687	111.05	9.55	92.00
103-4.169	4.375	.103 ±.003	4.169 ±.028	.11183	111.15	2.60	105.90
1-046	4.379	.070 ±.003	4.239 ±.030	.05210	111.25	1.80	107.65
103-4.175	4.381	.103 ±.003	4.175 ±.028	.11198	111.30	2.60	106.05
1-243	4.387	.139 ±.004	4.109 ±.028	.20251	111.45	3.55	104.35
83-4.226	4.392	.083 ±.003	4.226 ±.028	.07324	111.55	2.10	107.35
1-345	4.395	.210 ±.005	3.975 ±.028	.45538	111.65	5.35	100.95
1-420	4.400	.275 ±.006	3.850 ±.028	.76971	111.75	7.00	97.80
281-3.844	4.406	.281 ±.006	3.844 ±.028	.80367	111.90	7.15	97.65
140-4.127	4.407	.140 ±.004	4.127 ±.028	.20636	111.95	3.55	104.85
103-4.204ES	4.421	.103 ±.003	4.215 ±.028	.11303	112.30	2.60	107.05
71-4.281	4.423	.071 ±.003	4.281 ±.030	.05413	112.35	1.80	108.75
47-4.343	4.437	.047 ±.003	4.343 ±.030	.02393	112.70	1.20	110.30
70-4.300	4.440	.070 ±.003	4.300 ±.030	.05283	112.80	1.80	109.20
1-156	4.443	.103 ±.003	4.237 ±.030	.11361	112.85	2.60	107.60
155-4.139	4.449	.155 ±.005	4.139 ±.028	.25455	113.00	3.95	105.15
176-4.100	4.452	.176 ±.005	4.100 ±.028	.32682	113.10	4.45	104.15
103-4.256	4.462	.103 ±.003	4.256 ±.030	.11410	113.35	2.60	108.10
104-4.258	4.466	.104 ±.003	4.258 ±.030	.11641	113.45	2.65	108.15



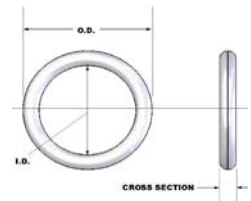
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
44-4.390	4.478	.044 ±.003	4.390 ±.030	.02118	113.75	1.10	111.50
186-4.095SS	4.479	.186 ±.005	4.107 ±.028	.36646	113.75	4.70	104.30
104-4.279	4.487	.104 ±.003	4.279 ±.030	.11697	113.95	2.65	108.70
500-3.500	4.500	.500 ±.010	3.500 ±.024	2.46740	114.30	12.70	88.90
140-4.125SS	4.502	.143 ±.004	4.216 ±.028	.21994	114.35	3.65	107.10
78-4.266SS	4.506	.079 ±.003	4.348 ±.030	.06817	114.45	2.00	110.45
1-244	4.512	.139 ±.004	4.234 ±.030	.20847	114.60	3.55	107.55
103-4.300ES	4.517	.103 ±.003	4.311 ±.030	.11554	114.75	2.60	109.50
1-346	4.520	.210 ±.005	4.100 ±.028	.46898	114.80	5.35	104.15
1-421	4.525	.275 ±.006	3.975 ±.028	.79304	114.95	7.00	100.95
211-4.120	4.542	.211 ±.005	4.120 ±.028	.47577	115.35	5.35	104.65
111-4.322	4.544	.111 ±.004	4.322 ±.030	.13477	115.40	2.80	109.80
224-4.098	4.546	.224 ±.006	4.098 ±.028	.53508	115.45	5.70	104.10
140-4.274	4.554	.140 ±.004	4.274 ±.030	.21347	115.65	3.55	108.55
103-4.350	4.556	.103 ±.003	4.350 ±.030	.11656	115.70	2.60	110.50
312-3.938	4.562	.312 ±.006	3.938 ±.027	1.02079	115.90	7.90	100.05
103-4.359	4.565	.103 ±.003	4.359 ±.030	.11680	115.95	2.60	110.70
30-4.523	4.567	.030 ±.003	4.507 ±.030	.01008	116.00	.75	114.50
176-4.225	4.577	.176 ±.005	4.225 ±.030	.33637	116.25	4.45	107.30
60-4.500SS	4.587	.060 ±.003	4.467 ±.030	.04021	116.50	1.50	113.45
139-4.300ES	4.589	.139 ±.004	4.311 ±.030	.21214	116.55	3.55	109.50
150-4.295	4.595	.150 ±.005	4.295 ±.030	.24677	116.70	3.80	109.10
71-4.409VS	4.599	.072 ±.003	4.455 ±.030	.05790	116.80	1.85	113.15
103-4.397	4.603	.103 ±.003	4.397 ±.030	.11779	116.90	2.60	111.70
1-047	4.629	.070 ±.003	4.489 ±.030	.05512	117.60	1.80	114.00
1-245	4.637	.139 ±.004	4.359 ±.030	.21443	117.80	3.55	110.70
1-347	4.645	.210 ±.005	4.225 ±.030	.48258	118.00	5.35	107.30
1-422	4.650	.275 ±.006	4.100 ±.028	.81636	118.10	7.00	104.15
400-3.850	4.650	.400 ±.009	3.850 ±.028	1.67783	118.10	10.15	97.80
140-4.379	4.659	.140 ±.004	4.379 ±.030	.21854	118.35	3.55	111.25
500-3.675	4.675	.500 ±.010	3.675 ±.024	2.57535	118.75	12.70	93.35
1-157	4.693	.103 ±.003	4.487 ±.030	.12015	119.20	2.60	113.95
70-4.562	4.702	.070 ±.003	4.562 ±.030	.05600	119.45	1.80	115.90
176-4.350	4.702	.176 ±.005	4.350 ±.030	.34592	119.45	4.45	110.50
103-4.487ES	4.704	.103 ±.003	4.498 ±.030	.12044	119.50	2.60	114.25
103-4.507	4.713	.103 ±.003	4.507 ±.030	.12067	119.70	2.60	114.50
210-4.304	4.724	.210 ±.005	4.304 ±.030	.49118	120.00	5.35	109.30
375-4.006	4.756	.375 ±.007	4.006 ±.028	1.52011	120.80	9.55	101.75
215-4.331	4.761	.215 ±.005	4.331 ±.030	.51850	120.95	5.45	110.00
1-246	4.762	.139 ±.004	4.484 ±.030	.22039	120.95	3.55	113.90
1-348	4.770	.210 ±.005	4.350 ±.030	.49618	121.15	5.35	110.50
1-423	4.775	.275 ±.006	4.225 ±.030	.83969	121.30	7.00	107.30
140-4.508	4.788	.140 ±.004	4.508 ±.030	.22478	121.60	3.55	114.50
70-4.672	4.812	.070 ±.003	4.672 ±.030	.05733	122.25	1.80	118.65
103-4.612	4.818	.103 ±.003	4.612 ±.030	.12342	122.40	2.60	117.15



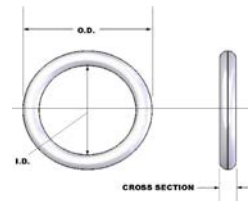
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
176-4.475	4.827	.176 ±.005	4.475 ±.030	.35548	122.60	4.45	113.65
125-4.600	4.850	.125 ±.004	4.600 ±.030	.18216	123.20	3.20	116.85
181-4.488	4.850	.181 ±.005	4.488 ±.030	.37742	123.20	4.60	114.00
103-4.609SS	4.862	.104 ±.003	4.654 ±.030	.12698	123.50	2.65	118.20
250-4.375	4.875	.250 ±.006	4.375 ±.030	.71323	123.85	6.35	111.15
1-048	4.879	.070 ±.003	4.739 ±.030	.05814	123.95	1.80	120.35
1-247	4.887	.139 ±.004	4.609 ±.030	.22635	124.15	3.55	117.05
1-349	4.895	.210 ±.005	4.475 ±.030	.50979	124.35	5.35	113.65
1-424	4.900	.275 ±.006	4.350 ±.030	.86301	124.45	7.00	110.50
140-4.630	4.910	.140 ±.004	4.630 ±.030	.23068	124.70	3.55	117.60
220-4.475	4.915	.220 ±.006	4.475 ±.033	.56069	124.85	5.60	113.65
71-4.784	4.926	.071 ±.003	4.784 ±.030	.06039	125.10	1.80	121.50
141-4.654	4.936	.141 ±.004	4.654 ±.030	.23522	125.35	3.60	118.20
157-4.606ES	4.936	.158 ±.005	4.620 ±.030	.29431	125.35	4.00	117.35
500-3.937	4.937	.500 ±.010	3.937 ±.028	2.73696	125.40	12.70	100.00
313-4.300ES	4.942	.315 ±.006	4.312 ±.030	1.13282	125.55	8.00	109.55
1-158	4.943	.103 ±.003	4.737 ±.030	.12670	125.55	2.60	120.30
241-4.475	4.957	.241 ±.006	4.475 ±.033	.67585	125.90	6.10	113.65
117-4.750	4.968	.117 ±.004	4.734 ±.030	.16385	126.20	2.95	120.25
188-4.600	4.976	.188 ±.005	4.600 ±.030	.41755	126.40	4.80	116.85
104-4.783	4.991	.104 ±.003	4.783 ±.030	.13042	126.75	2.65	121.50
375-4.250	4.992	.374 ±.007	4.244 ±.030	1.59381	126.80	9.50	107.80
70-4.864	5.004	.070 ±.003	4.864 ±.030	.05965	127.10	1.80	123.55
1-248	5.012	.139 ±.004	4.734 ±.030	.23231	127.30	3.55	120.25
1-350	5.020	.210 ±.005	4.600 ±.030	.52339	127.50	5.35	116.85
1-425	5.025	.275 ±.006	4.475 ±.033	.88634	127.65	7.00	113.65
70-4.890	5.030	.070 ±.003	4.890 ±.030	.05997	127.75	1.80	124.20
140-4.755	5.035	.140 ±.004	4.755 ±.030	.23673	127.90	3.55	120.80
375-4.250VS	5.052	.379 ±.007	4.294 ±.030	1.65620	128.30	9.65	109.05
103-4.859	5.065	.103 ±.003	4.859 ±.030	.12989	128.65	2.60	123.40
212-4.645	5.069	.212 ±.005	4.645 ±.030	.53862	128.75	5.40	118.00
176-4.725	5.077	.176 ±.005	4.725 ±.030	.37458	128.95	4.45	120.00
103-4.886ES	5.104	.103 ±.003	4.898 ±.030	.13091	129.65	2.60	124.40
1-049	5.129	.070 ±.003	4.989 ±.037	.06116	130.30	1.80	126.70
103-4.930	5.136	.103 ±.003	4.930 ±.030	.13175	130.45	2.60	125.20
1-249	5.137	.139 ±.004	4.859 ±.035	.23827	130.50	3.55	123.40
1-351	5.145	.210 ±.005	4.725 ±.030	.53699	130.70	5.35	120.00
1-426	5.150	.275 ±.006	4.600 ±.033	.90966	130.80	7.00	116.85
140-4.881	5.161	.140 ±.004	4.881 ±.035	.24282	131.10	3.55	124.00
159-4.850	5.168	.159 ±.005	4.850 ±.030	.31245	131.25	4.05	123.20
71-5.038	5.180	.071 ±.003	5.038 ±.037	.06355	131.55	1.80	127.95
219-4.750	5.188	.219 ±.006	4.750 ±.033	.58803	131.80	5.55	120.65
1-159	5.193	.103 ±.003	4.987 ±.035	.13324	131.90	2.60	126.65
212-4.774	5.198	.212 ±.005	4.774 ±.030	.55292	132.05	5.40	121.25
375-4.438ES	5.201	.376 ±.007	4.449 ±.030	1.68311	132.10	9.55	113.00



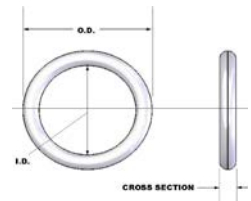
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
176-4.850	5.202	.176 ±.005	4.850 ±.030	.38414	132.15	4.45	123.20
141-4.928	5.210	.141 ±.004	4.928 ±.035	.24866	132.35	3.60	125.15
139-4.910ES	5.217	.140 ±.004	4.937 ±.035	.24553	132.50	3.55	125.40
70-5.114	5.254	.070 ±.003	5.114 ±.037	.06268	133.45	1.80	129.90
1-250	5.262	.139 ±.004	4.984 ±.035	.24423	133.65	3.55	126.60
1-352	5.270	.210 ±.005	4.850 ±.030	.55059	133.85	5.35	123.20
1-427	5.275	.275 ±.006	4.725 ±.033	.93299	134.00	7.00	120.00
147-4.984	5.278	.147 ±.005	4.984 ±.037	.27358	134.05	3.75	126.60
140-5.006	5.286	.140 ±.004	5.006 ±.035	.24887	134.25	3.55	127.15
50-5.163VS	5.312	.050 ±.003	5.212 ±.037	.03246	134.95	1.25	132.40
103-5.106	5.312	.103 ±.003	5.106 ±.035	.13635	134.95	2.60	129.70
197-4.921	5.315	.197 ±.005	4.921 ±.030	.49009	135.00	5.00	125.00
103-5.117	5.323	.103 ±.003	5.117 ±.035	.13664	135.20	2.60	129.95
278-4.769	5.325	.278 ±.006	4.769 ±.033	.96242	135.25	7.05	121.15
147-4.984SS	5.327	.148 ±.005	5.031 ±.037	.27990	135.30	3.75	127.80
241-4.850	5.332	.241 ±.006	4.850 ±.033	.72959	135.45	6.10	123.20
103-5.140ES	5.359	.103 ±.003	5.153 ±.035	.13758	136.10	2.60	130.90
62-5.250	5.374	.062 ±.003	5.250 ±.037	.05038	136.50	1.55	133.35
1-050	5.379	.070 ±.003	5.239 ±.037	.06419	136.65	1.80	133.05
312-4.700ES	5.386	.316 ±.007	4.754 ±.030	1.24917	136.80	8.05	120.75
1-251	5.387	.139 ±.004	5.109 ±.035	.25019	136.85	3.55	129.75
1-353	5.395	.210 ±.005	4.975 ±.037	.56419	137.05	5.35	126.35
168-5.005VS	5.397	.170 ±.005	5.057 ±.037	.37273	137.10	4.30	128.45
1-428	5.400	.275 ±.006	4.850 ±.033	.95631	137.15	7.00	123.20
315-4.776	5.406	.315 ±.007	4.776 ±.030	1.24642	137.30	8.00	121.30
71-5.288	5.430	.071 ±.003	5.288 ±.030	.06666	137.90	1.80	134.30
140-5.159	5.439	.140 ±.004	5.159 ±.035	.25627	138.15	3.55	131.05
1-160	5.443	.103 ±.003	5.237 ±.035	.13978	138.25	2.60	133.00
50-5.302VS	5.467	.051 ±.003	5.365 ±.037	.03476	138.85	1.30	136.25
252-4.905VS	5.478	.255 ±.006	4.968 ±.033	.83799	139.15	6.50	126.20
103-5.272ES	5.491	.103 ±.003	5.285 ±.035	.14104	139.45	2.60	134.25
70-5.360	5.500	.070 ±.003	5.360 ±.037	.06565	139.70	1.80	136.15
500-4.500	5.500	.500 ±.010	4.500 ±.030	3.08425	139.70	12.70	114.30
103-5.290ES	5.509	.103 ±.003	5.303 ±.035	.14151	139.95	2.60	134.70
1-252	5.512	.139 ±.004	5.234 ±.035	.25615	140.00	3.55	132.95
104-5.305	5.513	.104 ±.003	5.305 ±.035	.14435	140.05	2.65	134.75
70-5.379	5.519	.070 ±.003	5.379 ±.037	.06588	140.20	1.80	136.65
103-5.300ES	5.519	.103 ±.003	5.313 ±.035	.14177	140.20	2.60	134.95
125-5.270	5.520	.125 ±.004	5.270 ±.035	.20799	140.20	3.20	133.85
1-354	5.520	.210 ±.005	5.100 ±.037	.57779	140.20	5.35	129.55
1-429	5.525	.275 ±.006	4.975 ±.037	.97964	140.35	7.00	126.35
140-5.253	5.533	.140 ±.004	5.253 ±.030	.26081	140.55	3.55	133.45
170-5.118SS	5.535	.172 ±.005	5.191 ±.037	.39148	140.60	4.35	131.85
140-5.260	5.540	.140 ±.004	5.260 ±.035	.26115	140.70	3.55	133.60
103-5.322ES	5.542	.103 ±.003	5.336 ±.035	.14237	140.75	2.60	135.55



# Engineers Guide for O-Rings

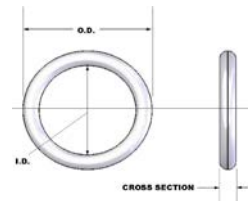


Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
118-5.315	5.551	.118 ±.004	5.315 ±.035	.18666	141.00	3.00	135.00
79-5.315VS	5.556	.080 ±.003	5.396 ±.035	.08647	141.10	2.05	137.05
197-5.197	5.591	.197 ±.005	5.197 ±.037	.51652	142.00	5.00	132.00
103-5.380ES	5.600	.103 ±.003	5.394 ±.035	.14389	142.25	2.60	137.00
1-051	5.629	.070 ±.003	5.489 ±.037	.06721	143.00	1.80	139.40
1-253	5.637	.139 ±.004	5.359 ±.035	.26210	143.20	3.55	136.10
1-355	5.645	.210 ±.005	5.225 ±.037	.59140	143.40	5.35	132.70
1-430	5.650	.275 ±.006	5.100 ±.037	1.00296	143.50	7.00	129.55
211-5.251	5.673	.211 ±.005	5.251 ±.037	.60001	144.10	5.35	133.40
71-5.543	5.685	.071 ±.003	5.543 ±.037	.06983	144.40	1.80	140.80
1-161	5.693	.103 ±.003	5.487 ±.035	.14633	144.60	2.60	139.35
103-5.483ES	5.703	.103 ±.003	5.497 ±.035	.14659	144.85	2.60	139.60
103-5.496ES	5.716	.103 ±.003	5.510 ±.035	.14693	145.20	2.60	139.95
104-5.512	5.722	.104 ±.003	5.514 ±.035	.14993	145.35	2.65	140.05
118-5.492	5.728	.118 ±.004	5.492 ±.035	.19274	145.50	3.00	139.50
142-5.466	5.750	.142 ±.004	5.466 ±.035	.27901	146.05	3.60	138.85
1-254	5.762	.139 ±.004	5.484 ±.035	.26806	146.35	3.55	139.30
1-356	5.770	.210 ±.005	5.350 ±.037	.60500	146.55	5.35	135.90
104-5.565	5.773	.104 ±.003	5.565 ±.035	.15129	146.65	2.65	141.35
1-431	5.775	.275 ±.006	5.225 ±.037	1.02628	146.70	7.00	132.70
455-4.866	5.776	.455 ±.010	4.866 ±.030	2.71804	146.70	11.55	123.60
375-5.000SS	5.777	.377 ±.007	5.023 ±.037	1.89372	146.75	9.60	127.60
125-5.531	5.781	.125 ±.004	5.531 ±.035	.21806	146.85	3.20	140.50
139-5.503	5.781	.139 ±.004	5.503 ±.035	.26897	146.85	3.55	139.80
139-5.503	5.781	.139 ±.004	5.503 ±.035	.26897	146.85	3.55	139.80
140-5.512	5.791	.140 ±.004	5.511 ±.035	.27329	147.10	3.55	140.00
121-5.562	5.804	.121 ±.004	5.562 ±.035	.20530	147.40	3.05	141.30
103-5.602	5.808	.103 ±.003	5.602 ±.035	.14934	147.50	2.60	142.30
210-5.450	5.810	.208 ±.005	5.394 ±.037	.59801	147.55	5.30	137.00
438-4.938	5.814	.438 ±.009	4.938 ±.030	2.54476	147.70	11.15	125.45
162-5.500	5.824	.162 ±.005	5.500 ±.037	.36664	147.95	4.10	139.70
70-5.700	5.843	.070 ±.003	5.703 ±.037	.06980	148.40	1.80	144.85
1-052	5.879	.070 ±.003	5.739 ±.037	.07023	149.35	1.80	145.75
1-255	5.887	.139 ±.004	5.609 ±.035	.27402	149.55	3.55	142.45
1-357	5.895	.210 ±.005	5.475 ±.037	.61860	149.75	5.35	139.05
1-432	5.900	.275 ±.006	5.350 ±.037	1.04961	149.85	7.00	135.90
97-5.723	5.917	.097 ±.003	5.723 ±.035	.13512	150.30	2.45	145.35
118-5.689	5.925	.118 ±.004	5.689 ±.035	.19951	150.50	3.00	144.50
157-5.512VS	5.927	.160 ±.005	5.607 ±.037	.36428	150.55	4.05	142.40
71-5.795	5.937	.071 ±.003	5.795 ±.037	.07296	150.80	1.80	147.20
70-5.740SS	5.938	.071 ±.003	5.796 ±.037	.07297	150.85	1.80	147.20
140-5.661	5.941	.140 ±.004	5.661 ±.035	.28054	150.90	3.55	143.80
1-162	5.943	.103 ±.003	5.737 ±.035	.15287	150.95	2.60	145.70
103-5.750ES	5.971	.103 ±.003	5.765 ±.035	.15360	151.65	2.60	146.45
500-5.000	6.000	.500 ±.010	5.000 ±.037	3.39268	152.40	12.70	127.00





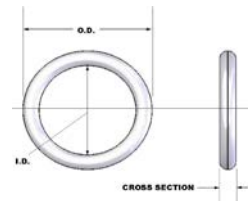
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
70-5.810SS	6.007	.071 ±.003	5.865 ±.037	.07383	152.60	1.80	148.95
189-5.650	6.007	.188 ±.005	5.631 ±.037	.50746	152.60	4.80	143.05
1-256	6.012	.139 ±.004	5.734 ±.035	.27998	152.70	3.55	145.65
1-358	6.020	.210 ±.005	5.600 ±.037	.63220	152.90	5.35	142.25
1-433	6.025	.275 ±.006	5.475 ±.037	1.07293	153.05	7.00	139.05
625-4.812	6.062	.625 ±.012	4.812 ±.033	5.24034	154.00	15.90	122.25
330-5.319SS	6.065	.335 ±.007	5.395 ±.037	1.58666	154.05	8.50	137.05
330-5.354SS	6.101	.335 ±.007	5.431 ±.037	1.59663	154.95	8.50	137.95
70-5.968	6.108	.070 ±.003	5.968 ±.037	.07300	155.15	1.80	151.60
70-5.910SS	6.108	.071 ±.003	5.966 ±.037	.07509	155.15	1.80	151.55
1-053	6.129	.070 ±.003	5.989 ±.037	.07325	155.70	1.80	152.10
1-257	6.137	.139 ±.004	5.859 ±.035	.28594	155.90	3.55	148.80
118-5.905	6.141	.118 ±.004	5.905 ±.035	.20693	156.00	3.00	150.00
1-359	6.145	.210 ±.005	5.725 ±.037	.64580	156.10	5.35	145.40
1-434	6.150	.275 ±.006	5.600 ±.037	1.09626	156.20	7.00	142.25
197-5.708VS	6.181	.200 ±.005	5.781 ±.037	.59030	157.00	5.10	146.85
71-6.048	6.190	.071 ±.003	6.048 ±.037	.07611	157.25	1.80	153.60
1-163	6.193	.103 ±.003	5.987 ±.035	.15942	157.30	2.60	152.05
241-5.725	6.207	.241 ±.006	5.725 ±.037	.85498	157.65	6.10	145.40
74-6.100	6.228	.074 ±.003	6.080 ±.035	.08315	158.20	1.90	154.45
1-258	6.262	.139 ±.004	5.984 ±.035	.29190	159.05	3.55	152.00
1-360	6.270	.210 ±.005	5.850 ±.037	.65940	159.25	5.35	148.60
1-435	6.275	.275 ±.006	5.725 ±.037	1.11958	159.40	7.00	145.40
60-6.187	6.307	.060 ±.003	6.187 ±.037	.05549	160.20	1.50	157.15
70-6.180	6.320	.070 ±.003	6.180 ±.037	.07556	160.55	1.80	156.95
140-6.043	6.323	.140 ±.004	6.043 ±.035	.29902	160.60	3.55	153.50
103-6.125	6.331	.103 ±.003	6.125 ±.035	.16303	160.80	2.60	155.60
141-6.064	6.346	.141 ±.004	6.064 ±.035	.30438	161.20	3.60	154.05
278-5.796	6.352	.278 ±.006	5.796 ±.037	1.15825	161.35	7.05	147.20
176-5.906SS	6.354	.179 ±.005	5.996 ±.037	.48818	161.40	4.55	152.30
1-054	6.379	.070 ±.003	6.239 ±.040	.07628	162.05	1.80	158.45
103.6-167ES	6.389	.103 ±.003	6.183 ±.035	.16455	162.30	2.60	157.05
1-361	6.395	.210 ±.005	5.975 ±.037	.67300	162.45	5.35	151.75
1-436	6.400	.275 ±.006	5.850 ±.037	1.14291	162.55	7.00	148.60
80-6.250	6.410	.080 ±.003	6.250 ±.040	.09996	162.80	2.05	158.75
71-6.300	6.442	.071 ±.003	6.300 ±.040	.07924	163.65	1.80	160.00
1-164	6.443	.103 ±.003	6.237 ±.040	.16596	163.65	2.60	158.40
70-6.284ES	6.446	.070 ±.003	6.306 ±.040	.07709	163.75	1.80	160.15
70-6.309	6.449	.070 ±.003	6.309 ±.040	.07712	163.80	1.80	160.25
70-6.310VS	6.489	.070 ±.003	6.349 ±.040	.07761	164.80	1.80	161.25
375-5.750	6.500	.375 ±.007	5.750 ±.037	2.12524	165.10	9.55	146.05
245-6.015	6.505	.245 ±.006	6.015 ±.037	.92714	165.25	6.20	152.80
104-6.299	6.506	.104 ±.003	6.298 ±.040	.17085	165.25	2.65	159.95
1-259	6.512	.139 ±.004	6.234 ±.040	.30382	165.40	3.55	158.35
224-6.075	6.523	.224 ±.006	6.075 ±.037	.77984	165.70	5.70	154.30



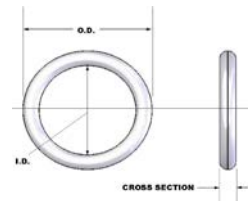
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
1-437	6.525	.275 ±.006	5.975 ±.037	1.16623	165.75	7.00	151.75
112-6.378SS	6.549	.112 ±.004	6.325 ±.040	.19923	166.35	2.85	160.65
500-5.562	6.562	.500 ±.010	5.562 ±.037	3.73935	166.70	12.70	141.30
103-6.380	6.586	.103 ±.003	6.380 ±.040	.16970	167.30	2.60	162.05
63-6.400VS	6.588	.064 ±.003	6.460 ±.040	.06593	167.35	1.65	164.10
157-6.299	6.613	.157 ±.005	6.299 ±.040	.39265	167.95	4.00	160.00
103-6.400ES	6.622	.103 ±.003	6.416 ±.040	.17065	168.20	2.60	162.95
139-6.350	6.628	.139 ±.003	6.350 ±.040	.30935	168.35	3.55	161.30
1-055	6.629	.070 ±.003	6.489 ±.040	.07930	168.40	1.80	164.80
103-6.424	6.630	.103 ±.003	6.424 ±.040	.17086	168.40	2.60	163.15
1-362	6.645	.210 ±.005	6.225 ±.040	.70021	168.80	5.35	158.10
70-6.520	6.660	.070 ±.003	6.520 ±.040	.07967	169.15	1.80	165.60
80-6.500	6.660	.080 ±.003	6.500 ±.040	.10391	169.15	2.05	165.10
211-6.256	6.678	.211 ±.005	6.256 ±.040	.71041	169.60	5.35	158.90
256-6.181	6.684	.256 ±.006	6.172 ±.037	1.03943	169.75	6.50	156.75
94-6.500	6.688	.094 ±.003	6.500 ±.040	.14376	169.90	2.40	165.10
1-165	6.693	.103 ±.003	6.487 ±.040	.17250	170.00	2.60	164.75
71-6.553	6.695	.071 ±.003	6.553 ±.040	.08239	170.05	1.80	166.45
91-6.394SS	6.696	.093 ±.003	6.510 ±.040	.14091	170.10	2.35	165.35
118-6.378VS	6.700	.120 ±.004	6.460 ±.040	.23379	170.20	3.05	164.10
241-6.225	6.707	.241 ±.006	6.225 ±.040	.92664	170.35	6.10	158.10
125-6.460	6.710	.125 ±.004	6.460 ±.040	.25387	170.45	3.20	164.10
375-5.850VS	6.712	.381 ±.007	5.950 ±.037	2.26758	170.50	9.70	151.15
103-6.501ES	6.724	.103 ±.003	6.518 ±.040	.17332	170.80	2.60	165.55
50-6.567VS	6.729	.050 ±.003	6.629 ±.040	.04120	170.90	1.25	168.40
164-6.299SS	6.729	.167 ±.005	6.395 ±.040	.45155	170.90	4.25	162.45
45-6.690	6.757	.045 ±.003	6.667 ±.040	.03354	171.65	1.15	169.35
104-6.551	6.759	.104 ±.003	6.551 ±.040	.17760	171.70	2.65	166.40
1-260	6.762	.139 ±.004	6.484 ±.040	.31574	171.75	3.55	164.70
210-6.350	6.770	.210 ±.005	6.350 ±.040	.71381	171.95	5.35	161.30
1-438	6.775	.275 ±.006	6.225 ±.040	1.21288	172.10	7.00	158.10
258-6.179VS	6.780	.261 ±.006	6.258 ±.040	1.09573	172.20	6.65	158.95
140-6.516	6.796	.140 ±.004	6.516 ±.040	.32189	172.60	3.55	165.50
70-6.687	6.827	.070 ±.003	6.687 ±.040	.08169	173.40	1.80	169.85
260-6.325	6.845	.260 ±.006	6.325 ±.040	1.09835	173.85	6.60	160.65
500-5.750VS	6.867	.509 ±.010	5.849 ±.037	4.06439	174.40	12.95	148.55
70-6.734	6.874	.070 ±.003	6.734 ±.040	.08226	174.60	1.80	171.05
1-056	6.879	.070 ±.003	6.739 ±.040	.08232	174.75	1.80	171.15
139-6.609	6.887	.139 ±.004	6.609 ±.040	.32170	174.95	3.55	167.85
1-363	6.895	.210 ±.005	6.475 ±.040	.72741	175.15	5.35	164.45
103-6.674ES	6.897	.103 ±.003	6.691 ±.040	.17784	175.20	2.60	169.95
47-6.812	6.906	.047 ±.003	6.812 ±.040	.03738	175.40	1.20	173.05
139-6.630ES	6.924	.139 ±.004	6.646 ±.040	.32346	175.85	3.55	168.80
70-6.722SS	6.927	.071 ±.003	6.785 ±.040	.08528	175.95	1.80	172.35
1-166	6.943	.103 ±.003	6.737 ±.040	.17905	176.35	2.60	171.10



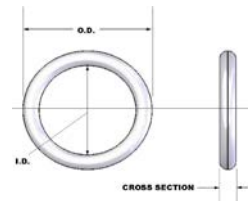
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
71-6.805	6.947	.071 ±.003	6.805 ±.040	.08552	176.45	1.80	172.85
500-6.000	7.000	.500 ±.010	6.000 ±.037	4.00953	177.80	12.70	152.40
104-6.803	7.011	.104 ±.003	6.803 ±.040	.18433	178.10	2.65	172.80
1-261	7.012	.139 ±.004	6.734 ±.040	.32765	178.10	3.55	171.05
1-439	7.025	.275 ±.006	6.475 ±.040	1.25953	178.45	7.00	164.45
258-6.437VS	7.042	.261 ±.006	6.520 ±.040	1.13976	178.85	6.65	165.60
103-6.850ES	7.073	.103 ±.003	6.867 ±.040	.18245	179.65	2.60	174.40
140-6.797	7.077	.140 ±.004	6.797 ±.040	.33548	179.75	3.55	172.65
150-6.650SS	7.084	.153 ±.005	6.778 ±.040	.40033	179.95	3.90	172.15
210-6.666	7.086	.210 ±.005	6.666 ±.040	.74819	180.00	5.35	169.30
70-6.950	7.090	.070 ±.003	6.950 ±.040	.08487	180.10	1.80	176.55
60-7.000	7.120	.060 ±.003	7.000 ±.040	.06271	180.85	1.50	177.80
1-057	7.129	.070 ±.003	6.989 ±.040	.08535	181.10	1.80	177.50
157-6.830	7.144	.157 ±.005	6.830 ±.040	.42494	181.45	4.00	173.50
139-6.850ES	7.145	.139 ±.004	6.867 ±.040	.33399	181.50	3.55	174.40
1-364	7.145	.210 ±.005	6.725 ±.040	.75461	181.50	5.35	170.80
275-6.600	7.150	.275 ±.006	6.600 ±.040	1.28286	181.60	7.00	167.65
1-167	7.193	.103 ±.003	6.987 ±.040	.18559	182.70	2.60	177.45
71-7.058	7.200	.071 ±.003	7.058 ±.040	.08867	182.90	1.80	179.25
455-6.308	7.218	.455 ±.010	6.308 ±.040	3.45463	183.35	11.55	160.20
500-6.264	7.219	.497 ±.010	6.225 ±.040	4.09686	183.35	12.60	158.10
224-6.783	7.231	.224 ±.006	6.783 ±.040	.86750	183.65	5.70	172.30
1.062-5.125	7.249	1.062 ±.015	5.125 ±.037	17.21745	184.10	26.95	130.20
104-7.053	7.261	.104 ±.003	7.053 ±.040	.19100	184.45	2.65	179.15
1-262	7.262	.139 ±.004	6.984 ±.040	.33957	184.45	3.55	177.40
1-440	7.275	.275 ±.006	6.725 ±.040	1.30618	184.80	7.00	170.80
160-7.006	7.326	.160 ±.005	7.006 ±.040	.45264	186.10	4.05	177.95
140-7.053	7.333	.140 ±.004	7.053 ±.040	.34786	186.25	3.55	179.15
1-058	7.379	.070 ±.003	7.239 ±.045	.08837	187.45	1.80	183.85
1-365	7.395	.210 ±.005	6.975 ±.040	.78182	187.85	5.35	177.15
312-6.700VS	7.400	.315 ±.007	6.770 ±.040	1.73461	187.95	8.00	171.95
380-6.640	7.400	.380 ±.007	6.640 ±.040	2.50117	187.95	9.65	168.65
295-6.835NS	7.410	.294 ±.006	6.822 ±.040	1.51765	188.20	7.45	173.30
1-168	7.443	.103 ±.003	7.237 ±.045	.19214	189.05	2.60	183.80
380-6.688	7.448	.380 ±.007	6.688 ±.040	2.51828	189.20	9.65	169.90
71-7.310	7.452	.071 ±.003	7.310 ±.045	.09181	189.30	1.80	185.65
241-6.975	7.457	.241 ±.006	6.975 ±.040	1.03412	189.40	6.10	177.15
70-7.360ES	7.511	.070 ±.003	7.371 ±.045	.08996	190.80	1.80	187.20
1-263	7.512	.139 ±.004	7.234 ±.045	.35149	190.80	3.55	183.75
104-7.308	7.516	.104 ±.003	7.308 ±.045	.19781	190.90	2.65	185.60
103-7.300ES	7.525	.103 ±.003	7.319 ±.045	.19428	191.15	2.60	185.90
1-441	7.525	.275 ±.006	6.975 ±.040	1.35283	191.15	7.00	177.15
375-6.650VS	7.525	.381 ±.007	6.763 ±.040	2.55877	191.15	9.70	171.80
295-6.910SS	7.558	.297 ±.006	6.964 ±.040	1.58033	191.95	7.55	176.90
520-6.519	7.559	.520 ±.011	6.519 ±.040	4.69632	192.00	13.20	165.60



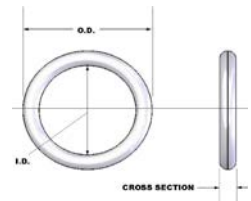
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
272-7.051	7.595	.272 ±.006	7.051 ±.045	1.33680	192.90	6.90	179.10
437-6.750	7.624	.437 ±.009	6.750 ±.040	3.38649	193.65	11.10	171.45
500-6.625	7.625	.500 ±.010	6.625 ±.040	4.39506	193.70	12.70	168.30
1-059	7.629	.070 ±.003	7.489 ±.045	.09139	193.80	1.80	190.20
70-7.500	7.640	.070 ±.003	7.500 ±.045	.09152	194.05	1.80	190.50
103-7.416	7.641	.103 ±.003	7.435 ±.045	.19732	194.10	2.60	188.85
1-366	7.645	.210 ±.005	7.225 ±.045	.80902	194.20	5.35	183.50
1-169	7.693	.103 ±.003	7.487 ±.045	.19868	195.40	2.60	190.15
71-7.562	7.704	.071 ±.003	7.562 ±.045	.09494	195.70	1.80	192.10
241-7.225	7.707	.241 ±.006	7.225 ±.045	1.06995	195.75	6.10	183.50
28-7.717NS	7.750	.028 ±.003	7.694 ±.045	.01494	196.85	.70	195.45
70-7.613	7.753	.070 ±.003	7.613 ±.045	.09289	196.95	1.80	193.35
1-264	7.762	.139 ±.004	7.484 ±.045	.36341	197.15	3.55	190.10
104-7.560	7.768	.104 ±.003	7.560 ±.045	.20453	197.30	2.65	192.00
1-442	7.775	.275 ±.006	7.225 ±.045	1.39948	197.50	7.00	183.50
103-7.583ES	7.808	.103 ±.003	7.602 ±.045	.20169	198.30	2.60	193.10
103-7.609	7.815	.103 ±.004	7.609 ±.045	.20187	198.50	2.60	193.25
140-7.562	7.842	.140 ±.004	7.562 ±.045	.37248	199.20	3.55	192.10
1-060	7.879	.070 ±.003	7.739 ±.045	.09441	200.15	1.80	196.55
1-367	7.895	.210 ±.005	7.475 ±.045	.83622	200.55	5.35	189.85
103-7.673ES	7.898	.103 ±.003	7.692 ±.045	.20405	200.60	2.60	195.40
139-7.609ES	7.906	.139 ±.004	7.628 ±.045	.37027	200.80	3.55	193.75
375-7.125SS	7.911	.377 ±.007	7.157 ±.040	2.64209	200.95	9.60	181.80
281-7.378	7.940	.281 ±.006	7.378 ±.045	1.49219	201.70	7.15	187.40
1-170	7.943	.103 ±.003	7.737 ±.045	.20523	201.75	2.60	196.50
241-7.475	7.957	.241 ±.006	7.475 ±.045	1.10577	202.10	6.10	189.85
236-7.441	7.985	.238 ±.006	7.509 ±.045	1.08275	202.80	6.05	190.75
215-7.581	8.001	.215 ±.005	7.571 ±.045	.88804	203.25	5.45	192.30
70-7.870	8.010	.070 ±.003	7.870 ±.045	.09600	203.45	1.80	199.90
1-265	8.012	.139 ±.004	7.734 ±.045	.37533	203.50	3.55	196.45
104-7.813	8.021	.104 ±.003	7.813 ±.045	.21128	203.75	2.65	198.45
1-443	8.025	.275 ±.006	7.475 ±.045	1.44613	203.85	7.00	189.85
103-7.862	8.068	.103 ±.003	7.862 ±.045	.20850	204.95	2.60	199.70
103-7.848ES	8.074	.103 ±.003	7.868 ±.045	.20865	205.10	2.60	199.85
118-7.784NS	8.079	.118 ±.004	7.843 ±.045	.27351	205.20	3.00	199.20
210-7.600VS	8.099	.212 ±.005	7.675 ±.045	.87463	205.70	5.40	194.95
146-7.700SS	8.113	.148 ±.005	7.817 ±.040	.43048	206.05	3.75	198.55
278-7.567	8.123	.278 ±.006	7.567 ±.045	1.49597	206.30	7.05	192.20
1-061	8.129	.070 ±.003	7.989 ±.045	.09744	206.50	1.80	202.90
103-7.950NS	8.145	.103 ±.003	7.939 ±.045	.21051	206.90	2.60	201.65
1-368	8.145	.210 ±.005	7.725 ±.045	.86343	206.90	5.35	196.20
139-7.850ES	8.148	.139 ±.004	7.870 ±.045	.38181	206.95	3.55	199.90
375-7.324SS	8.167	.379 ±.007	7.409 ±.045	2.76022	207.45	9.65	188.20
103-7.950ES	8.176	.103 ±.003	7.970 ±.045	.21132	207.65	2.60	202.45
1-171	8.193	.103 ±.003	7.987 ±.045	.21177	208.10	2.60	202.85



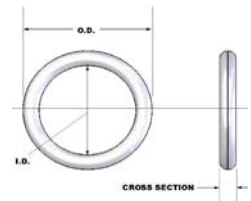
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
241-7.725	8.207	.241 ±.006	7.725 ±.045	1.14160	208.45	6.10	196.20
139-7.950ES	8.248	.139 ±.004	7.970 ±.045	.38658	209.50	3.55	202.45
375-7.500	8.250	.375 ±.007	7.500 ±.045	2.73245	209.55	9.55	190.50
1-266	8.262	.139 ±.004	7.984 ±.045	.38724	209.85	3.55	202.80
104-8.065	8.273	.104 ±.003	8.065 ±.045	.21801	210.15	2.65	204.85
1-444	8.275	.275 ±.006	7.725 ±.045	1.49278	210.20	7.00	196.20
70-8.135ES	8.288	.070 ±.003	8.148 ±.045	.09936	210.50	1.80	206.95
103-8.039ES	8.291	.104 ±.003	8.083 ±.045	.21849	210.60	2.65	205.30
140-8.023	8.303	.140 ±.004	8.023 ±.045	.39477	210.90	3.55	203.80
230-7.829VS	8.337	.231 ±.006	7.875 ±.045	1.06726	211.75	5.85	200.05
500-7.250ES	8.351	.506 ±.010	7.339 ±.045	4.95603	212.10	12.85	186.40
1-369	8.395	.210 ±.005	7.975 ±.045	.89063	213.25	5.35	202.55
1-172	8.443	.103 ±.003	8.237 ±.050	.21831	214.45	2.60	209.20
241-7.975	8.457	.241 ±.006	7.975 ±.045	1.17743	214.80	6.10	202.55
199-8.029ES	8.483	.200 ±.005	8.083 ±.045	.81750	215.45	5.10	205.30
375-7.733	8.483	.375 ±.007	7.733 ±.045	2.81330	215.45	9.55	196.40
104-8.277	8.485	.104 ±.003	8.277 ±.050	.22367	215.50	2.65	210.25
103-8.282ES	8.509	.103 ±.003	8.303 ±.050	.22004	216.15	2.60	210.90
1-267	8.512	.139 ±.004	8.234 ±.050	.39916	216.20	3.55	209.15
187-8.115ES	8.523	.188 ±.005	8.147 ±.045	.72688	216.50	4.80	206.95
1-445	8.525	.275 ±.006	7.975 ±.045	1.53943	216.55	7.00	202.55
500-7.250VS	8.541	.518 ±.010	7.505 ±.045	5.31173	216.95	13.15	190.65
70-8.400ES	8.553	.070 ±.003	8.413 ±.050	.10256	217.25	1.80	213.70
140-8.295	8.575	.140 ±.004	8.295 ±.050	.40793	217.80	3.55	210.70
1-370	8.645	.210 ±.005	8.225 ±.050	.91783	219.60	5.35	208.90
279-8.105	8.663	.279 ±.006	8.105 ±.045	1.61027	220.05	7.10	205.85
224-8.240	8.688	.224 ±.006	8.240 ±.045	1.04788	220.70	5.70	209.30
1-173	8.693	.103 ±.003	8.487 ±.050	.22486	220.80	2.60	215.55
1-268	8.762	.139 ±.004	8.484 ±.050	.41108	222.55	3.55	215.50
275-8.225	8.775	.275 ±.006	8.225 ±.045	1.58608	222.90	7.00	208.90
104-8.570	8.778	.104 ±.003	8.570 ±.050	.23149	222.95	2.65	217.70
236-8.225VS	8.782	.238 ±.006	8.306 ±.050	1.19414	223.05	6.05	210.95
118-8.504VS	8.822	.119 ±.004	8.584 ±.050	.30409	224.10	3.00	218.05
331-8.197	8.859	.331 ±.007	8.197 ±.045	2.30538	225.00	8.40	208.20
270-8.240SS	8.882	.273 ±.006	8.336 ±.045	1.58313	225.60	6.95	211.75
1-371	8.895	.210 ±.005	8.475 ±.050	.94504	225.95	5.35	215.25
187-8.553	8.896	.186 ±.005	8.524 ±.050	.74350	225.95	4.70	216.50
375-8.159	8.909	.375 ±.007	8.159 ±.045	2.96111	226.30	9.55	207.25
142-8.634	8.918	.142 ±.004	8.634 ±.050	.43663	226.50	3.60	219.30
1-174	8.943	.103 ±.003	8.737 ±.050	.23140	227.15	2.60	221.90
275-8.350ES	8.958	.277 ±.006	8.404 ±.045	1.64350	227.55	7.05	213.45
375-8.130SS	8.983	.379 ±.007	8.225 ±.050	3.04943	228.15	9.65	208.90
104-8.780	8.988	.104 ±.003	8.780 ±.050	.23709	228.30	2.65	223.00
375-8.250	9.000	.375 ±.007	8.250 ±.050	2.99269	228.60	9.55	209.55
1-269	9.012	.139 ±.004	8.734 ±.050	.42300	228.90	3.55	221.85



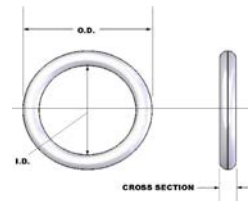
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
1-446	9.025	.275 ±.006	8.475 ±.055	1.63273	229.25	7.00	215.25
241-8.475SS	9.032	.243 ±.006	8.546 ±.055	1.28054	229.40	6.15	217.05
103-8.825ES	9.053	.103 ±.003	8.847 ±.050	.23428	229.95	2.60	224.70
210-8.641	9.061	.210 ±.005	8.641 ±.050	.96310	230.15	5.35	219.50
103-8.840ES	9.068	.103 ±.003	8.862 ±.050	.23467	230.35	2.60	225.10
1-372	9.145	.210 ±.005	8.725 ±.050	.97224	232.30	5.35	221.60
388-8.380	9.156	.388 ±.007	8.380 ±.050	3.25689	232.55	9.85	212.85
1-175	9.193	.103 ±.003	8.987 ±.050	.23795	233.50	2.60	228.25
103-8.998ES	9.227	.103 ±.003	9.021 ±.050	.23884	234.35	2.60	229.15
328-8.500VS	9.231	.331 ±.007	8.569 ±.050	2.40595	234.45	8.40	217.65
625-8.000	9.250	.625 ±.012	8.000 ±.045	8.31302	234.95	15.90	203.20
103-9.050	9.256	.103 ±.003	9.050 ±.050	.23959	235.10	2.60	229.85
1-270	9.262	.139 ±.004	8.984 ±.050	.43492	235.25	3.55	228.20
275-8.725	9.275	.275 ±.006	8.725 ±.055	1.67937	235.60	7.00	221.60
104-9.075	9.283	.104 ±.003	9.075 ±.050	.24496	235.80	2.65	230.50
140-9.072	9.352	.140 ±.004	9.072 ±.050	.44550	237.55	3.55	230.45
375-8.505SS	9.362	.379 ±.007	8.604 ±.050	3.18375	237.80	9.65	218.55
312-8.750	9.374	.312 ±.006	8.750 ±.050	2.17657	238.10	7.90	222.25
1-373	9.395	.210 ±.005	8.975 ±.050	.99944	238.65	5.35	227.95
1-176	9.443	.103 ±.003	9.237 ±.055	.24449	239.85	2.60	234.60
103-9.250	9.456	.103 ±.003	9.250 ±.055	.24483	240.20	2.60	234.95
1-271	9.512	.139 ±.004	9.234 ±.055	.44684	241.60	3.55	234.55
1-447	9.525	.275 ±.006	8.975 ±.055	1.72602	241.95	7.00	227.95
104-9.328	9.536	.104 ±.003	9.328 ±.055	.25172	242.20	2.65	236.95
323-8.898	9.544	.323 ±.007	8.898 ±.050	2.37368	242.40	8.20	226.00
70-9.435ES	9.590	.070 ±.003	9.450 ±.055	.11510	243.60	1.80	240.05
380-8.812ES	9.596	.381 ±.007	8.834 ±.050	3.30054	243.75	9.70	224.40
1-374	9.645	.210 ±.005	9.225 ±.055	1.02664	245.00	5.35	234.30
1-177	9.693	.103 ±.003	9.487 ±.055	.25103	246.20	2.60	240.95
103-9.500ES	9.730	.103 ±.003	9.524 ±.055	.25200	247.15	2.60	241.90
1-272	9.762	.139 ±.004	9.484 ±.055	.45875	247.95	3.55	240.90
70-9.621ES	9.799	.070 ±.003	9.659 ±.055	.11763	248.90	1.80	245.35
70-9.650ES	9.805	.070 ±.003	9.665 ±.055	.11770	249.05	1.80	245.50
140-9.531	9.811	.140 ±.004	9.531 ±.055	.46770	249.20	3.55	242.10
70-9.675ES	9.830	.070 ±.003	9.690 ±.055	.11800	249.70	1.80	246.15
625-8.625	9.875	.625 ±.012	8.625 ±.055	8.91541	250.85	15.90	219.10
1-375	9.895	.210 ±.005	9.475 ±.055	1.05385	251.35	5.35	240.65
1-178	9.943	.103 ±.003	9.737 ±.055	.25758	252.55	2.60	247.30
272-9.413	9.957	.272 ±.006	9.413 ±.055	1.76798	252.90	6.90	239.10
139-9.700	9.978	.139 ±.004	9.700 ±.055	.46905	253.45	3.55	246.40
1-273	10.012	.139 ±.004	9.734 ±.055	.47067	254.30	3.55	247.25
1-448	10.025	.275 ±.006	9.475 ±.055	1.81932	254.65	7.00	240.65
202-9.598VS	10.047	.203 ±.005	9.641 ±.055	1.00093	255.20	5.15	244.90
140-9.782	10.062	.140 ±.004	9.782 ±.055	.47984	255.60	3.55	248.45
270-9.421SS	10.077	.273 ±.006	9.531 ±.055	1.80289	255.95	6.95	242.10



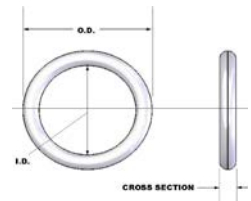
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
70-9.970	10.110	.070 ±.003	9.970 ±.055	.12139	256.80	1.80	253.25
103-9.892ES	10.123	.103 ±.003	9.917 ±.055	.26229	257.10	2.60	251.90
1-376	10.145	.210 ±.005	9.725 ±.055	1.08105	257.70	5.35	247.00
103-9.940ES	10.171	.103 ±.003	9.965 ±.055	.26355	258.35	2.60	253.10
375-9.312SS	10.179	.379 ±.007	9.421 ±.055	3.47332	258.55	9.65	239.30
1-179	10.193	.103 ±.003	9.987 ±.055	.26412	258.90	2.60	253.65
241-9.475SS	10.207	.247 ±.006	9.713 ±.055	1.49932	259.25	6.25	246.70
103-9.982ES	10.213	.103 ±.003	10.007 ±.055	.26465	259.40	2.60	254.20
375-9.250SS	10.232	.384 ±.007	9.464 ±.055	3.58303	259.90	9.75	240.40
70-9.989VS	10.254	.071 ±.003	10.112 ±.055	.12666	260.45	1.80	256.85
1-274	10.262	.139 ±.004	9.984 ±.055	.48259	260.65	3.55	253.60
215-9.837	10.267	.215 ±.005	9.837 ±.055	1.14649	260.80	5.45	249.85
159-9.950	10.268	.159 ±.005	9.950 ±.055	.63058	260.80	4.05	252.75
103-10.095ES	10.327	.103 ±.003	10.121 ±.055	.26763	262.30	2.60	257.05
139-10.048ES	10.351	.139 ±.004	10.073 ±.060	.48683	262.90	3.55	255.85
70-10.207ES	10.363	.070 ±.003	10.223 ±.055	.12445	263.20	1.80	259.65
1-377	10.395	.210 ±.005	9.975 ±.055	1.10825	264.05	5.35	253.35
374-9.646ES	10.413	.375 ±.007	9.664 ±.055	3.47810	264.50	9.50	245.45
375-9.600	10.450	.380 ±.007	9.690 ±.055	3.58402	265.40	9.65	246.15
139-10.178	10.456	.139 ±.004	10.178 ±.055	.49184	265.60	3.55	258.50
70-10.232SS	10.470	.071 ±.003	10.328 ±.055	.12934	265.95	1.80	262.35
215-10.060	10.490	.215 ±.005	10.060 ±.055	1.17192	266.45	5.45	255.50
1-449	10.525	.275 ±.006	9.975 ±.055	1.91262	267.35	7.00	253.35
210-10.115ES	10.563	.211 ±.005	10.141 ±.055	1.13718	268.30	5.35	257.60
104-10.372	10.580	.104 ±.003	10.372 ±.055	.27958	268.75	2.65	263.45
70-10.433ES	10.599	.070 ±.003	10.459 ±.055	.12730	269.20	1.80	265.65
241-9.975VS	10.606	.244 ±.006	10.118 ±.055	1.52217	269.40	6.20	257.00
167-10.186SS	10.620	.169 ±.005	10.282 ±.055	.73650	269.75	4.30	261.15
70-10.485	10.625	.070 ±.003	10.485 ±.055	.12761	269.90	1.80	266.30
210-10.250	10.670	.210 ±.005	10.250 ±.055	1.13818	271.00	5.35	260.35
103-10.450ES	10.693	.103 ±.003	10.487 ±.055	.27721	271.60	2.60	266.35
210-10.300	10.720	.210 ±.005	10.300 ±.055	1.14362	272.30	5.35	261.60
210-10.190SS	10.720	.212 ±.006	10.296 ±.055	1.16528	272.30	5.40	261.50
103-10.449	10.725	.104 ±.003	10.517 ±.060	.28345	272.40	2.65	267.15
375-9.881SS	10.754	.379 ±.007	9.996 ±.055	3.67711	273.15	9.65	253.90
1-275	10.762	.139 ±.004	10.484 ±.055	.50643	273.35	3.55	266.30
70-10.530SS	10.771	.071 ±.003	10.629 ±.060	.13309	273.60	1.80	270.00
71-10.635	10.777	.071 ±.003	10.635 ±.060	.13316	273.75	1.80	270.15
140-10.535	10.815	.140 ±.004	10.535 ±.055	.51625	274.70	3.55	267.60
103-10.500SS	10.870	.105 ±.003	10.660 ±.060	.29284	276.10	2.65	270.75
1-378	10.895	.210 ±.005	10.475 ±.060	1.16266	276.75	5.35	266.05
139-10.610	10.915	.139 ±.003	10.637 ±.060	.51372	277.25	3.55	270.20
159-10.600	10.918	.159 ±.005	10.600 ±.060	.67113	277.30	4.05	269.25
70-10.800ES	10.957	.070 ±.003	10.817 ±.060	.13163	278.30	1.80	274.75
351-10.270	10.972	.351 ±.007	10.270 ±.055	3.22864	278.70	8.90	260.85



# Engineers Guide for O-Rings

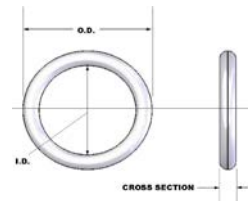


Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
103-10.781ES	11.014	.103 ±.003	10.808 ±.060	.28561	279.75	2.60	274.50
1-450	11.025	.275 ±.006	10.475 ±.060	2.00592	280.05	7.00	266.05
139-10.734	11.038	.139 ±.004	10.760 ±.055	.51958	280.35	3.55	273.30
349-10.199VS	11.043	.354 ±.007	10.335 ±.055	3.30509	280.50	9.00	262.50
260-10.425SS	11.047	.262 ±.006	10.523 ±.060	1.82668	280.60	6.65	267.30
157-10.827	11.141	.157 ±.005	10.827 ±.060	.66804	283.00	4.00	275.00
103-10.710SS	11.168	.105 ±.003	10.958 ±.060	.30095	283.65	2.65	278.35
103-10.984	11.190	.103 ±.003	10.984 ±.060	.29022	284.25	2.60	279.00
103-10.964ES	11.198	.103 ±.003	10.992 ±.060	.29043	284.45	2.60	279.20
70-11.085ES	11.242	.070 ±.003	11.102 ±.065	.13507	285.55	1.80	282.00
1-276	11.262	.139 ±.004	10.984 ±.065	.53026	286.05	3.55	279.00
275-10.725	11.275	.275 ±.006	10.725 ±.060	2.05257	286.40	7.00	272.40
256-10.846SS	11.311	.255 ±.006	10.801 ±.060	1.77386	287.30	6.50	274.35
103-11.120	11.326	.103 ±.003	11.120 ±.065	.29378	287.70	2.60	282.45
139-11.034ES	11.340	.139 ±.004	11.062 ±.065	.53398	288.05	3.55	281.00
103-11.150ES	11.384	.103 ±.003	11.178 ±.065	.29530	289.15	2.60	283.90
1-379	11.395	.210 ±.005	10.975 ±.060	1.21707	289.45	5.35	278.75
103-11.239NS	11.396	.103 ±.003	11.190 ±.065	.29562	289.45	2.60	284.25
141-11.120	11.402	.141 ±.004	11.120 ±.065	.55240	289.60	3.60	282.45
103-11.096SS	11.408	.104 ±.003	11.200 ±.065	.30167	289.75	2.65	284.50
103-11.275ES	11.481	.103 ±.003	11.275 ±.065	.29784	291.60	2.60	286.40
375-10.690SS	11.486	.379 ±.007	10.728 ±.060	3.93640	291.75	9.65	272.50
70-11.339ES	11.508	.070 ±.003	11.368 ±.065	.13829	292.30	1.80	288.75
1-451	11.525	.275 ±.006	10.975 ±.060	2.09922	292.75	7.00	278.75
272-10.988	11.532	.272 ±.006	10.988 ±.060	2.05549	292.90	6.90	279.10
70-11.240SS	11.565	.071 ±.003	11.423 ±.065	.14296	293.75	1.80	290.15
380-10.875	11.635	.380 ±.007	10.875 ±.060	4.01007	295.55	9.65	276.25
103-11.480ES	11.715	.103 ±.003	11.509 ±.065	.30396	297.55	2.60	292.35
93-11.500	11.727	.093 ±.003	11.541 ±.065	.24828	297.85	2.35	293.15
1-277	11.762	.139 ±.004	11.484 ±.065	.55410	298.75	3.55	291.70
1-380	11.895	.210 ±.005	11.475 ±.065	1.27147	302.15	5.35	291.45
1-452	12.025	.275 ±.006	11.475 ±.060	2.19252	305.45	7.00	291.45
103-11.897NS	12.052	.103 ±.003	11.846 ±.065	.31277	306.10	2.60	300.90
290-11.475ES	12.114	.291 ±.006	11.532 ±.065	2.47032	307.70	7.40	292.90
70-11.989	12.129	.070 ±.003	11.989 ±.065	.14580	308.10	1.80	304.50
1-278	12.262	.139 ±.004	11.984 ±.065	.57794	311.45	3.55	304.40
339-11.654	12.316	.339 ±.007	11.638 ±.065	3.39615	312.85	8.60	295.60
140-12.073	12.353	.140 ±.004	12.073 ±.065	.59063	313.75	3.55	306.65
103-12.155ES	12.392	.103 ±.003	12.186 ±.065	.32168	314.75	2.60	309.55
1-381	12.395	.210 ±.005	11.975 ±.065	1.32588	314.85	5.35	304.15
142-12.214	12.498	.142 ±.004	12.214 ±.065	.61474	317.45	3.60	310.25
142-12.224	12.508	.142 ±.004	12.224 ±.065	.61524	317.70	3.60	310.50
1-453	12.525	.275 ±.006	11.975 ±.060	2.28582	318.15	7.00	304.15
275-12.000	12.550	.275 ±.006	12.000 ±.060	2.29048	318.75	7.00	304.80
139-12.278	12.556	.139 ±.004	12.278 ±.065	.59195	318.90	3.55	311.85





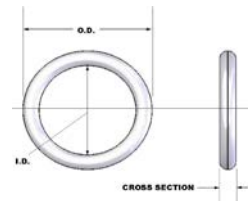
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
277-12.064	12.618	.277 ±.006	12.064 ±.060	2.33641	320.50	7.05	306.45
256-12.205	12.674	.255 ±.006	12.164 ±.060	1.99254	321.90	6.50	308.95
139-12.484	12.794	.139 ±.004	12.516 ±.065	.60328	324.95	3.55	317.90
370-12.157	12.817	.368 ±.007	12.081 ±.065	4.15978	325.55	9.35	306.85
209-12.413	12.831	.209 ±.005	12.413 ±.065	1.36038	325.90	5.30	315.30
370-12.106	12.846	.370 ±.007	12.106 ±.065	4.21423	326.30	9.40	307.50
70-12.720	12.860	.070 ±.003	12.720 ±.065	.15463	326.65	1.80	323.10
210-12.475	12.895	.210 ±.005	12.475 ±.065	1.38029	327.55	5.35	316.85
139-12.475VS	12.935	.141 ±.004	12.653 ±.065	.62760	328.55	3.60	321.40
103-12.718ES	12.996	.104 ±.003	12.788 ±.065	.34405	330.10	2.65	324.80
375-12.250VS	13.021	.376 ±.007	12.269 ±.065	4.41097	330.75	9.55	311.65
1-454	13.025	.275 ±.006	12.475 ±.060	2.37911	330.85	7.00	316.85
1-279	13.262	.139 ±.004	12.984 ±.065	.62561	336.85	3.55	329.80
70-13.114ES	13.274	.070 ±.003	13.134 ±.065	.15964	337.15	1.80	333.60
139-13.062	13.340	.139 ±.004	13.062 ±.065	.62933	338.85	3.55	331.80
139-13.114	13.394	.140 ±.004	13.114 ±.065	.64098	340.20	3.55	333.10
1-382	13.395	.210 ±.005	12.975 ±.065	1.43469	340.25	5.35	329.55
139-13.234	13.512	.139 ±.003	13.234 ±.070	.63753	343.20	3.55	336.15
1-455	13.525	.275 ±.006	12.975 ±.060	2.47241	343.55	7.00	329.55
139-13.248	13.526	.139 ±.004	13.248 ±.065	.63819	343.55	3.55	336.50
312-12.750SS	13.531	.316 ±.007	12.899 ±.065	3.25598	343.70	8.05	327.65
375-12.750SS	13.657	.379 ±.007	12.899 ±.065	4.70599	346.90	9.65	327.65
103-13.425ES	13.665	.103 ±.003	13.459 ±.065	.35501	347.10	2.60	341.85
224-13.252	13.700	.224 ±.006	13.252 ±.060	1.66839	348.00	5.70	336.60
139-13.484	13.762	.139 ±.004	13.484 ±.065	.64944	349.55	3.55	342.50
210-13.475	13.895	.210 ±.005	13.475 ±.065	1.48910	352.95	5.35	342.25
210-13.375SS	13.938	.212 ±.006	13.514 ±.070	1.52214	354.05	5.40	343.25
1-456	14.025	.275 ±.006	13.475 ±.070	2.56571	356.25	7.00	342.25
1-280	14.262	.139 ±.004	13.984 ±.065	.67328	362.25	3.55	355.20
1-383	14.395	.210 ±.005	13.975 ±.070	1.54350	365.65	5.35	354.95
1-457	14.525	.275 ±.006	13.975 ±.070	2.65901	368.95	7.00	354.95
224-14.146	14.594	.224 ±.006	14.146 ±.070	1.77907	370.70	5.70	359.30
139-14.484	14.762	.139 ±.004	14.484 ±.065	.69712	374.95	3.55	367.90
339-14.189	14.804	.338 ±.007	14.128 ±.070	4.07776	376.00	8.60	358.85
87-14.470SS	14.825	.088 ±.003	14.649 ±.070	.28159	376.55	2.25	372.10
1-458	15.025	.275 ±.006	14.475 ±.070	2.75231	381.65	7.00	367.65
288-14.250SS	15.101	.293 ±.006	14.515 ±.070	3.13669	383.55	7.45	368.70
500-14.156	15.156	.500 ±.010	14.156 ±.070	9.04056	384.95	12.70	359.55
197-14.764	15.158	.197 ±.005	14.764 ±.070	1.43263	385.00	5.00	375.00
104-14.990	15.198	.104 ±.003	14.990 ±.070	.40282	386.05	2.65	380.75
1-281	15.262	.139 ±.004	14.984 ±.065	.72095	387.65	3.55	380.60
225-14.900NS	15.284	.224 ±.006	14.836 ±.070	1.86449	388.20	5.70	376.85
625-13.875SS	15.361	.630 ±.012	14.101 ±.070	14.42624	390.15	16.00	358.15
631-14.101	15.363	.631 ±.012	14.101 ±.070	14.47305	390.20	16.05	358.15
1-384	15.395	.210 ±.005	14.975 ±.070	1.65232	391.05	5.35	380.35



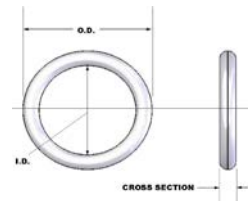
# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
248-15.000	15.444	.247 ±.006	14.950 ±.070	2.28766	392.30	6.25	379.75
103-15.170VS	15.467	.104 ±.003	15.259 ±.076	.41000	392.85	2.65	387.60
1-459	15.525	.275 ±.006	14.975 ±.070	2.84561	394.35	7.00	380.35
139-15.484	15.762	.139 ±.004	15.484 ±.065	.74479	400.35	3.55	393.30
103-15.500VS	15.799	.104 ±.003	15.591 ±.078	.41886	401.30	2.65	396.00
210-15.475	15.895	.210 ±.005	15.475 ±.070	1.70672	403.75	5.35	393.05
1-460	16.025	.275 ±.006	15.475 ±.070	2.93891	407.05	7.00	393.05
338-15.410	16.086	.338 ±.007	15.410 ±.070	4.43914	408.60	8.60	391.40
225-15.500SS	16.100	.227 ±.006	15.646 ±.070	2.01814	408.95	5.75	397.40
1-282	16.233	.139 ±.004	15.955 ±.075	.76724	412.30	3.55	405.25
1.000-14.430	16.311	.993 ±.015	14.325 ±.070	37.26836	414.30	25.20	363.85
1-385	16.375	.210 ±.005	15.955 ±.070	1.75895	415.95	5.35	405.25
110-16.186	16.406	.110 ±.004	16.186 ±.075	.48653	416.70	2.80	411.15
70-16.268SS	16.497	.070 ±.003	16.357 ±.075	.19861	419.00	1.80	415.45
1-461	16.505	.275 ±.006	15.955 ±.075	3.02847	419.25	7.00	405.25
70-16.535	16.717	.070 ±.003	16.577 ±.075	.20127	424.60	1.80	421.05
139-16.455	16.733	.139 ±.004	16.455 ±.075	.79108	425.00	3.55	417.95
1-462	17.005	.275 ±.006	16.455 ±.075	3.12177	431.95	7.00	417.95
1-283	17.233	.139 ±.004	16.955 ±.080	.81492	437.70	3.55	430.65
275-16.750	17.242	.274 ±.006	16.694 ±.075	3.14320	437.95	6.95	424.05
210-16.830	17.250	.210 ±.005	16.830 ±.075	1.85416	438.15	5.35	427.50
312-16.690	17.312	.311 ±.006	16.690 ±.075	4.05728	439.75	7.90	423.95
1-386	17.375	.210 ±.005	16.955 ±.080	1.86776	441.35	5.35	430.65
375-16.625	17.375	.375 ±.007	16.625 ±.075	5.89863	441.35	9.55	422.30
290-16.625SS	17.418	.294 ±.006	16.830 ±.075	3.65207	442.40	7.45	427.50
1-463	17.505	.275 ±.006	16.955 ±.080	3.21507	444.65	7.00	430.65
139-17.455	17.733	.139 ±.004	17.455 ±.080	.83875	450.40	3.55	443.35
1.000-15.735	17.735	1.000 ±.015	15.735 ±.075	41.29196	450.45	25.40	399.65
139-17.480	17.758	.139 ±.004	17.480 ±.080	.83994	451.05	3.55	444.00
1-464	18.005	.275 ±.006	17.455 ±.085	3.30837	457.35	7.00	443.35
240-17.250SS	18.071	.245 ±.006	17.581 ±.080	2.64013	459.00	6.20	446.55
1-284	18.233	.139 ±.004	17.955 ±.085	.86259	463.10	3.55	456.05
1-387	18.375	.210 ±.005	17.955 ±.085	1.97658	466.75	5.35	456.05
1-465	18.505	.275 ±.006	17.955 ±.085	3.40167	470.05	7.00	456.05
313-18.000	18.626	.313 ±.006	18.000 ±.085	4.42678	473.10	7.95	457.20
139-18.455	18.733	.139 ±.004	18.455 ±.085	.88643	475.80	3.55	468.75
125-18.600	18.850	.125 ±.004	18.600 ±.085	.72191	478.80	3.20	472.45
1-466	19.005	.275 ±.006	18.455 ±.085	3.49497	482.75	7.00	468.75
139-18.875	19.153	.139 ±.004	18.875 ±.085	.90645	486.50	3.55	479.45
1-388	19.375	.210 ±.005	18.955 ±.090	2.08539	492.15	5.35	481.45
1-467	19.505	.275 ±.006	18.955 ±.090	3.58826	495.45	7.00	481.45
210-19.200	19.620	.210 ±.005	19.200 ±.090	2.11205	498.35	5.35	487.70
139-19.455	19.733	.139 ±.004	19.455 ±.090	.93410	501.20	3.55	494.15
1-468	20.005	.275 ±.006	19.455 ±.090	3.68156	508.15	7.00	494.15
1-286	20.238	.139 ±.004	19.960 ±.090	.95817	514.05	3.55	507.00



# Engineers Guide for O-Rings



Mold IDen	Inch Dimensions				Metric Dimensions (mm)		
	OD	C/S	ID	Volume	OD	C/S	ID
1-389	20.375	.210 ±.005	19.955 ±.095	2.19420	517.55	5.35	506.85
1-473	24.490	.275 ±.006	23.940 ±.110	4.51845	622.05	7.00	608.10
212-24.104	24.528	.212 ±.006	24.104 ±.110	2.69652	623.00	5.40	612.25
212-24.188	24.612	.212 ±.005	24.188 ±.110	2.70583	625.15	5.40	614.40
210-24.625	25.045	.210 ±.005	24.625 ±.110	2.70236	636.15	5.35	625.50
1-394	25.360	.210 ±.005	24.940 ±.115	2.73663	644.15	5.35	633.50
1-474	25.490	.275 ±.006	24.940 ±.115	4.70505	647.45	7.00	633.50
70-25.570SS	25.952	.071 ±.003	25.810 ±.110	.32191	659.20	1.80	655.60
250-25.375VS	26.118	.252 ±.006	25.614 ±.115	4.05294	663.40	6.40	650.60
210-25.580VS	26.270	.212 ±.005	25.846 ±.115	2.88970	667.25	5.40	656.50
340-25.275VS	26.287	.344 ±.007	25.599 ±.110	7.57490	667.70	8.75	650.20
1-395	26.360	.210 ±.005	25.940 ±.120	2.84544	669.55	5.35	658.90
1-475	26.490	.275 ±.006	25.940 ±.120	4.89165	672.85	7.00	658.90
341-25.984	26.524	.339 ±.007	25.846 ±.110	7.42492	673.70	8.60	656.50
212-26.209	26.633	.212 ±.005	26.209 ±.120	2.92995	676.50	5.40	665.70
210-26.940	27.360	.210 ±.005	26.940 ±.120	2.95426	694.95	5.35	684.30
1-396	27.360	.210 ±.005	26.940 ±.120	2.95426	694.95	5.35	684.30
1-476	27.505	.275 ±.006	26.955 ±.120	5.08104	698.65	7.00	684.65
275-27.485	28.035	.275 ±.006	27.485 ±.120	5.17994	712.10	7.00	698.10
375-27.250VS	28.153	.377 ±.007	27.399 ±.120	9.74074	715.10	9.60	695.95
139-27.750SS	28.571	.140 ±.004	28.291 ±.120	1.37495	725.70	3.55	718.60
275-28.801	29.351	.275 ±.006	28.801 ±.130	5.42550	745.50	7.00	731.55
275-29.331ES	30.072	.276 ±.006	29.520 ±.130	5.60036	763.85	7.00	749.80
210-29.880VS	30.614	.212 ±.005	30.190 ±.140	3.37143	777.60	5.40	766.85
210-33.750VS	34.371	.211 ±.005	33.949 ±.115	3.75252	873.05	5.35	862.30
275-33.750VS	34.503	.277 ±.006	33.949 ±.115	6.47971	876.40	7.05	862.30



# ***International O-Ring Standard***

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## **Cross Reference**

**AS 568  
BS 1806  
ISO 3601-1  
DIN 3771  
NF T 47-501  
JIS B2401  
BS 4518  
SMS 1586  
ISO 6149**



Shortly after O-Rings first came into common use, it became obvious that standards for O-Ring sizes, tolerances, and groove design would be beneficial. The first standards were issued in 1942. Since then various government and engineering organizations have produced a multitude of O-Ring standards.

From this large list we chose to include the following national and international O-Ring standards in the cross reference tables presented in the following pages:

<b>AS568</b>	<b>ISO 3601</b>	<b>BS 4518</b>	<b>NF T47-501</b>	<b>ISO 6149</b>
<b>BS 1806</b>	<b>DIN 3771</b>	<b>JIS B 2401</b>	<b>SMS 1586</b>	

All of these standards specify acceptable tolerance ranges, while some call out quality and/or material requirements. **The O-Rings in this cross reference are presented without regard to any materials or tolerances specified in the actual standards.** We chose to list all sizes from each standard whether or not PAI has current tooling. Short descriptions of each standard follow including any designation for tolerances, quality and material. A sample Part Number appears in brackets at the end of each description, which are presented below in the order that they appear in our tables.

**AS 568** is produced by the Society of Automotive Engineers AS (Aerospace Standard) 568 describes 379 O-Rings including tolerances for Cross Section (C/S) and Inside Diameter (ID). The five main cross section groups are designed to be used in standard nominal inch applications. O-Rings are identified by - (dash) numbers with the first number (0-5) of each group matching up to a nominal inch cross section. An additional group is designed for use as tube fitting boss seals. The dash numbers for these tube & boss O-Rings begin with a 9. [ **AS 568 - 123** ]

**BS 1806** is issued by the British Standards Institution. This standard includes all of the 5 main cross section groups in AS 568 plus extended sizes in the 1/4" nominal cross section group. Additional extended sizes were included in earlier versions of this specification, but were later eliminated. We chose to include them in this document since they are still in use. [ **BS 1806 - 123** ]

**ISO 3601-1** is authored by the International Organization for Standardization. This document contains two groups of O-Rings. The first group, designated for General Industrial applications are "inch" sizes that for the most part match up exactly to the AS 568 O-Ring sizes (the AS 568 tube fitting O-Rings are not included). The ISO 3601-1 Size Code for these O-Rings is the same as the AS 568 dash number. The second group of O-Rings are "metric" sizes and are designated for Aerospace applications. The first digit of the Size Code indicates the cross section group (A-E), while the last four digits indicate the O-Ring inside diameter rounded to one-tenth millimeter. Complete item designations for both types include the word O-Ring followed by a hyphen and ISO 3601-1, followed by another hyphen and the Size Code and a letter indicating the tolerance class, another hyphen and a description of the size, and a final hyphen and a letter code indicating the Grade. Additionally, O-Rings intended for Aerospace use will be indicated by the letter A following 3601-1 (3601-1A) in the item designation. The tolerance classes are designated by the letters A and B (A is tighter). Aerospace O-Rings have only one tolerance class. Grade codes, N, S, and CS indicate General Purpose, Special, and Critical Service respectively. The grades are primarily visual inspection standards and are defined in ISO 3601-3. [ **O-ring - ISO 3601-1 - 011 A - 7,65 x 1,78 - S** ] - General Industrial  
[ **O-ring - ISO 3601-1 A - C0545 - 54,5 x 3,55 - S** ] - Aerospace

**DIN 3771** is produced by the Duetsches Institut für Normung (German Institute for Standards). O-Ring sizes are identified by the ID x C/S, followed by a letter indicating the Quality Level, and a code indicating the rubber polymer and IRHD hardness. Two Quality levels are specified: N - Normal Quality (1.0 AQL), S - Special Quality (.65 AQL). [ **O-ring DIN 3771 - 13,2 x 1,8 - N - NBR 70** ]

**NF T 47-501** is issued by the Association Française de Normalisation (French Standards Institute). It is very similar to ISO 3601-1 in both the sizes included and part nomenclature. O-Rings are designated with a



size code that is made up of a letters corresponding to each of 5 cross section groups (A-E), 4 digits indicating ID rounded to .1 mm, a 2nd letter indicating Precision Class and a 3rd letter indicating Visual (inspection) Class. The Precision Class is indicated by the letter A, for Aerospace applications, and G for General Purpose applications. The visual classes are N (1.0 AQL) and S (.65 AQL).

[ O-ring NF T 47-501 A0224 A S ]

**JIS B 2401**, a Japanese Industrial Standard, has two groupings of O-Ring sizes. The first group consists of two sets of O-Rings designed for General Purpose and for Aerospace applications. These O-Rings are mostly a subset of ISO 3601-1 with a few additional sizes. O-Rings are identified simply by their dimensions, ID first and then C/S, plus a Series Letter. The Series Letter is used to indicate the application: G indicates General use, while A indicates Aerospace applications. Aerospace O-Rings are held to closer tolerances than the General Purpose O-Rings. In our tables, the ISO O-Rings are indicated solely by the letters A or G. [ O-ring 7.5 x 1.8 - G - S ]

The second, more traditional group is organized into three sections: Moving (dynamic), designated by the letter P, Fixing (static), designated by the letter G, and Vacuum Flange, designated by the letter V. The O-Rings in each section have insignificant ascending numbers to complete the size code. Like the ISO group, the traditional part numbers include a Grade letter. In our tables the traditional group O-Rings are identified by their size code labels. [ O-ring Type 1A G80 N ]

Unlike the other standards listed here, JIS B 2401 calls out 6 material classes: 1A, 1B, 2, 3, 4C and 4D. We do not address them in this publication— see our Compound Selection Guide, or contact us for the PAI compounds meeting these classes.

**BS 4518**, also from the British Standards Institution, identifies British Standard metric sizes. The size code for these O-Rings is a four digit number indicating the O-Ring I.D. in tenths of millimeters followed by a hyphen and two digits indicating the O-Ring Cross Section, also in tenths of a millimeter. ] **BS 4518 0645 - 24 ]**

**SMS 1586** is a Sveriges Mekanstandardisering (Swedish Mechanical Standard). O-Rings are simply identified by ID and C/S similar to DIN 3771. SMS 1586 O-Rings are classified into two groupings. The first group, intended for dynamic and static installations is indicated in our table by the letter D. The second group, intended mainly for static applications, is indicated with an S.

[ “O”-ring SMS 1586 3.3 x 2.4 - (mat'l per SMS 1587) ]

**ISO 6149** covers O-Rings designed for use in Metric Tube Fittings. Unlike AS 568, ISO 3601 does not include these O-Rings. There is a separate table on the last inside page of this publication that references these 13 sizes.

The tables on the following pages list 1,484 different O-Ring sizes. While Precision Associates has over 2,200 O-Ring sizes, we are not tooled for all of the O-Rings in these pages. O-Rings that we are tooled for are indicated in the first column of the table. If you find that we don't have a tool listed, please call us as we regularly add sizes to our repertoire. If not, we can usually produce a mold in short order in our on-site mold shop.

As stated earlier in this section, this publication is only intended to identify O-Ring sizes from the various specification designations. Every effort was made to make sure that the information presented here is correct, but we recommend referral to the actual specifications before proceeding with design work, etc. You may contact Precision Associates for complete information regarding tolerances, inspection requirements and materials.



**International  
O-Ring Standard  
Cross Reference**



PAI Size	C/S mm	I.D. mm	C/S inch	I.D. inch	AS 568	BS 1806	ISO 3601	DIN 3771	NF T47-501	JIS B2401	BS 4518	SMS-1586
<b>1-001</b>	1,02	0,74	.040	.029	-001	-001	001					
<b>40-70</b>	1,02	1,78	.040	.070		-606						
<b>1-002</b>	1,02	2,54	.040	.100		-607						
<b>1-002</b>	1,27	1,07	.050	.042	-002	-002	002					
<b>1-905</b>	1,42	4,70	.056	.185	-905							
<b>1-003</b>	1,52	1,42	.060	.056	-003	-003	003					
<b>* 63-122VS</b>	1,60	3,10	.063	.122							0031-16	S
	1,60	4,10	.063	.161							0041-16	S
	1,60	5,10	.063	.201							0051-16	S
<b>63-240</b>	1,60	6,10	.063	.240							0061-16	S
	1,60	7,10	.063	.280							0071-16	S
<b>63-319</b>	1,60	8,10	.063	.319							0081-16	S
	1,60	9,10	.063	.358							0091-16	S
	1,60	10,10	.063	.398							0101-16	S
	1,60	11,10	.063	.437							0111-16	S
	1,60	12,10	.063	.476							0121-16	S
	1,60	13,10	.063	.516							0131-16	S
	1,60	14,10	.063	.555							0141-16	S
<b>* 63-594VS</b>	1,60	15,10	.063	.594							0151-16	S
	1,60	16,10	.063	.634							0161-16	S
	1,60	17,10	.063	.673							0171-16	S
	1,60	18,10	.063	.713							0181-16	S
	1,60	19,10	.063	.752							0191-16	S
	1,60	22,10	.063	.870							0221-16	S
	1,60	25,10	.063	.988							0251-16	S
	1,60	27,10	.063	1.067							0271-16	S
	1,60	29,10	.063	1.146							0291-16	S
	1,60	32,10	.063	1.264							0321-16	S
	1,60	35,10	.063	1.382							0351-16	S
	1,60	37,10	.063	1.461							0371-16	S
<b>1-902</b>	1,63	6,07	.064	.239	-902	-902						
<b>1-903</b>	1,63	7,65	.064	.301	-903	-903						
<b>1-004</b>	1,78	1,78	.070	.070	-004	-004	004					
<b>1-005</b>	1,78	2,57	.070	.101	-005	-005	005					
<b>1-006</b>	1,78	2,90	.070	.114	-006	-006	006					
<b>70-125</b>	1,78	3,18	.070	.125		-801						
<b>1-007</b>	1,78	3,68	.070	.145	-007	-007	007					
<b>1-008</b>	1,78	4,47	.070	.176	-008	-008	008					
<b>70-187</b>	1,78	4,75	.070	.187		-802						
<b>1-009</b>	1,78	5,28	.070	.208	-009	-009	009					

\* Mold is cut for non-standard shrink compensation



**International  
O-Ring Standard  
Cross Reference**



PAI Size	C/S mm	I.D. mm	C/S inch	I.D. inch	AS 568	BS 1806	ISO 3601	DIN 3771	NF T47-501	JIS B2401	BS 4518	SMS-1586
<b>1-010</b>	1,78	6,07	.070	.239	-010	-010	010					
	1,78	6,35	.070	.250		-803						
<b>1-011</b>	1,78	6,76	.070	.266		-610						
	1,78	7,65	.070	.301	-011	-011	011					
<b>* 70-313ES</b>	1,78	7,94	.070	.313		-804						
<b>* 70-344SS</b>	1,78	8,74	.070	.344		-611						
<b>1-012</b>	1,78	9,25	.070	.364	-012	-012	012					
<b>1-013</b>	1,78	10,82	.070	.426	-013	-013	013					
<b>70-437</b>	1,78	11,10	.070	.437		-806						
<b>1-014</b>	1,78	12,42	.070	.489	-014	-014	014					
<b>1-015</b>	1,78	14,00	.070	.551	-015	-015	015					
<b>1-016</b>	1,78	15,60	.070	.614	-016	-016	016					
<b>1-017</b>	1,78	17,17	.070	.676	-017	-017	017					
<b>1-018</b>	1,78	18,77	.070	.739	-018	-018	018					
<b>1-019</b>	1,78	20,35	.070	.801	-019	-019	019					
<b>1-020</b>	1,78	21,95	.070	.864	-020	-020	020					
<b>1-021</b>	1,78	23,52	.070	.926	-021	-021	021					
<b>1-022</b>	1,78	25,12	.070	.989	-022	-022	022					
<b>1-023</b>	1,78	26,70	.070	1.051	-023	-023	023					
<b>1-024</b>	1,78	28,30	.070	1.114	-024	-024	024					
<b>1-025</b>	1,78	29,87	.070	1.176	-025	-025	025					
<b>1-026</b>	1,78	31,47	.070	1.239	-026	-026	026					
<b>1-027</b>	1,78	33,05	.070	1.301	-027	-027	027					
<b>1-028</b>	1,78	34,65	.070	1.364	-028	-028	028					
<b>70-1.427</b>	1,78	36,27	.070	1.428		-517						
<b>1-029</b>	1,78	37,82	.070	1.489	-029	-029	029					
	1,78	39,45	.070	1.553		-519						
<b>1-030</b>	1,78	41,00	.070	1.614	-030	-030	030					
<b>1-031</b>	1,78	44,17	.070	1.739	-031	-031	031					
<b>1-032</b>	1,78	47,35	.070	1.864	-032	-032	032					
<b>1-033</b>	1,78	50,52	.070	1.989	-033	-033	033					
<b>1-034</b>	1,78	53,70	.070	2.114	-034	-034	034					
<b>1-035</b>	1,78	56,87	.070	2.239	-035	-035	035					
<b>1-036</b>	1,78	60,05	.070	2.364	-036	-036	036					
<b>1-037</b>	1,78	63,22	.070	2.489	-037	-037	037					
<b>1-038</b>	1,78	66,40	.070	2.614	-038	-038	038					
<b>1-039</b>	1,78	69,57	.070	2.739	-039	-039	039					
<b>1-040</b>	1,78	72,75	.070	2.864	-040	-040	040					
<b>1-041</b>	1,78	75,92	.070	2.989	-041	-041	041					
	1,78	78,99	.070	3.110		-532						

Contact Precision Associates for sizes not listed





**International  
O-Ring Standard  
Cross Reference**



PAI Size	C/S mm	I.D. mm	C/S inch	I.D. inch	AS 568	BS 1806	ISO 3601	DIN 3771	NF T47-501	JIS B2401	BS 4518	SMS-1586
<b>1-042</b>	1,78	82,27	.070	3.239	-042	-042	042					
	1,78	85,34	.070	3.360		-534						
<b>1-043</b>	1,78	88,62	.070	3.489	-043	-043	043					
	1,78	91,69	.070	3.610		-536						
<b>1-044</b> <b>70-3.860</b>	1,78	94,97	.070	3.739	-044	-044	044					
	1,78	98,04	.070	3.860		-538						
<b>1-045</b>	1,78	101,32	.070	3.989	-045	-045	045					
	1,78	104,39	.070	4.110		-540						
<b>1-046</b>	1,78	107,67	.070	4.239	-046	-046	046					
	1,78	110,74	.070	4.360		-542						
<b>1-047</b>	1,78	114,02	.070	4.489	-047	-047	047					
	1,78	117,09	.070	4.610		-544						
<b>1-048</b>	1,78	120,37	.070	4.739	-048	-048	048					
	1,78	123,44	.070	4.860		-546						
<b>1-049</b>	1,78	126,72	.070	4.989	-049	-049	049					
	1,78	129,41	.070	5.095		-548						
<b>1-050</b>	1,78	133,07	.070	5.239	-050	-050	050					
	1,78	135,76	.070	5.345		-550						
	1,78	138,94	.070	5.470		-551						
	1,78	142,11	.070	5.595		-552						
	1,78	145,29	.070	5.720		-553						
	1,78	148,46	.070	5.845		-554						
	1,78	151,64	.070	5.970		-555						
	1,78	154,81	.070	6.095		-556						
	1,78	157,99	.070	6.220		-557						
	1,78	161,16	.070	6.345		-558						
	1,78	164,34	.070	6.470		-559						
	1,78	170,05	.070	6.695		-560						
	1,78	170,69	.070	6.720		-561						
	1,78	173,86	.070	6.845		-562						
	1,80	1,80	.071	.071			A0018	1,80 X 1,80	A0018	A,G		
	1,80	2,00	.071	.079			A0020	2,00 X 1,80	A0020	A,G		
<b>70-87</b> <b>* 70-98SS</b>	1,80	2,24	.071	.088			A0022	2,24 X 1,80	A0022	A,G		
	1,80	2,50	.071	.098			A0025	2,50 X 1,80	A0025	A,G		
	1,80	2,80	.071	.110			A0028	2,80 X 1,80	A0028	A,G		
	1,80	3,15	.071	.124			A0032	3,15 X 1,80	A0032	A,G		
<b>71-147</b>	1,80	3,55	.071	.140			A0036	3,55 X 1,80	A0036	A,G		
	1,80	3,75	.071	.148			A0038	3,75 X 1,80	A0038	A,G		
<b>71-178</b>	1,80	4,00	.071	.157			A0040	4,00 X 1,80	A0040	A,G		
	1,80	4,50	.071	.177			A0045	4,50 X 1,80	A0045	A,G		

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	1,80	4,75	.071	.187					A0048	G		
	1,80	4,87	.071	.192			A0049	4,87 X 1,80	A0049	A,G		
	1,80	5,00	.071	.197			A0050	5,00 X 1,80	A0050	A,G		
	1,80	5,15	.071	.203			A0052	5,15 X 1,80	A0052	A,G		
<b>71-210</b>	1,80	5,30	.071	.209			A0053	5,30 X 1,80	A0053	A,G		
	1,80	5,60	.071	.220			A0056	5,60 X 1,80	A0056	A,G		
	1,80	6,00	.071	.236			A0060	6,00 X 1,80	A0060	A,G		
<b>71-248</b>	1,80	6,30	.071	.248			A0063	6,30 X 1,80	A0063	A,G		
	1,80	6,70	.071	.264			A0067	6,70 X 1,80	A0067	A,G		
	1,80	6,90	.071	.272			A0069	6,90 X 1,80	A0069	A,G		
	1,80	7,10	.071	.280			A0071	7,10 X 1,80	A0071	A,G		
	1,80	7,50	.071	.295			A0075	7,50 X 1,80	A0075	A,G		
	1,80	8,00	.071	.315			A0080	8,00 X 1,80	A0080	A,G		
	1,80	8,50	.071	.335			A0085	8,50 X 1,80	A0085	A,G		
	1,80	8,75	.071	.344			A0088	8,75 X 1,80	A0088	A,G		
	1,80	9,00	.071	.354			A0090	9,00 X 1,80	A0090	A,G		
	1,80	9,50	.071	.374			A0095	9,50 X 1,80	A0095	A,G		
	1,80	9,75	.071	.384						G		
	1,80	10,00	.071	.394			A0100	10,00 X 1,80	A0100	A,G		
	1,80	10,60	.071	.417			A0106	10,60 X 1,80	A0106	A,G		
	1,80	11,20	.071	.441			A0112	11,20 X 1,80	A0112	A,G		
	1,80	11,60	.071	.457					A0116	G		
	1,80	11,80	.071	.465			A0118	11,80 X 1,80	A0118	A,G		
	1,80	12,10	.071	.476					A0121	G		
<b>70-495SS</b>	1,80	12,50	.071	.492			A0125	12,50 X 1,80	A0125	A,G		
	1,80	12,80	.071	.504					A0128	G		
	1,80	13,20	.071	.520			A0132	13,20 X 1,80	A0132	A,G		
	1,80	14,00	.071	.551			A0140	14,00 X 1,80	A0140	A,G		
	1,80	14,50	.071	.571					A0145	G		
	1,80	15,00	.071	.591			A0150	15,00 X 1,80	A0150	A,G		
	1,80	15,50	.071	.610					A0155	G		
	1,80	16,00	.071	.630			A0160	16,00 X 1,80	A0160	A,G		
	1,80	17,00	.071	.669			A0170	17,00 X 1,80	A0170	A,G		
	1,80	18,00	.071	.709			A0180		A0180	A,G		
<b>70-739VS</b>	1,80	19,00	.071	.748			A0190		A0190	A,G		
	1,80	20,00	.071	.787			A0200		A0200	A,G		
<b>71-810</b>	1,80	20,60	.071	.811					A0206	G		
	1,80	21,20	.071	.835			A0212		A0212	A,G		
	1,80	22,40	.071	.882			A0224		A0224	A,G		
	1,80	23,00	.071	.906						G		

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	1,80	23,60	.071	.929			A0236		A0236	A,G		
	1,80	24,30	.071	.957					A0243	G		
	1,80	25,00	.071	.984			A0250		A0250	A,G		
	1,80	25,80	.071	1.016			A0258		A0258	A,G		
	1,80	26,50	.071	1.043			A0265		A0265	A,G		
	1,80	27,30	.071	1.075					A0273	G		
	1,80	28,00	.071	1.102			A0280		A0280	A,G		
	1,80	29,00	.071	1.142						G		
	1,80	30,00	.071	1.181			A0300		A0300	A,G		
	1,80	31,50	.071	1.240			A0315		A0315	A		
<b>* 71-1.280VS</b>	1,80	32,50	.071	1.280			A0325		A0325	A		
	1,80	33,50	.071	1.319			A0335		A0335	A		
	1,80	34,50	.071	1.358			A0345		A0345	A		
<b>70-1.378VS</b>	1,80	35,50	.071	1.398			A0355		A0355	A		
	1,80	36,50	.071	1.437			A0365		A0365	A		
	1,80	37,50	.071	1.476			A0375		A0375	A		
	1,80	38,70	.071	1.524			A0387		A0387	A		
	1,80	40,00	.071	1.575			A0400		A0400	A		
	1,80	41,20	.071	1.622			A0412		A0412	A		
	1,80	42,50	.071	1.673			A0425		A0425	A		
	1,80	43,70	.071	1.720			A0437		A0437	A		
	1,80	45,00	.071	1.772			A0450		A0450	A		
	1,80	46,20	.071	1.819					A0462			
	1,80	47,50	.071	1.870			A0475		A0475	A		
	1,80	48,70	.071	1.917					A0487			
	1,80	50,00	.071	1.969			A0500		A0500	A		
	1,80	53,00	.071	2.087			A0530			A		
	1,80	56,00	.071	2.205			A0560			A		
	1,80	60,00	.071	2.362			A0600			A		
	1,80	63,00	.071	2.480			A0630			A		
<b>* 71-2.638VS</b>	1,80	67,00	.071	2.638			A0670			A		
	1,80	71,00	.071	2.795			A0710			A		
	1,80	75,00	.071	2.953			A0750			A		
	1,80	80,00	.071	3.150			A0800			A		
	1,80	85,00	.071	3.346			A0850			A		
	1,80	90,00	.071	3.543			A0900			A		
	1,80	95,00	.071	3.740			A0950			A		
	1,80	100,00	.071	3.937			A1000			A		
<b>* 71-4.409VS</b>	1,80	106,00	.071	4.173			A1060			A		
	1,80	112,00	.071	4.409			A1120			A		

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	1,80	118,00	.071	4.646			A1180			A		
	1,80	125,00	.071	4.921			A1250			A		
<b>1-904</b>	1,83	8,92	.072	.351	-904							
<b>1-905</b>	1,83	10,52	.072	.414	-905							
	1,90	2,80	.075	.110						P3		
	1,90	3,80	.075	.150						P4		
	1,90	4,80	.075	.189						P5		
	1,90	5,80	.075	.228						P6		
<b>* 75-268SS</b>	1,90	6,80	.075	.268						P7		
	1,90	7,80	.075	.307						P8		
	1,90	8,80	.075	.346						P9		
<b>* 75-386VS</b>	1,90	9,80	.075	.386						P10		
<b>1-906</b>	1,98	11,89	.078	.468	-906							
<b>1-907</b>	2,08	13,46	.082	.530	-907							
<b>1-908</b>	2,21	16,36	.087	.644	-908							
<b>95-130</b>	2,40	3,30	.094	.130								D
<b>94-142</b>	2,40	3,60	.094	.142							0036-24	
	2,40	4,30	.094	.169								D
	2,40	4,60	.094	.181							0046-24	
	2,40	5,30	.094	.209								D
<b>* 94-248VS</b>	2,40	5,60	.094	.220							0056-24	
	2,40	6,30	.094	.248								D
<b>* 94-287VS</b>	2,40	6,60	.094	.260							0066-24	
	2,40	7,30	.094	.287								D
	2,40	7,60	.094	.299							0076-24	
	2,40	8,30	.094	.327								D
<b>* 94-366SS</b>	2,40	8,60	.094	.339							0086-24	
	2,40	9,30	.094	.366								D
	2,40	9,60	.094	.378							0096-24	
	2,40	9,80	.094	.386						P10A		
<b>95-418</b>	2,40	10,30	.094	.406								D
	2,40	10,60	.094	.417							0106-24	
	2,40	10,80	.094	.425						P11		
	2,40	11,00	.094	.433						P11.2		
<b>* 94-445VS</b>	2,40	11,30	.094	.445								D
	2,40	11,60	.094	.457							0116-24	
	2,40	11,80	.094	.465						P12		
	2,40	12,30	.094	.484						P12.5		D
<b>94-523</b>	2,40	12,60	.094	.496							0126-24	
	2,40	13,30	.094	.524								D

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	2,40	13,60	.094	.535							0136-24	
	2,40	13,80	.094	.543						P14		
	2,40	14,30	.094	.563								D
	2,40	14,60	.094	.575							0146-24	
<b>94-602</b>	2,40	14,80	.094	.583						P15		
	2,40	15,30	.094	.602								D
<b>* 94-614SS</b>	2,40	15,60	.094	.614							0156-24	
	2,40	15,80	.094	.622						P16		
	2,40	16,30	.094	.642								D
	2,40	16,60	.094	.654							0166-24	
	2,40	17,30	.094	.681								D
	2,40	17,60	.094	.693							0176-24	
	2,40	17,80	.094	.701						P18		
	2,40	18,60	.094	.732							0186-24	
	2,40	19,60	.094	.772							0196-24	
	2,40	19,80	.094	.780						P20		
	2,40	20,60	.094	.811							0206-24	
	2,40	20,80	.094	.819						P21		
	2,40	21,60	.094	.850							0216-24	
	2,40	21,80	.094	.858						P22		
	2,40	24,60	.094	.969							0246-24	
	2,40	27,60	.094	1.087							0276-24	
	2,40	29,60	.094	1.165							0296-24	
	2,40	31,60	.094	1.244							0316-24	
	2,40	34,60	.094	1.362							0346-24	
	2,40	35,60	.094	1.402							0356-24	
	2,40	37,60	.094	1.480							0376-24	
	2,40	39,60	.094	1.559							0396-24	
	2,40	41,60	.094	1.638							0416-24	
	2,40	44,60	.094	1.756							0446-24	
	2,40	45,60	.094	1.795							0456-24	
	2,40	47,60	.094	1.874							0476-24	
	2,40	49,60	.094	1.953							0496-24	
	2,40	51,60	.094	2.031							0516-24	
	2,40	54,60	.094	2.150							0546-24	
	2,40	55,60	.094	2.189							0556-24	
	2,40	57,60	.094	2.268							0576-24	
	2,40	58,60	.094	2.307							0586-24	
	2,40	59,60	.094	2.346							0596-24	
	2,40	61,60	.094	2.425							0616-24	

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	2,40	62,60	.094	2.465							0626-24	
	2,40	64,60	.094	2.543							0646-24	
	2,40	67,60	.094	2.661							0676-24	
	2,40	69,60	.094	2.740							0696-24	
<b>1-909</b>	2,46	17,93	.097	.706	-909							
<b>1-910</b>	2,46	19,18	.097	.755	-910							
<b>1-102</b>	2,62	1,24	.103	.049	-102	-102	102					
<b>1-103</b>	2,62	2,06	.103	.081	-103	-103	103					
<b>1-104</b>	2,62	2,84	.103	.112	-104	-104	104					
<b>1-105</b>	2,62	3,63	.103	.143	-105	-105	105					
<b>1-106</b>	2,62	4,45	.103	.175	-106	-106	106					
<b>1-107</b>	2,62	5,23	.103	.206	-107	-107	107					
<b>1-108</b>	2,62	6,02	.103	.237	-108	-108	108					
<b>1-109</b>	2,62	7,59	.103	.299	-109	-109	109					
<b>1-110</b>	2,62	9,19	.103	.362	-110	-110	110					
<b>103-391</b>	2,62	9,93	.103	.391		-613						
<b>1-111</b>	2,62	10,77	.103	.424	-111	-111	111					
	2,62	11,91	.103	.469		-614						
<b>1-112</b>	2,62	12,37	.103	.487	-112	-112	112					
	2,62	12,70	.103	.500		-807						
	2,62	13,11	.103	.516		-615						
<b>1-113</b>	2,62	13,94	.103	.549	-113	-113	113					
	2,62	15,09	.103	.594		-616						
<b>1-114</b>	2,62	15,54	.103	.612	-114	-114	114					
	2,62	15,88	.103	.625		-809						
<b>1-115</b>	2,62	17,12	.103	.674	-115	-115	115					
	2,62	17,45	.103	.687		-810						
	2,62	17,86	.103	.703		-617						
<b>1-116</b>	2,62	18,72	.103	.737	-116	-116	116					
<b>1-117</b>	2,62	20,29	.103	.799	-117	-117	117					
	2,62	20,62	.103	.812		-812						
<b>1-118</b>	2,62	21,89	.103	.862	-118	-118	118					
	2,62	22,23	.103	.875		-813						
<b>1-119</b>	2,62	23,47	.103	.924	-119	-119	119					
	2,62	23,80	.103	.937		-814						
<b>1-120</b>	2,62	25,07	.103	.987	-120	-120	120					
<b>1-121</b>	2,62	26,64	.103	1.049	-121	-121	121					
<b>1-122</b>	2,62	28,24	.103	1.112	-122	-122	122					
<b>1-123</b>	2,62	29,82	.103	1.174	-123	-123	123					
<b>1-124</b>	2,62	31,42	.103	1.237	-124	-124	124					

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1-125	2,62	32,99	.103	1.299	-125	-125	125					
1-126	2,62	34,59	.103	1.362	-126	-126	126					
1-127	2,62	36,17	.103	1.424	-127	-127	127					
1-128	2,62	37,77	.103	1.487	-128	-128	128					
1-129	2,62	39,34	.103	1.549	-129	-129	129					
1-130	2,62	40,94	.103	1.612	-130	-130	130					
1-131	2,62	42,52	.103	1.674	-131	-131	131					
1-132	2,62	44,12	.103	1.737	-132	-132	132					
1-133	2,62	45,69	.103	1.799	-133	-133	133					
1-134	2,62	47,29	.103	1.862	-134	-134	134					
1-135	2,62	48,90	.103	1.925	-135	-135	135					
1-136	2,62	50,47	.103	1.987	-136	-136	136					
1-137	2,62	52,07	.103	2.050	-137	-137	137					
1-138	2,62	53,64	.103	2.112	-138	-138	138					
1-139	2,62	55,25	.103	2.175	-139	-139	139					
1-140	2,62	56,82	.103	2.237	-140	-140	140					
1-141	2,62	58,42	.103	2.300	-141	-141	141					
1-142	2,62	59,99	.103	2.362	-142	-142	142					
1-143	2,62	61,60	.103	2.425	-143	-143	143					
1-144	2,62	63,17	.103	2.487	-144	-144	144					
1-145	2,62	64,77	.103	2.550	-145	-145	145					
1-146	2,62	66,34	.103	2.612	-146	-146	146					
1-147	2,62	67,95	.103	2.675	-147	-147	147					
1-148	2,62	69,52	.103	2.737	-148	-148	148					
1-149	2,62	71,12	.103	2.800	-149	-149	149					
1-150	2,62	72,69	.103	2.862	-150	-150	150					
1-151	2,62	74,27	.103	2.924		-640						
	2,62	75,87	.103	2.987	-151	-151	151					
	2,62	77,44	.103	3.049		-641						
	2,62	80,62	.103	3.174		-642						
1-152	2,62	82,22	.103	3.237	-152	-152	152					
	2,62	83,79	.103	3.299		-643						
1-153	2,62	88,57	.103	3.487	-153	-153	153					
1-154	2,62	94,92	.103	3.737	-154	-154	154					
1-155	2,62	101,27	.103	3.987	-155	-155	155					
1-156	2,62	107,62	.103	4.237	-156	-156	156					
1-157	2,62	113,97	.103	4.487	-157	-157	157					
1-158	2,62	120,32	.103	4.737	-158	-158	158					
1-159	2,62	126,67	.103	4.987	-159	-159	159					
1-160	2,62	133,02	.103	5.237	-160	-160	160					

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**International  
O-Ring Standard  
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PAI Size	C/S mm	I.D. mm	C/S inch	I.D. inch	AS 568	BS 1806	ISO 3601	DIN 3771	NF T 47-501	JIS B2401	BS 4518	SMS-1586
<b>1-161</b>	2,62	139,37	.103	5.487	-161	-161	161					
<b>1-162</b>	2,62	145,72	.103	5.737	-162	-162	162					
<b>1-163</b>	2,62	152,07	.103	5.987	-163	-163	163					
<b>1-164</b>	2,62	158,42	.103	6.237	-164	-164	164					
<b>1-165</b>	2,62	164,77	.103	6.487	-165	-165	165					
<b>1-166</b>	2,62	171,12	.103	6.737	-166	-166	166					
<b>1-167</b>	2,62	177,47	.103	6.987	-167	-167	167					
<b>1-168</b>	2,62	183,82	.103	7.237	-168	-168	168					
<b>1-169</b>	2,62	190,17	.103	7.487	-169	-169	169					
<b>1-170</b>	2,62	196,52	.103	7.737	-170	-170	170					
<b>1-171</b>	2,62	202,87	.103	7.987	-171	-171	171					
<b>1-172</b>	2,62	209,22	.103	8.237	-172	-172	172					
<b>1-173</b>	2,62	215,57	.103	8.487	-173	-173	173					
<b>1-174</b>	2,62	221,92	.103	8.737	-174	-174	174					
<b>1-175</b>	2,62	228,27	.103	8.987	-175	-175	175					
<b>1-176</b>	2,62	234,62	.103	9.237	-176	-176	176					
<b>1-177</b>	2,62	240,97	.103	9.487	-177	-177	177					
<b>1-178</b>	2,62	247,32	.103	9.737	-178	-178	178					
<b>1-179</b>	2,62	253,67	.103	9.987								
	2,65	4,50	.104	.177			B0045			A		
	2,65	5,30	.104	.209			B0053			A		
	2,65	6,00	.104	.236			B0060			A		
<b>* 104-272VS</b>	2,65	6,90	.104	.272			B0069			A		
	2,65	8,00	.104	.315			B0080			A		
	2,65	9,00	.104	.354			B0090		B0090	A		
	2,65	9,50	.104	.374			B0095		B0095	A		
<b>* 104-417VS</b>	2,65	10,00	.104	.394			B0100		B0100	A		
	2,65	10,60	.104	.417			B0106		B0106	A		
	2,65	11,20	.104	.441			B0112		B0112	A		
	2,65	11,60	.104	.457					B0116			
	2,65	11,80	.104	.465			B0118		B0118	A		
	2,65	12,10	.104	.476					B0121			
<b>104-492</b>	2,65	12,50	.104	.492			B0125		B0125	A		
	2,65	12,80	.104	.504					B0128			
	2,65	13,20	.104	.520			B0132		B0132	A		
	2,65	14,00	.104	.551			B0140	14,00 X 2,65	B0140	A,G		
	2,65	14,50	.104	.571					B0145	G		
	2,65	15,00	.104	.591			B0150	15,00 X 2,65	B0150	A,G		
	2,65	15,50	.104	.610						G		
	2,65	16,00	.104	.630			B0160	16,00 X 2,65	B0160	A,G		

Contact Precision Associates for sizes not listed

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: (612) 333-7464  
Fax: (612) 342-2417  
Toll: (800) 394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)





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PAI Size	C/S mm	I.D. mm	C/S inch	I.D. inch	AS 568	BS 1806	ISO 3601	DIN 3771	NF T47-501	JIS B2401	BS 4518	SMS-1586
	2,65	17,00	.104	.669			B0170	17,00 X 2,65	B0170	A,G		
	2,65	18,00	.104	.709			B0180	18,00 X 2,65	B0180	A,G		
<b>* 104-787VS</b>	2,65	19,00	.104	.748			B0190	19,00 X 2,65	B0190	A,G		
	2,65	20,00	.104	.787			B0200	20,00 X 2,65	B0200	A,G		
<b>* 104-835VS</b>	2,65	20,60	.104	.811					B0206	G		
	2,65	21,20	.104	.835			B0212	21,20 X 2,65	B0212	A,G		
	2,65	22,40	.104	.882			B0224	22,40 X 2,65	B0224	A,G		
	2,65	23,00	.104	.906						G		
	2,65	23,60	.104	.929			B0236	23,60 X 2,65	B0236	A,G		
	2,65	24,30	.104	.957					B0243	G		
	2,65	25,00	.104	.984			B0250	25,00 X 2,65	B0250	A,G		
	2,65	25,80	.104	1.016			B0258	25,80 X 2,65	B0258	A,G		
	2,65	26,50	.104	1.043			B0265	26,50 X 2,65	B0265	A,G		
	2,65	27,30	.104	1.075					B0273	G		
	2,65	28,00	.104	1.102			B0280	28,00 X 2,65	B0280	A,G		
	2,65	29,00	.104	1.142						G		
	2,65	30,00	.104	1.181			B0300	30,00 X 2,65	B0300	A,G		
	2,65	31,50	.104	1.240			B0315	31,50 X 2,65	B0315	A,G		
	2,65	32,50	.104	1.280			B0325	32,50 X 2,65	B0325	A,G		
	2,65	33,50	.104	1.319			B0335	33,50 X 2,65	B0335	A,G		
	2,65	34,50	.104	1.358			B0345	34,50 X 2,65	B0345	A,G		
	2,65	35,50	.104	1.398			B0355	35,50 X 2,65	B0355	A,G		
	2,65	36,50	.104	1.437			B0365	36,50 X 2,65	B0365	A,G		
	2,65	37,50	.104	1.476			B0375	37,50 X 2,65	B0375	A,G		
	2,65	38,70	.104	1.524			B0387	38,70 X 2,65	B0387	A,G		
	2,65	40,00	.104	1.575			B0400		B0400	A,G		
	2,65	41,20	.104	1.622			B0412		B0412	A,G		
	2,65	42,50	.104	1.673			B0425		B0425	A,G		
	2,65	43,70	.104	1.720			B0437		B0437	A,G		
	2,65	45,00	.104	1.772			B0450		B0450	A,G		
	2,65	46,20	.104	1.819			B0462		B0462	A,G		
	2,65	47,50	.104	1.870			B0475		B0475	A,G		
	2,65	48,70	.104	1.917			B0487		B0487	A,G		
	2,65	50,00	.104	1.969			B0500		B0500	A,G		
	2,65	51,50	.104	2.028			B0515		B0515	A,G		
	2,65	53,00	.104	2.087			B0530		B0530	A,G		
	2,65	54,50	.104	2.146			B0545		B0545	A,G		
	2,65	56,00	.104	2.205			B0560		B0560	A,G		
	2,65	58,00	.104	2.283			B0580		B0580	A,G		
	2,65	60,00	.104	2.362			B0600		B0600	A,G		

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	2,65	61,50	.104	2.421			B0615		B0615	A,G		
	2,65	63,00	.104	2.480			B0630		B0630	A,G		
<b>104-2.638</b>	2,65	65,00	.104	2.559			B0650		B0650	A,G		
	2,65	67,00	.104	2.638			B0670		B0670	A,G		
	2,65	69,00	.104	2.717			B0690		B0690	A,G		
	2,65	71,00	.104	2.795			B0710		B0710	A,G		
<b>104-2.874</b>	2,65	73,00	.104	2.874			B0730		B0730	A,G		
	2,65	75,00	.104	2.953			B0750		B0750	A,G		
	2,65	77,50	.104	3.051					B0775	G		
	2,65	80,00	.104	3.150			B0800		B0800	G		
	2,65	82,50	.104	3.248					B0825	G		
	2,65	85,00	.104	3.346			B0850		B0850	A,G		
	2,65	87,50	.104	3.445					B0875	G		
	2,65	90,00	.104	3.543			B0900		B0900	A,G		
	2,65	92,50	.104	3.642					B0925	G		
	2,65	95,00	.104	3.740			B0950		B0950	A,G		
	2,65	97,50	.104	3.839					B0975	G		
	2,65	100,00	.104	3.937			B1000		B1000	A,G		
	2,65	103,00	.104	4.055						G		
	2,65	106,00	.104	4.173			B1060			A,G		
	2,65	112,00	.104	4.409			B1120			A		
	2,65	118,00	.104	4.646			B1180					
	2,65	125,00	.104	4.921			B1250			A		
	2,65	132,00	.104	5.197			B1320			A		
<b>104-5.512</b>	2,65	140,00	.104	5.512			B1400			A		
	2,65	145,00	.104	5.709						A		
	2,65	150,00	.104	5.906			B1500			A		
	2,65	155,00	.104	6.120						A		
<b>104-6.299</b>	2,65	160,00	.104	6.299			B1600			A		
	2,65	165,00	.104	6.496						A		
	2,65	170,00	.104	6.693			B1700			A		
	2,65	175,00	.104	6.890						A		
	2,65	180,00	.104	7.087			B1800			A		
	2,65	185,00	.104	7.283						A		
	2,65	190,00	.104	7.480			B1900			A		
	2,65	195,00	.104	7.677						A		
	2,65	200,00	.104	7.874			B2000			A		
	2,65	212,00	.104	8.346			B2120					
	2,65	224,00	.104	8.819			B2240					
	2,65	230,00	.104	9.055			B2300					

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	2,65	236,00	.104	9.291			B2360					
	2,65	243,00	.104	9.567			B2430					
	2,65	250,00	.104	9.843			B2500					
<b>1-911</b>	2,95	21,92	.116	.863	-911							
<b>1-912</b>	2,95	23,47	.116	.924	-912							
<b>1-913</b>	2,95	25,04	.116	.986	-913							
<b>1-914</b>	2,95	26,59	.116	1.047	-914							
<b>1-915</b>	2,95	28,17	.116	1.109								
<b>1-916</b>	2,95	29,74	.116	1.171	-916							
<b>1-918</b>	2,95	34,42	.116	1.355	-918							
<b>118-748VS</b>	3,00	19,20	.118	.756								D
	3,00	19,50	.118	.768							0195-30	
	3,00	21,50	.118	.846							0215-30	
	3,00	22,20	.118	.874								D
<b>* 118-886SS</b>	3,00	22,50	.118	.886							0225-30	
<b>118-953</b>	3,00	24,20	.118	.953								D
	3,00	24,50	.118	.965							0245-30	
	3,00	25,50	.118	1.004							0255-30	
	3,00	26,20	.118	1.031								D
	3,00	26,50	.118	1.043							0265-30	
	3,00	27,50	.118	1.083							0275-30	
	3,00	29,20	.118	1.150								D
	3,00	29,50	.118	1.161							0295-30	
	3,00	31,50	.118	1.240							0315-30	
	3,00	32,20	.118	1.268								D
	3,00	32,50	.118	1.280							0325-30	
	3,00	34,20	.118	1.346								D
	3,00	34,50	.118	1.358							0345-30	
	3,00	35,50	.118	1.398							0355-30	
	3,00	36,20	.118	1.425								D
<b>1-920</b>	3,00	36,50	.118	1.437							0365-30	
	3,00	37,47	.118	1.475	-920							
	3,00	37,50	.118	1.476							0375-30	
<b>* 118-1.543VS</b>	3,00	39,20	.118	1.543								D
	3,00	39,50	.118	1.555							0395-30	
	3,00	41,50	.118	1.634							0415-30	
<b>* 118-1.673VS</b>	3,00	42,20	.118	1.661								D
	3,00	42,50	.118	1.673							0425-30	
<b>1-924</b>	3,00	43,69	.118	1.720	-924							
	3,00	44,20	.118	1.740								D

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	3,00	44,50	.118	1.752							0445-30	
	3,00	49,50	.118	1.949							0495-30	S
<b>1-928</b>	3,00	53,09	.118	2.090	-928							
	3,00	54,50	.118	2.146							0545-30	S
	3,00	55,50	.118	2.185							0555-30	
	3,00	57,50	.118	2.264							0575-30	
<b>1-932</b>	3,00	59,36	.118	2.337	-932							
<b>118-2.342</b>	3,00	59,50	.118	2.343							0595-30	S
	3,00	62,50	.118	2.461							0625-30	
	3,00	64,50	.118	2.539							0645-30	S
	3,00	69,50	.118	2.736							0695-30	S
	3,00	74,50	.118	2.933							0745-30	S
<b>118-3.130</b>	3,00	79,50	.118	3.130							0795-30	S
	3,00	84,50	.118	3.327							0845-30	S
	3,00	89,50	.118	3.524							0895-30	S
	3,00	94,50	.118	3.720							0945-30	S
	3,00	99,50	.118	3.917							0995-30	S
	3,00	104,50	.118	4.114							1045-30	S
	3,00	109,50	.118	4.311							1095-30	S
	3,00	114,50	.118	4.508							1145-30	S
	3,00	119,50	.118	4.705							1195-30	S
	3,00	124,50	.118	4.902							1245-30	S
	3,00	129,50	.118	5.098							1295-30	S
	3,00	134,50	.118	5.295							1345-30	S
<b>118-5.492</b>	3,00	139,50	.118	5.492							1395-30	S
<b>118-5.689</b>	3,00	144,50	.118	5.689							1445-30	S
	3,00	149,50	.118	5.886							1495-30	
	3,00	154,50	.118	6.083							1545-30	
	3,00	159,50	.118	6.280							1595-30	
	3,00	164,50	.118	6.476							1645-30	
	3,00	169,50	.118	6.673							1695-30	
	3,00	174,50	.118	6.870							1745-30	
	3,00	179,50	.118	7.067							1795-30	
	3,00	184,50	.118	7.264							1845-30	
	3,00	189,50	.118	7.461							1895-30	
	3,00	194,50	.118	7.657							1945-30	
	3,00	199,50	.118	7.854							1995-30	
	3,00	209,50	.118	8.248							2095-30	
	3,00	219,50	.118	8.642							2195-30	
	3,00	229,50	.118	9.035							2295-30	

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<b>PAI Size</b>	<b>C/S mm</b>	<b>I.D. mm</b>	<b>C/S inch</b>	<b>I.D. inch</b>	<b>AS 568</b>	<b>BS 1806</b>	<b>ISO 3601</b>	<b>DIN 3771</b>	<b>NF T47-501</b>	<b>JIS B2401</b>	<b>BS 4518</b>	<b>SMS-1586</b>
	3,00	239,50	.118	9.429							2395-30	
	3,00	244,50	.118	9.626							2445-30	
	3,00	249,50	.118	9.823							2495-30	
	3,10	24,40	.122	.961						G25		
	3,10	29,40	.122	1.157						G30		
	3,10	34,40	.122	1.354						G35		
	3,10	39,40	.122	1.551						G40		
	3,10	44,40	.122	1.748						G45		
	3,10	49,40	.122	1.945						G50		
	3,10	54,40	.122	2.142						G55		
	3,10	59,40	.122	2.339						G60		
	3,10	64,40	.122	2.535						G65		
	3,10	69,40	.122	2.732						G70		
	3,10	74,40	.122	2.929						G75		
	3,10	79,40	.122	3.126						G80		
	3,10	84,40	.122	3.323						G85		
<b>122-3.520</b>	3,10	89,40	.122	3.520						G90		
	3,10	94,40	.122	3.717						G95		
	3,10	99,40	.122	3.913						G100		
	3,10	104,40	.122	4.110						G105		
	3,10	109,40	.122	4.307						G110		
	3,10	114,40	.122	4.504						G115		
	3,10	119,40	.122	4.701						G120		
	3,10	124,40	.122	4.898						G125		
	3,10	129,40	.122	5.094						G130		
	3,10	134,40	.122	5.291						G135		
	3,10	139,40	.122	5.488						G140		
	3,10	144,40	.122	5.685						G145		
	3,50	21,70	.138	.854						P22A		
	3,50	22,10	.138	.870						P22.4		
	3,50	23,70	.138	.933						P24		
	3,50	24,70	.138	.972						P25		
	3,50	25,20	.138	.992						P25.5		
	3,50	25,70	.138	1.012						P26		
	3,50	27,70	.138	1.091						P28		
	3,50	28,70	.138	1.130						P29		
	3,50	29,20	.138	1.150						P29.5		
	3,50	29,70	.138	1.169						P30		
	3,50	30,70	.138	1.209						P31		
	3,50	31,20	.138	1.228						P31.5		

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	3,50	31,70	.138	1.248						P32		
	3,50	33,70	.138	1.327						P34		
	3,50	34,70	.138	1.366						P35		
	3,50	35,20	.138	1.386						P35.		
	3,50	35,70	.138	1.406						P36		
	3,50	37,70	.138	1.484						P38		
	3,50	38,70	.138	1.524						P39		
	3,50	39,70	.138	1.563						P40		
	3,50	40,70	.138	1.602						P41		
	3,50	41,70	.138	1.642						P42		
	3,50	43,70	.138	1.720						P44		
	3,50	44,70	.138	1.760						P45		
	3,50	45,70	.138	1.799						P46		
	3,50	47,70	.138	1.878						P48		
	3,50	48,70	.138	1.917						P49		
	3,50	49,70	.138	1.957						P50		
<b>1-201</b>	3,53	4,34	.139	.171	-201	-201	201					
<b>1-202</b>	3,53	5,94	.139	.234	-202	-202	202					
<b>1-203</b>	3,53	7,52	.139	.296	-203	-203	203					
<b>1-204</b>	3,53	9,12	.139	.359	-204	-204	204					
<b>1-205</b>	3,53	10,69	.139	.421	-205	-205	205					
<b>1-206</b>	3,53	12,29	.139	.484	-206	-206	206					
<b>1-207</b>	3,53	13,94	.139	.549	-207	-207	207					
<b>1-208</b>	3,53	15,47	.139	.609	-208	-208	208					
<b>1-209</b>	3,53	17,07	.139	.672	-209	-209	209					
<b>1-210</b>	3,53	18,64	.139	.734	-210	-210	210					
<b>1-211</b>	3,53	20,22	.139	.796	-211	-211	211					
<b>1-212</b>	3,53	21,82	.139	.859	-212	-212	212					
<b>1-213</b>	3,53	23,39	.139	.921	-213	-213	213					
<b>1-214</b>	3,53	24,99	.139	.984	-214	-214	214					
<b>1-215</b>	3,53	25,81	.139	1.016		-618						
	3,53	26,57	.139	1.046	-215	-215	215					
<b>1-216</b>	3,53	28,17	.139	1.109	-216	-216	216					
<b>1-217</b>	3,53	29,74	.139	1.171	-217	-217	217					
<b>1-218</b>	3,53	31,34	.139	1.234	-218	-218	218					
<b>1-219</b>	3,53	32,92	.139	1.296	-219	-219	219					
<b>1-220</b>	3,53	34,52	.139	1.359	-220	-220	220					
<b>1-221</b>	3,53	36,09	.139	1.421	-221	-221	221					
<b>1-222</b>	3,53	37,69	.139	1.484	-222	-222	222					
	3,53	39,70	.139	1.563		-824						

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<b>1-223</b>	3,53	40,87	.139	1.609	-223	-223	223					
	3,53	41,28	.139	1.625		-825						
<b>1-224</b>	3,53	42,85	.139	1.687		-826						
	3,53	44,04	.139	1.734	-224	-224	224					
<b>1-225</b>	3,53	44,45	.139	1.750		-827						
	3,53	46,04	.139	1.813		-828						
<b>1-226</b>	3,53	47,22	.139	1.859	-225	-225	225					
	3,53	47,63	.139	1.875		-829						
<b>1-227</b>	3,53	49,20	.139	1.937		-830						
	3,53	50,39	.139	1.984	-226	-226	226					
<b>1-228</b>	3,53	50,80	.139	2.000		-831						
	3,53	52,39	.139	2.063		-832						
<b>1-229</b>	3,53	53,57	.139	2.109	-227	-227	227					
	3,53	53,98	.139	2.125		-833						
<b>1-230</b>	3,53	55,55	.139	2.187		-834						
	3,53	56,74	.139	2.234	-228	-228	228					
<b>1-231</b>	3,53	57,15	.139	2.250		-835						
	3,53	58,74	.139	2.313		-836						
<b>1-232</b>	3,53	59,92	.139	2.359	-229	-229	229					
	3,53	60,33	.139	2.375		-837						
<b>1-233</b>	3,53	61,90	.139	2.437		-838						
	3,53	63,09	.139	2.484	-230	-230	230					
<b>1-234</b>	3,53	63,50	.139	2.500		-839						
	3,53	65,10	.139	2.563		-840						
<b>1-235</b>	3,53	66,27	.139	2.609	-231	-231	231					
	3,53	66,68	.139	2.625		-841						
<b>1-236</b>	3,53	68,25	.139	2.687		-842						
	3,53	69,44	.139	2.734	-232	-232	232					
<b>1-237</b>	3,53	69,85	.139	2.750		-843						
	3,53	71,44	.139	2.813		-844						
<b>1-238</b>	3,53	72,62	.139	2.859	-233	-233	233					
	3,53	73,03	.139	2.875		-845						
<b>1-239</b>	3,53	74,60	.139	2.937		-846						
	3,53	75,79	.139	2.984	-234	-234	234					
<b>1-240</b>	3,53	78,97	.139	3.109	-235	-235	235					
<b>1-241</b>	3,53	82,14	.139	3.234	-236	-236	236					
<b>1-242</b>	3,53	85,32	.139	3.359	-237	-237	237					
<b>1-243</b>	3,53	88,49	.139	3.484	-238	-238	238					
<b>1-244</b>	3,53	91,67	.139	3.609	-239	-239	239					
<b>1-245</b>	3,53	94,84	.139	3.734	-240	-240	240					

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1-241	3,53	98,02	.139	3.859	-241	-241	241					
1-242	3,53	101,19	.139	3.984	-242	-242	242					
1-243	3,53	104,37	.139	4.109	-243	-243	243					
1-244	3,53	107,54	.139	4.234	-244	-244	244					
1-245	3,53	110,72	.139	4.359	-245	-245	245					
1-246	3,53	113,89	.139	4.484	-246	-246	246					
1-247	3,53	117,07	.139	4.609	-247	-247	247					
1-248	3,53	120,24	.139	4.734	-248	-248	248					
1-249	3,53	123,42	.139	4.859	-249	-249	249					
1-250	3,53	126,59	.139	4.984	-250	-250	250					
1-251	3,53	129,77	.139	5.109	-251	-251	251					
1-252	3,53	132,94	.139	5.234	-252	-252	252					
1-253	3,53	136,12	.139	5.359	-253	-253	253					
1-254	3,53	139,29	.139	5.484	-254	-254	254					
1-255	3,53	142,47	.139	5.609	-255	-255	255					
1-256	3,53	145,64	.139	5.734	-256	-256	256					
1-257	3,53	148,82	.139	5.859	-257	-257	257					
1-258	3,53	151,99	.139	5.984	-258	-258	258					
1-259	3,53	158,34	.139	6.234	-259	-259	259					
1-260	3,53	164,69	.139	6.484	-260	-260	260					
1-261	3,53	171,04	.139	6.734	-261	-261	261					
1-262	3,53	177,39	.139	6.984	-262	-262	262					
1-263	3,53	183,74	.139	7.234	-263	-263	263					
1-264	3,53	190,09	.139	7.484	-264	-264	264					
1-265	3,53	196,44	.139	7.734	-265	-265	265					
1-266	3,53	202,79	.139	7.984	-266	-266	266					
1-267	3,53	209,14	.139	8.234	-267	-267	267					
1-268	3,53	215,49	.139	8.484	-268	-268	268					
1-269	3,53	221,84	.139	8.734	-269	-269	269					
1-270	3,53	228,19	.139	8.984	-270	-270	270					
1-271	3,53	234,54	.139	9.234	-271	-271	271					
1-272	3,53	240,89	.139	9.484	-272	-272	272					
1-273	3,53	247,24	.139	9.734	-273	-273	273					
1-274	3,53	253,59	.139	9.984	-274	-274	274					
1-275	3,53	266,29	.139	10.484	-275	-275	275					
1-276	3,53	278,99	.139	10.984	-276	-276	276					
1-277	3,53	291,69	.139	11.484	-277	-277	277					
1-278	3,53	304,39	.139	11.984	-278	-278	278					
1-279	3,53	329,79	.139	12.984	-279	-279	279					
1-280	3,53	355,19	.139	13.984	-280	-280	280					

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<b>1-281</b>	3,53	380,59	.139	14.984	-281	-281	281					
<b>1-282</b>	3,53	405,26	.139	15.955	-282		282					
<b>1-283</b>	3,53	430,66	.139	16.955	-283		283					
<b>1-284</b>	3,53	456,06	.139	17.955	-284		284					
<b>1-286</b>	3,53	506,99	.139	19.960								
	3,55	14,00	.140	.551			C0140		C0140	A		
	3,55	14,50	.140	.571					C0145			
	3,55	15,00	.140	.591			C0150		C0150	A		
	3,55	15,50	.140	.610					C0155			
	3,55	16,00	.140	.620			C0160		C0160	A		
	3,55	17,00	.140	.669			C0170		C0170	A		
	3,55	18,00	.140	.709			C0180	18,00 X 3,55	C0180	A, G		
	3,55	19,00	.140	.748			C0190	19,00 X 3,55	C0190	A, G		
	3,55	20,00	.140	.787			C0200	20,00 X 3,55	C0200	A, G		
	3,55	20,60	.140	.811					C0206	G		
	3,55	21,20	.140	.835			C0212	21,20 X 3,55	C0212	A, G		
	3,55	22,40	.140	.882			C0224	22,40 X 3,55	C0224	A, G		
	3,55	23,00	.140	.906						G		
<b>140-930</b>	3,55	23,60	.140	.929			C0236	23,60 X 3,55	C0236	A, G		
	3,55	24,30	.140	.957					C0243	G		
	3,55	25,00	.140	.984			C0250	25,00 X 3,55	C0250	A, G		
	3,55	25,80	.140	1.016			C0258	25,80 X 3,55	C0258	A, G		
	3,55	26,50	.140	1.043			C0265	26,50 X 3,55	C0265	A, G		
	3,55	27,30	.140	1.075					C0273	G		
	3,55	28,00	.140	1.102			C0280	28,00 X 3,55	C0280	A, G		
	3,55	29,00	.140	1.142						G		
	3,55	30,00	.140	1.181			C0300	30,00 X 3,55	C0300	A, G		
	3,55	31,50	.140	1.240			C0315	31,50 X 3,55	C0315	A, G		
	3,55	32,50	.140	1.280			C0325	32,50 X 3,55	C0325	A, G		
	3,55	33,50	.140	1.319			C0335	33,50 X 3,55	C0335	A, G		
	3,55	34,50	.140	1.358			C0345	34,50 X 3,55	C0345	A, G		
	3,55	35,50	.140	1.398			C0355	35,50 X 3,55	C0355	A, G		
	3,55	36,50	.140	1.437			C0365	36,50 X 3,55	C0365	A, G		
	3,55	37,50	.140	1.476			C0375	37,50 X 3,55	C0375	A, G		
	3,55	38,70	.140	1.524			C0387	38,70 X 3,55	C0387	A, G		
	3,55	40,00	.140	1.575			C0400	40,00 X 3,55	C0400	A, G		
	3,55	41,20	.140	1.622			C0412	41,20 X 3,55	C0412	A, G		
	3,55	42,50	.140	1.673			C0425	42,50 X 3,55	C0425	A, G		
	3,55	43,70	.140	1.720			C0437	43,70 X 3,55	C0437	A, G		
	3,55	45,00	.140	1.772			C0450	45,00 X 3,55	C0450	A, G		

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	3,55	46,20	.140	1.819			C0462	46,20 X 3,55	C0462	A, G		
	3,55	47,50	.140	1.870			C0475	47,50 X 3,55	C0475	A, G		
	3,55	48,70	.140	1.917			C0487	48,70 X 3,55	C0487	A, G		
	3,55	50,00	.140	1.969			C0500	50,00 X 3,55	C0500	A, G		
	3,55	51,50	.140	2.028			C0515	51,50 X 3,55	C0515	A, G		
	3,55	53,00	.140	2.087			C0530	53,00 X 3,55	C0530	A, G		
	3,55	54,50	.140	2.146			C0545	54,50 X 3,55	C0545	A, G		
	3,55	56,00	.140	2.205			C0560	56,00 X 3,55	C0560	A, G		
	3,55	58,00	.140	2.283			C0580	58,00 X 3,55	C0580	A, G		
	3,55	60,00	.140	2.362			C0600	60,00 X 3,55	C0600	A, G		
	3,55	61,50	.140	2.421			C0615	61,50 X 3,55	C0615	A, G		
	3,55	63,00	.140	2.480			C0630	63,00 X 3,55	C0630	A, G		
	3,55	65,00	.140	2.559			C0650	65,00 X 3,55	C0650	A, G		
	3,55	67,00	.140	2.638			C0670	67,00 X 3,55	C0670	A, G		
	3,55	69,00	.140	2.717			C0690	69,00 X 3,55	C0690	A, G		
	3,55	71,00	.140	2.795			C0710	71,00 X 3,55	C0710	A, G		
	3,55	73,00	.140	2.874			C0730	73,00 X 3,55	C0730	A, G		
	3,55	75,00	.140	2.953			C0750	75,00 X 3,55	C0750	A, G		
	3,55	77,50	.140	3.051			C0775	77,50 X 3,55	C0775	A, G		
	3,55	80,00	.140	3.150			C0800	80,00 X 3,55	C0800	A, G		
<b>140-3.248</b>	3,55	82,50	.140	3.248			C0825	82,50 X 3,55	C0825	A, G		
	3,55	85,00	.140	3.346			C0850	85,00 X 3,55	C0850	A, G		
	3,55	87,50	.140	3.445			C0875	87,50 X 3,55	C0875	A, G		
	3,55	90,00	.140	3.543			C0900	90,00 X 3,55	C0900	A, G		
	3,55	92,50	.140	3.642			C0925	92,50 X 3,55	C0925	A, G		
	3,55	95,00	.140	3.740			C0950	95,00 X 3,55	C0950	A, G		
	3,55	97,50	.140	3.839			C0975	97,50 X 3,55	C0975	A, G		
	3,55	100,00	.140	3.937			C1000	100,00 X 3,55	C1000	A, G		
	3,55	103,00	.140	4.055			C1030	103,00 X 3,55	C1030	A, G		
	3,55	106,00	.140	4.173			C1060	106,00 X 3,55	C1060	A, G		
	3,55	109,00	.140	4.291			C1090	109,00 X 3,55	C1090	A, G		
	3,55	112,00	.140	4.409			C1120	112,00 X 3,55	C1120	A, G		
	3,55	115,00	.140	4.528			C1150	115,00 X 3,55	C1150	A, G		
	3,55	118,00	.140	4.646			C1180	118,00 X 3,55	C1180	A, G		
	3,55	122,00	.140	4.803			C1220	122,00 X 3,55	C1220	A, G		
	3,55	125,00	.140	4.921			C1250	125,00 X 3,55	C1250	A, G		
	3,55	128,00	.140	5.039			C1280	128,00 X 3,55	C1280	A, G		
	3,55	132,00	.140	5.197			C1320	132,00 X 3,55	C1320	A, G		
<b>140-5.512</b>	3,55	136,00	.140	5.354			C1360	136,00 X 3,55	C1360	A, G		
	3,55	140,00	.140	5.512			C1400	140,00 X 3,55	C1400	A, G		

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	3,55	142,50	.140	5.610						G		
	3,55	145,00	.140	5.709			C1450	145,00 X 3,55	C1450	A, G		
	3,55	147,50	.140	5.807						G		
	3,55	150,00	.140	5.906			C1500	150,00 X 3,55	C1500	A, G		
	3,55	152,50	.140	6.004						G		
	3,55	155,00	.140	6.102			C1550	155,00 X 3,55	C1550	A, G		
	3,55	157,50	.140	6.201						G		
	3,55	160,00	.140	6.299			C1600	160,00 X 3,55	C1600	A, G		
	3,55	162,50	.140	6.398						G		
	3,55	165,00	.140	6.496			C1650	165,00 X 3,55	C1650	A, G		
	3,55	167,50	.140	6.594						G		
	3,55	170,00	.140	6.693			C1700	170,00 X 3,55	C1700	A, G		
	3,55	172,50	.140	6.791						G		
	3,55	175,00	.140	6.890			C1750	175,00 X 3,55	C1750	A, G		
	3,55	177,50	.140	6.988						G		
	3,55	180,00	.140	7.087			C1800	180,00 X 3,55	C1800	A, G		
	3,55	182,50	.140	7.185						G		
	3,55	185,00	.140	7.283			C1850	185,00 X 3,55	C1850	A, G		
	3,55	187,50	.140	7.382						G		
	3,55	190,00	.140	7.480			C1900	190,00 X 3,55	C1900	A, G		
	3,55	195,00	.140	7.677			C1950	195,00 X 3,55	C1950	A, G		
	3,55	200,00	.140	7.874			C2000	200,00 X 3,55	C2000	A, G		
	3,55	212,00	.140	8.346			C2120					
	3,55	218,00	.140	8.583			C2180					
	3,55	224,00	.140	8.819			C2240					
	3,55	230,00	.140	9.055			C2300					
	3,55	236,00	.140	9.291			C2360					
	3,55	250,00	.140	9.843			C2500					
	3,55	258,00	.140	10.157			C2580					
	3,55	265,00	.140	10.433			C2650					
	3,55	280,00	.140	11.024			C2800					
	3,55	290,00	.140	11.417			C2900					
	3,55	300,00	.140	11.811			C3000					
	3,55	307,00	.140	12.087			C3070					
	3,55	315,00	.140	12.402			C3150					
	3,55	335,00	.140	13.189			C3350					
	3,55	355,00	.140	13.976			C3550					
	4,00	14,50	.157	.571						V15		
	4,00	23,50	.157	.925						V24		
	4,00	33,50	.157	1.319						V34		

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	4,00	39,50	.157	1.555						V40		
	4,00	54,50	.157	2.146						V55		
	4,00	69,00	.157	2.717						V70		
	4,00	84,00	.157	3.307						V85		
	4,00	99,00	.157	3.898						V100		
	4,00	119,00	.157	4.685						V120		
	4,00	148,50	.157	5.846						V150		
	4,00	173,00	.157	6.811						V175		
	5,30	37,50	.209	1.476			D0375		D0375	A		
	5,30	38,70	.209	1.524			D0387		D0387	A		
	5,30	40,00	.209	1.575			D0400	40,00 X 5,30	D0400	A, G		
	5,30	41,20	.209	1.622			D0412	41,20 X 5,30	D0412	A, G		
	5,30	42,50	.209	1.673			D0425	42,50 X 5,30	D0425	A, G		
	5,30	43,70	.209	1.720			D0437	43,70 X 5,30	D0437	A, G		
	5,30	45,00	.209	1.772			D0450	45,00 X 5,30	D0450	A, G		
	5,30	46,20	.209	1.819			D0462	46,20 X 5,30	D0462	A, G		
	5,30	47,50	.209	1.870			D0475	47,50 X 5,30	D0475	A, G		
	5,30	48,70	.209	1.917			D0487	48,70 X 5,30	D0487	A, G		
	5,30	50,00	.209	1.969			D0500	50,00 X 5,30	D0500	A, G		
	5,30	51,50	.209	2.028			D0515	51,50 X 5,30	D0515	A, G		
	5,30	53,00	.209	2.087			D0530	53,00 X 5,30	D0530	A, G		
	5,30	54,50	.209	2.146			D0545	54,50 X 5,30	D0545	A, G		
	5,30	56,00	.209	2.205			D0560	56,00 X 5,30	D0560	A, G		
	5,30	58,00	.209	2.283			D0580	58,00 X 5,30	D0580	A, G		
	5,30	60,00	.209	2.362			D0600	60,00 X 5,30	D0600	A, G		
	5,30	61,50	.209	2.421			D0615	61,50 X 5,30	D0615	A, G		
	5,30	63,00	.209	2.480			D0630	63,00 X 5,30	D0630	A, G		
	5,30	65,00	.209	2.559			D0650	65,00 X 5,30	D0650	A, G		
	5,30	67,00	.209	2.638			D0670	67,00 X 5,30	D0670	A, G		
	5,30	69,00	.209	2.717			D0690	69,00 X 5,30	D0690	A, G		
	5,30	71,00	.209	2.795			D0710	71,00 X 5,30	D0710	A, G		
	5,30	73,00	.209	2.874			D0730	73,00 X 5,30	D0730	A, G		
	5,30	75,00	.209	2.953			D0750	75,00 X 5,30	D0750	A, G		
	5,30	77,50	.209	3.051			D0775	77,50 X 5,30	D0775	A, G		
	5,30	80,00	.209	3.150			D0800	80,00 X 5,30	D0800	A, G		
	5,30	82,50	.209	3.248			D0825	82,50 X 5,30	D0825	A, G		
	5,30	85,00	.209	3.346			D0850	85,00 X 5,30	D0850	A, G		
	5,30	87,50	.209	3.445			D0875	87,50 X 5,30	D0875	A, G		
	5,30	90,00	.209	3.543			D0900	90,00 X 5,30	D0900	A, G		
	5,30	92,50	.209	3.642			D0925	92,50 X 5,30	D0925	A, G		

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	5,30	95,00	.209	3.740			D0950	95,00 X 5,30	D0950	A, G		
	5,30	97,50	.209	3.829			D0975	97,50 X 5,30	D0975	A, G		
	5,30	100,00	.209	3.937			D1000	100,00 X 5,30	D1000	A, G		
	5,30	103,00	.209	4.055			D1030	103,00 X 5,30	D1030	A, G		
	5,30	106,00	.209	4.173			D1060	106,00 X 5,30	D1060	A, G		
	5,30	109,00	.209	4.291			D1090	109,00 X 5,30	D1090	A, G		
	5,30	112,00	.209	4.409			D1120	112,00 X 5,30	D1120	A, G		
	5,30	115,00	.209	4.528			D1150	115,00 X 5,30	D1150	A, G		
	5,30	118,00	.209	4.646			D1180	118,00 X 5,30	D1180	A, G		
	5,30	122,00	.209	4.803			D1220	122,00 X 5,30	D1220	A, G		
	5,30	125,00	.209	4.921			D1250	125,00 X 5,30	D1250	A, G		
	5,30	128,00	.209	5.039			D1280	128,00 X 5,30	D1280	A, G		
	5,30	132,00	.209	5.197			D1320	132,00 X 5,30	D1320	A, G		
	5,30	136,00	.209	5.354			D1360	136,00 X 5,30	D1360	A, G		
	5,30	140,00	.209	5.512			D1400	140,00 X 5,30	D1400	A, G		
	5,30	142,50	.209	5.610						G		
	5,30	145,00	.209	5.709			D1450	145,00 X 5,30	D1450	A, G		
	5,30	147,50	.209	5.807						G		
	5,30	150,00	.209	5.906			D1500	150,00 X 5,30	D1500	A, G		
	5,30	152,50	.209	6.004						G		
	5,30	155,00	.209	6.102			D1550	155,00 X 5,30	D1550	A, G		
	5,30	157,50	.209	6.201						G		
	5,30	160,00	.209	6.299			D1600	160,00 X 5,30	D1600	A, G		
	5,30	162,50	.209	6.398						G		
	5,30	165,00	.209	6.496			D1650	165,00 X 5,30	D1650	A, G		
	5,30	167,50	.209	6.594						G		
	5,30	170,00	.209	6.693			D1700	170,00 X 5,30	D1700	A, G		
	5,30	172,50	.209	6.791						G		
	5,30	175,00	.209	6.890			D1750	175,00 X 5,30	D1750	A, G		
	5,30	177,50	.209	6.988						G		
	5,30	180,00	.209	7.087			D1800	180,00 X 5,30	D1800	A, G		
	5,30	182,50	.209	7.185						G		
	5,30	185,00	.209	7.283			D1850	185,00 X 5,30	D1850	A, G		
	5,30	187,50	.209	7.382						G		
	5,30	190,00	.209	7.480			D1900	190,00 X 5,30	D1900	A, G		
	5,30	195,00	.209	7.677			D1950	195,00 X 5,30	D1950	A, G		
	5,30	200,00	.209	7.874			D2000	200,00 X 5,30	D2000	A, G		
	5,30	203,00	.209	7.992						G		
	5,30	206,00	.209	8.110				206,00 X 5,30	D2060	A, G		
	5,30	212,00	.209	8.346				212,00 X 5,30	D2120	A, G		

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	5,30	218,00	.209	8.583				218,00 X 5,30	D2180	A, G		
	5,30	224,00	.209	8.819				224,00 X 5,30	D2240	A, G		
	5,30	227,00	.209	8.937						G		
	5,30	230,00	.209	9.055				230,00 X 5,30	D2300	A, G		
	5,30	236,00	.209	9.291				236,00 X 5,30	D2360	A, G		
	5,30	239,00	.209	9.409					D2390	G		
	5,30	243,00	.209	9.567				243,00 X 5,30	D2430	A, G		
	5,30	250,00	.209	9.843				250,00 X 5,30	D2500	A, G		
	5,30	254,00	.209	10.000					D2540	G		
	5,30	258,00	.209	10.157				258,00 X 5,30	D2580	A, G		
	5,30	261,00	.209	10.276					D2610	G		
	5,30	265,00	.209	10.433				265,00 X 5,30	D2650	A, G		
	5,30	268,00	.209	10.551					D2680	G		
	5,30	272,00	.209	10.709				272,00 X 5,30	D2720	A, G		
	5,30	276,00	.209	10.866					D2760	G		
	5,30	280,00	.209	11.024				280,00 X 5,30	D2800	A, G		
	5,30	283,00	.209	11.142					D2830	G		
	5,30	286,00	.209	11.260					D2860	G		
	5,30	290,00	.209	11.417				290,00 X 5,30	D2900	A, G		
	5,30	295,00	.209	11.614					D2950	G		
	5,30	300,00	.209	11.811				300,00 X 5,30	D3000	A, G		
	5,30	303,00	.209	11.929					D3030	G		
	5,30	307,00	.209	12.087				307,00 X 5,30	D3070	A, G		
	5,30	311,00	.209	12.244					D3110	G		
	5,30	315,00	.209	12.402				315,00 X 5,30	D3150	A, G		
	5,30	320,00	.209	12.598					D3200	G		
	5,30	325,00	.209	12.795				325,00 X 5,30	D3250	A, G		
	5,30	330,00	.209	12.992					D3300	G		
	5,30	335,00	.209	13.189				335,00 X 5,30	D3350	A, G		
	5,30	340,00	.209	13.386					D3400	G		
	5,30	345,00	.209	13.583				345,00 X 5,30	D3450	A, G		
	5,30	350,00	.209	13.780					D3500	G		
	5,30	355,00	.209	13.976				355,00 X 5,30	D3550	A, G		
	5,30	360,00	.209	14.173					D3600	G		
	5,30	365,00	.209	14.370				365,00 X 5,30	D3650	A, G		
	5,30	370,00	.209	14.567					D3700	G		
	5,30	375,00	.209	14.764				375,00 X 5,30	D3750	A, G		
	5,30	379,00	.209	14.921					D3790	G		
	5,30	383,00	.209	15.079					D3830	G		
	5,30	387,00	.209	15.236				387,00 X 5,30	D3870	A, G		

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	5,30	391,00	.209	15.394					D3910	G		
	5,30	395,00	.209	15.551					D3950	G		
	5,30	400,00	.209	15.748				400,00 X 5,30	D4000	A, G		
<b>1-308</b>	5,33	8,89	.210	.350								
<b>1-309</b>	5,33	10,46	.210	.412	-309	-309	309					
<b>1-310</b>	5,33	12,07	.210	.475	-310	-310	310					
<b>1-311</b>	5,33	13,64	.210	.537	-311	-311	311					
<b>1-312</b>	5,33	15,24	.210	.600	-312	-312	312					
<b>1-313</b>	5,33	16,81	.210	.662	-313	-313	313					
<b>1-314</b>	5,33	18,42	.210	.725	-314	-314	314					
<b>1-315</b>	5,33	19,99	.210	.787	-315	-315	315					
<b>1-316</b>	5,33	21,59	.210	.850	-316	-316	316					
<b>1-317</b>	5,33	23,16	.210	.912	-317	-317	317					
<b>1-318</b>	5,33	24,77	.210	.975	-318	-318	318					
<b>1-319</b>	5,33	26,34	.210	1.037	-319	-319	319					
<b>1-320</b>	5,33	27,94	.210	1.100	-320	-320	320					
<b>1-321</b>	5,33	29,51	.210	1.162	-321	-321	321					
<b>1-322</b>	5,33	31,12	.210	1.225	-322	-322	322					
<b>1-323</b>	5,33	32,69	.210	1.287	-323	-323	323					
<b>1-324</b>	5,33	34,29	.210	1.350	-324	-324	324					
<b>1-325</b>	5,33	37,47	.210	1.475	-325	-325	325					
<b>1-326</b>	5,33	40,64	.210	1.600	-326	-326	326					
<b>1-327</b>	5,33	43,82	.210	1.725	-327	-327	327					
<b>1-328</b>	5,33	46,99	.210	1.850	-328	-328	328					
<b>1-329</b>	5,33	50,17	.210	1.975	-329	-329	329					
<b>1-330</b>	5,33	53,34	.210	2.100	-330	-330	330					
<b>1-331</b>	5,33	56,52	.210	2.225	-331	-331	331					
<b>1-332</b>	5,33	59,69	.210	2.350	-332	-332	332					
<b>1-333</b>	5,33	62,87	.210	2.475	-333	-333	333					
<b>1-334</b>	5,33	66,04	.210	2.600	-334	-334	334					
<b>1-335</b>	5,33	69,22	.210	2.725	-335	-335	335					
<b>1-336</b>	5,33	72,39	.210	2.850	-336	-336	336					
	5,33	74,61	.210	2.938		-619						
<b>1-337</b>	5,33	75,57	.210	2.975	-337	-337	337					
<b>1-338</b>	5,33	78,74	.210	3.100	-338	-338	338					
	5,33	79,78	.210	3.141		-620						
<b>1-339</b>	5,33	81,92	.210	3.225	-339	-339	339					
<b>1-340</b>	5,33	85,09	.210	3.350	-340	-340	340					
<b>1-341</b>	5,33	88,27	.210	3.475	-341	-341	341					
	5,33	89,69	.210	3.531		-621						

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<b>1-342</b>	5,33	91,44	.210	3.600	-342	-342	342					
<b>1-343</b>	5,33	94,62	.210	3.725	-343	-343	343					
<b>1-344</b>	5,33	97,79	.210	3.850	-344	-344	344					
	5,33	100,00	.210	3.937		-622						
<b>1-345</b>	5,33	100,97	.210	3.975	-345	-345	345					
<b>1-346</b>	5,33	104,14	.210	4.100	-346	-346	346					
<b>1-347</b>	5,33	107,32	.210	4.225	-347	-347	347					
	5,33	109,54	.210	4.313		-623						
<b>1-348</b>	5,33	110,49	.210	4.350	-348	-348	348					
<b>1-349</b>	5,33	113,67	.210	4.475	-349	-349	349					
<b>1-350</b>	5,33	116,84	.210	4.600	-350	-350	350					
	5,33	117,48	.210	4.625		-860						
<b>1-351</b>	5,33	120,02	.210	4.725	-351	-351	351					
	5,33	120,65	.210	4.750		-861						
<b>1-352</b>	5,33	123,19	.210	4.850	-352	-352	352					
	5,33	123,83	.210	4.875		-862						
<b>1-353</b>	5,33	126,37	.210	4.975	-353	-353	353					
	5,33	127,00	.210	5.000		-863						
<b>1-354</b>	5,33	129,54	.210	5.100	-354	-354	354					
	5,33	130,18	.210	5.125		-864						
<b>1-355</b>	5,33	132,72	.210	5.225	-355	-355	355					
	5,33	133,35	.210	5.250		-865						
<b>1-356</b>	5,33	135,89	.210	5.350	-356	-356	356					
	5,33	136,53	.210	5.375		-866						
<b>1-357</b>	5,33	139,07	.210	5.475	-357	-357	357					
	5,33	139,70	.210	5.500		-867						
<b>1-358</b>	5,33	142,24	.210	5.600	-358	-358	358					
	5,33	142,88	.210	5.625		-868						
<b>1-359</b>	5,33	145,42	.210	5.725	-359	-359	359					
	5,33	146,05	.210	5.750		-869						
<b>1-360</b>	5,33	148,59	.210	5.850	-360	-360	360					
	5,33	149,23	.210	5.875		-870						
<b>1-361</b>	5,33	151,77	.210	5.975	-361	-361	361					
	5,33	154,94	.210	6.100		-644						
<b>1-362</b>	5,33	158,12	.210	6.225	-362	-362	362					
	<b>210-6.350</b>	5,33	161,29	.210	6.350		-645					
<b>1-363</b>	5,33	164,47	.210	6.475	-363	-363	363					
	5,33	167,64	.210	6.600		-646						
<b>1-364</b>	5,33	170,82	.210	6.725	-364	-364	364					
	5,33	173,99	.210	6.850		-647						

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1-365	5,33	177,17	.210	6.975	-365	-365	365					
1-366	5,33	183,52	.210	7.225	-366	-366	366					
1-367	5,33	189,87	.210	7.475	-367	-367	367					
1-368	5,33	196,22	.210	7.725	-368	-368	368					
1-369	5,33	202,57	.210	7.975	-369	-369	369					
1-370	5,33	208,92	.210	8.225	-370	-370	370					
1-371	5,33	215,27	.210	8.475	-371	-371	371					
1-372	5,33	221,62	.210	8.725	-372	-372	372					
1-373	5,33	227,97	.210	8.975	-373	-373	373					
1-374	5,33	234,32	.210	9.225	-374	-374	374					
1-375	5,33	240,67	.210	9.475	-375	-375	375					
1-376	5,33	247,02	.210	9.725	-376	-376	376					
1-377	5,33	253,37	.210	9.975	-377	-377	377					
1-378	5,33	266,07	.210	10.475	-378	-378	378					
1-379	5,33	278,77	.210	10.975	-379	-379	379					
1-380	5,33	291,47	.210	11.475	-380	-380	380					
1-381	5,33	304,17	.210	11.975	-381	-381	381					
1-382	5,33	329,57	.210	12.975	-382	-382	382					
1-383	5,33	354,97	.210	13.975	-383	-383	383					
1-384	5,33	380,37	.210	14.975	-384	-384	384					
1-385	5,33	405,26	.210	15.955	-385	-385	385					
1-386	5,33	430,66	.210	16.955	-386	-386	386					
1-387	5,33	456,06	.210	17.955	-387	-387	387					
1-388	5,33	481,46	.210	18.955	-388	-388	388					
1-389	5,33	506,86	.210	19.955	-389	-389	389					
1-390	5,33	532,26	.210	20.955	-390	-390	390					
1-391	5,33	557,66	.210	21.955	-391	-391	391					
1-392	5,33	582,68	.210	22.940	-392	-392	392					
1-393	5,33	608,08	.210	23.940	-393	-393	393					
1-394	5,33	633,48	.210	24.940	-394	-394	394					
1-395	5,33	658,88	.210	25.940	-395	-395	395					
1-396	5,33	684,91	.210	26.965								
	5,70	44,20	.224	1.740								D
	5,70	44,30	.224	1.744							0443-57	
	5,70	45,30	.224	1.783							0453-57	
	5,70	47,60	.224	1.874						P48A		
	5,70	49,20	.224	1.937								D
* 224-1.941VS	5,70	49,30	.224	1.941							0493-57	
	5,70	49,60	.224	1.953						P50A		
	5,70	51,60	.224	2.031						P52		

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<b>PAI Size</b>	<b>C/S mm</b>	<b>I.D. mm</b>	<b>C/S inch</b>	<b>I.D. inch</b>	<b>AS 568</b>	<b>BS 1806</b>	<b>ISO 3601</b>	<b>DIN 3771</b>	<b>NF T47-501</b>	<b>JIS B2401</b>	<b>BS 4518</b>	<b>SMS-1586</b>
	5,70	52,30	.224	2.059							0523-57	
	5,70	52,60	.224	2.071						P53		
	5,70	54,20	.224	2.134								D
	5,70	54,30	.224	2.138							0543-57	
	5,70	54,60	.224	2.150						P55		
	5,70	55,30	.224	2.177							0553-57	
	5,70	55,60	.224	2.189						P56		
	5,70	57,60	.224	2.268						P58		
	5,70	59,20	.224	2.331								D
	5,70	59,30	.224	2.335							0593-57	
	5,70	59,60	.224	2.346						P60		
	5,70	61,60	.224	2.425						P62		
	5,70	62,30	.224	2.453							0623-57	
	5,70	62,60	.224	2.465						P63		
	5,70	64,20	.224	2.528								D
	5,70	64,30	.224	2.531							0643-57	
	5,70	64,60	.224	2.543						P65		
	5,70	66,60	.224	2.622						P67		
	5,70	69,20	.224	2.724								D
	5,70	69,30	.224	2.728							0693-57	
	5,70	69,60	.224	2.740						P70		
	5,70	70,60	.224	2.780						P71		
<b>224-2.925</b>	5,70	74,20	.224	2.921								D
	5,70	74,30	.224	2.925							0743-57	
	5,70	74,60	.224	2.937						P75		D
	5,70	79,20	.224	3.118								D
	5,70	79,30	.224	3.122							0793-57	
	5,70	79,60	.224	3.134						P80		
	5,70	84,10	.224	3.311								D
	5,70	84,30	.224	3.319							0843-57	
	5,70	84,60	.224	3.331						P85		D
	5,70	89,10	.224	3.508								D
	5,70	89,30	.224	3.516							0893-57	
	5,70	89,60	.224	3.528						P90		
	5,70	94,10	.224	3.705								D
	5,70	94,30	.224	3.713							0943-57	
<b>224-3.724</b>	5,70	94,60	.224	3.724						P95		D
	5,70	99,10	.224	3.902								D
	5,70	99,30	.224	3.909							0993-57	
	5,70	99,60	.224	3.921						P100		

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<b>224-4.098</b>	5,70	101,60	.224	4.000						P102		
	5,70	104,10	.224	4.098								D
	5,70	104,30	.224	4.106							1043-57	
	5,70	104,60	.224	4.118						P105		
	5,70	109,10	.224	4.295								D
	5,70	109,30	.224	4.303							1093-57	
	5,70	109,60	.224	4.315						P110		
	5,70	111,60	.224	4.394						P112		
	5,70	114,30	.224	4.500							1143-57	D
	5,70	114,60	.224	4.512						P115		
	5,70	119,30	.224	4.697							1193-57	D
	5,70	119,60	.224	4.709						P120		
	5,70	124,30	.224	4.894							1243-57	D
	5,70	124,60	.224	4.906						P125		
	5,70	129,30	.224	5.091							1293-57	D
	5,70	129,60	.224	5.102						P130		
	5,70	131,60	.224	5.181						P132		
	5,70	134,30	.224	5.287							1343-57	D
	5,70	134,60	.224	5.299						P135		
	5,70	139,30	.224	5.484							1393-57	D
	5,70	139,60	.224	5.496						P140		
	5,70	144,30	.224	5.681							1443-57	D
	5,70	144,60	.224	5.693						P145		
	5,70	149,30	.224	5.878						G150	1493-57	S
<b>224-6.075</b>	5,70	149,60	.224	5.890						P150		
	5,70	154,30	.224	6.075						G155	1543-57	S
	5,70	159,30	.224	6.272						G160	1593-57	S
	5,70	164,30	.224	6.468						G165	1643-57	S
	5,70	169,30	.224	6.665						G170	1693-57	S
	5,70	174,30	.224	6.862						G175	1743-57	S
	5,70	179,30	.224	7.059						G180	1793-57	S
	5,70	184,30	.224	7.256						G185	1843-57	S
	5,70	189,30	.224	7.453						G190	1893-57	S
	5,70	194,30	.224	7.650						G195	1943-57	S
<b>224-8.240</b>	5,70	199,30	.224	7.846						G200	1993-57	S
	5,70	209,30	.224	8.240						G210	2093-57	S
	5,70	219,30	.224	8.634						G220	2193-57	S
	5,70	229,30	.224	9.028						G230	2293-57	S
	5,70	239,30	.224	9.421						G240	2393-57	S
	5,70	249,30	.224	9.815						G250	2493-57	S

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	5,70	259,30	.224	10.210						G260	2593-57	S
	5,70	269,30	.224	10.600						G270	2693-57	S
	5,70	279,30	.224	11.000						G280	2793-57	S
	5,70	289,30	.224	11.390						G290	2893-57	S
	5,70	299,30	.224	11.783						G300	2993-57	S
	5,70	309,30	.224	12.177							3093-57	
	5,70	319,30	.224	12.571							3193-57	S
	5,70	339,30	.224	13.358							3393-57	S
<b>224-14.146</b>	5,70	359,30	.224	14.146							3593-57	S
	5,70	379,30	.224	14.933							3793-57	S
	5,70	389,30	.224	15.327							3893-57	
	5,70	399,30	.224	15.720							3993-57	S
	5,70	419,30	.224	16.508							4193-57	S
	5,70	439,30	.224	17.295							4393-57	S
	5,70	459,30	.224	18.083							4593-57	S
	5,70	479,30	.224	18.870							4793-57	S
	5,70	489,30	.224	19.264							4893-57	
	5,70	499,30	.224	19.657							4993-57	S
	6,00	222,50	.236	8.760						V225		
	6,00	272,00	.236	10.709						V275		
	6,00	321,50	.236	12.657						V325		
	6,00	376,00	.236	14.803						V380		
	6,00	425,50	.236	16.752						V430		
<b>1-400</b>	6,99	34,29	.275	1.350								
<b>1-401</b>	6,99	37,47	.275	1.475								
<b>1-402</b>	6,99	40,64	.275	1.600								
<b>1-403</b>	6,99	43,82	.275	1.725								
<b>1-404</b>	6,99	46,99	.275	1.850								
<b>1-405</b>	6,99	50,17	.275	1.975								
<b>1-406</b>	6,99	53,34	.275	2.100								
<b>1-407</b>	6,99	56,52	.275	2.225								
<b>1-408</b>	6,99	59,69	.275	2.350								
<b>1-409</b>	6,99	62,87	.275	2.475								
<b>1-410</b>	6,99	66,04	.275	2.600								
<b>1-411</b>	6,99	69,22	.275	2.725								
<b>1-412</b>	6,99	72,39	.275	2.850								
<b>1-413</b>	6,99	75,57	.275	2.975								
<b>1-414</b>	6,99	78,74	.275	3.100								
<b>1-415</b>	6,99	81,92	.275	3.225								
<b>1-416</b>	6,99	85,09	.275	3.350								

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1-417	6,99	88,27	.275	3.475								
1-418	6,99	91,44	.275	3.600								
1-419	6,99	94,62	.275	3.725								
1-420	6,99	97,79	.275	3.850								
1-421	6,99	100,97	.275	3.975								
1-422	6,99	104,14	.275	4.100								
1-423	6,99	107,32	.275	4.225								
1-424	6,99	110,49	.275	4.350								
1-425	6,99	113,67	.275	4.475	-425	-425	425					
	6,99	114,71	.275	4.516		-624						
1-426	6,99	116,84	.275	4.600	-426	-426	426					
1-427	6,99	120,02	.275	4.725	-427	-427	427					
1-428	6,99	123,19	.275	4.850	-428	-428	428					
	6,99	124,61	.275	4.906		-625						
1-429	6,99	126,37	.275	4.975	-429	-429	429					
1-430	6,99	129,54	.275	5.100	-430	-430	430					
1-431	6,99	132,72	.275	5.225	-431	-431	431					
	6,99	134,54	.275	5.297		-626						
1-432	6,99	135,89	.275	5.350	-432	-432	432					
1-433	6,99	139,07	.275	5.475	-433	-433	433					
1-434	6,99	142,24	.275	5.600	-434	-434	434					
1-435	6,99	145,42	.275	5.725	-435	-435	435					
1-436	6,99	148,59	.275	5.850	-436	-436	436					
1-437	6,99	151,77	.275	5.975	-437	-437	437					
	6,99	155,58	.275	6.125		-872						
1-438	6,99	158,12	.275	6.225	-438	-438	438					
	6,99	159,54	.275	6.281		-627						
	6,99	161,93	.275	6.375		-874						
1-439	6,99	164,47	.275	6.475	-439	-439	439					
	6,99	166,70	.275	6.563		-628						
	6,99	168,28	.275	6.625		-876						
1-440	6,99	170,82	.275	6.725	-440	-440	440					
	6,99	174,63	.275	6.875		-878						
1-441	6,99	177,17	.275	6.975	-441	-441	441					
	6,99	180,98	.275	7.125		-880						
1-442	6,99	183,52	.275	7.225	-442	-442	442					
	6,99	187,33	.275	7.375		-882						
1-443	6,99	189,87	.275	7.475	-443	-443	443					
	6,99	193,68	.275	7.625		-884						
1-444	6,99	196,22	.275	7.725	-444	-444	444					

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<b>1-445</b>	6,99	200,03	.275	7.875		-886						
	6,99	202,57	.275	7.975	-445	-445	445					
<b>275-8.225</b>	6,99	208,92	.275	8.225		-445A						
<b>1-446</b>	6,99	215,27	.275	8.475	-446	-446	446					
<b>275-8.275</b>	6,99	221,62	.275	8.725		-446A						
<b>1-447</b>	6,99	227,97	.275	8.975	-447	-447	447					
	6,99	234,32	.275	9.225		-447A						
<b>1-448</b>	6,99	240,67	.275	9.475	-448	-448	448					
	6,99	247,02	.275	9.725		-448A						
<b>1-449</b>	6,99	253,37	.275	9.975	-449	-449	449					
	6,99	259,72	.275	10.225		-449A						
<b>1-450</b>	6,99	266,07	.275	10.475	-450	-450	450					
<b>275-10.725</b>	6,99	272,42	.275	10.725		-450A						
<b>1-451</b>	6,99	278,77	.275	10.975	-451	-451	451					
	6,99	285,12	.275	11.225		-451A						
<b>1-452</b>	6,99	291,47	.275	11.475	-452	-452	452					
	6,99	297,82	.275	11.725		-452A						
<b>1-453</b>	6,99	304,17	.275	11.975	-453	-453	453					
	6,99	310,52	.275	12.225		-648						
<b>1-454</b>	6,99	316,87	.275	12.475	-454	-454	454					
	6,99	323,22	.275	12.725		-649						
<b>1-455</b>	6,99	329,57	.275	12.975	-455	-455	455					
	6,99	335,92	.275	13.225		-650						
<b>1-456</b>	6,99	342,27	.275	13.475	-456	-456	456					
<b>1-457</b>	6,99	354,97	.275	13.975	-457	-457	457					
<b>1-458</b>	6,99	367,67	.275	14.475	-458	-458	458					
<b>1-459</b>	6,99	380,37	.275	14.975	-459	-459	459					
<b>1-460</b>	6,99	393,07	.275	15.475	-460	-460	460					
<b>1-461</b>	6,99	405,26	.275	15.955	-461	-461	461					
<b>1-462</b>	6,99	417,96	.275	16.455	-462	-462	462					
<b>1-463</b>	6,99	430,66	.275	16.955	-463	-463	463					
<b>1-464</b>	6,99	443,36	.275	17.455	-464	-464	464					
<b>1-465</b>	6,99	456,06	.275	17.955	-465	-465	465					
<b>1-466</b>	6,99	468,76	.275	18.455	-466	-466	466					
<b>1-467</b>	6,99	481,46	.275	18.955	-467	-467	467					
<b>1-468</b>	6,99	494,16	.275	19.455	-468	-468	468					
<b>1-469</b>	6,99	506,86	.275	19.955	-469	-469	469					
<b>1-470</b>	6,99	532,26	.275	20.955	-470	-470	470					
<b>1-471</b>	6,99	557,66	.275	21.955	-471	-471	471					
<b>1-472</b>	6,99	582,68	.275	22.940	-472	-472	472					

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<b>1-473</b>	6,99	608,08	.275	23.940	-473	-473	473					
<b>1-474</b>	6,99	633,48	.275	24.940	-474	-474	474					
<b>1-475</b>	6,99	658,88	.275	25.940	-475	-475	475					
<b>1-476</b>	6,99	684,66	.275	26.955								
	7,00	109,00	.276	4.291			E1090		E1090	A, G		
	7,00	112,00	.276	4.409			E1120		E1120	A, G		
	7,00	115,00	.276	4.528			E1150		E1150	A, G		
	7,00	118,00	.276	4.646			E1180		E1180	A, G		
	7,00	122,00	.276	4.803			E1220		E1220	A, G		
	7,00	125,00	.276	4.921			E1250		E1250	A, G		
	7,00	128,00	.276	5.039			E1280		E1280	A, G		
	7,00	132,00	.276	5.197			E1320		E1320	A, G		
	7,00	136,00	.276	5.354			E1360		E1360	A, G		
	7,00	140,00	.276	5.512			E1400		E1400	A, G		
	7,00	142,50	.276	5.610						G		
	7,00	145,00	.276	5.709			E1450		E1450	A, G		
	7,00	147,50	.276	5.807						G		
	7,00	150,00	.276	5.906			E1500		E1500	A, G		
	7,00	152,50	.276	6.004						G		
	7,00	155,00	.276	6.102			E1550		E1550	A, G		
	7,00	157,50	.276	6.201						G		
	7,00	160,00	.276	6.299			E1600		E1600	A, G		
	7,00	162,50	.276	6.398						G		
	7,00	165,00	.276	6.496			E1650		E1650	A, G		
	7,00	167,50	.276	6.594						G		
	7,00	170,00	.276	6.693			E1700		E1700	A, G		
	7,00	172,50	.276	6.791					E1725	G		
	7,00	175,00	.276	6.890			E1750		E1750	A, G		
	7,00	177,50	.276	6.988					E1775	G		
	7,00	180,00	.276	7.087			E1800		E1800	A, G		
	7,00	182,50	.276	7.185					E1825	G		
	7,00	185,00	.276	7.283			E1850		E1850	A, G		
	7,00	185,70	.276	7.382					E1875	G		
	7,00	190,00	.276	7.480			E1900		E1900	A, G		
	7,00	195,00	.276	7.677			E1950		E1950	A, G		
	7,00	200,00	.276	7.874			E2000		E2000	A, G		
	7,00	203,00	.276	7.992					E2030	G		
	7,00	206,00	.276	8.110			E2060	206,00 X 7,00	E2060	A, G		
	7,00	212,00	.276	8.346			E2120	212,00 X 7,00	E2120	A, G		
	7,00	218,00	.276	8.583			E2180	218,00 X 7,00	E2180	A, G		

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	7,00	224,00	.276	8.819			E2240	224,00 X 7,00	E2240	A, G		
	7,00	227,00	.276	8.937						G		
	7,00	230,00	.276	9.055			E2300	230,00 X 7,00	E2300	A, G		
	7,00	236,00	.276	9.291			E2360	236,00 X 7,00	E2360	A, G		
	7,00	239,00	.276	9.409					E2390	G		
	7,00	243,00	.276	9.567			E2430	243,00 X 7,00	E2430	A, G		
	7,00	250,00	.276	9.843			E2500	250,00 X 7,00	E2500	A, G		
	7,00	254,00	.276	10.000					E2540	G		
	7,00	258,00	.276	10.157			E2580	258,00 X 7,00	E2580	A, G		
	7,00	261,00	.276	10.276					E2610	G		
	7,00	265,00	.276	10.433			E2650	265,00 X 7,00	E2650	A, G		
	7,00	268,00	.276	10.551					E2680	G		
	7,00	272,00	.276	10.709			E2720	272,00 X 7,00	E2720	A, G		
	7,00	276,00	.276	10.866					E2760	G		
	7,00	280,00	.276	11.024			E2800	280,00 X 7,00	E2800	A, G		
	7,00	283,00	.276	11.142					E2830	G		
	7,00	286,00	.276	11.260					E2860	G		
	7,00	290,00	.276	11.417			E2900	290,00 X 7,00	E2900	A, G		
	7,00	295,00	.276	11.614					E2950	G		
	7,00	300,00	.276	11.811			E3000	300,00 X 7,00	E3000	A, G		
	7,00	303,00	.276	11.929					E3030	G		
	7,00	307,00	.276	12.087			E3070	307,00 X 7,00	E3070	A, G		
	7,00	311,00	.276	12.244					E3110	G		
	7,00	315,00	.276	12.402			E3150	315,00 X 7,00	E3150	A, G		
	7,00	320,00	.276	12.598					E3200	G		
	7,00	325,00	.276	12.795			E3250	325,00 X 7,00	E3250	A, G		
	7,00	330,00	.276	12.992					E3300	G		
	7,00	335,00	.276	13.189			E3350	335,00 X 7,00	E3350	A, G		
	7,00	340,00	.276	13.386					E3400	G		
	7,00	345,00	.276	13.583			E3450	345,00 X 7,00	E3450	A, G		
	7,00	350,00	.276	13.780					E3500	G		
	7,00	355,00	.276	13.976			E3550	355,00 X 7,00	E3550	A, G		
	7,00	360,00	.276	14.173					E3600	G		
	7,00	365,00	.276	14.370			E3650	365,00 X 7,00	E3650	A, G		
	7,00	370,00	.276	14.567					E3700	G		
	7,00	375,00	.276	14.764			E3750	375,00 X 7,00	E3750	A, G		
	7,00	379,00	.276	14.921					E3790	G		
	7,00	383,00	.276	15.079					E3830	G		
	7,00	387,00	.276	15.236			E3870	387,00 X 7,00	E3870	A, G		
	7,00	391,00	.276	15.394					E3910	G		

Contact Precision Associates for sizes not listed

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3800 N. Washington Ave.  
Minneapolis, MN 55412

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Toll: (800) 394-6590

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**International  
O-Ring Standard  
Cross Reference**



PAI Size	C/S mm	I.D. mm	C/S inch	I.D. inch	AS 568	BS 1806	ISO 3601	DIN 3771	NF T47-501	JIS B2401	BS 4518	SMS-1586
	7,00	395,00	.276	15.551					E3950	G		
	7,00	400,00	.276	15.748			E4000	400,00 X 7,00	E4000	A, G		
	7,00	406,00	.276	15.984					E4060	G		
	7,00	412,00	.276	16.220				412,00 X 7,00	E4120	G		
	7,00	418,00	.276	16.457					E4180	G		
	7,00	425,00	.276	16.732				425,00 X 7,00	E4250	G		
	7,00	429,00	.276	16.890					E4290	G		
	7,00	433,00	.276	17.047					E4330	G		
	7,00	437,00	.276	17.205				437,00 X 7,00	E4370	G		
	7,00	443,00	.276	17.441					E4430	G		
	7,00	450,00	.276	17.717				450,00 X 7,00	E4500	G		
	7,00	456,00	.276	17.953					E4560	G		
	7,00	462,00	.276	18.189				462,00 X 7,00	E4620	G		
	7,00	466,00	.276	18.346					E4660	G		
	7,00	470,00	.276	18.504					E4700	G		
	7,00	475,00	.276	18.701				475,00 X 7,00	E4750	G		
	7,00	479,00	.276	18.858					E4790	G		
	7,00	483,00	.276	19.016					E4830	G		
	7,00	487,00	.276	19.173				487,00 X 7,00	E4870	G		
	7,00	493,00	.276	19.409					E4930	G		
	7,00	500,00	.276	19.685				500,00 X 7,00	E5000	G		
	7,00	508,00	.276	20.000					E5080	G		
	7,00	515,00	.276	20.276				515,00 X 7,00	E5150	G		
	7,00	523,00	.276	20.591					E5230	G		
	7,00	530,00	.276	20.866				530,00 X 7,00	E5300	G		
	7,00	538,00	.276	21.181					E5380	G		
	7,00	545,00	.276	21.457				545,00 X 7,00	E5450	G		
	7,00	553,00	.276	21.772					E5530	G		
	7,00	560,00	.276	22.047				560,00 X 7,00	E5600	G		
	7,00	570,00	.276	22.441					E5700	G		
	7,00	580,00	.276	22.835				580,00 X 7,00	E5800	G		
	7,00	590,00	.276	23.228					E5900	G		
	7,00	600,00	.276	23.622				600,00 X 7,00	E6000	G		
	7,00	608,00	.276	23.937					E6080	G		
	7,00	615,00	.276	24.213				615,00 X 7,00	E6150	G		
	7,00	623,00	.276	24.528					E6230	G		
	7,00	630,00	.276	24.803				630,00 X 7,00	E6300	G		
	7,00	640,00	.276	25.197					E6400	G		
	7,00	650,00	.276	25.591				650,00 X 7,00	E6500	G		
	7,00	660,00	.276	25.984					E6600	G		

\* Mold is cut for non-standard shrink compensation



**International  
O-Ring Standard  
Cross Reference**



PAI Size	C/S mm	I.D. mm	C/S inch	I.D. inch	AS 568	BS 1806	ISO 3601	DIN 3771	NF T47-501	JIS B2401	BS 4518	SMS-1586
	7,00	670,00	.276	26.378				670,00 X 7,00	E6700	G		
	8,40	144,10	.331	5.673							1441-84	D
	8,40	149,10	.331	5.870							1491-84	D
	8,40	149,50	.331	5.886						P150		
	8,40	154,10	.331	6.067							1541-84	D
	8,40	154,50	.331	6.083						P155		
	8,40	159,10	.331	6.264							1591-84	D
	8,40	159,50	.331	6.280						P160		
	8,40	164,10	.331	6.461							1641-84	D
	8,40	164,50	.331	6.476						P165		
	8,40	169,10	.331	6.657							1691-84	D
	8,40	169,50	.331	6.673						P170		
	8,40	174,10	.331	6.854							1741-84	D
	8,40	174,50	.331	6.870						P175		
	8,40	179,10	.331	7.051							1791-84	D
	8,40	179,50	.331	7.067						P180		
	8,40	184,10	.331	7.248							1841-84	D
	8,40	184,50	.331	7.264						P185		
	8,40	189,10	.331	7.445							1891-84	D
	8,40	189,50	.331	7.461						P190		
	8,40	194,10	.331	7.642							1941-84	D
	8,40	194,50	.331	7.657						P195		
	8,40	199,10	.331	7.839							1991-84	D
	8,40	199,50	.331	7.854						P200		
	8,40	204,10	.331	8.035							2041-84	
	8,40	204,50	.331	8.051						P205		
	8,40	208,50	.331	8.209						P209		
	8,40	209,10	.331	8.232							2091-84	D
	8,40	209,50	.331	8.248						P210		
	8,40	214,50	.331	8.445						P215		
	8,40	219,10	.331	8.626							2191-84	D
	8,40	219,50	.331	8.642						P220		
	8,40	224,50	.331	8.839						P225		
	8,40	229,10	.331	9.020							2291-84	D
	8,40	229,50	.331	9.035						P230		
	8,40	234,10	.331	9.217							2341-84	
	8,40	234,50	.331	9.232						P235		
	8,40	239,10	.331	9.413							2391-84	D
	8,40	239,50	.331	9.429						P240		
	8,40	244,50	.331	9.626						P245		

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**International  
O-Ring Standard  
Cross Reference**



PAI Size	C/S mm	I.D. mm	C/S inch	I.D. inch	AS 568	BS 1806	ISO 3601	DIN 3771	NF T47-501	JIS B2401	BS 4518	SMS-1586
	8,40	249,10	.331	9.807							2491-84	D
	8,40	249,50	.331	9.823						P250		
	8,40	254,50	.331	10.020						P255		
	8,40	259,50	.331	10.217						P260		
	8,40	264,50	.331	10.413						P265		
	8,40	269,50	.331	10.610						P270		
	8,40	274,50	.331	10.807						P275		
	8,40	279,50	.331	11.004						P280		
	8,40	284,50	.331	11.201						P285		
	8,40	289,50	.331	11.398						P290		
	8,40	294,50	.331	11.594						P295		
	8,40	299,50	.331	11.791						P300		
	8,40	314,50	.331	12.382						P315		
	8,40	319,50	.331	12.579						P320		
	8,40	334,50	.331	13.169						P335		
	8,40	339,50	.331	13.366						P340		
	8,40	354,50	.331	13.957						P355		
	8,40	359,50	.331	14.154						P360		
	8,40	374,50	.331	14.744						P375		
	8,40	384,50	.331	15.138						P385		
	8,40	399,50	.331	15.728						P400		
	10,00	475,00	.394	18.701						V480		
	10,00	524,50	.394	20.650						V530		
	10,00	579,00	.394	22.795						V585		
	10,00	633,50	.394	24.941						V640		
	10,00	683,00	.394	26.890						V690		
	10,00	732,50	.394	28.839						V740		
	10,00	782,00	.394	30.787						V790		
	10,00	836,50	.394	32.933						V845		
	10,00	940,50	.394	37.027						V950		
	10,00	1044,00	.394	41.102						V1055		

\* Mold is cut for non-standard shrink compensation



## ISO 6149 Metric Tube Fitting O-Rings

PAI Size	C/S mm	I.D. mm	C/S inch	I.D. inch	Thread Size
<b>63-240</b>	1,60	6,10	.063	.240	<b>M8 x 1</b>
<b>63-319</b>	1,60	8,10	.063	.319	<b>M10 x 1</b>
<b>87-366</b>	2,20	9,30	.087	.366	<b>M12 x 1.5</b>
<b>87-445</b>	2,20	11,30	.087	.445	<b>M14 x 1.5</b>
<b>87-524</b>	2,20	13,30	.087	.524	<b>M16 x 1.5</b>
<b>87-602</b>	2,20	15,30	.087	.602	<b>M18 x 1.5</b>
<b>87-681</b>	2,20	17,30	.087	.681	<b>M20 x 1.5</b>
<b>87-760</b>	2,20	19,30	.087	.760	<b>M22 x 1.5</b>
<b>114-929</b>	2,90	23,60	.114	.929	<b>M27 x 2</b>
<b>114-1.165</b>	2,90	29,60	.114	1.165	<b>M33 x 2</b>
<b>114-1.520</b>	2,90	38,60	.114	1.520	<b>M42 x 2</b>
<b>114-1.756</b>	2,90	44,60	.114	1.756	<b>M48 x 2</b>
<b>114-2.228</b>	2,90	56,60	.114	2.228	<b>M60 x 2</b>

Contact Precision Associates for sizes not listed



*Kurv-Bak™*

Hard Rubber Back-up Rings



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Fax: (612) 342-2417  
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## Kurv-Bak™

Hard Rubber  
Back-up Rings



Back-up Rings are used for one of two purposes. Higher pressures may be sealed by using back-up rings with standard, or tightened, manufacturing tolerances. Alternately, tolerances may be loosened in low pressure applications by using back-ups. Kurv-Bak™ back-up rings may be used in static and dynamic sealing applications.

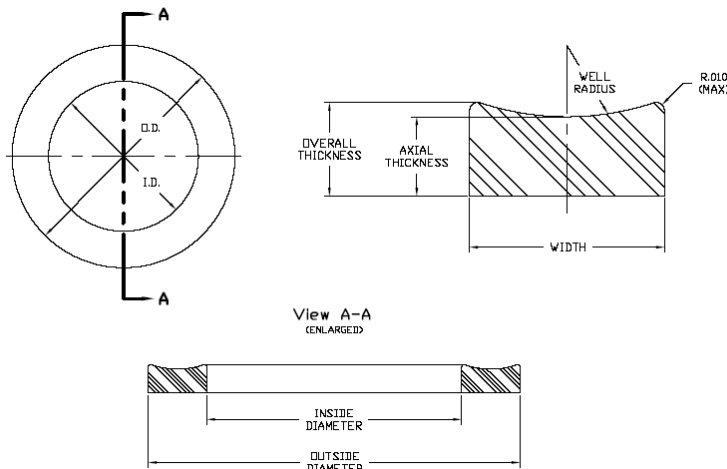
Precision Associates' hard rubber molded contoured Back-Ups are routinely produced in our 90 durometer Nitrile Compound 5939. This provides sufficient elasticity to permit stretching over the major diameter of a piston and then snap back into the gland of the piston. Compound 5939 has sufficient hardness to resist extrusion of the softer elastomeric O-Ring performing the actual sealing function. You can order Kurv-Baks™ in special materials too! We regularly mold them in Fluoroelastomer, EPDM, Aflas® & HNBR.

Many customary standard sizes are available. Also, subject to reasonable lead-time for the necessary mold construction, we can manufacture many other additional sizes to meet your needs.

The tables on the following pages contain sizes on which we are already tooled. Numbers to the right of the hyphen correspond to AS-568 O-Ring dash numbers. Please contact us for additional sizes.

### Kurv-Bak™ Design Dimensions

Series	Nominal Size	Well Radius	Overall Thickness	Axial Thickness	Width
888-0XX	1/16	.087 ± .010	.049	.045 ± .003	.053 ± .003
888-1XX	3/32	.129 ± .010	.053	.045 ± .003	.086 ± .003
888-2XX	1/8	.174 ± .010	.050	.040 ± .003	.118 ± .004
888-3XX	3/16	.262 ± .010	.076	.060 ± .004	.183 ± .005
888-4XX	1/4	.334 ± .010	.117	.096 ± .005	.236 ± .006





**Kurv-Bak™**

Hard Rubber  
Back-up Rings



**1/16" Nominal Cross Section**

Size	Nominal		Actual (Ref)	
	ID	OD	I.D.	O.D
888-005	7/64	15/64	.127 ±.005	.233
888-006	1/8	1/4	.140	.246
888-007	5/32	9/32	.171	.277
888-008	3/16	5/16	.202	.308
888-009	7/32	11/32	.234	.340
888-010	1/4	3/8	.265	.371
888-011	5/16	7/16	.327	.433
888-012	3/8	1/2	.390	.496
888-013	7/16	9/16	.455	.561
888-014	1/2	5/8	.518	.624
888-015	9/16	11/16	.580 ±.007	.686
888-016	5/8	3/4	.643 ±.009	.749
888-017	11/16	13/16	.705	.811
888-018	3/4	7/8	.768	.874
888-019	13/16	15/16	.830	.936
888-020	7/8	1	.893	.999
888-021	15/16	1 1/16	.955	1.061
888-022	1	1 1/8	1.018 ±.010	1.124
888-023	1 1/16	1 3/16	1.080	1.186
888-024	1 1/8	1 1/4	1.143	1.249
888-025	1 3/16	1 5/16	1.205	1.311
888-026	1 1/4	1 3/8	1.268	1.374
888-027	1 5/16	1 7/16	1.330	1.436
888-028	1 3/8	1 1/2	1.393 ±.013	1.499
888-029	1 1/2	1 5/8	1.518	1.624
888-030	1 5/8	1 3/4	1.643	1.749
888-031	1 3/4	1 7/8	1.768 ±.015	1.874
888-032	1 7/8	2	1.893	1.999
888-033	2	2 1/8	2.018 ±.018	2.124
888-034	2 1/8	2 1/4	2.143	2.249
888-035	2 1/4	2 3/8	2.268	2.374
888-036	2 3/8	2 1/2	2.393	2.499
888-037	2 1/2	2 5/8	2.518	2.624
888-038	2 5/8	2 3/4	2.643 ±.020	2.749
888-039	2 3/4	2 7/8	2.768	2.874
888-040	2 7/8	3	2.893	2.999
888-041	3	3 1/8	3.018 ±.024	3.124
888-042	3 1/4	3 3/8	3.268	3.374
888-047	4 1/2	4 5/8	4.518 ±.030	4.624
888-050	5 1/4	5 3/8	5.268 ±.037	5.374

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**Kurv-Bak™**

Hard Rubber  
Back-up Rings



**3/32" Nominal Cross Section**

Size	Nominal		Actual I.D.	(Ref) O.D
	ID	OD		
888-103	3/32	9/32	.109 ±.005	.281
888-104	1/8	5/16	.140	.312
888-106	3/16	3/8	.202	.374
888-107	7/32	13/32	.234	.406
888-108	1/4	7/16	.265	.437
888-109	5/16	1/2	.327	.499
888-110	3/8	9/16	.390	.562
888-111	7/16	5/8	.452	.624
888-112	1/2	11/16	.515 ±.007	.687
888-113	9/16	3/4	.577	.749
888-114	5/8	13/16	.640	.812
888-115	11/16	7/8	.702 ±.010	.874
888-116	3/4	15/16	.765	.937
888-117	13/16	1	.831	1.003
888-118	7/8	1 1/16	.893	1.065
888-119	15/16	1 1/8	.956	1.128
888-120	1	1 3/16	1.018	1.190
888-121	1 1/16	1 1/4	1.081	1.253
888-122	1 1/8	1 5/16	1.143 ±.012	1.315
888-123	1 3/16	1 3/8	1.206	1.378
888-124	1 1/4	1 7/16	1.268	1.440
888-125	1 5/16	1 1/2	1.331	1.503
888-126	1 3/8	1 9/16	1.393	1.565
888-127	1 7/16	1 5/8	1.456	1.628
888-128	1 1/2	1 11/16	1.518 ±.015	1.690
888-129	1 9/16	1 3/4	1.581	1.753
888-130	1 5/8	1 13/16	1.643	1.815
888-131	1 11/16	1 7/8	1.706	1.878
888-132	1 3/4	1 15/16	1.768	1.940
888-133	1 13/16	2	1.831	2.003
888-134	1 7/8	2 1/16	1.893	2.065
888-135	1 15/16	2 1/8	1.956 ±.018	2.128

Size	Nominal		Actual I.D.	(Ref) O.D
	ID	OD		
888-136	2	2 3/16	2.018 ±.018	2.190
888-137	2 1/16	2 1/4	2.081	2.253
888-138	2 1/8	2 5/16	2.143	2.315
888-139	2 3/16	2 3/8	2.206 ±.020	2.378
888-140	2 1/4	2 7/16	2.268	2.440
888-141	2 5/16	2 1/2	2.331	2.503
888-142	2 3/8	2 9/16	2.393	2.565
888-143	2 7/16	2 5/8	2.456	2.628
888-144	2 1/2	2 11/16	2.518	2.690
888-145	2 9/16	2 3/4	2.581	2.753
888-146	2 5/8	2 13/16	2.643	2.815
888-147	2 11/16	2 7/8	2.706 ±.024	2.878
888-148	2 3/4	2 15/16	2.768	2.940
888-149	2 13/16	3	2.831	3.003
888-150	2 7/8	3 1/16	2.893	3.065
888-151	3	3 3/16	3.018	3.190
888-152	3 1/4	3 7/16	3.268	3.440
888-153	3 1/2	3 11/16	3.518	3.690
888-154	3 3/4	3 15/16	3.768 ±.028	3.940
888-155	4	4 3/16	4.018	4.190
888-156	4 1/4	4 7/16	4.268 ±.030	4.440
888-157	4 1/2	4 11/16	4.518	4.690
888-158	4 3/4	4 15/16	4.768	4.940
888-159	5	5 3/16	5.018 ±.037	5.190
888-161	5 1/4	5 7/16	5.518	5.690
888-162	5 1/2	5 15/16	5.768	5.940
888-163	6	6 3/16	6.018	6.190
888-164	6 1/4	6 7/16	6.268 ±.040	6.440
888-166	6 3/4	6 15/16	6.768	6.940
888-167	7	7 3/16	7.018	7.190
888-168	7 1/4	7 7/16	7.268 ±.045	7.440

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**Kurv-Bak™**

Hard Rubber  
Back-up Rings



**1/8" Nominal Cross Section**

Size	Nominal		Actual (Ref)	
	ID	OD	I.D.	O.D
888-201	3/16	7/16	.202 ±.005	.438
888-202	1/4	1/2	.265	.501
888-203	5/16	9/16	.327	.563
888-204	3/8	5/8	.390	.626
888-205	7/16	11/16	.455	.691
888-206	1/2	3/4	.518	.754
888-207	9/16	13/16	.580 ±.007	.816
888-208	5/8	7/8	.643 ±.009	.879
888-209	11/16	15/16	.705	.941
888-210	3/4	1	.766 ±.010	1.002
888-211	13/16	1 1/16	.828	1.064
888-212	7/8	1 1/8	.891	1.127
888-213	15/16	1 3/16	.953	1.189
888-214	1	1 1/4	1.016	1.252
888-215	1 1/16	1 5/16	1.078	1.314
888-216	1 1/8	1 3/8	1.141 ±.012	1.377
888-217	1 3/16	1 7/16	1.203	1.439
888-218	1 1/4	1 1/2	1.266	1.502
888-219	1 5/16	1 9/16	1.334	1.570
888-220	1 3/8	1 5/8	1.397	1.633
888-221	1 7/16	1 11/16	1.459	1.695
888-222	1 1/2	1 3/4	1.522 ±.015	1.758
888-223	1 5/8	1 7/8	1.647	1.883
888-224	1 3/4	2	1.772	2.008
888-225	1 7/8	2 1/8	1.897 ±.018	2.133
888-226	2	2 1/4	2.022	2.258
888-227	2 1/8	2 3/8	2.147	2.383
888-228	2 1/4	2 1/2	2.272 ±.020	2.508
888-229	2 3/8	2 5/8	2.397	2.633
888-230	2 1/2	2 3/4	2.522	2.758
888-231	2 5/8	2 7/8	2.631	2.867
888-232	2 3/4	3	2.756 ±.024	2.992
888-233	2 7/8	3 1/8	2.881	3.117
888-234	3	3 1/4	3.006	3.242
888-235	3 1/8	3 3/8	3.131	3.367
888-236	3 1/4	3 1/2	3.256	3.492
888-237	3 3/8	3 5/8	3.381	3.617
888-238	3 1/2	3 3/4	3.506	3.742
888-239	3 5/8	3 7/8	3.631 ±.028	3.867

Size	Nominal		Actual (Ref)	
	ID	OD	I.D.	O.D
888-240	3 3/4	4	3.756 ±.028	3.992
888-241	3 7/8	4 1/8	3.881	4.117
888-242	4	4 1/4	4.006	4.242
888-243	4 1/8	4 3/8	4.131	4.367
888-244	4 1/4	4 1/2	4.256 ±.030	4.492
888-245	4 3/8	4 5/8	4.381	4.617
888-246	4 1/2	4 3/4	4.506	4.742
888-247	4 5/8	4 7/8	4.631	4.867
888-248	4 3/4	5	4.768	5.004
888-249	4 7/8	5 1/8	4.893 ±.035	5.129
888-250	5	5 1/4	5.018	5.254
888-251	5 1/8	5 3/8	5.143	5.379
888-252	5 1/4	5 1/2	5.268	5.504
888-253	5 3/8	5 5/8	5.393	5.629
888-254	5 1/2	5 3/4	5.518	5.754
888-255	5 5/8	5 7/8	5.643	5.879
888-256	5 3/4	6	5.768	6.004
888-257	5 7/8	6 1/8	5.893	6.129
888-258	6	6 1/4	6.018	6.254
888-259	6 1/4	6 1/2	6.268 ±.040	6.504
888-260	6 1/2	6 3/4	6.518	6.754
888-261	6 3/4	7	6.768	7.004
888-262	7	7 1/4	7.018	7.254
888-263	7 1/4	7 1/2	7.268 ±.045	7.504
888-264	7 1/2	7 3/4	7.518	7.754
888-265	7 3/4	8	7.768	8.004
888-266	8	8 1/4	8.018	8.254
888-267	8 1/4	8 1/2	8.268 ±.050	8.504
888-268	8 1/2	8 3/4	8.518	8.754
888-269	8 3/4	9	8.768	9.004
888-271	9 1/4	9 1/2	9.268 ±.055	9.504
888-272	9 1/2	9 3/4	9.518	9.754
888-273	9 3/4	10	9.768	10.004
888-274	10	10 1/4	10.018	10.254
888-275	10 1/2	10 3/4	10.518	10.754
888-276	11	11 1/4	11.018 ±.065	11.254
888-278	12	12 1/2	12.018	12.254
888-279	13	13 1/2	13.018	13.254
888-281	15	15 1/2	15.018 ±.070	15.254

Please contact Precision Associates for sizes not listed.



**Kurv-Bak™**

Hard Rubber  
Back-up Rings



**3/16" Nominal Cross Section**

Size	Nominal		Actual (Ref)	
	ID	OD	I.D.	O.D
888-310	1/2	7/8	.513 ±.005	.879
888-312	5/8	1	.638 ±.009	1.004
888-314	3/4	1 1/8	.763 ±.010	1.129
888-315	13/16	1 3/16	.825	1.191
888-316	7/8	1 1/2	.888	1.254
888-317	15/16	1 5/16	.950	1.316
888-318	1	1 3/8	1.013	1.379
888-319	1 1/16	1 7/16	1.075	1.441
888-320	1 1/8	1 1/2	1.138 ±.012	1.504
888-321	1 3/16	1 9/16	1.200	1.566
888-322	1 1/4	1 5/8	1.263	1.629
888-323	1 5/16	1 11/16	1.316	1.682
888-324	1 3/8	1 3/4	1.388	1.754
888-325	1 1/2	1 7/8	1.513 ±.015	1.879
888-326	1 5/8	2	1.638	2.004
888-327	1 3/4	2 1/8	1.763	2.129
888-328	1 7/8	2 1/4	1.888	2.254
888-329	2	2 3/8	2.013	2.379
888-330	2 1/8	2 1/2	2.138	2.504
888-331	2 1/4	2 5/8	2.268	2.634
888-332	2 3/8	2 3/4	2.393	2.759
888-333	2 1/2	2 7/8	2.518 ±.020	2.884
888-334	2 5/8	3	2.643	3.009
888-335	2 3/4	3 1/8	2.768	3.134
888-336	2 7/8	3 1/4	2.893	3.259
888-337	3	3 3/8	3.018 ±.024	3.384
888-338	3 1/8	3 1/2	3.143	3.509
888-339	3 1/4	3 5/8	3.273	3.639
888-340	3 3/8	3 3/4	3.398	3.764
888-341	3 1/2	3 7/8	3.523	3.889
888-342	3 5/8	4	3.648 ±.028	4.014
888-343	3 3/4	4 1/8	3.773	4.139
888-344	3 7/8	4 1/4	3.898	4.264
888-345	4	4 3/8	4.028	4.394

Size	Nominal		Actual (Ref)	
	ID	OD	I.D.	O.D
888-346	4 1/8	4 1/2	4.153 ±.028	4.519
888-347	4 1/4	4 5/8	4.278 ±.030	4.644
888-348	4 3/8	4 3/4	4.403	4.769
888-349	4 1/2	4 7/8	4.528	4.894
888-350	4 5/8	5	4.653	5.019
888-351	4 3/4	5 1/8	4.778	5.144
888-352	4 7/8	5 1/4	4.903 ±.037	5.269
888-353	5	5 3/8	5.028	5.394
888-354	5 1/8	5 1/2	5.153	5.519
888-355	5 1/4	5 5/8	5.278	5.644
888-356	5 3/8	5 3/4	5.403	5.769
888-357	5 1/2	5 7/8	5.528	5.894
888-358	5 5/8	6	5.653	6.019
888-359	5 3/4	6 1/8	5.778	6.144
888-360	5 7/8	6 1/4	5.903	6.269
888-361	6	6 3/8	6.028	6.394
888-362	6 1/4	6 5/8	6.278 ±.040	6.644
888-363	6 1/2	6 7/8	6.528	6.894
888-364	6 3/4	7 1/8	6.778	7.144
888-365	7	7 3/8	7.028	7.394
888-367	7 1/2	7 7/8	7.528 ±.045	7.894
888-368	7 3/4	8 1/8	7.778	8.144
888-369	8	8 3/8	8.028	8.394
888-370	8 1/4	8 5/8	8.278 ±.050	8.644
888-371	8 1/2	8 7/8	8.528	8.894
888-372	8 3/4	9 1/8	8.778	9.145
888-374	9 1/4	9 5/8	9.278 ±.055	9.644
888-379	11	11 3/8	11.028 ±.060	11.394
888-380	11 1/2	11 7/8	11.528 ±.065	11.894
888-382	13	13 3/8	13.028	13.394
888-383	14	14 3/8	14.028 ±.070	14.341
888-384	15	15 3/8	15.028	15.394
888-385	16	16 3/8	16.008	16.374
888-392	23	23 3/8	22.993 ±.105	23.359

Please contact Precision Associates for sizes not listed.



Kurv-Bak™

Hard Rubber  
Back-up Rings



**1/4" Nominal Cross Section**

Size	Nominal		Actual (Ref)	
	ID	OD	I.D.	O.D
888-402	1 5/8	2 1/8	1.659 ±.015	2.131
888-403	1 3/4	2 1/4	1.784	2.256
888-404	1 7/8	2 3/8	1.909	2.381
888-405	2	2 1/2	2.034 ±.018	2.506
888-409	2 1/2	3	2.534 ±.020	3.006
888-413	3	3 1/2	3.034 ±.024	3.506
888-415	3 1/4	3 3/4	3.294	3.766
888-417	3 1/2	4	3.544	4.016
888-421	4	4 1/2	4.044 ±.028	4.516
888-422	4 1/8	4 5/8	4.169	4.641
888-423	4 1/4	4 3/4	4.294 ±.030	4.766
888-424	4 3/8	4 7/8	4.419	4.891
888-425	4 1/2	5	4.551 ±.033	5.023
888-426	4 5/8	5 1/8	4.676	5.148
888-427	4 3/4	5 1/4	4.801	5.273
888-428	4 7/8	5 3/8	4.926	5.398
888-429	5	5 1/2	5.051 ±.037	5.523
888-430	5 1/8	5 5/8	5.176	5.648
888-431	5 1/4	5 3/4	5.301	5.773
888-432	5 3/8	5 7/8	5.426	5.898
888-433	5 1/2	6	5.551	6.023
888-434	5 5/8	6 1/8	5.676	6.148
888-435	5 3/4	6 1/4	5.801	6.273
888-436	5 7/8	6 3/8	5.926	6.398
888-437	6	6 1/2	6.051	6.523
888-438	6 1/4	6 3/4	6.274 ±.040	6.746
888-439	6 1/2	7	6.524	6.996
888-440	6 3/4	7 1/4	6.774	7.246
888-441	7	7 1/2	7.024	7.496
888-442	7 1/4	7 3/4	7.274 ±.045	7.746

Size	Nominal		Actual (Ref)	
	ID	OD	I.D.	O.D
888-443	7 1/2	8	7.524 ±.045	7.996
888-444	7 3/4	8 1/4	7.774	8.246
888-445	8	8 1/2	8.024	8.496
888-446	8 1/2	9	8.524 ±.055	8.996
888-447	9	9 1/2	9.024	9.496
888-448	9 1/2	10	9.524	9.996
888-449	10	10 1/2	10.024	10.496
888-450	10 1/2	11	10.524 ±.060	10.996
888-451	11	11 1/2	11.024	11.496
888-452	11 1/2	12	11.524	11.996
888-453	12	12 1/2	12.024	12.496
888-454	12 1/2	13	12.524	12.996
888-455	13	13 1/2	13.024	13.496
888-456	13 1/2	14	13.524 ±.070	13.996
888-457	14	14 1/2	14.024	14.496
888-458	14 1/2	15	14.524	14.996
888-459	15	15 1/2	15.024	15.496
888-460	15 1/2	16	15.524	15.996
888-461	16	16 1/2	16.004 ±.075	16.476
888-462	16 1/2	17	16.504	16.976
888-463	17	17 1/2	17.004 ±.080	17.476
888-464	17 1/2	18	17.504 ±.085	17.976
888-465	18	18 1/2	18.004	18.476
888-466	18 1/2	19	18.504	18.976
888-467	19	19 1/2	19.004 ±.090	19.476
888-468	19 1/2	20	19.504	19.976
888-469	20	20 1/2	20.004	20.476
888-470	21	21 1/2	21.004	21.476
888-471	22	22 1/2	22.004 ±.100	22.476

Please contact Precision Associates for sizes not listed.



# *X-Ring & Multiseal<sup>®</sup>*

Low Friction Seals





X-Ring &  
Multiseal®  
Low Friction Seals



## Low Friction Compression Seals – Run Circles Around O-Rings!

After years of concentrated research, PAI has perfected synthetic rubber hydraulic and pneumatic seals that are far superior to O-Rings. These packings were designed to overcome the weaknesses of O-Rings – such as high friction, spiral failures and leakage from compression set.

PAI manufactures two types of low friction compression seals:

- Multiseal® bi-directional lip style seals
- X-Ring multidirectional lobed style seals

Both styles offer significant advantages over standard O-Rings, making them the choice for any application where you want to achieve a better, high performing seal.

## What Makes Multiseal® Low Friction Seals and X-Ring Seals Better

- A better seal – With their multi-lobed designs, they provide more sealing surfaces than standard O-Rings.
- Increased life for the seal ring – With multiple seal points, less squeeze is required to provide an effective seal. This means less friction and wear which will increase seal life and lower maintenance costs.
- Prevents spiral failure – The square cross sections resist distortion called “spiral twist” that may be encountered when using O-Rings.
- Puts parting lines where they belong – Unlike an O-Ring, where the parting line is found on the only sealing surface, the parting lines of Multiseal® low friction seals and X-Ring compression seals are located in the center of the cross section away from the primary sealing surfaces.
- Better lubricant retention – The grooves on the inside and outside diameter of these rings retain lubricant thereby lowering friction and extending packing life.
- Saves space, reduces cost – One Multiseal® low friction seal can replace two U-Cups in many applications.
- Less force, better seal – Lower breakaway force and reduced operating pressures make them ideal in reciprocating applications.
- The right fit – Multiseal® low friction seals and X-Rings compression seals will fit in standard O-Ring grooves

Multiseal® is a registered trademark of Precision Associates, Inc.

## Low Breakaway Pressures Solved with PAI's Multiseal

Jim Viken of **Transclean Corporation** uses PAI's Multiseal® as a piston seal in their patented bi-directional hydraulic fluid exchange pump that is designed to operate in a range from 5 to 300 psi. This application requires very low breakaway pressures, good sealing, and minimal pressure drop due to seal drag on the cylinder wall.

PAI's Multiseal® works far better than any other product we tried! O-Rings produced too much resistance to piston movement for our low-pressure application. Quad Rings made some improvement, but still couldn't achieve the low resistance (i.e. drag) we were looking for. U-Cups generated too much drag when energized, plus we needed two of them since they are not bi-directional like the Multiseal®. The self-energizing Multiseal® quickly proved to be the best solution because it provides optimal sealing in low pressure as well as higher pressures without parasitical drag! By optimizing the gland for our application, we are able to achieve good sealing with very low drag through the full operating pressure range, with piston movement starting at less than 2 psi and extending to 300 psi. The Multiseal® provides a good seal with minimal pressure drop throughout the full pressure operating range of the pump.

## Availability of PAI Low Friction Seals

PAI's low friction seals are available “off the shelf” in our standard 70 durometer nitrile compound 5716. Most of our other 1,000+ compounds can be used to meet your special requirements.



**X-Ring &  
Multiseal®**  
Low Friction Seals



X-Ring	Multiseal®	Actual Dimensions			Nominal Dimensions		
		C/S	ID	OD (Ref)	C/S	ID	OD
4444-002		.050 ±.003	.042 ±.003	.142	3/64	3/64	9/64
4444-003		.060	.056 ±.004	.176	1/16	1/16	11/64
4444-004		.070	.070 ±.005	.210	1/16	5/64	13/64
4444-005		.070	.101	.241	1/16	7/64	15/64
4444-006	4-006	.070	.114	.254	1/16	1/8	1/4
4444-007	4-007	.070	.145	.285	1/16	5/32	9/32
4444-008	4-008	.070	.176	.316	1/16	3/16	5/16
4444-009	4-009	.070	.208	.348	1/16	7/32	11/32
4444-010	4-010	.070	.239	.379	1/16	1/4	3/8
4444-011	4-011	.070	.301	.441	1/16	5/16	7/16
4444-012	4-012	.070	.364	.504	1/16	3/8	1/2
4444-013	4-013	.070	.426	.566	1/16	7/16	9/16
4444-014	4-014	.070	.489	.629	1/16	1/2	5/8
4444-015	4-015	.070	.551 ±.007	.691	1/16	9/16	11/16
4444-016	4-016	.070	.614 ±.009	.754	1/16	5/8	3/4
4444-017	4-017	.070	.676	.816	1/16	11/16	13/16
4444-018	4-018	.070	.739	.879	1/16	3/4	7/8
4444-019	4-019	.070	.801	.941	1/16	13/16	15/16
4444-020	4-020	.070	.864	1.004	1/16	7/8	1
4444-021	4-021	.070	.926	1.066	1/16	15/16	1 1/16
4444-022	4-022	.070	.989 ±.010	1.129	1/16	1	1 1/8
4444-023		.070	1.051	1.191	1/16	1 1/16	1 3/16
4444-024	4-024	.070	1.114	1.254	1/16	1 1/8	1 1/4
4444-025		.070	1.176 ±.011	1.316	1/16	1 3/16	1 5/16
4444-026		.070	1.239	1.379	1/16	1 1/4	1 3/8
4444-027		.070	1.301	1.441	1/16	1 5/16	1 7/16
4444-028	4-028	.070	1.364 ±.013	1.504	1/16	1 3/8	1 1/2
4444-029	4-029	.070	1.489	1.629	1/16	1 1/2	1 5/8
4444-030		.070	1.614	1.754	1/16	1 5/8	1 3/4
4444-031		.070	1.739 ±.015	1.879	1/16	1 3/4	1 7/8
4444-032		.070	1.864	2.004	1/16	1 7/8	2
4444-034		.070	2.114 ±.018	2.254	1/16	2 1/8	2 1/4
	4-036	.070	2.364	2.504	1/16	2 3/8	2 1/2
	4-039	.070	2.739 ±.020	2.879	1/16	2 3/4	2 7/8
4444-042		.070	3.239 ±.024	3.379	1/16	3 1/4	3 3/8
	4-043	.070	3.489	3.629	1/16	3 1/2	3 5/8
	4-044	.070	3.739 ±.027	3.879	1/16	3 3/4	3 7/8

**PAI Sealing Tip #1**

Whether you choose Multiseal® low friction seals or X-Ring compression seals, you can reduce breakaway and operating pressures even more by selecting internally lubed compounds.



X-Ring &  
Multiseal®  
Low Friction Seals



X-Ring	Multiseal®	Actual Dimensions			Nominal Dimensions		
		C/S	ID	OD (Ref)	C/S	ID	OD
4444-102		.103 ±.003	.050 ±.005	.256	3/32	1/16	1/4
4444-103		.103	.081	.287	3/32	3/32	9/32
4444-104		.103	.112	.318	3/32	1/8	5/16
4444-105		.103	.143	.349	3/32	5/32	11/32
4444-106		.103	.175	.381	3/32	3/16	3/8
4444-107		.103	.206	.412	3/32	7/32	13/32
4444-108		.103	.237	.443	3/32	1/4	7/16
4444-109	4-109	.103	.299	.505	3/32	5/16	1/2
4444-110	4-110	.103	.362	.568	3/32	3/8	9/16
5444-610		.103	.404	.610	3/32		
4444-111	4-111	.103	.424	.630	3/32	7/16	5/8
4444-112	4-112	.103	.487	.693	3/32	1/2	11/16
4444-113	4-113	.103	.549 ±.007	.755	3/32	9/16	3/4
5444-804		.103	.598	.804	3/32		
4444-114	4-114	.103	.612 ±.009	.818	3/32	5/8	13/16
5444-860		.103	.654	.860	3/32		
4444-115	4-115	.103	.674	.880	3/32	11/16	7/8
5444-917		.103	.711	.917	3/32		
4444-116	4-116	.103	.737	.943	3/32	3/4	15/16
4444-117	4-117	.103	.799 ±.010	1.005	3/32	13/16	1
4444-118	4-118	.103	.862	1.068	3/32	7/8	1 1/16
4444-119	4-119	.103	.924	1.130	3/32	15/16	1 1/8
4444-120		.103	.987	1.193	3/32	1	1 3/16
4444-121	4-121	.103	1.049	1.255	3/32	1 1/16	1 1/4
4444-122	4-122	.103	1.112	1.318	3/32	1 1/8	1 5/16
4444-123		.103	1.174 ±.012	1.380	3/32	1 3/16	1 3/8
4444-124	4-124	.103	1.237	1.443	3/32	1 1/4	1 7/16
4444-125	4-125	.103	1.299	1.505	3/32	1 5/16	1 1/2
4444-126		.103	1.362	1.568	3/32	1 3/8	1 9/16
4444-127	4-127	.103	1.424	1.630	3/32	1 7/16	1 5/8
4444-128	4-128	.103	1.487	1.693	3/32	1 1/2	1 11/16
4444-129	4-129	.103	1.549 ±.015	1.755	3/32	1 9/16	1 3/4

Please contact Precision Associates for sizes not listed.

### Availability of PAI Low Friction Seals

PAI's low friction seals are available "off the shelf" in our standard 70 durometer nitrile compound 5716. Most of our other 1,000+ compounds can be used to meet your special requirements.



X-Ring &  
Multiseal®  
Low Friction Seals



X-Ring	Multiseal®	Actual Dimensions			Nominal Dimensions		
		C/S	ID	OD (Ref)	C/S	ID	OD
4444-130	4-130	.103 ±.003	1.612 ±.015	1.818	3/32	1 5/8	1 13/16
4444-131		.103	1.674	1.880	3/32	1 11/16	1 7/8
4444-132		.103	1.737	1.943	3/32	1 3/4	1 15/16
4444-133	4-133	.103	1.799	2.005	3/32	1 13/16	2
4444-134		.103	1.862	2.068	3/32	1 7/8	2 1/16
4444-135		.103	1.925 ±.017	2.131	3/32	1 15/16	2 1/8
4444-136	4-136	.103	1.987	2.193	3/32	2	2 3/16
4444-137		.103	2.050	2.256	3/32	2 1/16	2 1/4
4444-138	4-138	.103	2.112	2.318	3/32	2 1/8	2 5/16
	4-140	.103	2.237	2.443	3/32	2 1/4	2 7/16
	4-142	.103	2.362 ±.020	2.568	3/32	2 3/8	2 9/16
4444-143		.103	2.425	2.631	3/32	2 7/16	2 5/8
4444-144	4-144	.103	2.487	2.693	3/32	2 1/2	2 11/16
4444-145		.103	2.550	2.756	3/32	2 9/16	2 3/4
4444-150		.103	2.862 ±.022	3.068	3/32	2 7/8	3 1/16
	4-152	.103	3.237 ±.024	3.443	3/32	3 1/4	3 7/16
4444-153		.103	3.487	3.693	3/32	3 1/2	3 11/16
4444-154		.103	3.737 ±.028	3.943	3/32	3 3/4	3 15/16
4444-155		.103	3.987	4.193	3/32	4	4 3/16
4444-159	4-159	.103	4.987 ±.035	5.193	3/32	5	5 3/16
	4-160	.103	5.237	5.443	3/32	5 1/4	5 7/16
4444-163		.103	5.987	6.193	3/32	6	6 3/16
	4-165	.103	6.487 ±.040	6.693	3/32	6 1/2	6 11/16
	4-166	.103	6.737	6.943	3/32	6 3/4	6 15/16
4444-168		.103	7.237 ±.045	7.443	3/32	7 1/4	7 7/16
4444-170		.103	7.737	7.943	3/32	7 3/4	7 15/16
4444-177		.103	9.487	9.693	3/32	9 1/2	9 11/16

Please contact Precision Associates for sizes not listed.

### PAI Sealing Tip #2

Breakaway pressures will be reduced by using less compression (see gland design charts for more information).





X-Ring &  
Multiseal®  
Low Friction Seals



X-Ring	Multiseal®	Actual Dimensions			Nominal Dimensions		
		C/S	ID	OD (Ref)	C/S	ID	OD
4444-201		.139 ±.003	.171 ±.005	.449	1/8	3/16	7/16
4444-202		.139	.234	.512	1/8	1/4	1/2
4444-203		.139	.301	.579	1/8	5/16	9/16
4444-204	4-204	.139	.359	.637	1/8	3/8	5/8
4444-205	4-205	.139	.421	.699	1/8	7/16	11/16
4444-206	4-206	.139	.484	.762	1/8	1/2	3/4
4444-207	4-207	.139	.546 ±.007	.824	1/8	9/16	13/16
4444-208	4-208	.139	.609 ±.009	.887	1/8	5/8	7/8
4444-209	4-209	.139	.672	.950	1/8	11/16	15/16
4444-210	4-210	.139	.734 ±.010	1.012	1/8	3/4	1
4444-211	4-211	.139	.796	1.074	1/8	13/16	1 1/16
4444-212	4-212	.139	.859	1.137	1/8	7/8	1 1/8
4444-213	4-213	.139	0.921	1.199	1/8	15/16	1 3/16
4444-214	4-214	.139	0.984	1.262	1/8	1	1 1/4
4444-215	4-215	.139	1.046	1.324	1/8	1 1/16	1 5/16
4444-216	4-216	.139	1.109 ±.012	1.387	1/8	1 1/8	1 3/8
4444-217	4-217	.139	1.171	1.449	1/8	1 3/16	1 7/16
4444-218	4-218	.139	1.234	1.512	1/8	1 1/4	1 1/2
4444-219	4-219	.139	1.296	1.574	1/8	1 5/16	1 9/16
4444-220	4-220	.139	1.359	1.637	1/8	1 3/8	1 5/8
4444-221	4-221	.139	1.421	1.699	1/8	1 7/16	1 11/16
4444-222	4-222	.139	1.484 ±.015	1.762	1/8	1 1/2	1 3/4
4444-223	4-223	.139	1.609	1.887	1/8	1 5/8	1 7/8
4444-224	4-224	.139	1.734	2.012	1/8	1 3/4	2
4444-225	4-225	.139	1.859 ±.018	2.137	1/8	1 7/8	2 1/8
4444-226	4-226	.139	1.984	2.262	1/8	2	2 1/4
4444-227	4-227	.139	2.109	2.387	1/8	2 1/8	2 3/8
4444-228	4-228	.139	2.234 ±.020	2.512	1/8	2 1/4	2 1/2
4444-229	4-229	.139	2.359	2.637	1/8	2 3/8	2 5/8
4444-230	4-230	.139	2.484	2.762	1/8	2 1/2	2 3/4
4444-231	4-231	.139	2.609	2.887	1/8	2 5/8	2 7/8

Please contact Precision Associates for sizes not listed.

### Availability of PAI Low Friction Seals

PAI's low friction seals are available "off the shelf" in our standard 70 durometer nitrile compound 5716. Most of our other 1,000+ compounds can be used to meet your special requirements.



**X-Ring &  
Multiseal®**  
Low Friction Seals



X-Ring	Multiseal®	Actual Dimensions			Nominal Dimensions		
		C/S	ID	OD (Ref)	C/S	ID	OD
4444-232	4-232	.139 ±.003	2.734 ±.024	3.012	1/8	2 3/4	3
4444-233	4-233	.139	2.859	3.137	1/8	2 7/8	3 1/8
4444-234	4-234	.139	2.984	3.262	1/8	3	3 1/4
4444-235	4-235	.139	3.109	3.387	1/8	3 1/8	3 3/8
4444-236	4-236	.139	3.234	3.512	1/8	3 1/4	3 1/2
4444-237	4-237	.139	3.359	3.637	1/8	3 3/8	3 5/8
4444-238	4-238	.139	3.484	3.762	1/8	3 1/2	3 3/4
4444-239		.139	3.609 ±.028	3.887	1/8	3 5/8	3 7/8
	4-240	.139	3.734	4.012	1/8	3 3/4	4
	4-241	.139	3.859	4.137	1/8	3 7/8	4 1/8
4444-242		.139	3.984	4.262	1/8	4	4 1/4
4444-244	4-244	.139	4.234 ±.030	4.512	1/8	4 1/4	4 1/2
	4-245	.139	4.359	4.637	1/8	4 3/8	4 5/8
	4-248	.139	4.734	5.012	1/8	4 3/4	5
4444-249	4-249	.139	4.859 ±.035	5.137	1/8	4 7/8	5 1/8
	4-250	.139	4.984	5.262	1/8	5	5 1/4
	4-252	.139	5.234	5.512	1/8	5 1/4	5 1/2
	4-253	.139	5.359	5.637	1/8	5 3/8	5 5/8
	4-256	.139	5.734	6.012	1/8	5 3/4	6
	4-259	.139	6.234 ±.040	6.512	1/8	6 1/4	6 1/2
	4-260	.139	6.484	6.762	1/8	6 1/2	6 3/4
	4-262	.139	6.984	7.262	1/8	7	7 1/4
5444-7.419		.139	7.141	7.419	1/8		
4444-264		.139	7.484 ±.045	7.762	1/8	7 1/2	7 3/4
4444-265	4-265	.139	7.734	8.012	1/8	7 3/4	8
	4-269	.139	8.734 ±.050	9.012	1/8	8 3/4	9
	4-270	.139	8.984	9.262	1/8	9	9 1/4
5444-9.434		.139	9.156	9.434	1/8		

Please contact Precision Associates for sizes not listed.

### PAI Sealing Tip #3

*If you have a special application, we can design a special compound to help seal it.*



X-Ring &  
Multiseal®  
Low Friction Seals



X-Ring	Multiseal®	Actual Dimensions			Nominal Dimensions		
		C/S	ID	OD (Ref)	C/S	ID	OD
4444-312		.210 ±.005	.600 ±.009	1.020	3/16	5/8	1
4444-313		.210	.662	1.082	3/16	11/16	1 1/16
4444-316		.210	.850 ±.010	1.270	3/16	7/8	1 1/4
4444-320		.210	1.100 ±.012	1.520	3/16	1 1/8	1 1/2
4444-322		.210	1.225	1.645	3/16	1 1/4	1 5/8
4444-324	4-324	.210	1.350	1.770	3/16	1 3/8	1 3/4
4444-325	4-325	.210	1.475 ±.015	1.895	3/16	1 1/2	1 7/8
4444-326	4-326	.210	1.600	2.020	3/16	1 5/8	2
4444-327	4-327	.210	1.725	2.145	3/16	1 3/4	2 1/8
4444-328	4-328	.210	1.850	2.270	3/16	1 7/8	2 1/4
4444-329	4-329	.210	1.975 ±.018	2.395	3/16	2	2 3/8
4444-330	4-330	.210	2.100	2.520	3/16	2 1/8	2 1/2
4444-331	4-331	.210	2.225	2.645	3/16	2 1/4	2 5/8
4444-332	4-332	.210	2.350	2.770	3/16	2 3/8	2 3/4
4444-333	4-333	.210	2.475 ±.020	2.895	3/16	2 1/2	2 7/8
4444-334	4-334	.210	2.600	3.020	3/16	2 5/8	3
4444-335	4-335	.210	2.725	3.145	3/16	2 3/4	3 1/8
4444-336	4-336	.210	2.850	3.270	3/16	2 7/8	3 1/4
4444-337	4-337	.210	2.975 ±.024	3.395	3/16	3	3 3/8
4444-338	4-338	.210	3.100	3.520	3/16	3 1/8	3 1/2
4444-339	4-349	.210	3.225	3.645	3/16	3 1/4	3 5/8
4444-340	4-340	.210	3.350	3.770	3/16	3 3/8	3 3/4
	4-341	.210	3.475	3.895	3/16	3 1/2	3 7/8
	4-342	.210	3.600 ±.028	4.020	3/16	3 5/8	4
	4-343	.210	3.725	4.145	3/16	3 3/4	4 1/8
4444-344	4-344	.210	3.850	4.270	3/16	3 7/8	4 1/4
4444-345	4-345	.210	3.975	4.395	3/16	4	4 3/8
4444-346	4-346	.210	4.100	4.520	3/16	4 1/8	4 1/2
	4-347	.210	4.225 ±.030	4.645	3/16	4 1/4	4 5/8
	4-348	.210	4.350	4.770	3/16	4 3/8	4 3/4
4444-349	4-349	.210	4.475	4.895	3/16	4 1/2	4 7/8
	4-350	.210	4.600	5.020	3/16	4 5/8	5
4444-352	4-352	.210	4.850	5.270	3/16	4 7/8	5 1/4
4444-356		.210	5.350 ±.037	5.776	3/16	5 3/8	5 3/4
	4-357	.210	5.475	5.895	3/16	5 1/2	5 7/8
4444-361		.210	5.975	6.395	3/16	6	6 3/8
	4-363	.210	6.475	6.895	3/16	6 1/2	6 7/8
	4-366	.210	7.225 ±.045	7.645	3/16	7 1/4	7 5/8
	4-369	.210	7.975	8.395	3/16	8	8 3/8
4444-378		.210	10.475 ±.060	10.895	3/16	10 1/2	10 7/8

8 Please contact Precision Associates for sizes not listed.

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: (612) 333-7464  
Fax: (612) 342-2417  
Toll: (800) 394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



X-Ring &  
Multiseal®  
Low Friction Seals



X-Ring	Multiseal®	Actual Dimensions			Nominal Dimensions		
		C/S	ID	OD (Ref)	C/S	ID	OD
4444-425	4-425	.275 ±.006	4.475 ±.033	5.025	1/4	4 1/2	5
4444-426		.275	4.600	5.150	1/4	4 5/8	5 1/8
4444-427		.275	4.725	5.275	1/4	4 3/4	5 1/4
4444-428	4-428	.275	4.850	5.400	1/4	4 7/8	5 3/8
4444-429	4-429	.275	4.975 ±.037	5.525	1/4	5	5 1/2
4444-430		.275	5.100	5.650	1/4	5 1/8	5 5/8
4444-431	4-431	.275	5.225	5.775	1/4	5 1/4	5 3/4
4444-432	4-432	.275	5.350	5.900	1/4	5 3/8	5 7/8
4444-433	4-433	.275	5.475	6.025	1/4	5 1/2	6
4444-434		.275	5.600	6.150	1/4	5 5/8	6 1/8
4444-435		.275	5.725	6.275	1/4	5 3/4	6 1/4
4444-436		.275	5.850	6.400	1/4	5 7/8	6 3/8
4444-437	4-437	.275	5.975	6.525	1/4	6	6 1/2
4444-438	4-438	.275	6.225 ±.040	6.775	1/4	6 1/4	6 3/4
4444-439	4-439	.275	6.475	7.025	1/4	6 1/2	7
4444-440		.275	6.725	7.275	1/4	6 3/4	7 1/4
4444-441	4-441	.275	6.975	7.525	1/4	7	7 1/2
4444-442		.275	7.225 ±.045	7.775	1/4	7 1/4	7 3/4
4444-443	4-443	.275	7.475	8.025	1/4	7 1/2	8
4444-444		.275	7.725	8.275	1/4	7 3/4	8 1/4
4444-445	4-445	.275	7.975	8.525	1/4	8	8 1/2
4444-446	4-446	.275	8.475 ±.055	9.025	1/4	8 1/2	9
4444-447		.275	8.975	9.525	1/4	9	9 1/2
4444-448	4-448	.275	9.475	10.025	1/4	9 1/2	10
4444-449		.275	9.975	10.525	1/4	10	10 1/2
4444-450	4-450	.275	10.475 ±.060	11.025	1/4	10 1/2	11
4444-451	4-451	.275	10.975	11.525	1/4	11	11 1/2
	4-453	.275	11.975	12.525	1/4	12	12 1/2
4444-454		.275	12.475	13.025	1/4	12 1/2	13

Please contact Precision Associates for sizes not listed.

### PAI Sealing Tip #4

*Custom X-Rings or Multiseals can be manufactured for your specific application.*

### Availability of PAI Low Friction Seals

PAI's low friction seals are available "off the shelf" in our standard 70 durometer nitrile compound 5716. Most of our other 1,000+ compounds can be used to meet your special requirements.



X-Ring &  
Multiseal®  
Low Friction Seals



**Non-Standard Size Low Friction Seals**

X-Ring	Multiseal®	Actual Dimensions			Nominal Dimensions		
		C/S	ID	OD (Ref)	C/S	ID	OD
5444-142*		.050 ±.003	.050 ±.004	.142			
	4-088	.071 ±.003	.174	.316			
5444-323		.089 ±.003	.145 ±.005	.323	2 mm	4 mm	8 mm
5444-335		.051 ±.003	.233	.335			
5444-377		.071 ±.003	.237	.379			
5444-403		.089 ±.003	.225	.403	2 mm	6 mm	10 mm
5444-481		.089 ±.003	.303	.481	2 mm	8 mm	12 mm
5444-488		.094 ±.003	.299	.487			
5444-610		.103 ±.003	.404	.610	3/32		
5444-804		.103 ±.003	.598 ±.007	.804	3/32		
5444-860		.103 ±.003	.654 ±.009	.860	3/32		
5444-917		.103 ±.003	.711	.917	3/32		
	4-830	.070 ±.003	.830 ±.010	.970	1/16		
5444-1.690		.065 ±.003	1.560 ±.013	1.690			
5444-4.173		.079 ±.003 2 mm ±.1	4.016 .028 108 mm ±.7	4.173 106 mm			
5444-6.525		.330 ±.006	5.975 ±.040	6.635	5/16	6	6 5/8
	4-3625	.210 ±.005	6.350	6.770	3/16		
5444-7.419		.139 ±.004	7.173	7.419	1/8		
5444-9.434		.139 ±.004	9.156 ±.050	9.434	1/8		
	4-13.854	.500 ±.010	13.854 ±.065	14.854			

\* Rectangular Cross Section

Please contact Precision Associates to see about making a special size for you.

**PAI Sealing Tip #5**

Standard X-Rings can be manufactured in different color compounds when you require more than one polymer for different applications.

**Availability of PAI Low Friction Seals**

PAI's low friction seals are available "off the shelf" in our standard 70 durometer nitrile compound 5716. Most of our other 1,000+ compounds can be used to meet your special requirements.





X-Ring &  
Multiseal®  
Low Friction Seals



### X-Ring Design Chart

PAI Size Number Range	4444-004 thru -042	4444-102 thru-159	4444-201 thru -265	4444-312 thru -352	4444-433 thru -451
Cross Section	.070 ±.003	.103 ±.003	.139 ±.004	.210 ±.005	.275 ±.006
Dynamic Seal Groove Depth	.062 -.002	.093 -.002	.126 -.002	.190 -.002	.254 -.002
Groove Width (Wall to Wall)	.080 ±.003	.117 ±.003	.157 ±.005	.237 ±.005	.310 ±.005
Static Seal Groove Depth	.057 -.002	.089 -.002	.120 -.002	.195 -.002	.250 -.002
Groove Width (Wall to Wall)	.080 ±.003	.117 ±.003	.157 ±.005	.237 ±.005	.310 ±.005
Diametric Clearance (max.)	.002	.003	.003	.004	.005
Radius (max.)	.010	.010	.015	.015	.015
Eccentricity (max.)	.002	.002	.003	.004	.005

The Gland dimensions provided are only intended to be a starting point for your design. We recommend that you test to meet your requirements in each application.

### Multiseal® Design Chart

PAI Size Number Range	4-006 thru 4-044	4-109 thru 4-166	4-204 thru 4-270	4-324 thru 4-369	4-425 thru 4-453
Cross Section	.070 ±.003	.103 ±.003	.139 ±.004	.210 ±.005	.275 ±.006
Piston Groove Groove Depth	.055 -.002	.091 -.002	.126 -.002	.191 -.002	.245 -.002
Groove Width (Wall to Wall)	.080 ±.003	.117 ±.003	.175 ±.005	.255 ±.005	.295 ±.005
Housing Groove Groove Depth	.057 -.002	.093 -.002	.129 -.002	.195 -.002	.250 -.002
Groove Width (Wall to Wall)	.080 ±.003	.117 ±.003	.175 ±.005	.255 ±.005	.295 ±.005
Rotating Seal (Housing Only) Groove Depth	.057 -.002	.093 -.002	.129 -.002	.195 -.002	.250 -.002
Groove Width (Wall to Wall)	.075 ±.003	.115 ±.003	.168 ±.005	.247 ±.005	.285 ±.005
Diametric Clearance (max.)	.002	.003	.003	.004	.005
Radius (max.)	.010	.010	.015	.015	.015
Eccentricity (max.)	.002	.002	.003	.004	.005

The Gland dimensions provided are only intended to be a starting point for your design. We recommend that you test to meet your requirements in each application.



# X-Ring Kits



## Top Quality Precision X-Rings in Attractive, Functional, & Durable Kits

### Our Most Popular X-Rings at Your Fingertips

Attractive and functional describes these special X-Ring assortment packages.

Kits X-2, X-7, and X-14 contain 190 rings

- 10 each of the 19 inside diameters.

X-2714 contains 228 rings, 4 each of:

- 19 sizes 1/16" C/S
- 19 sizes 3/32" C/S
- 19 sizes 1/8" C/S

Precision Associates Kits are made up of Butadiene Acrylonitrile (Buna N) O-Rings resistant to:

- Gasoline
- Kerosene
- LP Fuels
- Oil
- Water
- Grease
- Gases



Material Meets ASTM D2000 2 BG 715 B14 B34 EA14 E014 EO34 EF11 EF21

Ask your customer service representative about kits in special materials

D20C17b

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Fax: (612) 342-2417  
Toll: (800) 394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



# X-Ring Kits



PAI No.	Nominal			Actual		(Ref)
	I.D.	O.D.	C/S	I.D.	C/S	O.D.
4444-010	1/4	3/8	1/16	.239 ±.005	.070 ±.003	.379
4444-011	5/16	7/16	1/16	.301	.070	.441
4444-012	3/8	1/2	1/16	.364	.070	.504
4444-013	7/16	9/16	1/16	.426	.070	.566
4444-014	1/2	5/8	1/16	.489	.070	.629
4444-015	9/16	11/16	1/16	.551 ±.007	.070	.691
4444-016	5/8	3/4	1/16	.614 ±.009	.070	.754
4444-017	11/16	13/16	1/16	.676	.070	.816
4444-018	3/4	7/8	1/16	.739	.070	.879
4444-019	13/16	15/16	1/16	.801	.070	.941
4444-020	7/8	1	1/16	.864	.070	1.004
4444-021	15/16	1 1/16	1/16	.926	.070	1.006
4444-022	1	1 1/8	1/16	.989 ±.010	.070	1.129
4444-023	1 1/16	1 3/16	1/16	1.051	.070	1.191
4444-024	1 1/8	1 1/4	1/16	1.114	.070	1.254
4444-025	1 3/16	1 15/16	1/16	1.176 ±.011	.070	1.316
4444-026	1 1/4	1 3/8	1/16	1.239	.070	1.379
4444-027	1 15/16	1 7/16	1/16	1.301	.070	1.441
4444-028	1 3/8	1 1/2	1/16	1.364 ±.013	.070	1.504

## X-2

- 10 Rings of Each Size
- 19 Different Sizes
- 4444-010 - 4444-028
- Buna N (5716)

PAI No.	Nominal			Actual		(Ref)
	I.D.	O.D.	C/S	I.D.	C/S	O.D.
4444-108	1/4	7/16	3/32	.237 ±.005	.103 ±.003	.445
4444-109	5/16	1/2	3/32	.299	.103	.507
4444-110	3/8	9/16	3/32	.362	.103	.568
4444-111	7/16	5/8	3/32	.424	.103	.630
4444-112	1/2	11/16	3/32	.487	.103	.693
4444-113	9/16	3/4	3/32	.549 ±.007	.103	.755
4444-114	5/8	13/16	3/32	.612 ±.009	.103	.818
4444-115	11/16	7/8	3/32	.674	.103	.880
4444-116	3/4	15/16	3/32	.737	.103	.943
4444-117	13/16	1	3/32	.779 ±.010	.103	1.005
4444-118	7/8	1 1/16	3/32	.862	.103	1.068
4444-119	15/16	1 1/8	3/32	.924	.103	1.130
4444-120	1	1 3/16	3/32	.987	.103	1.193
4444-121	1 1/16	1 1/4	3/32	1.049	.103	1.255
4444-122	1 1/8	1 15/16	3/32	1.112	.103	1.318
4444-123	1 3/16	1 3/8	3/32	1.174 ±.012	.103	1.380
4444-124	1 1/4	1 7/16	3/32	1.237	.103	1.443
4444-125	1 15/16	1 1/2	3/32	1.299	.103	1.505
4444-126	1 3/8	1 9/16	3/32	1.362	.103	1.568

## X-7

- 10 Rings of Each Size
- 19 Different Sizes
- 4444-108 - 4444-126
- Buna N (5716)

## X-2714

- 4 Rings of Each Size
- 57 Different Sizes
- -010 thru -028
- -108 thru-126
- -202 thru-220
- Buna N (5716)

PAI No.	Nominal			Actual		(Ref)
	I.D.	O.D.	C/S	I.D.	C/S	O.D.
4444-202	1/4	1/2	1/8	.234 ±.005	.139 ±.004	.512
4444-203	5/16	9/16	1/8	.296	.139	.579
4444-204	3/8	5/8	1/8	.359	.139	.637
4444-205	7/16	11/16	1/8	.421	.139	.699
4444-206	1/2	3/4	1/8	.484	.139	.762
4444-207	9/16	13/16	1/8	.546 ±.007	.139	.827
4444-208	5/8	7/8	1/8	.609 ±.009	.139	.887
4444-209	11/16	15/16	1/8	.672	.139	.950
4444-210	3/4	1	1/8	.734 ±.010	.139	1.012
4444-211	13/16	1 1/16	1/8	.796	.139	1.074
4444-212	7/8	1 1/8	1/8	.859	.139	1.137
4444-213	15/16	1 3/16	1/8	.921	.139	1.199
4444-214	1	1 1/4	1/8	.984	.139	1.262
4444-215	1 1/16	1 5/16	1/8	1.046	.139	1.324
4444-216	1 1/8	1 3/8	1/8	1.109 ±.012	.139	1.387
4444-217	1 3/16	1 7/16	1/8	1.171	.139	1.449
4444-218	1 1/4	1 1/2	1/8	1.234	.139	1.512
4444-219	1 5/16	1 9/16	1/8	1.296	.139	1.574
4444-220	1 3/8	1 5/8	1/8	1.359	.139	1.637

## X-14

- 10 Rings of Each Size
- 19 Different Sizes
- 4444-202 - 4444-220
- Buna N (5716)





# *U-Cups*





U-Cups



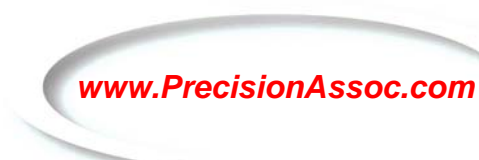
Precision Associates' Homogeneous Rubber U-Cups are the seal of choice for Pneumatic and low-pressure Hydraulic applications. Because U-Cups do not rely on initial compression to seal, they are excellent in applications that require low breakaway pressure. The sealing lips on Precision Associates' U-Cups are molded – not cut, so they are always symmetrical. The sealing lip has a very slight radius, reducing the likely hood of wiping all of the lubricant, which might cause a dry surface that leads to wear and early seal failure.

Our U-Cups are available in three standard configurations; AN, Straight Lip and Pruva™ styles. AN style U-Cups are designed in accordance with AN-6226. The original 53 sizes are listed with the dash numbers assigned by the standard. This lighter bodied seal has been so popular with some customers we have expanded our selection of AN sizes. Parts included in this extension to the standard are numbered similar to our other two styles.

Precision Associates' U-Cups are available off the shelf in our 70 and 80 Durometer Buna N and Fluoroelastomer compounds. For unusual applications, one of PAI's 1,000+ specialty materials, including our N-Dure extended wear compounds, may be your solution. If not, we can design a compound especially for you.



Mold IDen			Nominal Dimensions - Decimal			Nominal Dimensions - Fractional		
Pruva™	Straight	AN	C/S	I.D.	O.D.	C/S	I.D.	O.D.
666-006	626-006		.062	.125	.250	1/16	1/8	1/4
	626-007		.062	.156	.281	1/16	5/32	9/32
666-008	626-008		.062	.187	.312	1/16	3/16	5/16
	626-009		.062	.218	.343	1/16	7/32	11/32
666-010	626-010		.062	.250	.375	1/16	1/4	3/8
666-011	626-011		.062	.312	.437	1/16	5/16	7/16
666-012	626-012		.062	.375	.500	1/16	3/8	1/2
666-013			.062	.437	.563	1/16	7/16	9/16
	626-014		.062	.500	.625	1/16	1/2	5/8
	626-020		.062	.875	1.000	1/16	7/8	1
666-104	626-104		.093	.125	.312	3/32	1/8	5/16
666-106	626-106		.093	.187	.375	3/32	3/16	3/8
	626-107		.093	.218	.406	3/32	7/32	13/32
666-108	626-108		.093	.250	.437	3/32	1/4	7/16
666-109	626-109		.093	.312	.500	3/32	5/16	1/2
666-110	626-110		.093	.375	.562	3/32	3/8	9/16
666-111	626-111		.093	.437	.625	3/32	7/16	5/8





U-Cups



Pruva™	Mold IDen		Nominal Dimensions - Decimal			Nominal Dimensions - Fractional		
	Straight	AN	C/S	I.D.	O.D.	C/S	I.D.	O.D.
666-112	626-112		.093	.500	.687	3/32	1/2	11/16
666-113	626-113		.093	.562	.750	3/32	9/16	3/4
666-114	626-114		.093	.625	.812	3/32	5/8	13/16
666-115	626-115		.093	.687	.875	3/32	11/16	7/8
666-116			.093	.750	.937	3/32	3/4	15/16
	626-117		.093	.812	1.000	3/32	13/16	1
	626-118		.093	.875	1.062	3/32	7/8	1 1/16
666-120			.093	1.000	1.187	3/32	1	1 3/16
	626-130		.093	1.625	1.812	3/32	1 5/8	1 13/16
		6226-41	.125	.125	.375	1/8	1/8	3/8
666-201		6226-42	.125	.187	.437	1/8	3/16	7/16
666-202		6226-43	.125	.250	.500	1/8	1/4	1/2
666-203		6226-44	.125	.312	.562	1/8	5/16	9/16
666-204		6226-45	.125	.375	.625	1/8	3/8	5/8
666-205		6226-46	.125	.437	.687	1/8	7/16	11/16
666-206	626-206	6226-47	.125	.500	.750	1/8	1/2	3/4
666-207	626-207		.125	.562	.812	1/8	9/16	13/16
	626-40059		.125	.593	.843	1/8	19/32	27/32
666-208	626-208	6226-208	.125	.625	.875	1/8	5/8	7/8
666-209	626-209		.125	.687	.937	1/8	11/16	15/16
666-210	626-210		.125	.750	1.000	1/8	3/4	1
666-211	626-211		.125	.812	1.062	1/8	13/16	1 1/16
666-212	626-212		.125	.875	1.125	1/8	7/8	1 1/8
666-213			.125	.937	1.187	1/8	15/16	1 3/16
666-214	626-214		.125	1.000	1.250	1/8	1	1 1/4
666-216			.125	1.125	1.375	1/8	1 1/8	1 3/8
666-217			.125	1.187	1.437	1/8	1 3/16	1 7/16
666-218	626-218		.125	1.250	1.500	1/8	1 1/4	1 1/2
666-219			.125	1.312	1.562	1/8	1 5/16	1 9/16
	626-220		.125	1.375	1.625	1/8	1 3/8	1 5/8
666-222			.125	1.500	1.750	1/8	1 1/2	1 3/4
	626-223		.125	1.625	1.875	1/8	1 5/8	1 7/8
666-224			.125	1.750	2.000	1/8	1 3/4	2
666-226			.125	2.000	2.250	1/8	2	2 1/4
666-248			.125	4.750	5.000	1/8	4 3/4	5
666-259			.125	6.250	6.500	1/8	6 1/4	6 1/2

Please contact Precision Associates for sizes not listed.

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: (612) 333-7464  
Fax: (612) 342-2417  
Toll: (800) 394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



U-Cups



Mold IDen			Nominal Dimensions - Decimal			Nominal Dimensions - Fractional		
Pruva™	Straight	AN	C/S	I.D.	O.D.	C/S	I.D.	O.D.
	626-50025		.156	.250	.562	5/32	1/4	9/16
666-50050			.156	.500	.812	5/32	1/2	13/16
666-50081			.156	.812	1.125	5/32	13/16	1 1/8
666-50087			.156	.875	1.187	5/32	7/8	1 3/16
666-50093	626-50093		.156	.937	1.250	5/32	15/16	1 1/4
666-50100			.156	1.000	1.312	5/32	1	1 5/16
666-50106			.156	1.062	1.375	5/32	1 1/16	1 3/8
666-50112			.156	1.125	1.437	5/32	1 1/8	1 7/16
666-50118	626-50118		.156	1.187	1.500	5/32	1 3/16	1 1/2
666-50125	626-50125		.156	1.250	1.562	5/32	1 1/4	1 9/16
666-50131			.156	1.312	1.625	5/32	1 5/16	1 5/8
666-50137	626-50137		.156	1.375	1.687	5/32	1 3/8	1 11/16
666-50143			.156	1.437	1.750	5/32	1 7/16	1 3/4
666-50150			.156	1.500	1.812	5/32	1 1/2	1 13/16
	626-50162		.156	1.625	1.937	5/32	1 5/8	1 15/16
666-50175			.156	1.750	2.062	5/32	1 3/4	2 1/16
		6226-1	.187	.125	.500	3/16	1/8	1/2
		6226-2	.187	.187	.562	3/16	3/16	9/16
		6226-3	.187	.250	.625	3/16	1/4	5/8
		6226-4	.187	.312	.687	3/16	5/16	11/16
		6226-5	.187	.375	.750	3/16	3/8	3/4
		6226-6	.187	.437	.812	3/16	7/16	13/16
		6226-7	.187	.500	.875	3/16	1/2	7/8
666-312		6226-48	.187	.625	1.000	3/16	5/8	1
	626-313	6226-313	.187	.687	1.062	3/16	11/16	1 1/16
666-314		6226-49	.187	.750	1.125	3/16	3/4	1 1/8
		6226-50	.187	.875	1.250	3/16	7/8	1 1/4
666-318		6226-51	.187	1.000	1.375	3/16	1	1 3/8
		6226-52	.187	1.125	1.500	3/16	1 1/8	1 1/2
666-322		6226-53	.187	1.250	1.625	3/16	1 1/4	1 5/8
666-324	626-324		.187	1.375	1.750	3/16	1 3/8	1 3/4
666-325	626-325		.187	1.500	1.875	3/16	1 1/2	1 7/8
666-326	626-326		.187	1.625	2.000	3/16	1 5/8	2
666-327	626-327		.187	1.750	2.125	3/16	1 3/4	2 1/8
666-328	626-328		.187	1.875	2.250	3/16	1 7/8	2 1/4
666-329	626-329		.187	2.000	2.375	3/16	2	2 3/8



U-Cups



Mold IDen			Nominal Dimensions - Decimal			Nominal Dimensions - Fractional		
Pruva™	Straight	AN	C/S	I.D.	O.D.	C/S	I.D.	O.D.
666-330	626-330		.187	2.125	2.500	3/16	2 1/8	2 1/2
666-331			.187	2.250	2.625	3/16	2 1/4	2 5/8
666-332	626-332		.187	2.375	2.750	3/16	2 3/8	2 3/4
666-333			.187	2.500	2.875	3/16	2 1/2	2 7/8
666-334	626-334		.187	2.625	3.000	3/16	2 5/8	3
666-335			.187	2.750	3.125	3/16	2 3/4	3 1/8
666-336			.187	2.875	3.250	3/16	2 7/8	3 1/4
666-337			.187	3.000	3.375	3/16	3	3 3/8
666-338	626-338		.187	3.125	3.500	3/16	3 1/8	3 1/2
666-339			.187	3.250	3.625	3/16	3 1/4	3 5/8
666-340			.187	3.375	3.750	3/16	3 3/8	3 3/4
666-341	626-341		.187	3.500	3.875	3/16	3 1/2	3 7/8
	626-342		.187	3.625	4.000	3/16	3 5/8	4
666-70250			.218	2.500	2.937	7/32	2 1/2	2 15/16
666-70256	626-70256		.218	2.562	3.000	7/32	2 9/16	3
666-70268			.218	2.687	3.125	7/32	2 11/16	3 1/8
666-70275			.218	2.750	3.187	7/32	2 3/4	3 3/16
666-70281	626-70281		.218	2.812	3.250	7/32	2 13/16	3 1/4
666-70300			.218	3.000	3.437	7/32	3	3 7/16
666-70306			.218	3.062	3.500	7/32	3 1/16	3 1/2
666-70331			.218	3.312	3.750	7/32	3 5/16	3 3/4
666-70356			.218	3.562	4.000	7/32	3 9/16	4
		6226-8	.250	.250	.750	1/4	1/4	3/4
		6226-9	.250	.312	.812	1/4	5/16	13/16
		6226-10	.250	.375	.875	1/4	3/8	7/8
		6226-11	.250	.437	.937	1/4	7/16	15/16
		6226-12	.250	.500	1.000	1/4	1/2	1
		6226-13	.250	.562	1.062	1/4	9/16	1 1/16
		6226-14	.250	.625	1.125	1/4	5/8	1 1/8
		6226-15	.250	.687	1.187	1/4	11/16	1 3/16
666-16		6226-16	.250	.750	1.250	1/4	3/4	1 1/4
		6226-17	.250	.812	1.312	1/4	13/16	1 5/16
		6226-18	.250	.875	1.375	1/4	7/8	1 3/8
		6226-19	.250	.937	1.437	1/4	15/16	1 7/16
666-20		6226-20	.250	1.000	1.500	1/4	1	1 1/2
		6226-21	.250	1.062	1.562	1/4	1 1/16	1 9/16



U-Cups



Mold IDen			Nominal Dimensions - Decimal			Nominal Dimensions - Fractional		
Pruva™	Straight	AN	C/S	I.D.	O.D.	C/S	I.D.	O.D.
		6226-22	.250	1.125	1.625	1/4	1 1/8	1 5/8
		6226-23	.250	1.187	1.687	1/4	1 3/16	1 11/16
666-24		6226-24	.250	1.250	1.750	1/4	1 1/4	1 3/4
666-400	626-400		.250	1.375	1.875	1/4	1 3/8	1 7/8
666-401	626-401		.250	1.500	2.000	1/4	1 1/2	2
666-403			.250	1.750	2.250	1/4	1 3/4	2 1/4
	626-404		.250	1.875	2.375	1/4	1 7/8	2 3/8
666-405			.250	2.000	2.500	1/4	2	2 1/2
	626-406		.250	2.125	2.625	1/4	2 1/8	2 5/8
666-407			.250	2.250	2.750	1/4	2 1/4	2 3/4
666-409	626-409		.250	2.500	3.000	1/4	2 1/2	3
666-411			.250	2.750	3.250	1/4	2 3/4	3 1/4
	626-413		.250	3.000	3.500	1/4	3	3 1/2
666-417	626-417		.250	3.500	4.000	1/4	3 1/2	4
666-418			.250	3.625	4.125	1/4	3 5/8	4 1/8
666-419			.250	3.750	4.250	1/4	3 3/4	4 1/4
666-421	626-421		.250	4.000	4.500	1/4	4	4 1/2
666-423			.250	4.250	4.750	1/4	4 1/4	4 3/4
666-425	626-425		.250	4.500	5.000	1/4	4 1/2	5
666-427			.250	4.750	5.250	1/4	4 3/4	5 1/4
	626-433		.250	5.500	6.000	1/4	5 1/2	6
	626-434		.250	5.625	6.125	1/4	5 5/8	6 1/8
666-446			.250	8.500	9.000	1/4	8 1/2	9
666-90443	626-90443		.281	4.437	5.000	9/32	4 7/16	5
666-90456			.281	4.562	5.125	9/32	4 9/16	5 1/8
666-90500			.281	5.000	5.562	9/32	5	5 9/16
666-90543			.281	5.437	6.000	9/32	5 7/16	6
666-90593			.281	5.937	6.500	9/32	5 15/16	6 1/2
666-90743			.281	7.437	8.000	9/32	7 7/16	8
	626-100037		.312	.375	1.000	5/16	3/8	1
	626-100050		.312	.500	1.125	5/16	1/2	1 1/8
		6226-25	.312	1.250	1.875	5/16	1 1/4	1 7/8
		6226-26	.312	1.375	2.000	5/16	1 3/8	2
		6226-27	.312	1.500	2.125	5/16	1 1/2	2 1/8
		6226-28	.312	1.625	2.250	5/16	1 5/8	2 1/4
666-100175		6226-29	.312	1.750	2.375	5/16	1 3/4	2 3/8
		6226-30	.312	1.875	2.500	5/16	1 7/8	2 1/2



U-Cups



Mold IDen			Nominal Dimensions - Decimal			Nominal Dimensions - Fractional		
Pruva™	Straight	AN	C/S	I.D.	O.D.	C/S	I.D.	O.D.
		6226-31	.312	2.000	2.625	5/16	2	2 5/8
		6226-32	.312	2.125	2.750	5/16	2 1/8	2 3/4
		6226-33	.312	2.250	2.875	5/16	2 1/4	2 7/8
		6226-34	.312	2.375	3.000	5/16	2 3/8	3
		6226-35	.312	2.500	3.125	5/16	2 1/2	3 1/8
666-100287			.312	2.875	3.500	5/16	2 7/8	3 1/2
666-100437			.312	4.375	5.000	5/16	4 3/8	5
666-100512			.312	5.125	5.750	5/16	5 1/8	5 3/4
666-100537			.312	5.375	6.000	5/16	5 3/8	6
666-100550			.312	5.500	6.125	5/16	5 1/2	6 1/8
666-100600			.312	6.000	6.625	5/16	6	6 5/8
666-100637	626-100637		.312	6.375	7.000	5/16	6 3/8	7
666-100737	626-100737		.312	7.375	8.000	5/16	7 3/8	8
	626-110162		.343	1.625	2.312	11/32	1 5/8	2 5/16
666-110931	626-110931		.343	9.312	10.000	11/32	9 5/16	10
	626-120012		.375	.125	.875	3/8	1/8	7/8
	626-120150		.375	1.500	2.250	3/8	1 1/2	2 1/4
666-120225	626-120225		.375	2.250	3.000	3/8	2 1/4	3
666-120250		6226-36	.375	2.500	3.250	3/8	2 1/2	3 1/4
666-120262		6226-37	.375	2.625	3.375	3/8	2 5/8	3 3/8
666-120275		6226-38	.375	2.750	3.500	3/8	2 3/4	3 1/2
		6226-39	.375	2.875	3.625	3/8	2 7/8	3 5/8
		6226-40	.375	3.000	3.750	3/8	3	3 3/4
666-120325	626-120325		.375	3.250	4.000	3/8	3 1/4	4
	626-120350		.375	3.500	4.250	3/8	3 1/2	4 1/4
666-120425	626-120425		.375	4.250	5.000	3/8	4 1/4	5
666-120525			.375	5.250	6.000	3/8	5 1/4	6
666-121125			.375	11.250	12.000	3/8	11 1/4	12
666-131318			.406	13.187	14.000	13/32	13 3/16	14
666-140512	626-140512		.437	5.125	6.000	7/16	5 1/8	6
	626-160700		.500	7.000	8.000	1/2	7	8
	626-160900		.500	9.000	10.000	1/2	9	10
	626-161100		.500	11.000	12.000	1/2	11	12
666-161300	626-161300		.500	13.000	14.000	1/2	13	14



# V-Rings

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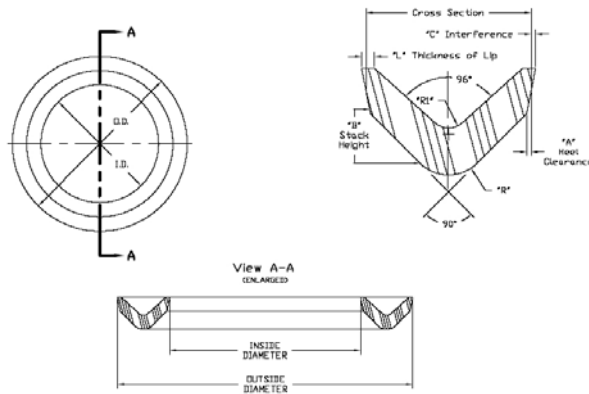
## V-Rings



Precision Associates V-Rings are designed in accordance with drawing AN 6225. Sizes exactly matching the drawing are noted with prefix number 6225 and suffix numbers of -1 thru -80. PAI has produced additional sizes of V-Rings using similar design dimensions. They are listed here as well.

Buna N compounds 5747 (70 durometer) and 5939 (90 durometer) are our standard material for V-Rings, but we routinely mold them in Fluoroelastomers, EPDM, as well as specialty materials.

The table on the following page contains sizes on which we are already tooled. Please contact us for additional sizes.



	Cross Section Groups					
	I	II	III	IV	V	VI
Dash Numbers	-1 to -7	-8 to -24	-25 to -35	-36 to -47	-48 to -55	-56 to -80
Nominal Width	3/16	1/4	5/16	3/8	7/16	1/2
Cross Section	.191	.253	.316	.379	.442	.505
A (Reference)	.006	.006	.007	.009	.010	.010
B ± .010	.083	.083	.140	.158	.197	.197
"C" Maximum	.013	.011	.023	.029	.036	.031
"C" Minimum	.009	.008	.017	.022	.029	.025
"R"	1/16	1/16	7/64	1/8	5/32	5/32
"R1"	1/32	1/32	3/64	3/64	1/16	1/16
"L" Maximum	.020	.020	.035	.035	.035	.035
"L" Minimum	.005	.005	.005	.005	.005	.005



Size	Nominal		C/S
	I.D	O.D	
6225-1	1/8	1/2	3/16
6225-2	3/16	9/16	
6225-3	1/4	5/8	
6225-4	5/16	11/16	
6225-5	3/8	3/4	
6225-6	7/16	13/16	
6225-7	1/2	7/8	
6225-8	1/4	3/4	
6225-9	5/16	13/16	1/4
6225-10	3/8	7/8	
6225-11	7/16	15/16	
6225-12	1/2	1	
6225-13	9/16	1 1/16	
6225-14	5/8	1 1/8	
6225-15	11/16	1 3/16	
6225-16	3/4	1 1/4	
6225-17	13/16	1 5/16	
6225-18	7/8	1 3/8	
6225-20	1	1 1/2	
6225-22	1 1/8	1 5/8	
6225-23	1 3/16	1 11/16	
6225-24	1 1/4	1 3/4	
6225-401	1 1/2	2	
6225-405	2	2 1/2	
6225-409	2 1/2	3	
652-410	2 5/8	3 1/8	

Size	Nominal		C/S
	I.D	O.D	
6225-25	1 1/4	1 7/8	5/16
6225-26	1 3/8	2	
6225-27	1 1/2	2 1/8	
6225-28	1 5/8	2 1/4	
6225-29	1 3/4	2 3/8	
6225-30	1 7/8	2 1/2	
6225-31	2	2 5/8	
6225-33	2 1/4	2 7/8	
6225-34	2 3/8	3	
6225-35	2 1/2	3 1/8	
6225-36	2 1/2	3 1/4	3/8
6225-37	2 5/8	3 3/8	
6225-38	2 3/4	3 1/2	
6225-40	3	3 3/4	
6225-42	3 1/4	4	
6225-43	3 3/8	4 1/8	
6225-44	3 1/2	4 1/4	7/16
6225-45	3 5/8	4 3/8	
6225-46	3 3/4	4 1/2	
6225-49	4	4 7/8	1/2
6225-50	4 1/4	5 1/8	
6225-51	4 1/5	5 3/8	
6225-57	5 3/4	6 3/4	
6225-78	14	15	

Please contact Precision Associates for sizes not listed.





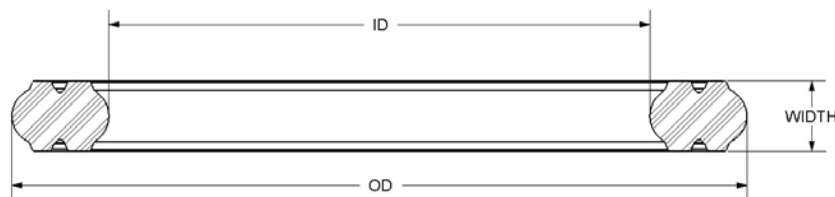
**8-Rings™**

## Bi-Directional Pneumatic Piston Seals

Precision Associate's 8-Rings™ are used almost exclusively as piston seals in pneumatic applications requiring a low profile and long wear. Unlike O-Rings, 8-Rings will not roll or twist. 8-Rings' unique bumpers reduce premature failure due to nibbling, while preventing pressure trap.

For extra long life and lower breakaway pressures, we recommend 8-Rings™ made in our compound 55857. In addition to being internally lubricated, 55857 will perform well at higher pressures and temperatures than standard Nitrile compounds. Compound 55857 is your best choice for dry air applications.

PAI 8-Rings are also available in 70 durometer Nitrile (NBR) and Fluoroelastomer (FKM) as well as most of our other 900+ compounds.



Size	Nominal Seal Dimensions			Groove Dimensions	
	OD mm	ID mm	Width mm	Width mm	ID MM
908-10	10	5.4	1.6	1.8	5.4
908-12	12	7.4	1.6	1.8	7.4
908-16	16	11.4	1.6	1.8	11.4
908-20	20	14	2.24	2.4	14
908-25	25	17	3	3.2	17
908-32	32	24	3	3.2	24
908-40	40	32	3	3.2	32
908-50	50	40	3.8	4	40
908-63	63	53	3.8	4	53
908-80	80	65	5.6	6	65

Please contact Precision Associates for sizes not listed, including inch sizes.



# Wipers

H-Wipers  
Rod Wipers





# Wipers

## H-Wipers



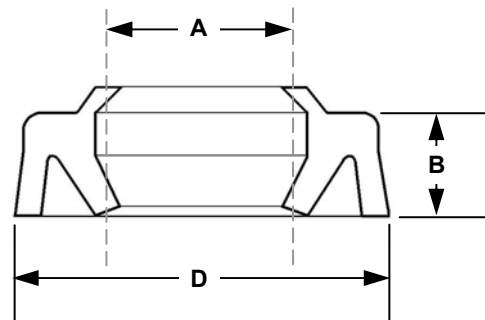
Precision Associates manufactures 2 popular style of Rod Wipers as well as a series of "H" Wipers.

Our first line of rod wipers is made to comply exactly with Military Drawing AN 28776. These wipers are commonly referred to as "AN" Style. We also make another series with a slightly heavier profile. Most noticeable is the Base Thickness. These wipers are referred to as the "Linear" Style. Both of these styles of Rod Wipers are available as a standard in our compound 5939, a 90 Durometer Nitrile (Buna N). They can also be molded in most of our other 900+ compounds. The sizes we are currently tooled for are listed on the following page. Please contact Precision Associates for sizes not listed.

Precision Associates H-Wipers combine a wiping lip with a U-Cup base. These special wiper/seals are used as a primary or secondary seal in pneumatic and other applications. H-Wipers are available as a standard in our compound 3847, an 80 Durometer Nitrile (Buna N). They can also be made in most of our other 900+ compounds. The sizes we are currently tooled on are listed below. Please contact Precision Associates for sizes not listed.

## H Wipers

Size	"A" Rod Diameter	"B" Base Thickness	"D" Outside Diameter
860-0025	1/4	.194	9/16
860-0031	5/16		5/8
860-0037	3/8		11/16
860-0043	7/16		3/4
860-0050	1/2		13/16
860-0062	5/8		15/16
860-0075	3/4		1
860-0100	1	.212	1 3/8
860-0106	1 1/16		1 7/16
860-0125	1 1/4		1 5/8
860-0137	1 3/8		1 3/4
860-0150	1 1/2		1 7/8
860-0175	1 3/4		2 1/8
860-0200	2		2 3/8
860-0250	2 1/2	.275	3
860-0300	3		3 1/2
860-0325	3 1/4		3 3/4
860-0350	3 1/2		4
860-0450	4 1/2		5
860-0500	5		5 1/2
860-0875	8 3/4		9 1/4



Please Contact Precision Associates for sizes not listed.



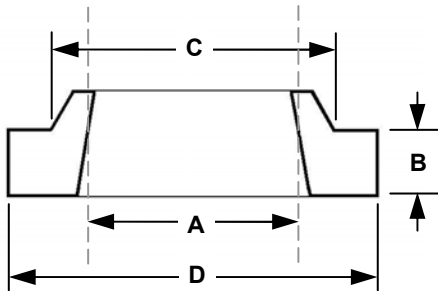
# Wipers

## Rod Wipers



### AN Style Rod Wipers

Size	"A" Rod Diameter	"B" Base Thickness	"C" Wiper Lip O.D.	"D" Outside Diameter
776-110	3/8	.094	.492	.615
776-1	1/2		.617	.740
776-3	5/8		.742	.865
776-5	3/4		.982	.990
776-7	7/8		1.094	1.094
776-9	1		1.106	1.219
776-10	1 1/16		1.169	1.282
776-11	1 1/8		1.232	1.344
776-13	1 1/4		1.356	1.469
776-14	1 5/16		1.450	1.594
776-15	1 3/8		1.512	1.657
776-17	1 1/2		1.638	1.782
776-19	1 3/4		1.888	2.032
776-21	2		2.138	2.282
776-25	2 1/2		2.638	2.782
776-26	2 5/8		.109	2.794
776-27	2 3/4	2.919		3.094



### Linear Style Rod Wipers

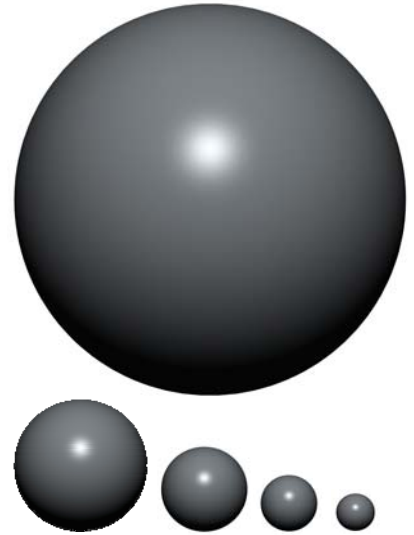
Size	"A" Rod Diameter	"B" Base Thickness	"C" Wiper Lip O.D.	"D" Outside Diameter
716-375	3/8	.104	.500	.622
716-500	1/2		.623	.766
716-625	5/8		.748	.891
716-750	3/4		.873	1.016
716-1.000	1		1.113	1.246
716-1.062	1 1/16		1.176	1.309
716-1.125	1 1/8		1.239	1.371
716-1.375	1 3/8		1.519	1.684
716-1.500	1 1/2		1.645	1.809
716-1.625	1 5/8		1.770	1.934
716-1.750	1 3/4		1.895	2.059
716-1.875	1 7/8		2.020	2.184
716-2.125	2 1/8		2.270	2.434
716-5.500	5 1/2		.135	5.708

Please Contact Precision Associates for sizes and styles not listed.



# *Rubber Balls*

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### Precision Ground Balls

Our Rubber Balls are precision ground to remove parting lines for a superior sealing surface. Ground balls are available in a variety of Polymers in durometers from 70 to 90. Our standard materials are listed below. Compound 5716 is usually available "off the shelf".

ASTM Designation	Common Polymer Name	Standard Compound	Durometer
NBR	Nitrile, Buna N	5716	70
FKM	Fluoroelastomer, Viton®	8746	75
CR	Neoprene	4753	70
EPDM	EPDM	23701	70
HNBR	Hydrogenated Nitrile	55801	75

Most compounds that are 70 Durometer and higher in these five polymers can be used to make ground balls. Sometimes we are able to grind balls in compounds or polymers that are not normally ground. Contact us to find out if we can produce your special requirement. Ground balls are available in the sizes and tolerances listed below. Because our balls are ground after molding, you do not need to consider compound shrinkage.

PAI Size	Fractional Diameter	Decimal Diameter	Diametric Tolerance +/-	Sphericity
1901-188	3/16	.187	.003	.003
1901-250	1/4	.250	.003	.003
1901-312	5/16	.312	.003	.003
1901-375	3/8	.375	.003	.003
1901-437	7/16	.437	.004	.004
1901-500	1/2	.500	.004	.005
1901-625	5/8	.625	.004	.005
1901-750	3/4	.750	.004	.005

Please contact Precision Associates for sizes not listed.





## Rubber Balls



### Molded Balls

Molded Rubber Balls can be made in almost every one of our 1,000+ compounds. Current tooling is listed below.

Mold IDen	Size	
901-044		.044
901-060		.060
901-127	1/8 in.	.127
901-134		.134
901-139		.139
901-156	5/32 in.	.156
901-188	3/16 in.	.188
901-200		.200
901-218	7/32 in.	.218
901-250	1/4 in.	.250
901-259		.259
901-264		.264
901-281	9/32 in.	.281
901-312	5/16 in.	.312
901-320		.320
901-325		.325
901-375	3/8 in.	.375
901-390	25/64 in.	.390
901-402		.402
901-446		.446

Mold IDen	Size	
901-450		.450
901-500	1/2 in.	.500
901-528		.528
901-645		.645
901-760		.760
901-768		.768
901-775		.775
901-866	22 mm	.866
901-896		.896
901-937	15/16 in.	.937
901-1.000	1 in.	1.000
901-1.125	1 1/8 in.	1.125
901-1.375	1 3/8 in.	1.375
901-1.500	1 1/2 in.	1.500
901-1.625	1 5/8 in.	1.625
901-2.039		2.039
901-2.750	2 3/4 in.	2.750
901-5.000	5 in.	5.000
901-6.500	6 1/2 in.	6.500

Please contact Precision Associates for sizes not listed.

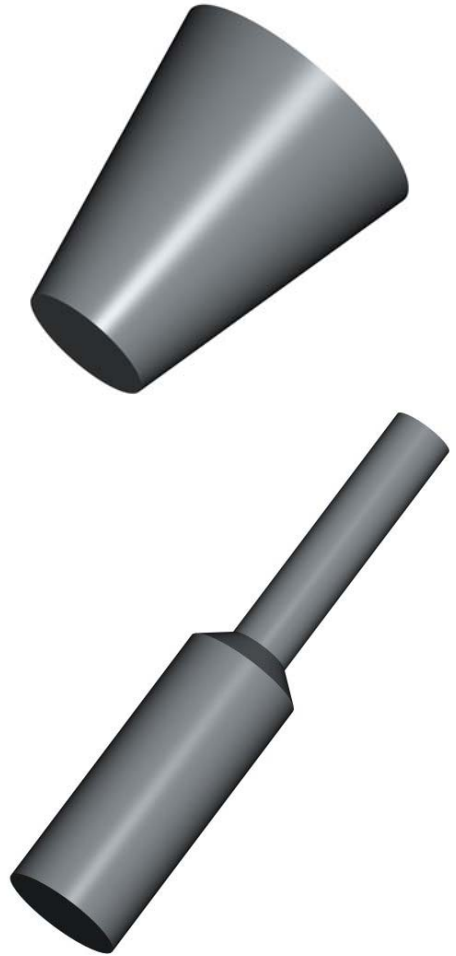
### Polished Balls

Because of properties inherent in some rubber materials, they cannot be successfully ground. As an alternative, PAI uses a method we call "Polishing" to provide a surface finish that is an improvement over standard *molded* balls. In many cases the parting line can be reduced significantly using this process. All of our balls under 1/2" can be polished successfully. Larger balls can also be improved by polishing. This polishing process is also an option to avoid expensive grinding fixtures for your custom size requirements. The finish of *ground* balls can also be improved by polishing them to a shiny finish.



# Hol-Masks™

Tapered & Pull Thru  
Masking Plugs





## Hol-Masks™

Tapered  
Masking Plugs



Low-cost, easy-application protection for holes, threads, counter bores, etc. in the process of Electroplating, Anodizing, Dipping, Painting, De-burring, etc.

Precision Associates' Hol-Masks™ are molded in a specially developed high-strength EPDM compound that is resistant to all plating solutions, high temperature, etc. as are normally encountered in the finishing industry. Although this low cost permits just one time use, they can be re-used many times.

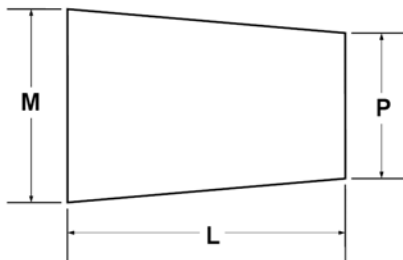
For specialty applications, such as extreme heat, special chemicals, or other unusual circumstances, PAI can mold these sizes in one of our other 900+ compounds. Contact us for help determining the compound suitable for you special need.

The tables on these two pages contain our standard stock sizes. Sometimes unique problems can be solved with a custom shape masking device. Please contact our engineering department for help with your special design. Our in-house tooling facility can quickly produce a mold to your specifications.

### Tapered Hol-Masks™ for Bottomed Holes

Size	M	P	L
915-112	.112	.046	.465
915-125	.125	.031	.650
915-135	.135	.085	.386
915-160	.160	.100	.390
915-200	.200	.115	.475
915-188	.215	.118	.375
915-250	.250	.060	.500
915-249	.250	.063	.750
915-251	.250	.125	.530
915-313	.313	.187	.530
915-314*	.314	.187	1.030
915-370	.370	.260	.730
915-430	.430	.320	.730

Size	M	P	L
915-570*	.570	.381	1.500
915-750	.750	.375	.875
915-1.188	1.188	.812	1.000
915-1.615	1.615	1.300	1.000
915-1.626	1.625	1.125	1.120
915-1.625	1.625	1.125	1.120
915-2.086	2.086	1.775	1.030
915-2.137	2.137	2.072	1.500
915-2.250	2.250	1.950	1.000
915-2.570	2.570	2.070	1.030
915-2.610	2.610	2.300	1.000
915-3.070	3.070	2.440	1.375
915-4.188	4.188	1.500	1.500



\*Indicates that the Hol-Mask has a tag on the (M) end to aid installation and removal.

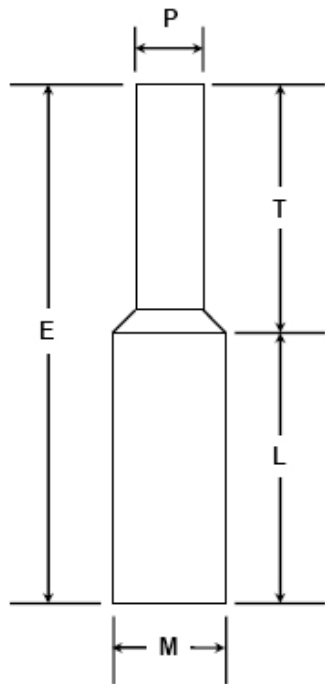


# Hol-Masks™

Pull-Thru  
Masking Plugs



## Pull-Thru Hol-Masks™ for Through Holes



Size	M	P	L	T	E
927-055	.055	.035	.563	.563	1.125
927-060	.060	.035	.563	.563	1.125
927-069	.067	.047	.625	.625	1.250
927-090	.090	.062	.875	.875	1.750
927-093	.091	.062	.625	.625	1.250
927-107	.104	.062	.625	.625	1.250
927-105	.105	.075	.875	.875	1.750
927-125	.121	.062	.625	.625	1.250
927-137	.137	.110	.875	.875	1.750
927-145	.145	.095	.250	.370	.620
927-150	.150	.120	1.125	1.125	2.250
927-157	.154	.091	.375	.375	.750
927-166	.162	.093	.625	.625	1.250
927-181	.181	.125	1.000	1.000	2.000
927-195	.195	.110	.625	.625	1.250
927-225	.225	.125	.625	.625	1.250
927-226	.226	.125	1.324	1.464	2.788
927-250	.245	.193	.500	.500	1.000
927-260	.257	.130	.625	.625	1.250
927-284	.287	.160	1.150	1.150	2.300
927-312	.310	.147	.625	.625	1.250
927-335	.335	.157	.625	.625	1.250
927-370	.370	.250	1.150	1.438	2.588
927-388	.388	.157	.625	.625	1.250
927-414	.414	.157	.625	.625	1.250
927-441	.440	.200	.875	.875	2.000
927-445	.445	.157	.625	.625	1.250
927-496	.496	.187	.625	.625	1.250
927-510	.510	.187	.625	.625	1.250
927-620	.620	.250	.875	.875	1.750
927-751	.750	.375	.950	1.062	2.012
927-765	.765	.200	.625	.625	1.250



# ESP Bags

Electric Submersible Pumps (ESP) are one type of artificial lift system used in oil wells to pump fluids to the surface. Elastomer bags function as protectors of the motor within the system. The bag, manufactured from a high temperature, high performance elastomer, is positioned to separate the well fluids on the outside from the clean motor oil on the inside. The elastomer provides the flexibility necessary for thermal volume changes of the oil. Selection of the proper rubber material for operating in the well environment is critical to performance.

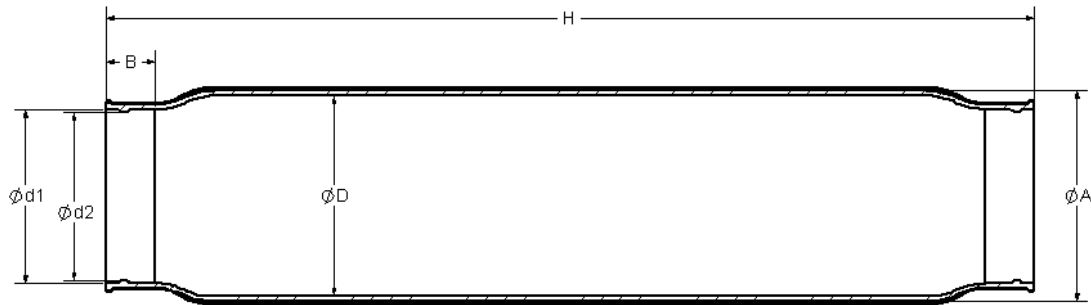
ESP bags are molded from compounds developed especially for down-hole use including AFLAS<sup>®</sup>, HNBR, NBR, Viton<sup>®</sup>, and Perfluoroelastomer.

Laser marking is available for part number identification, batch and cure date information or compound identification.

Precision Associates has standard tools available for the sizes listed below.



ISO 9001-2008  
Registered



PAI Product	H (inches)*	ød1 (inches)*	ød2 (inches)*	øD (inches)*	B (inches)*	øA (inches)*
920-17.543	17.54	2.80	2.68	3.10	1.00	3.30
920-17.716	17.72	2.13	2.00	2.64	0.87	2.82
920-17.717	17.72	2.60	2.47	3.21	0.87	3.40
920-17.756	17.76	2.60	2.47	3.21	0.73	3.39
920-18.838	18.84	3.59	3.47	4.13	1.00	3.30

\*General tolerances are +/-0.5%. Compound specifics will affect shrink.



## Custom Parts



If you need a special  
O-Ring, Lip Seal,  
Gasket,  
Rubber-to-Metal  
or other custom shape,  
we'll design and  
manufacture just what your  
situation requires.

Our In-House Tooling facility assures your mold is produced rapidly and economically ... so a custom solution can be delivered almost as quickly as one of our many standard solutions.



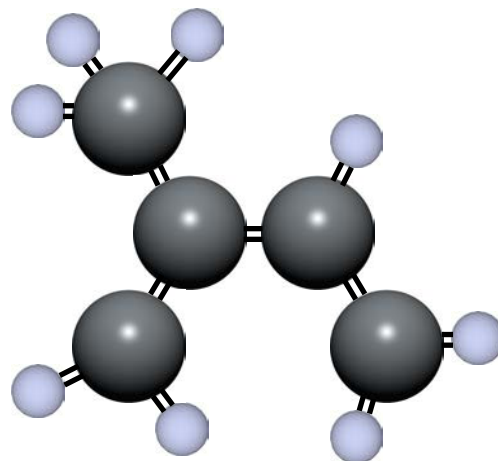
We will manufacture a mold directly to your specifications and drawings. Or our engineers can work with you to learn your specific needs, and then propose a number of alternative solutions from which to choose.

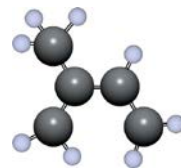
Most likely, one of our many compounds will be exactly what you need. But if it isn't, we'll develop a compound especially for you.



# *Compound Selection Guide*

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THIS DOCUMENT SHOULD BE USED AS A DESIGN GUIDE FOR SELECTING SUITABLE ELASTOMERIC MATERIALS FOR YOUR APPLICATION. IT IS DIVIDED INTO THREE SECTIONS:

## POLYMERS

The polymers used by Precision Associates are listed on the next page. Included are the common names, the ASTM designations, chemical names, our number, and the polymer shrink range.

Our tooling is commonly cut for 2.0% shrinkage. Many compounds have shrinkage rates that will cause them to be outside of the normal tolerance range for a given size. Due to the elastic nature of rubber, products will often function well even though they are under/over sized. When designs requiring close tolerances are necessary, engineers should contact Precision Associates for specific guidelines. We may already have, or may suggest, special tooling to compensate for non-standard materials.

## SPECIFICATIONS

This section contains a listing of specifications with an abbreviated description. When the specification describes a rubber material, we have included the Precision Associates compound number of first choice for evaluation. Other materials may be suitable as well.

Many Military specifications have Lot Testing requirements in addition to meeting the original property tests. These Lot Tests require additional cost and are added as one-time charges for each shipment. If a product is required to meet a specification, the specification number and all required tests must be noted when requesting pricing and when placing an order. Also, many Military specifications have size tolerance requirements that may necessitate special tooling.

## CHEMICAL COMPATIBILITY

This section contains chemical names and our recommendation of a compound for you to evaluate. In most cases we have listed a black 70-75 durometer material in the most compatible, least expensive compound suitable for the application. Often we will have other compounds in different colors and/or durometers that may work even better in your particular application. With over 900 compounds in production, we are likely to have one that fits your requirements. If not, our team may develop one for you. Please contact us for our recommendations.

In addition to our recommended compound, we show the general compatibility of the most common polymers with each of the chemicals listed.

If multiple materials or unusual conditions complicate your sealing situation, please fill out the Material Selection Worksheet at the end of this section and fax it to us. Our technical staff will evaluate your data and contact you with our suggestion.

## PLEASE NOTE:

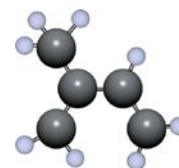
The compounds listed in this Selection guide are recommendations only. Customers should determine the suitability of our compounds in their own applications.





# Compound Selection Guide

## Polymers



### POLYMERS USED BY PRECISION ASSOCIATES

Common or Trade Name	ASTM Abbr	Chemical Name	PAI Cpd Series	Shrink Range %
Acrylic	ACM	Polyacrylate	21xxx	2.0 - 4.0
Aflas®	FEPM	Tetrafluoroethylene Propylene	25xxx	3.0 - 4.5
Blend		Various Polymer Blends	6xxx	
Buna N, Nitrile	NBR	Butadiene Acrylonitrile	3xxx	1.5 - 3.5
			5xxx	
			7xxx	
Buna S	SBR	Styrene Butadiene	15xxx	2.0 - 3.0
Butyl	CIIR	Chlorobutyl	13xxx	1.1 - 2.3
	IIR	Isobutylene Isoprene		
Carboxylated Nitrile	XNBR	Carboxylic Acrylonitrile Butadiene	77xxx	2.0 - 3.0
Chlorinated	CM	Chloro-Polyethylene	16xxx	2.0 - 3.0
EPDM	EPDM	Ethylene Propylene Diene Terpolymer	23xxx	1.9 - 3.5
Fluorel®	FKM	Fluoroelastomer	9xxx	2.0 - 4.5
Fluorosilicone	FVMQ	Fluoro Methyl Vinyl Silicone	20xxx	2.8 - 4.7
Highly Saturated Nitrile	HNBR	Hydrogenated NBR	55xxx	2.0 - 3.0
Hydrin	ECO	Epichlorohydrin	32xxx	2.0 - 3.0
Hypalon®	CSM	Chlorosulfonated Polyethylene	14xxx	1.8 - 3.0
Natural Rubber	IR	Isoprene	1xxx	2.0 - 3.5
Neoprene®	CR	Chloroprene	4xxx	1.0 - 3.0
P-REX™	FFKM	Perfluoroelastomer	34xxx	3.0 - 4.0
Silicone	PVMQ	Methyl Phenyl Vinyl Silicone	19xxx	2.0 - 5.0
	VMQ	Methyl Vinyl Silicone		
Silicone, Medical			49xxx	
Teflon®	PTFE	Tetrafluoroethylene	18xxx	N/A
Urethane	AU	Polyester Urethane	35xxx	1.6 - 3.3
	EU	Polyether Urethane		
Vamac®	AEM	Ethylene Acrylate	22xxx	2.0 - 4.0
Viton®	FKM	Fluoroelastomer	8xxx	2.0 - 4.5

### COMPOUND NOMENCLATURE

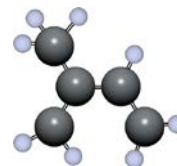
Precision Associates compound numbers are typically four or five digits. The number(s) in the thousand position(s) specify the base polymer. The digit in the hundred position signifies the durometer in multiples of ten. The last two digits separate like-compounds within a given polymer/durometer group.

Examples for compounds 5747 and 19711 follow:

5	7	4	7	70 Durometer Butadiene Acrylonitrile
1	9	5	1 1	50 Durometer Silicone
Polymer Group	Duro	File Number		



# Compound Selection Guide Specifications



## SPECIFICATIONS

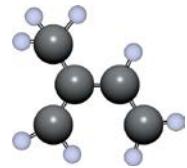
The following pages contain brief descriptions of over 365 military and industrial specifications that relate to O-Rings. For more complete information on these or other specifications please call our manufacturing facility. We are continually updating our files and developing new compounds to meet customer requirements.

- (A4)** Age control, no more than 4 quarters old at time of delivery.
- (B)** Specification requires certification and testing of each lot and/or batch. There is an additional charge for this service when required. Customer must request Batch Certification when placing order.
- (P1)** Specification calls out individual packaging and identification per AMS 2817. This service is available at extra cost; quoted prices do not include individual packaging unless specifically stated.
- (P2)** Specification calls out individual packaging per MIL-P-4861.
- (Q)** QPL specification
- (T)** Qualification testing required.
  
- AIR** Aeronautical Information Report
- AMS** Aerospace Material Specification
- AN** Airforce-Navy Aeronautical Standard
- ARP** Aeronautical Recommended Practice
- AS** Aerospace Standard
- ASTM** American Society for Testing and Materials
- BSI** British Standards Institute
- DIN** German Institute for Standardization
- ISO** International Organization for Standardization
- JIS** Japanese Industrial Standard
- MIL** Military Specification
- MS** Military Standard
- NAS** National Aerospace Standard
- N/A** Not Available
- SAE** Society of Automotive Engineers

MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION															
<b>CLHX3</b>		Seal, Oil type ML - is a metal encased seal with spring-loaded leather or neoprene sealing member. Superseded by mil. specs.															
<b>SAE J 14</b>		Canceled. Superseded by SAE J200 and ASTM D2000.															
<b>AIR 63</b>		"O-Ring Size and Part Number Cross Reference Chart". Cross references many of the O-Ring sizes found on the various drawings: <table style="margin-left: 40px; border: none;"> <tr> <td>CKCX2</td> <td>CKCX3</td> <td>AS568</td> <td>AN6227</td> <td>AN 6230</td> </tr> <tr> <td>MX9021</td> <td>MS28775</td> <td>MS28784</td> <td>MS29513</td> <td></td> </tr> <tr> <td>AN123870</td> <td>AN12391</td> <td>AN123970</td> <td>AN124014</td> <td></td> </tr> </table>	CKCX2	CKCX3	AS568	AN6227	AN 6230	MX9021	MS28775	MS28784	MS29513		AN123870	AN12391	AN123970	AN124014	
CKCX2	CKCX3	AS568	AN6227	AN 6230													
MX9021	MS28775	MS28784	MS29513														
AN123870	AN12391	AN123970	AN124014														
<b>AFLCM71</b>		Preservation, Packaging methods and instructions for coding.															
<b>AN-P-79</b>		Superseded by MIL-P-5516B O-Rings class B Nitrile.															
<b>AIR 81</b>		"Hydraulic Fluid Characteristics"															
<b>Fed. Std. 90</b>		Describes the principle synthetic rubber specification limits sampling and testing.															
<b>MIL-STD-100</b>		"Engineering Drawing Practices".															
<b>MIL-STD-105</b>		"Sampling Procedures and Tables for Inspection by Attributes".															



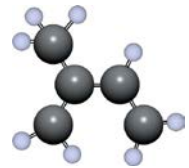
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
H 106		"Multi-Level continuous sampling procedures and instructions for selection and administration of sampling inspection procedures".
H 107		"Single-Level Continuous Sampling Procedures and Tables for Inspection by Attributes".
MIL-P-116		"Methods of Preservation" to protect against corrosion, mechanical and physical damage.
MIL-B-117		"Heat sealable, interior packaging bags, sleeves and tubing required by Military Services for the protection of supplies".
SAE J 120 (Obsolete)		"Rubber Automotive Applications" Dash numbers correspond with AS 568 series. Dash number "R1" denotes O-rings;"R2" denotes square cross-section rings. Class I - Oil resistant service Class II - Gasoline Resistant service
MIL-P-121		Flexible, greaseproofed, waterproofed barrier material used for protection of supplies and equipment during transportation and storage.
MIL-STD-129		"Marking for Shipment and Storage".
MIL-STD-130		"Identification Marking of US Military Property".
MIL-HDBK-149		"Rubber" 500 page Handbook of Rubber Properties.
HH-P-151		"Cloth-Insert Rubber-Sheet Packing" Intended for flange joints for water or brine services up to 250 pounds pressure and ventilating systems.
HH-G-156		General Purpose Rubber Gasket Material. Type I - Soft 35-45 durometer Type II - Medium 50-60 durometer Type III - Hard 75-85 durometer
MIL-STD-177		"Terms for Visible Defects of Rubber Products".
NACE TM 0187		Standard test Method for Evaluating Elastomeric Materials in Sour Gas Environments
SAE J200		"Classification System for Rubber Materials for Automotive Applications" Same nomenclature system as ASTM D2000. See ASTM D2000 for more details.
MIL-STD-289		"Visual Inspection Guide for Rubber Sheet Material".
Mil-STD-298		"Visual Inspection Guide for Rubber Extruded Goods".
L-P-390		Polyethylene and copolymers for general purpose, dielectric and weather resistant uses in low, medium and high density.
MIL-STD-407		"Visual Inspection Guide for Rubber Molded Items".
MIL-STD-413		"Visual Inspection Guide for Rubber Molded O-Rings".
MIL-STD-417		Nomenclature system for specifying the properties of a wide range of compounds with many classes and grades. Supersedes MIL-R-3065.
MIL-G-432		"Synthetic Rubber Gaskets-Nonmetallic" Five types of synthetic rubber gaskets.
ANA 438		Canceled. Superseded by MIL-STD-1523.
MIL-STD-454		"Standard General Requirements for Electronic Equipment".
TT-C-490		"Cleaning Methods for Ferrous Surfaces & Pretreating for Organic Coatings".
L-P-512		"Requirements for Polyethylene Sheets" .
SAE J 514		"Straight Thread Tube Fitting Boss Gasket Gland Dimensions".
SAE J 515	7915 23811 9948	"Hydraulic O-Ring" Sizes correspond with AS 568 straight thread tube fitting boss gaskets: Type CH Petroleum base and nonflammable waterbase hydraulic fluids 85-95 durometer. Type CA Nonflammable phosphate ester base hydraulic fluid 75-85 durometer. Type HK High Temperature for Hydraulic Fluids 85 -95 Durometer



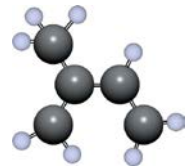
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
AS 568A		Standardized dash numbering system for O-Rings. Dimensions for 379 sizes are published as the minimum and maximum cross section and inside diameter for each dash number and expressed both in millimeters and inches.
L-P-590		"Requirements for Polyethylene Molding and Extrusion Plastic Compounds".
FED-STD-601		Federal Test Method standard for sampling and testing rubber.
NAS 617		Thirteen standard size O-rings. Dash numbers correspond with AS 568 straight thread tube fitting boss gaskets (900 series). Material 65-75 durometer nitrile per MIL-R-7362 Type 1, Composition A.
MIL-STD-670		"Classification System and Tests for Cellular Elastomeric Materials".
MIL-HDBK-695		Shelf storage of rubber products.
AS 708		Special O-ring surface condition requirements (top quality).
NORSOK M-710		"Qualification of non-metallic sealing materials and manufacturers"
ZZ-R-710		Vulcanized rubber gasket material of 35 durometer hardness.
MIL-STD-726		"Packaging Requirements Code".
ASTM D735		Canceled. Superseded by SAE J200 and ASTM D2000.
TT-S-735	*	"Hydrocarbon Standard Test Fluids" Supersedes MIL-S-3136B Type I - Iso-octane (ASTM Ref. Fuel A) Type II - Iso-octane and aromatic mixture Type III - Iso-octane and toluene mixture (ASTM Ref. Fuel B) Type IV - Petroleum base oil, low swell characteristics (ASTM Oil #1) Type V - Petroleum base oil, medium swell characteristics (ASTM Oil #2) Type VI - Petroleum base oil, high swell characteristics (ASTM Oil #3) Type VII - Cyclohexane and aromatic mixture (Mercaptan added)
AS 757		Straight thread boss dimensions.
ZZ-R-765 (B) (A-A-55801) (A-A-59588)	See Table	"Silicone Rubber" Specifications for 3 classes with various grades (durometers). Class 1a Low temperature resistant Class 1b Low temperature resistant and low compression set high temperature Class 2a High temperature resistant Class 2b High temperature resistant and low compression set Class 3a Low temperature, tear and flex resistant Class 3b Flex and tear resistant Durometer: 30 40 50 60 70 80 Class 1a -- 19454 19566 19601 19701 19801 Class 1b -- 19454 19501 19601 19701 19801 Class 2a -- 19411 19511 19611 19711 19811 Class 2b -- 19411 19511 19611 19711 19811 Class 3a -- -- -- -- -- -- Class 3b -- -- -- -- -- --
ZZ-R-768		"Rubber for Mountings (Unbounded Spool and Compression Types)" Used for shock protection.



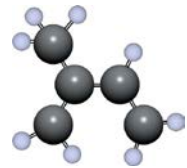
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION																				
AIR 786		Rubber-fluid compatibility information.																				
ZZ-C-796		"Inflatable Ring Cushion".																				
MIL-STD-810		"Environmental Test Methods" for accelerated aging tests.																				
MIL-STD-831		"Preparation of Test Reports"																				
AS 871		O-Ring dimensional inspection guide.																				
MIL-R-900		"45 Durometer Hardness Rubber Gasket Material" for watertight and airtight enclosures. - 20° to 130°F.																				
MIL-G-1086 (B)	7886 7586	"Gasket Material, Synthetic Rubber" for Bolted Steel Tanks. Type I - 70-80 durometer Type II - 45-55 durometer																				
MIL-PRF-1149 (B) (MIL-G-1149)	See Table	"50 and 65 Durometer Hardness Synthetic Rubber Gasket Materials". Type I - 45-55 Type II - 60-70 Class 1 - Oil resistant chloroprene polymer Class 2 - Non-oil resistant styrene-butadiene copolymer Class 3 - Phosphate ester resistant isoprene-isobutylene copolymer Class 4 - None Class 5 - Fuel resistant acrylonitrile-butadiene copolymer <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Class 1</th> <th>Class 2</th> <th>Class 3</th> <th>Class 5</th> </tr> </thead> <tbody> <tr> <td></td> <td>Chloroprene</td> <td>SBR</td> <td>Butyl</td> <td>NBR</td> </tr> <tr> <td>Type I</td> <td>4503</td> <td>15501</td> <td>13501</td> <td>7501</td> </tr> <tr> <td>Type II</td> <td></td> <td>15605</td> <td>13666</td> <td>5606</td> </tr> </tbody> </table>		Class 1	Class 2	Class 3	Class 5		Chloroprene	SBR	Butyl	NBR	Type I	4503	15501	13501	7501	Type II		15605	13666	5606
	Class 1	Class 2	Class 3	Class 5																		
	Chloroprene	SBR	Butyl	NBR																		
Type I	4503	15501	13501	7501																		
Type II		15605	13666	5606																		
MIL-STD-1188		"Commercial Packaging of Supplies and Equipment".																				
MIL-STD-1189		"Standard Department of Defense Bar Code Symbology".																				
ARP 1231		O-ring gland design considerations.																				
ARP 1232		O-ring gland design for static, radial squeeze.																				
ARP 1233		O-ring gland design for dynamic, radial squeeze.																				
ARP 1234		O-ring gland design for static and dynamic axial squeeze.																				
NAS 1515		Washers - Plastic and Synthetic Rubber.																				
SMS 1586		Swedish Military Standard Dimensions for (metric) O-Rings																				
SMS 1587		"Sealing elements - O-rings - Material"																				
SMS 1588		"Sealing elements - O-rings - Housings"																				
NAS 1593		Two hundred and forty-nine standard O-ring sizes. Dash numbers correspond with AS-9746-568. Material is a high-temperature, fluid-resistant, fluorocarbon rubber per MIL-R-83248 Type 1, Class 1 (70-80 durometer).																				
NAS 1594		Two hundred and forty-nine standard O-ring sizes. Dash numbers correspond with AS 568. Material is a high-temperature, fluid-resistant, fluorocarbon rubber per MIL-R-83248 Type 1, Class 2 (85-95 durometer).																				
NAS 1595		Twenty standard O-ring sizes. Dash numbers correspond with AS 568 straight thread tube fitting boss gaskets (900 series). Material is a high-temperature, fluid-resistant, fluorocarbon rubber per MIL-R-83248 Type 1, Class 1 (70-80 durometer).																				
NAS 1596		Twenty standard O-ring sizes. Dash numbers correspond with AS 568 straight thread tube fitting gasket (900 series). Material is a high-temperature, fluid-resistant, fluorocarbon rubber per MIL-R-83248 Type 1, Class 2 (85-95 durometer).																				



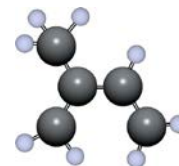
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
NAS 1598		"Sealing washer" Metal washer with synthetic rubber O-ring bonded to inside diameter.
SAE J 1601		"Rubber Cups for Hydraulic Actuating Cylinders" .
SAE J 1603		"Rubber Seals for Hydraulic Disc Brake Cylinders".
SAE J 1604		"Rubber Boots for Drum Type Hydraulic Brake Wheel Cylinders".
SAE J 1605		"Brake Master Cylinder Reservoir Diaphragm Gasket".
NAS 1611 (T)		Two hundred and forty-nine standard O-ring sizes. Dash numbers correspond with AS 568. Material is ethylene propylene per NAS 1613.
NAS 1612 (T)		Twenty standard O-ring sizes. Dash numbers correspond with AS 568 straight thread tube fitting boss (900 series). Material is ethylene propylene per NAS 1613.
NAS 1613 (T)		"Phosphate Ester Resistant O-ring Packing" Qualification testing procedures and material specifications.
BIS BS 1806		"Specification for dimensions of toroidal sealing rings (O-Rings) and their housings (inch series)"
ASTM D2000		"Standard Classification System for Rubber Products in Automotive Applications" Establishes a nomenclature system for 'line call-outs' for commercially available elastomeric materials. Following is a partial list of the polymer type usually used for a given Type-Class. Precision Associates has compounds to meet nearly all specifications. Please call us with your specific call-out for more details and our compound number.
AA	1xxx 15xxx 13xxx	Natural Rubber, Polyisoprene SBR Butyl
AK	17xxx	Polysulfide (Thiokol®)
BA	23xxx 15xxx 13xxx	Ethylene Propylene High temperature SBR Butyl
BC	4xxx	Chloroprene (Neoprene®)
BE	4xxx	Chloroprene (Neoprene®)
BF	3xxx, 5xxx	Nitrile (Buna N)
BG	3xxx, 5xxx 35xxx	Nitrile Urethane, Millable gum
BK	17xxx	Polysulfide (Thiokol®)
CA	23xxx	Ethylene Propylene (EPDM)
CE	14xxx	Chlorosulfonated Polyethylene (Hypalon®)
CH	3xxx, 5xxx	Nitrile
DA	23xxx	Ethylene Propylene (EPDM)
DE	4xxx 14xxx	Chloroprene (Neoprene®) CSM (Hypalon®)
DF	21xxx	Polyacrylic (butyl-actylate type)
DH	21xxx	Polyacrylic
EE	22xxx	AEM (Vamac®)
EH	21xxx	ACM (Polyacrylic)
FC	19xxx	Silicones (high strength)
FE	19xxx	Silicones
FK	20xxx	Fluorinated silicones (Fluorosilicone)
GE	19xxx	Silicones
HK	8xxx, 9xxx	Fluorinated elastomers (Viton®, Fluorel®)
KK	34xxx	Perfluorinated elastomers (P-REX™)
MIL-STD-2073		Standard Practice for Military Packaging
ISO 2230		"Rubber products – Guidelines for storage"



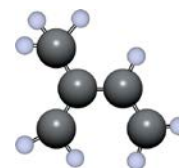
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
JIS B 2401 (T)	See Table	Japanese Industrial Standard O-Rings Class 1A <b>5767</b> Class 2 <b>5767</b> Class 4C <b>19711</b> Class 1B <b>5916</b> Class 3 <b>23711</b> Class 4D <b>9746</b>
MIL-R-2765		Synthetic rubber material for use as gaskets where resistance to oil and serviceability to temperatures above -20°F are required.
AMS 2817		"Packaging and Identification of Preformed Packings" Individual packaging and marking of O-ring in heat-sealed envelopes. Type I envelope - Polyethylene-lined natural kraft paper of 30lb. min. wt. per ream (opaque both sides). Type II envelope - One side as Type I, one side 300 gage cellophane coated with polyethylene.
MIL-P-2911 (Q)		"Hydraulic Conical and V Types Packing Assembly" Fiber reinforced at least 40% by weight. Type I - Hydraulic Conical Type II - Hydraulic V
MIL-G-3036		"Hot-Oil and Coolant Resistant Rubber Grommet".
MIL-R-3065		"Fabricated Rubber Products" Establishes the requirements for fabricated products of synthetic rubber together with procedures for the inspection of such products. Any material specification is per MIL-STD-417 nomenclature.
AN 3067		"3/8 Inch Conduit Boss Seal Assembly".
AS 3084		Twenty Standard O-ring sizes. Dash numbers correspond to AS 568 straight fluorocarbon rubber per AMS 7280.
AS 3085		"Preformed Packing" Three hundred and forty-nine standard size O-rings. Dash numbers correspond with AS 568. Material is a 70-80 durometer fluorocarbon per AMS 7280.
MIL-T-3100 (Q)		"Solid Rubber Tires".
MIL-S-3136		"Hydrocarbon Standard Test Fluids" Supplanted by TT-S-735.
AMS 3195		"Medium Closed Cell Silicone Rubber Sponge".
AMS 3196		"Firm Closed Cell Silicone Rubber Sponge".
AMS 3197		"Soft Chloroprene-Rubber Sponge".
AMS 3198		"Medium Chloroprene Type Synthetic Rubber Sponge".
AMS 3199		"Firm Chloroprene Type Synthetic Rubber Sponge".
AMS 3200 (B)	<b>5606</b>	"Petroleum-Base Hydraulic Fluid Resistant Nitrile Rubber 55-65 Durometer".
AMS 3201 (B)	<b>3447</b>	"Dry Heat Resistant Synthetic Rubber 35-45 Durometer".
AMS 3202 (B)		"Dry Heat Resistant Synthetic Rubber 55-65 Durometer".
AMS 3204 (B)		"Low Temperature Resistant Synthetic Rubber 25-35 Durometer".
AMS 3205 (B)		"Low Temperature Resistant Synthetic Rubber 45-55 Durometer".
AMS 3206		"Extreme Pressure Lubricant Resistant Synthetic Rubber 65-75 Durometer".
AMS 3207 (B)		"Weather Resistant Chloroprene Rubber 25-35 Durometer".
AMS 3208 (B)	<b>4503</b>	"Weather Resistant Chloroprene Type Synthetic Rubber 45-55 Durometer".
AMS 3209 (B)	<b>4753</b>	"Weather Resistant Chloroprene Type Synthetic Rubber 65-75 Durometer".
AS 3209 (B)		Preformed Packing. Material is a 70-80 durometer, high temperature, fluid resistant, low compression fluorocarbon per AMS7276.
AMS 3210 (B)		"Electrical Resistant Chloroprene Rubber 65-75 Durometer".
AMS 3212 (B)		"Aromatic Fuel Resistant Acrylonitrile Butadiene (NBR) Rubber 55-65 Durometer".



# Compound Selection Guide Specifications

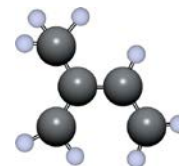


MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
AMS 3213 (B)	3847	"Aromatic Fuel Resistant Acrylonitrile Butadiene (NBR) Rubber 75-85 Durometer".
AMS 3214 (B)		"Aromatic Fuel Resistant Acrylonitrile Butadiene (NBR) Rubber 35-45 Durometer".
AMS 3215 (B)	3740	"Aromatic Fuel Resistant Acrylonitrile Butadiene (NBR) Rubber 65-75 Durometer".
AMS 3216 (B)	9848	"Fluorocarbon Rubber – Fuel and Oil Resistant".
AMS 3220 (B)	4624	"Synthetic Rubber 55-65 Durometer".
AMS 3222 (B)	4522	"High Swell Hot Oil Resistant Synthetic Rubber 45-55 Durometer".
AMS 3226 (B)		"Low Swell Hot Oil and Coolant Resistant Synthetic Rubber 45-55 Durometer".
AMS 3227 (B)	7627	"Low Swell Hot Oil and Coolant Resistant Synthetic Rubber 55-65 Durometer".
AMS 3228 (B)	7728	"Low Swell Hot Oil and Coolant Resistant Synthetic Rubber 65-75 Durometer".
AMS 3229 (B)		"Low Swell Hot Oil Resistant Synthetic Rubber 75-85 Durometer".
AMS 3230		"Oil Resistant Gasket".
AMS 3231		"Synthetic Rubber Binder Oil Resistant Gasket".
AMS 3237 (B)		"Phosphate Ester Resistant Butyl Rubber 35-45 Durometer".
AMS 3238 (B)		"Phosphate Ester Resistant Butyl Type Synthetic Rubber 65-75 Durometer".
AMS 3239 (B)		"Phosphate Ester Resistant Butyl Type Synthetic Rubber 85-95 Durometer".
AMS 3240 (B)	4409	"Weather Resistant Chloroprene Rubber 35-45 Durometer".
AMS 3241 (B)	4603	"Weather Resistant Chloroprene Type Synthetic Rubber 55-65 Durometer".
AMS 3242 (B)	4844	"Weather Resistant Chloroprene Type Synthetic Rubber 75-85 Durometer".
AMS 3243 (B)	4651	"Flame Resistant Chloroprene Type Synthetic Rubber 55-65 Durometer".
AMS 3244 (B)	4753	"Flame Resistant Chloroprene Type Synthetic Rubber 65-75 Durometer".
AMS 3248 (B)		"Phosphate Ester Resistant Ethylene Propylene Type Synthetic Rubber 55-65 Durometer".
AMS 3249 (B)		"Hydrazine Base Fluid Resistant Ethylene Propylene Type Synthetic Rubber 75-85 Durometer".
AMS 3260 (B)	23560	"General Purpose Ethylene Propylene Terpolymer Synthetic Rubber Sheet".
AMS 3301 (B)	19411	"General Purpose Silicone Rubber 35-45 Durometer".
AMS 3302 (B)	19511	"General Purpose Silicone Rubber 45-55 Durometer".
AMS 3303 (B)	19611	"General Purpose Silicone Rubber 55-65 Durometer".
AMS 3304 (B)	19711	"General Purpose Silicone Rubber 65-75 Durometer".
AMS 3305 (B)	19811	"General Purpose Silicone Rubber 75-85 Durometer".
AMS 3306		"High Modulus Silicone Rubber 55-65 Durometer"
AMS 3307 (B)	19711	"Non-Oil Resistant Low Compression Set Silicone Rubber 70-80 Durometer".
AMS 3325 (B)	20662	"Fuel and Oil Resistant Fluorosilicone Rubber 55-65 Durometer".
AMS 3326 (B)	20662	"Fuel and Oil Resistant Fluorosilicone Rubber 50-65 Durometer".
AMS 3327 (B)		"High Temp. Fuel and Oil Resistant Fluorosilicone (FVMQ) Rubber 70-80 Durometer".
AMS 3328 (B)	20463	"Fuel and Oil Resistant Fluorosilicone (FVMQ) Rubber 35-45 Durometer".
AMS 3329 (B)	20563	"Fuel and Oil Resistant, Fluorosilicone (FVMQ) Rubber 45-55 Durometer, High Strength".





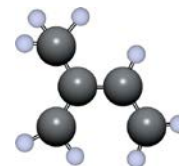
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
AMS 3330 (B)	20563	"Fuel and Oil Resistant, Fluorosilicone (FVMQ) Rubber 45-55 Durometer".
AMS 3331 (B)	20662	"Fuel and Oil Resistant, Fluorosilicone (FVMQ) Rubber 65-75 Durometer".
AMS 3334 (B)	19454	"Extreme Low Temperature Resistant Silicone Rubber 35-45 Durometer".
AMS 3335 (B)	19556	"Extreme Low Temperature Resistant Silicone Rubber 45-55 Durometer".
AMS 3336 (B)	19601	"Extreme Low Temperature Resistant Silicone Rubber 55-65 Durometer".
AMS 3337 (B)	19701	"High and Extreme Low Temperature Resistant Silicone Rubber 65-75 Durometer".
AMS 3338 (B)		"High and Extreme Low Temperature Resistant Silicone Rubber 75-85 Durometer".
AMS 3344 (B)		"1800psi Tensile Strength Silicone Rubber 45-55 Durometer".
AMS 3345 (B)	19524	"1000psi Tensile Strength Silicone Rubber 45-55 Durometer".
AMS 3346 (B)	19624	"1000psi Tensile Strength Silicone Rubber 55-65 Durometer".
AMS 3347 (B)	19559	"High Modulus 1200psi Tensile Strength Silicone Rubber 45-55 Durometer".
AMS 3348 (B)	19325	"High Resiliency 1150psi Tensile Strength Silicone Rubber".
AMS 3349 (B)		"High Resiliency 1100psi Tensile Strength Silicone Rubber 55-75 Durometer".
AMS 3356 (B)		"Lubricating Oil and Compression Set Resistant, Electrical Grade Silicone Rubber 55-65 Durometer".
AMS 3357 (B)	19711	"Lubricating Oil and Compression Set Resistant Silicone Rubber 65-75 Durometer".
MIL-D-3377		"Synthetic Rubber Diaphragms". Type I - Synthetic rubber composition without reinforcement Type II - Synthetic rubber reinforced with fabric
AMS 3384 (B)	8703	"Rubber, Fluorocarbon Elastomer (FKM), 70 to 80 Hardness, Low Temperature Sealing Tg -22 °F (-30 °C). For Elastomeric Shapes or Parts in Gas Turbine Engine Oil, Fuel and Hydraulic Systems."
MS 3420		"Adapter, Clamp to Cable, Bushing, Telescoping".
MIL-R-3533		"Sheet, Strip and Molded Synthetic Rubber" Oil and salt water resistant. Type I & II - Grade A, 75-85 durometer Type I & II - Grade B, 65-75 durometer
MIL-G-3545	*	"High Temperature Aircraft Grease".
AS 3569		"Packing, Preformed - O-Ring Seal". Material per AMS 7270
AS 3570		"Packing, Preformed - O-Ring Seal". Material per AMS 7274
ISO 3601/1		"Fluid Power Systems - O-Rings". Inside diameters, cross sections, tolerances and size identification code.
ISO 3601/2		"Fluid Power Systems - O-Rings". Housing dimensions for general applications.
ISO 3601/3		"Fluid Power Systems - O-Rings". Quality acceptance criteria.
ISO 3601/4		"Fluid Power Systems - O-Rings". Anti-extrusion rings (back-up rings).
ISO 3601/5		"Fluid Power Systems - O-Rings". Suitability of elastomeric materials for industrial applications.
AMS 3651		"Polytetrafluoroethylene".
DIN 3771		"O-Rings for use in fluid power systems."
MIL-P-3803		"Plastic, Polyethylene, Molded and Extruded Shapes, Sheets and Tubing".



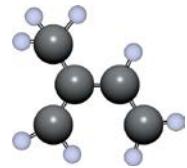
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
ASTM D 3951		"Standard Practice for Commercial Packaging". Level A - Individual packaging in opaque bags, in accordance with MIL-P-116 Level C - Good commercial practice, 1, 5, 50, or 100 per bag
BIS BS 4518		"Specification for Metric dimensions of toroidal sealing rings (O-Rings) and their housings"
MIL-P-4861		"Packaging of Preformed Rubber Packing".
MIL-S-5049 (Q)		"Piston Rod Scrapers" Performance requirements and qualification tests.  Type M - all metal Type R - containing rubber Class 2 - usable temperature range -65° to 275°F
MIL-P-5315 (Q)		"Hydrocarbon Fuel Resistant Preformed Packaging" Material is 60-70 durometer nitrile.
ARP 5316		"Storage of Elastomer Seals and Seal Assemblies Which Include an Elastomer Element Prior to Hardware Assembly."
MIL-B-5423		"General Specifications for Boots, Dust and Water Seal (for Toggle and Push Button Switches, Circuit Breaker and Rotary Actuated Parts)".
MIL-G-5510 (Q)		"Straight Thread Tube Fitting Boss Preformed Packings" Material is 88 durometer nitrile.
MIL-G-5514		"Gland design recommendations for standard size O-rings. Complete engineering design consideration for O-ring installation.
AMS-P-5516 (Q)		Specifies two classes of preformed packings for use where resistance to hydraulic fluid is required at temperatures from -65° to 160°F. Class A - Low Flexibility 83-93 durometer nitrile Class B - High Flexibility 63-72 durometer nitrile
MIL-W-5521 (Q)		"Aircraft Hydraulic Packing Backup Washer" Leather.
MIL-F-5566	*	"Anti-Icing Fluid (isopropyl alcohol)".
MIL-G-5572	*	"Aviation Gasoline Grades 80/87, 100/130, 115/145".
MIL-H-5606	*	"Petroleum Base Hydraulic Fluid".
MIL-T-5624	*	"Aviation Turbine Fuel Grades JP-4 and JP-5".
MIL-R-5847		"Silicone Rubber Low-and High-Temperature and Tear Resistant" Supplanted by ZZ-R-765. All Classes, grades and requirements remain the same. See ZZ-R-765 for PAI compounds that qualify.
MIL-L-6081	*	"Jet Engine Lubricating Oil".
MIL-L-6082	*	"Aircraft Reciprocating Engine (Piston) Lubricating Oil".
MIL-H-6083	*	"Petroleum Base Hydraulic Fluid for Preservation and Testing".
MIL-L-6085	*	"Low Volatility Aircraft Instrument Lubricating Oil".
MIL-A-6091		"Specially Denatured Ethyl Alcohol".
MIL-R-6130		"Chemically Blown Cellular Rubber".
ISO 6149		"Connections for hydraulic fluid power and general use -- Ports and stud ends with ISO 261 metric threads and O-ring sealing."
MIL-C-6183		"Cork and Synthetic Rubber Composition Sheets for Aromatic Fuel and Oil Resistant Gaskets".
AN 6225		V-Ring Dimensions. PAI manufactures most of the 80 sizes shown. Material specified is a 70 durometer nitrile per MIL-P-5516. However, V-Rings are available in other 90 durometer nitrile and Fluoroelastomer compounds.
AN 6226		U-Cup Dimensions. PAI manufactures all 53 sizes shown plus over 170 other U-Cup sizes. Material specified is a 70 durometer nitrile per MIL-P-5516 Class B. However, U-Cups are available in a wide range of compounds to meet your specific needs.



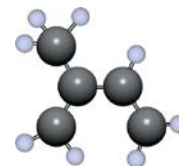
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION																																																	
AN 6227		Eighty-eight O-ring sizes corresponding with AS 568 but dash numbers are different. Material specified is a 70 durometer nitrile per MIL-P-5516.																																																	
AN 6228		"V-Ring, Female Adapters" Sizes correspond to AN 6225. Material specified is aluminum alloy.																																																	
AN 6229		"V-Ring, Male Adapters" Sizes correspond to AN 6225. Material specified is aluminum alloy.																																																	
AN 6230		Fifty-two O-ring sizes corresponding with AS 568 but dash numbers are different. Material specified is a 70 durometer nitrile per MIL-P-5516. Entire size group has cross section 1/8" nominal, .139" actual.																																																	
AN 6231		"Hydraulic Piston Rod Scraper" Superseded by MS28776.																																																	
AN 6238		"Hydraulic Replacement Reservoir Type Filler Element Gasket" Material per MIL-P-5516 Class B. Flat Gaskets - 1 5.25" OD x 3.50" ID x 0.063" thick.																																																	
AN 6290 (Q)		"Box Gaskets, for use with MIL-H-5606 Hydraulic Fluid" Material is an 88+ durometer nitrile per MIL-P-5510.																																																	
MIL-L-6387		* "Synthetic Base Lubricant Oil".																																																	
MIL-PRF-6855 (B) (AMS-R-6855) (B) (MIL-R-6855) (B)	See Table	<p>"Synthetic Rubber, Sheets, Strips, Molded or Extruded Shapes".</p> <p>Low - Temperature Synthetic Rubber</p> <p>Class 1 - Fuel and Petroleum oil resistant</p> <p>Class 2 - Petroleum oil, weather and ozone resistant</p> <p style="padding-left: 40px;">Type A - High Ozone concentration</p> <p style="padding-left: 40px;">Type B - Low Ozone concentration</p> <p>Class 3 - Non-oil resistant</p> <p>Class 4 - Petroleum oil, weather and Ozone resistant (for use in contact with acrylic plastics)</p> <p style="padding-left: 40px;">Type A - High Ozone concentration</p> <p style="padding-left: 40px;">Type B - Low Ozone concentration</p> <p>Class 5 - Non-oil resistant (for use in contact with acrylic plastics durometers)</p> <table border="1" style="margin-left: 40px;"> <thead> <tr> <th>Durometer:</th> <th>30</th> <th>40</th> <th>50</th> <th>60</th> <th>70</th> <th>80</th> </tr> </thead> <tbody> <tr> <td>Class 1</td> <td>--</td> <td>3447</td> <td>7555</td> <td>7655</td> <td>3740</td> <td>--</td> </tr> <tr> <td>Class 2a</td> <td>--</td> <td>4403</td> <td>4503</td> <td>4603</td> <td>4705</td> <td>4845</td> </tr> <tr> <td>Class 2b</td> <td>--</td> <td>4403</td> <td>4503</td> <td>4603</td> <td>4705</td> <td>4845</td> </tr> <tr> <td>Class 3</td> <td>--</td> <td>--</td> <td>--</td> <td>15606</td> <td>15705</td> <td>15805</td> </tr> <tr> <td>Class 4</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> </tr> <tr> <td>Class 5</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> </tr> </tbody> </table>	Durometer:	30	40	50	60	70	80	Class 1	--	3447	7555	7655	3740	--	Class 2a	--	4403	4503	4603	4705	4845	Class 2b	--	4403	4503	4603	4705	4845	Class 3	--	--	--	15606	15705	15805	Class 4	--	--	--	--	--	--	Class 5	--	--	--	--	--	--
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MIL-R-6891		"Anodic Rubber".																																																	
MIL-H-7083	5747	Nonflammable water-base hydraulic fluid for aircraft use.																																																	
AMS 7255 (B)	25796	"Rings, Sealing, Tetrafluoroethylene/Propylene Rubber (FEPM), Hydraulic Oil and Synthetic Oil Resistant 70 to 80".																																																	
AMS 7259 (B)		"Very Low Compression Set High-Temperature-Fluid Resistant Fluorocarbon Rubber Sealing Rings 85-95 Durometer".																																																	
AMS 7260 (B)		"Fuel and Low Temperature Resistant Synthetic Rubber Packing Rings 70-80 Durometer".																																																	
AMS 7263 (B)		"Phosphate Ester Hydraulic Fluid Resistant, Butyl Type Synthetic Rubber Packing Rings 85-95 Durometer".																																																	
AMS 7266 (B)	20766	"General Purpose High Temperature Fuel and Oil Resistant Fluorosilicone Rubber Sealing Rings".																																																	
AMS 7267 (B)		"Heat Resistant, Low Compression Set Silicone Rubber Sealing Rings 70-80 Durometer".																																																	
AMS 7268 (B)	19711	"Non-Oil Resistant Low Compression Set Silicone Rubber Sealing Rings 65-75 Durometer".																																																	
AMS 7269 (B)		"Space and Vacuum Service Low Out Gassing Silicone Rubber Sealing Rings 45-55 Durometer".																																																	
AMS 7270 (Q)		"Fuel Resistant Synthetic Rubber Sealing Rings 65-75 Durometer".																																																	
AMS 7271 (B, P1)		"Fuel and Low Temperature Resistant Synthetic Rubber Sealing Rings 60-70 Durometer".																																																	



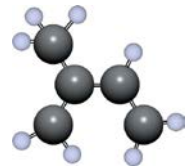
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
AMS 7272 (B)	3772	"Synthetic Lubricant Resistant NBR Type Synthetic Rubber Sealing Rings 65-75 Durometer".
AMS 7273 (B)		"High Temperature Fuel and Oil Resistant Fluorosilicone Rubber Sealing Rings 70-80 Durometer".
AMS 7274 (B)	3774	"Oil Resistant Synthetic Rubber Sealing Rings 65-75 Durometer".
AMS 7275		"Synthetic Lubricant Resistant Fluorocarbon Type Synthetic Rubber Sealing Rings 65-85 Durometer".
AMS 7276 (B)		"High-Temperature Fluid Resistant, Very Low Compression Set, Fluorocarbon Rubber Sealing Rings 70-80 Durometer".
AMS 7277		"Phosphate Ester Hydraulic Fluid Resistant Butyl Type Synthetic Rubber Sealing Rings 70-85 Durometer".
AMS 7278 (B)		"High Temperature Fluid Resistant Fluorocarbon Type Synthetic Rubber Sealing Rings 70-80 Durometer" NONCURRENT for new design AMS 7276 and AMS 7280 should be used where AMS 7278 material would have been suitable.
AMS 7279 (B)		"High Temperature Fluid Resistant Fluorocarbon Type Synthetic Rubber Sealing Rings 85-95 Durometer".
AMS 7280 (B)	9848	"High Temperature Fluid Resistant, Low Compression Set Fluorocarbon Rubber Sealing Rings 70-80 Durometer".
AMS 7287 (Q)		"Fluorocarbon Elastomer (FKM) High Temperature"
MIL-R-7362		"Diester Synthetic Oil Resistant Synthetic Rubber". Type I - O-Rings Type II - Molded parts, sheets, strips and extruded parts
MIL-L-7808		"Synthetic Base Aircraft Turbine Engine Lubricating Oil".
MIL-A-8243		"Anti-Icing and Deicing-Defrosting Fluid".
MIL-H-8446		"Aircraft Non-Petroleum Base Hydraulic Fluid".
MIL-C-8603		"Support Loop Type Clamps" for electrical wire bundles and other non-hydraulic uses".
MIL-S-8660		"Silicone, Compound NATO Code Number S-763".
MIL-R-8791		Tetrafluoroethylene resin (TFE) retainers intended for use in hydraulic and pneumatic system components as anti-extrusion devices in conjunction with packings and gaskets.
MIL-R-8913		"Piston Rod Wiper Ring" Sizes per MS 28903. Type I - Rubber rings Type II - Polytetrafluoroethylene rings (PTFE) Type III - Metallic rings
MS 9020 (P2)		Twenty O-ring sizes. Dash numbers correspond with AS 568 straight thread tube fitting boss gaskets (900 series). Material per AMS 7271.
MS 9021 (P2)		Three-hundred and twenty O-ring sizes. Dash numbers correspond with AS 568 series. Material per AMS 7271.
MS 9058		Scarf cut split Back-up rings. Eighteen sizes for straight thread tube fitting boss gaskets (900 series). Material is PTFE per AMS 3651.
MS 9068 (P2)	19711	Two-hundred and twenty-nine O-ring sizes. Dash numbers correspond to AS 568. Material is a 65-75 durometer silicone rubber per AMS 3304.
MS 9136		"Engine Accessory Drive Gasket" Asbestos and synthetic rubber.
MS 9203		Metal O-ring, .094" tube by .006" wall.
MS 9204		Metal O-ring, .094" tube by .010" wall.
MS 9205		Metal O-ring, .125" tube by .010" wall.
MS 9241 (P1, A4)	3772	Three-hundred and fifty-nine standard O-ring sizes. Dash numbers correspond to AS 568. Material is a 65-75 durometer nitrile per AMS 7272.
MS 9355 (P1)	3772	Twenty standard O-ring sizes. Dash numbers correspond to AS 568 straight thread tube fitting boss gaskets (900 series). Material is a 65-75 durometer nitrile per AMS 7272.



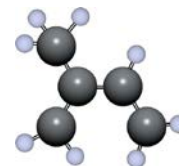
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
MS 9373		Silver plated metal O-Ring: .062" tube by .010" wall.
MS 9374		Silver plated metal O-Ring: .094" tube by .006" wall.
MS 9375		Silver plated metal O-Ring: .094" tube by .010" wall.
MS 9376		Silver plated metal O-Ring: .125" tube by .010" wall.
MS 9385		Twenty standard O-ring sizes. Dash numbers correspond to AS 568 straight thread tube fitting boss gaskets (900 series). Material is a 70-80 durometer silicone per AMS 7267.
MS 9386		Three-hundred and fifty-nine standard O-ring sizes. Dash numbers correspond to AS 568. Material is a 70-80 durometer silicone per AMS 7267.
MS 9387 (P1)		Twenty standard O-ring sizes. Dash numbers correspond to AS 568 straight thread 9746 tube fitting boss gaskets (900 series) but tolerances are not as large. Material is a 70-80 durometer fluorocarbon per AMS 7278.
MS 9388 (P1)		Three-hundred and fifty-nine standard O-ring sizes. Dash numbers correspond to AS 568, but tolerances are not as large. Material is a 70-80 durometer fluorocarbon per AMS 7278.
MS 9484		Eighteen sizes of scarf cut split Back-up rings for straight thread tube fitting boss gaskets. Material is polytetrafluoroethylene (PTFE) per AMS 3651.
MIL-Q-9858		"Quality Program Requirements".
MS 9966 (P1)		Twenty standard O-ring sizes. Dash numbers correspond to AS 568 straight thread tube fitting boss gaskets (900 series). Material is a 70-80 durometer Fluorosilicone rubber per AMS 7273.
MS 9967 (P1)		Three-hundred and fifty-nine standard O-ring sizes. Dash numbers correspond to AS 568. Material is a 70-80 durometer Fluorosilicone rubber per AMS 7273.
MS 9968 (P1)	9848	"Internal Straight Thread Boss" Material 70-80 durometer fluorocarbon per AMS 7280.
MS 9970 (P1)		Three-hundred and fifty-nine standard size O-rings. Dash numbers correspond to AS 568, but tolerances are not as large. Material is an 85-95 durometer fluorocarbon rubber per AMS 7279.
ISO 10423		Petroleum and natural gas industries -- Drilling and production equipment -- Wellhead and christmas tree equipment.
MIL-L-10547		"Flexible Water-Vaporproof or Waterproof Case Liners. Overwraps and Sheets".
MIL-F-10870		"Insulated Food Container with Inserts" Elastomeric gasket per MIL-R-3065 and ASTM D2000.
MIL-G-10924		"Automotive and Artillery Grease".
ISO 10993		"Biological evaluation of medical devices". A twenty part series of standards.
MIL-R-11512		Synthetic rubber seals for pure petroleum insulating oil.
MIL-P-11719		"Preformed Rubber Packing for use with Pneumatic Hose Couplings".
MIL-G-12803		"Non-metallic Gasket Material" Does not cover molded gaskets.
MIL-M-12863		"Vibration Mounts".
MIL-G-13210		"Rubber Gaskets" intended for use in making gas-tight connections in the assembly of gas mask canisters.
ISO 13485		Medical devices - Quality management systems - Requirements for regulatory purposes
MIS 13937		"Ethylene Propylene Rubber Sheets, Molded and Cut Shapes". Type I - Molded sheets or parts Type II - Precision molded O-rings, gaskets and packing Type III - Extruded molds
ISO 14001		Environmental management systems -- Requirements with guidance for use



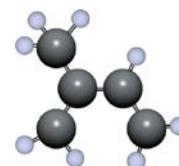
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
MIL-C 14055 (Q)		"Synthetic Rubber Hydraulic Brake Actuating Cylinder Cup".
MIL-R-14328		"General Purpose Gasket Material (for Extreme Climatic Conditions) Medium Soft Synthetic Rubber Sheet".
MIL-P-14401		"Vehicular Personnel-Protection Cushioning Pads".
ISO 14644		"Cleanrooms and associated controlled environments". A nine part series of standards.
MIL-P-14574		"Cloth Insertion Synthetic Rubber Packing (Wiper Ring)" Fiber reinforced rubber rod wiper.
MIL-R-15624		Medium soft synthetic rubber for shipboard gasket use except low temperature application. Class 1 - Chloroprene Class 2 - Butadiene-styrene (SBR) Class 3 - Butadiene-acrylonitrile (NBR)
MS 17413 (P1)		Two hundred and thirty-nine standard size O-rings. Dash numbers to AS 568. Material is a 70-80 durometer fluorocarbon rubber per AMS 7278.
MIL-G-17553 (Q)		"O-Ring Gasket for Rockets".
MIL-D-17650		"Insert Type Rubber Valve Disk".
MIL-P-18484		"Synthetic Rubber Hydraulic-Seal Preformed Packing".
MIL-G-18586 (Q)		"Shipboard Electrical Junction Box O-ring Gaskets" -20°F and above. Class 1 - Butadiene-styrene copolymer (non-oil resistant) Class 2 - Butadiene-acrylonitrile copolymer (oil resistant)
MIL-P-19152		"High Pressure Hydraulic Packings (for Hydropneumatic Systems)".
MIL-H-19457		"Non-Neurotoxic Fire-Resistant Hydraulic Fluid".
MIL-G-19655		High-pressure gasket material for use where petroleum or phosphate ester hydraulic fluids are used.
MIL-G-19769		"Slide Valve Oil Resistant Synthetic Rubber Gaskets".
MIL-P-19918		"V-Ring Packing" material and Filler Ring Material.
MIL-S-21558		"Oil, Plain or Plain Encase Seals".
MIL-G-21569 (B)		Synthetic Rubber Cylinder Liner Seal Gaskets. Class I - Oil resistant 55-75 durometer butadiene and acrylonitrile copolymer Class II - High temperature resistant 55-75 durometer elastomeric polysiloxanes
MIL-G-21610 (B)	19611	Synthetic rubber gaskets of various cross sections for use in heat exchangers, 60-75 durometer. Type II - Elastomeric Polysiloxanes base material
MIL-S-21923		"Ozone Resistant Butadiene-Styrene Type Synthetic Rubber Compound for Low Temperature Service".
MIL-G-22004		"Lighting Fixture High Temperature Gasket".
MIL-G-22050 (B)		"Rubber Gasket, Packing Seals and Sheet Rubber Material, for use with Polar Fluids, Steam and Air at Moderately High Temperatures". Grade 1 - 60-70 durometer hardness Grade 2 - 75-85 durometer hardness Grade 3 - 85-95 durometer hardness
MIL-S-23190		"Plastic Straps, Clamps and Mounting Hardware for Cable Hardness Tying and Support".
MIL-M-23573		This specification covers chelated-Monethanolamine (MEA) for use in equipment for the removal of carbon dioxide from the air using a regenerative absorption process.



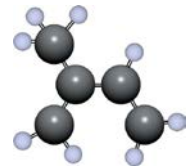
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION
MIL-G-23652		Rubber gasket and packing material intended for use in 300psig hydraulic systems. The material is compatible with both petroleum base fluids and phosphate ester fluid. Specification requires either color coding of parts or individual packaging. Type I - for use in hydraulic systems up to 300psig pressure 65-75 durometer. Type II - for use in hydraulic systems up to 5200psig pressure 85-95 durometer.
ISO 239236-2		Petroleum, petrochemical and natural gas industries -- Non-metallic materials in contact with media related to oil and gas production -- Part 2: Elastomers (under development)
MIL-I-24063		"Insert Sets, Sound Isolation for RISIC-I Flexible Connectors".
MS 24690 (Q)		"Preformed High Pressure Air Valve Packing" One size only, 0.070" c/s x 0.551" ID. Material per MIL-P-5516, Class B.
MIL-P-25732 (Q) (Obsolete) MIL-R-25897 (Obsolete)		O-Ring packings for use with petroleum based hydraulic fluid over the temperature range of 65° to 275°F. Sizes conform to MS 28775 (same as AS 568 dash numbers). "High Temperature Fluid Resistant Fluorocarbon Elastomeric Rubber". Type I - O-Ring and compression seals Type II - Molded parts (other than sealing devices) sheets, strips and extruded shapes Class I (70-80 durometer) Type I & II Class II (85-95 durometer) Type I & II
AMS-R-25988 (MIL-R-25988) (B) (MIL-DTL-25988) (B)	See Table	"Oil and Fuel Resistant Fluorosilicone Elastomer Rubber Sheets, Strips, Molded Parts and Extruded Shapes". Type I - O-Rings Type II - Other Molded parts Class 1 - general purpose Class 2 - high-strength general purpose Class 3 - high modulus, increased temperature resistant <u>Type I O-Rings</u> Durometer: 40 50 60 70 80 90 Class 1 20662 20763 20883 Class 2 Class 3 <u>Type II Molded Parts</u> Durometer: 40 50 60 70 80 Class 1 20463 20563 20662 20763 Class 2 20563 Class 3
MIL R-25988/1 (B)	20763	"Grade 70 Class 1 O-Rings Oil and Fuel-Resistant Fluorosilicone Elastomer Rubber".
MIL-R-25988/2 (B)		"Grade 70 Class 3 O-Rings Oil and Fuel-Resistant Fluorosilicone Elastomer Rubber".
MIL-R-25988/3 (B)	20662	"Grade 60 Class 1 O-Rings Oil and Fuel-Resistant Fluorosilicone Elastomer Rubber".
MIL-R-25988/4 (B)		"Grade 80 Class 1 O-Rings Oil and Fuel-Resistant Fluorosilicone Elastomer Rubber".
MS 26577	19811	"Airport Marker Light Base Gasket" Material is a heat resistant silicone rubber per ZZ-R-765 Class 2a, Grade 80.
MS 27030		"Gasket-Coupling half, Quick Disconnect, Cam-locking Type" 10 sizes, flat gaskets.
MS 27198		Metal retainer with molded in rubber seal, material per MIL-R-25988.
MS 27290	19511	"Cable Adapter Bushing" Material is a silicone rubber per MIL-R-5847 Class 2b, Grade 50.



# Compound Selection Guide Specifications

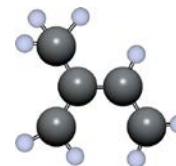


MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION																																										
MS 27488		"Electric Connector Sealing Plug".																																										
MS 27595		"Tetrafluoroethylene Continuous Ring Packing Backing Retainer" One-hundred and sixty-four sizes for standard O-Rings. Material per MIL-R-8791 Rectangular cross section.																																										
MS 28772 (Q)		"D-Ring Preform Packing Shock Strut" material per MIL-P-5516.																																										
MS 28773		"Straight Thread Tube Fitting Boss Tetrafluoroethylene Packing Backup Retainer" Thirteen sizes of 22-degree scarf cut backups for 900 series O-Rings. Rectangular cross section. Material per MIL-R-8791.																																										
MS 28774		"Tetrafluoroethylene Single Turn Packing Backup Retainer" One-hundred and sixty-four sizes of 22 degree scarf cut backups for standard O-Ring sizes. Rectangular cross section, material per MIL-R-8791.																																										
MS28775 (Q)		Three-hundred and fifty-nine standard O-ring sizes. Dash numbers correspond with AS 568. Material is a 68+ durometer nitrile per MIL-P-25732.																																										
MS 28776		"Piston Rod Scraper" PAI manufactures many of the 71 dash sizes in the dimensional style but not to the material specification in both 70 and 90 durometer nitrile.																																										
MS 28777		"Aircraft Hydraulic Packing Backup Washer" Thirteen sizes of uncut rectangular cross section backups for 900 series O-rings. Material specified is leather. PAI can supply in Teflon.																																										
MS 28778 (Q)		"Straight Thread Tube Fitting Boss Preformed Packing" Dash numbers correspond with AS 568 straight thread tube fitting boss gaskets (900 series) Material per MIL-P-5510.																																										
MS 28782		"Teflon Backup Packing Retainer" Eighty-eight sizes of spiral cut, double turn backups, dash numbers correspond to the dash numbers of AN 6227 packings. Material per MIL-R-8791.																																										
MS 28783		"Teflon Backup Gasket Ring" Twenty-five sizes of spiral cut double turn backup rings. Dash numbers correspond to AN 6230 gaskets. Material per MIL-R-8791.																																										
MS 28784		Canceled. Superseded by MS 28775.																																										
MS 28900	4753	<p>"Preformed Packings for Electrical Use" Material is a 65-75 durometer chloroprene per AMS 3209</p> <table border="1"> <thead> <tr> <th>Dash #</th> <th>PAI Size</th> <th>Dash #</th> <th>PAI Size</th> <th>Dash#</th> <th>PAI Size</th> </tr> </thead> <tbody> <tr> <td>-8</td> <td>31-332</td> <td>-20</td> <td>31-984</td> <td>-38</td> <td>1-110</td> </tr> <tr> <td>-10</td> <td>31-410</td> <td>-22</td> <td>31-1.109</td> <td>-40</td> <td>1-111</td> </tr> <tr> <td>-12</td> <td>31-526</td> <td>-24</td> <td>31-1.226</td> <td>-42</td> <td>1-112</td> </tr> <tr> <td>-14</td> <td>31-643</td> <td>-28</td> <td>47-1.453</td> <td>-44</td> <td>1-113</td> </tr> <tr> <td>-16</td> <td>31-779</td> <td>-32</td> <td>47-1.672</td> <td>-46</td> <td>1-114</td> </tr> <tr> <td>-18</td> <td>31-915</td> <td>-36</td> <td>47-1.891</td> <td>-48</td> <td>1-115</td> </tr> </tbody> </table>	Dash #	PAI Size	Dash #	PAI Size	Dash#	PAI Size	-8	31-332	-20	31-984	-38	1-110	-10	31-410	-22	31-1.109	-40	1-111	-12	31-526	-24	31-1.226	-42	1-112	-14	31-643	-28	47-1.453	-44	1-113	-16	31-779	-32	47-1.672	-46	1-114	-18	31-915	-36	47-1.891	-48	1-115
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MS 28903		"Hydraulic and Pneumatic Piston Rod Dirt Wiper Ring" Material per MIL-R-8913.																																										
MS 29512		"Fuel Resistant Straight Thread Tube Fitting Boss Gasket" Thirteen standard size O-rings. Dash numbers correspond to AS 568 straight thread tube fitting boss gaskets (900 series), Material per MIL-P-5315.																																										
MS 29513 (Q)		"Hydrocarbon Fuel Resistant Packing O-Ring" One-hundred and seventy-four standard size O-rings. Dash numbers correspond to AS 568. Material per MIL-P-5315.																																										
MS 29531		"Aircraft Engine Exhaust Port Closure Plug" Material per MIL-R-6855 Class I or II Grade 40, Color yellow.																																										
MS 29561 (P2)		"Synthetic Lubricant Resistant Preformed O-Ring Packing" One-hundred ninety-one standard size O-rings. Dash numbers correspond to AS 568. Material is a 65-75 durometer nitrile per MIL R-7362 Type I.																																										
MS 33649		"Straight Thread Tube Fitting Boss Gasket Gland Dimensions".																																										
MS 33666		"Range of Sizes Aeronautical Elastomer Preformed Packing" Two-hundred and fifty-six standard size O-rings. Dash numbers correspond to AS 568. No material specification.																																										
MS 33675		"Packing Gland Ring Scrapper Installation" No material specification.																																										
MS 33688		"Range of Sizes Elastomeric Tube Fitting Preformed Packing" Twenty standard dash sizes for straight thread tube fitting boss gaskets (900 series). No material specification.																																										





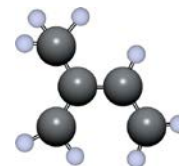
# Compound Selection Guide Specifications



MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION																																																	
MS 35133		"Preformed Packing" Five dash sizes inactive for design after 11/6/64.																																																	
MS 35489		"Hot Oil and Coolant Resistant Rubber Grommet" Material 50 durometer nitrile per MIL-STD-417 Grade SB-515-A1, B1, C2, E3, F2.																																																	
MS 35769		"Copper and Asbestos Annular Metallic-Encased Gasket".																																																	
MS 35796		"Hot Galvanized (Pole-Line) Thimble Eye (Straight) Bolt".																																																	
MS 35803 (Q)		"Leather Backup Ring Packing Retainer" Material per MIL-R-5521.																																																	
MIL-S-45005		Spring-loaded single and multiple lip oil seal. The seal incorporates either a leather or synthetic elastomer sealing member.																																																	
MIL-I-45208		"Inspection System Requirements".																																																	
MIL-C-45662		"Calibration System Requirements".																																																	
MIL-R-46089		"Closed Cell Silicone Sponge Rubber".																																																	
MIL-L-46167 (Q)		"Arctic Internal Combustion Engine Lubricating Oil".																																																	
MIL-H-46170		"Fire Resistant Rush Inhibited Synthetic Hydrocarbon Base Hydraulic Fluid".																																																	
MIL-B-46176		"Operational and Preservation Automotive All Weather Silicone Brake Fluid".																																																	
NF T47-501		"Rubber O-Ring – Designation, sizes and tolerances." Published by AFNOR, the French standards association																																																	
MIL-C-50072		"Voicemitter-Outlet Valve Cover".																																																	
MS 51920		Steel encased rod seals.																																																	
MIL-S-52000		"Synthetic Rubber Gasket".																																																	
MIL-C-52211		"Packing of Components and Assemblies for Industrial Gas".																																																	
A-A-55801		"Silicone Rubber" Specifications for 3 classes with various grades (durometers). See A-A-59588 (below)																																																	
A-A-59588	See Table	<p>"Silicone Rubber" Specifications for 3 classes with various grades (durometers).</p> <p>Class 1a Low temperature resistant</p> <p>Class 1b Low temperature resistant and low compression set</p> <p>Class 2a High temperature resistant</p> <p>Class 2b High temperature resistant and low compression set</p> <p>Class 3a Low temperature, tear and flex resistant</p> <p>Class 3b Flex and tear resistant</p> <table border="1"> <thead> <tr> <th>Durometer:</th> <th>30</th> <th>40</th> <th>50</th> <th>60</th> <th>70</th> <th>80</th> </tr> </thead> <tbody> <tr> <td>Class 1a</td> <td>--</td> <td>19454</td> <td>19501</td> <td>19601</td> <td>19701</td> <td>19801</td> </tr> <tr> <td>Class 1b</td> <td>--</td> <td>19454</td> <td>19501</td> <td>19601</td> <td>19701</td> <td>19801</td> </tr> <tr> <td>Class 2a</td> <td>--</td> <td>19411</td> <td>19511</td> <td>19611</td> <td>19711</td> <td>19811</td> </tr> <tr> <td>Class 2b</td> <td>--</td> <td>19411</td> <td>19511</td> <td>19611</td> <td>19711</td> <td>19811</td> </tr> <tr> <td>Class 3a</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> </tr> <tr> <td>Class 3b</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> <td>--</td> </tr> </tbody> </table>	Durometer:	30	40	50	60	70	80	Class 1a	--	19454	19501	19601	19701	19801	Class 1b	--	19454	19501	19601	19701	19801	Class 2a	--	19411	19511	19611	19711	19811	Class 2b	--	19411	19511	19611	19711	19811	Class 3a	--	--	--	--	--	--	Class 3b	--	--	--	--	--	--
Durometer:	30	40	50	60	70	80																																													
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Class 3a	--	--	--	--	--	--																																													
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MIL-R-83248 (B)		<p>"High Temperature, Fluid and Compression Set Resistant, Fluorocarbon Elastomer Rubber".</p> <p>Type I - O-rings and compression seals</p> <p>Type II - Molded parts (other than sealing devices) sheets, strips and extruded shapes.</p> <p>Class 1 - 70-80 durometer</p> <p>Class 2 - 85-95 durometer</p>																																																	



# Compound Selection Guide Specifications



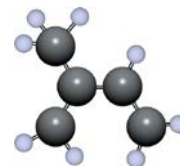
MIL SPEC	PAI CPD	DESCRIPTION OF SPECIFICATION																																								
MIL-R-83248/1		"Rubber, Fluorocarbon Elastomer, High Temperature, Fluid and Compression Set Resistant, O-Rings, Class 1, 75 Durometer".																																								
MIL-R-83248/2		"Rubber, Fluorocarbon Elastomer, High Temperature, Fluid and Compression Set Resistant, O-Rings, Class 2, 90 Durometer".																																								
MIL-R-82385		"General Purpose Ethylene-Propylene Rubber". Class I - 60-70 durometer hardness Class II - 85-95 durometer hardness																																								
MIL-R-83322		"Nitrogen Tetroxide (N2O4) Resistant Carboxy-Nitroso Rubber".																																								
MIL-R-83397		"Humidity Resistant Castable Polyurethane Rubber".																																								
MIL-R-83412		"Hydrazine Resistant Ethylene-Propylene Rubber". Type I - Seal Material Type II - Bladder and diaphragm material Type III - Valve seal material																																								
MIL-P-83461 (Q, B)		"Petroleum Hydraulic Fluid Resistant Preformed Packing Improved Performance at 275°F (136°C)".																																								
MS 83461 (Q)		Standard O-ring sizes corresponding to AS 568. Material per MIL P-83461.																																								
AMS-R-83485 (B) (MIL-P-83485) (Obsolete)	8703	"Fluorocarbon, Improved Performance at Low Temperature". <i>Superseded by AMS 3384 and AMS 7287</i>																																								
MIL-P-87175 (Q)		"Petroleum Hydraulic Fluid Resistant Phosphonitrilic Fluoroelastomer Preformed Packing". Grade 70 65-75 durometer Grade 80 75-85 durometer																																								
A-A-55549 (MS 90064)	19511 19711	"Round Preformed Packing for use with Waveguide Flanges and Dummy Loads". Waveform guides - material is a 45-55 durometer silicone per AMS 3302 Dummy loads - material is a 65-75 durometer silicone per AMS 3304 <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Dash #</th> <th>PAI size</th> <th>Dash #</th> <th>PAI size</th> </tr> </thead> <tbody> <tr><td>-1</td><td>1-012</td><td>-10</td><td>1-013</td></tr> <tr><td>-2</td><td>60-575</td><td>-11</td><td>60-575</td></tr> <tr><td>-3</td><td>1-115</td><td>-12</td><td>1-213</td></tr> <tr><td>-4</td><td>1-212</td><td>-13</td><td>92-1.338</td></tr> <tr><td>-5</td><td>92-1.338</td><td>-14</td><td>92-1.550</td></tr> <tr><td>-6</td><td>92-1.550</td><td>-15</td><td>1-227</td></tr> <tr><td>-7</td><td>2-227</td><td>-16</td><td>115-2.683</td></tr> <tr><td>-8</td><td>115-2.683</td><td>-17</td><td>1-346</td></tr> <tr><td>-9</td><td>1-345</td><td></td><td></td></tr> </tbody> </table>	Dash #	PAI size	Dash #	PAI size	-1	1-012	-10	1-013	-2	60-575	-11	60-575	-3	1-115	-12	1-213	-4	1-212	-13	92-1.338	-5	92-1.338	-14	92-1.550	-6	92-1.550	-15	1-227	-7	2-227	-16	115-2.683	-8	115-2.683	-17	1-346	-9	1-345		
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-8	115-2.683	-17	1-346																																							
-9	1-345																																									
MS 90065	19511	"Gaskets (Rectangular, for use with Waveguide Flanges)" Material unless otherwise specified is a silicone per MIL-R-5847 Class 2b, Grade 50.																																								
AN 123020		"Aluminum-Asbestos Annular Gaskets".																																								
AN 123851 thru (B) AN 123950	3774	One hundred standard size O-rings. Sizes correspond with AS 568 but numbers are different. Material is a 65-75 durometer nitrile per AMS 7274.																																								
AN 123951 thru (B) AN 124050	3720	One-hundred standard size O-rings. Sizes correspond with AS 568 but numbers are different. Material is a 65-75 durometer nitrile per AMS 7270.																																								

\* Specification is for Fluid. See Chemical Compatibility Chart for recommended compound.



# Compound Selection Guide

## Chemical Compatibility



### Polymer Comparison

Values shown in the tables are for general comparison only. They do not represent individual compound recipes.

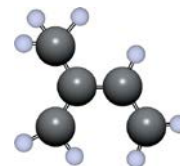
ASTM Abbr	Temperature Range (°F)		Durometer Range		Media Resistance							
	Low	High	Low	High	Oil	Fuel	Acid	Alkali	Ozone	Steam	Brake	Weather
ACM	-40	400	50	80	E	P-G	P-F	G-E	G-E	P	P	E
AEM	-50	350	40	90	F	P-G	P-F	P-F	E	P	P	E
AU	-65	250	40	90	G	P-G	P-G	P-F	E	P	P	E
CIIR	-50	300	60	70	P	P	F-E	G-E	E	G-E	G	F
CM	-60	300	80	80	G-E	P-F	G-E	E	E	P-F	G	E
CR	-80	220	30	90	F-G	P-F	F-G	G-P	G-E	P-G	F	P-G
CSM	-65	275	50	80	E	F	G-E	G-E	E-O	P-G	F	E-O
ECO	-80 to -15	275 to 325	50	90	E	G-E	P-G	P-G	G-E	F-G	P	G-E
EPDM	-75	350	40	90	P	P	G	G	G-E	E	G-E	E
EU	-65	250	40	90	G	P-G	P-G	P-F	E	P	P	E
FEPM	0	450 to 500	70	90	E	P-F	F-G	E	E	G-E	F-E	E
FKM	-20 to 20	500	50	90	E	E	G-E	P-G	O	P-G	F	E
FVMQ	-110 to -90	450	40	80	G-E	G-E	F-G	G-E	E	F-G	E	E
HNBR	-40	350	60	90	E	P-F	F-E	P-E	G-E	E	F	G-E
IIR	-75	300	60	70	P	P	F-E	G-E	E	G-E	G	E
IR	-60 to -20	180	30	70	P	P	P-G	F-G	P	F-G	G	P-F
NBR	-70 to -40	250 to 300	30	95	E	F-G	F-G	P-G	P-F	F-G	P	P-F
PVMQ	-150	450	20	80	F	P	P-F	P-E	E-O	F	G	E
SBR	-75	250	40	80	P	P-F	F	F-G	P	F-G	P-G	F-G
PTFE	N/A	400 to 500	95	95	E	E	E	E	O	E	E	E
VMQ	-100	500	20	80	F-G	P	P-G	P-E	E-O	F-G	E	E
XNBR	-50	250	50	90	E	F-G	F-G	P-G	P-F	P-F	P	P-F

P	Poor
F	Fair
G	Good
E	Excellent
O	Outstanding



# Compound Selection Guide

## Chemical Compatibility

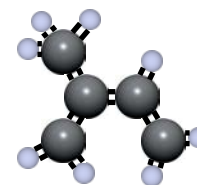


Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU/EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
AN-O-3 Grade M	5767	1	1	4	1	1	2	4	1	1	4	4	2	1	2	1
AN-O-6	5767	1	1	4	1	1	2	4	1	1	4	4	2	1	4	1
AN-O-366	5767	1	1	4	1	2	2	4	1	1	4	4	2	1	4	1
AN-VV-O-366b Hydraulic Fluid	5767	1	1	4	1	1	2	4	2	2	4	4	2	1	4	X
ANG-25 (Di-ester Base)	9746	2	2	4	1	2	4	4	2	4	4	4	4	2	2	X
ANG-25 (Glycerol Ester)	23711	2	2	1	1	1	2	2	4	4	2	2	2	2	2	X
ASTM Oil #1	5747	1	1	4	1	1	1	4	1	1	4	4	2	1	1	1
ASTM Oil #2	5747	1	1	4	1	1	2	4	1	2	4	4	4	1	4	1
ASTM Oil #3	5747	1	1	4	1	1	4	4	1	2	4	4	4	1	3	1
ASTM Oil #4	9746	2	2	4	1	1	4	4	2	4	4	4	4	2	4	1
ASTM Oil #5	9746	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
ASTM Reference Fuel A	5747	1	1	4	1	1	2	4	2	1	4	4	2	1	4	1
ASTM Reference Fuel B	5767	1	1	4	1	1	4	4	4	2	4	4	4	1	4	1
ASTM Reference Fuel C	9746	2	2	4	1	1	4	4	4	4	4	4	4	2	4	1
ASTM Reference Fuel D	9746	2	2	4	1	4	4	X	X	X	X	X	X	X	X	1
ATL-857	9746	2	2	4	1	1	4	4	2	4	4	4	4	2	4	X
Abietic Acid	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Acetaldehyde	23711	4	3	1	4	3	3	3	4	4	1	2	3	4	2	1
Acetamide	4753	1	1	1	2	2	2	4	4	4	1	4	2	1	2	1
Acetanilide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Acetic Acid, 30%	23711	2	2	1	2	X	1	2	4	4	2	2	2	2	1	1
Acetic Acid, 5%	23711	2	2	1	1	1	1	2	4	4	1	2	1	2	1	1
Acetic Acid, Glacial	23711	3	3	1	3	3	4	2	4	4	2	2	3	4	2	1
Acetic Acid, Hot, High Pressure	N/A	4	4	3	4	3	4	4	4	4	4	4	3	4	3	1
Acetic Anhydride	4753	3	4	2	4	2	2	2	4	4	2	2	1	4	3	1
Acetoacetic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Acetone	23711	4	4	1	4	2	3	3	4	4	1	3	2	4	3	1
Acetone Cyanohydrin	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Acetonitrile	23711	3	X	1	1	1	X	X	X	X	X	X	X	X	X	1
Acetophenetidine	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Acetophenone	23711	4	4	1	4	2	4	4	4	4	1	4	4	4	4	1
Acetotoluidide	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Acetyl Acetone	23711	4	4	1	4	2	4	4	4	4	1	4	4	4	4	1
Acetyl Bromide	9746	4	4	1	1	2	4	4	4	4	1	4	4	4	4	1
Acetyl Chloride	9746	4	4	4	1	2	4	4	4	4	4	4	4	1	4	1
Acetylene	23711	1	1	1	1	1	2	2	4	4	1	2	2	X	2	1
Acetylene Tetrabromide	9848	4	4	1	1	1	2	4	X	4	1	X	X	X	X	1
Acetylene Tetrachloride	9848	4	4	1	1	1	2	4	X	4	1	X	X	X	X	1
Acetylsalicylic Acid	9848	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1



# Compound Selection Guide

## Compound Worksheet



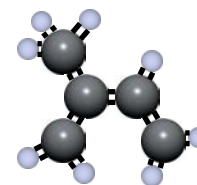
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Acids, Non-organic	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Acids, Organic	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aconitic Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Acridine	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Acrolein	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Acrylic Acid	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Acrylonitrile	34744	4	4	4	3	3	4	4	4	4	4	4	3	4	4	1
Adipic Acid	23711	1	1	2	1	2	1	1	X	X	1	1	X	1	X	1
Aero Lubriplate	3720	1	1	4	1	2	1	2	1	1	4	4	1	1	2	1
AeroShell Grease 17	3720	1	1	4	1	2	2	4	1	1	4	4	1	1	2	1
AeroShell Grease 750	9745	2	2	4	1	2	4	4	2	4	4	4	4	2	4	1
AeroShell Grease 7A	3720	2	2	4	1	2	2	4	1	1	4	4	1	1	2	1
AeroShell Grease 1AC	3720	1	1	4	1	2	2	4	1	1	4	4	1	1	2	1
Aerosafe 2300	23711	4	4	1	4	2	4	4	4	4	2	4	4	3	3	1
Aerosafe 2300W	23711	4	4	1	4	2	4	4	4	4	2	4	4	3	3	1
Aerozine 50 (50% Hydrazine 50% UDMH)	23711	3	3	1	4	2	4	4	X	4	1	4	4	4	4	2
Air Below 200° F	23711	2	2	1	1	1	1	2	1	2	1	2	1	1	1	1
Air, 200 - 300° F	19711	3	3	2	1	1	2	4	2	3	2	4	2	1	1	1
Air, 300 - 400° F	19711	4	4	4	1	2	4	4	4	4	4	4	4	2	1	1
Air, 400 - 500° F	N/A	4	4	4	3	3	4	4	4	4	4	4	4	4	2	2
Aliphatic Dicarboxylic Acid	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Alkanes (Paraffin Hydrocarbons)	5767	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Alkanesulfonic Acid	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Alkazene	9746	4	4	4	2	2	4	4	4	4	4	4	4	2	4	1
Alkenes (Olefin Hydrocarbons)	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Alkyl Acetone	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Alkyl Alcohol	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Alkyl Amine	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Alkyl Aryl Sulfonates	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Alkyl Aryl Sulfonics	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Alkyl Benzene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Alkyl Chloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Alkyl Sulfide	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Alkyl naphthalene Sulfonic Acid	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Allyl Chloride	9746	2	2	4	1	X	1	X	X	X	X	X	X	X	X	1
Allylidene Diacetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Alpha Picoline	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Aluminum Acetate	23711	2	2	1	4	2	2	2	4	4	1	1	1	4	4	1
Aluminum Bromide	5747	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1

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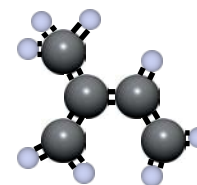
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Aluminum Chlorate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Aluminum Chloride	5780	1	1	1	1	1	1	1	1	3	1	1	1	1	2	1
Aluminum Ethylate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aluminum Fluoride	5780	1	1	1	1	1	1	1	X	3	1	2	1	1	2	1
Aluminum Fluorosilicate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aluminum Formate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Aluminum Hydroxide	23711	2	X	1	2	1	X	X	X	X	X	X	X	X	2	1
Aluminum Linoleate	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Aluminum Nitrate	5780	1	1	1	1	1	1	1	X	3	1	1	1	X	2	1
Aluminum Oxalate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Aluminum Phosphate	23711	1	1	1	1	1	1	1	X	X	1	1	1	X	1	1
Aluminum Potassium Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Aluminum Salts	5747	1	1	1	1	1	1	1	1	3	1	1	1	1	1	1
Aluminum Sodium Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Aluminum Sulfate	5780	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Alums-NH3 -Cr -K	5747	1	1	1	4	2	1	1	4	X	1	1	1	4	1	1
Ambrex 33 (ExxonMobil)	5747	1	1	4	1	2	2	4	1	2	4	4	3	3	4	1
Ambrex 830 (ExxonMobil)	5747	1	1	3	1	2	2	4	1	1	3	4	2	1	2	1
Amines-Mixed	4753	4	4	2	4	3	2	2	4	4	2	2	4	4	2	1
Aminoanthraquinone	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aminoazobenzene	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Aminobenzene Sulfonic Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aminobenzoic Acid	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Aminopyridine	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Aminosalicylic Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ammonia (Anhydrous)	4753	2	2	1	4	2	1	4	4	4	1	4	2	4	3	1
Ammonia and Lithium Metal in Solution	23711	2	2	2	4	3	X	4	4	4	2	4	4	4	4	4
Ammonia, Gas, Cold	4753	1	1	1	4	2	1	1	4	3	1	1	1	4	1	1
Ammonia, Gas, Hot	19711	4	4	2	4	2	2	4	4	4	2	4	2	4	1	1
Ammonia, Liquid (Anhydrous)	4753	2	2	1	4	2	1	4	4	4	1	4	2	4	3	1
Ammonium Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Arsenate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Benzoate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Bicarbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Bisulfite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Bromide	5747	1	1	1	1	1	1	1	X	1	1	1	1	X	X	1
Ammonium Carbamate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Carbonate	4753	4	4	1	1	1	1	1	4	4	1	1	1	X	X	1
Ammonium Chloride, 2N	5780	1	1	1	1	1	1	1	X	1	1	1	1	X	X	1

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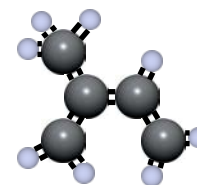
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU/EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Ammonium Citrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Dichromate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Diphosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Fluoride	5747	1	1	1	1	1	1	1	X	1	1	1	1	X	X	1
Ammonium Fluorosilicate	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Ammonium Formate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Hydroxide, 3 Molar	23711	1	1	1	3	2	1	2	4	4	1	2	1	1	1	2
Ammonium Hydroxide, Concentrated	23711	4	4	1	2	2	1	4	4	4	1	4	1	2	1	1
Ammonium Iodide	5747	1	1	1	1	1	1	1	X	1	1	1	1	X	X	1
Ammonium Lactate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Metaphosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Molybdenate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Nitrate, 2N	5780	1	1	1	1	1	1	2	2	4	1	3	1	X	X	1
Ammonium Nitrite	5780	1	1	1	1	2	1	1	X	X	1	1	1	X	2	1
Ammonium Oxalate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Perchlorate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Perchloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ammonium Persulfate 10%	23711	4	4	1	1	2	1	4	4	4	1	1	1	X	X	1
Ammonium Persulfate Solution	23711	4	4	1	1	2	X	4	4	4	1	1	1	X	X	1
Ammonium Phosphate	5780	1	1	1	1	2	1	1	X	X	1	1	1	X	1	1
Ammonium Phosphate, Dibasic	5780	1	1	1	1	2	1	1	X	X	1	1	1	X	1	1
Ammonium Phosphate, Mono-Basic	5780	1	1	1	1	2	1	1	X	X	1	1	1	X	1	1
Ammonium Phosphate, Tribasic	5780	1	1	1	1	2	1	1	X	X	1	1	1	X	1	1
Ammonium Phosphite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Picrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Polysulfide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Salicylate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Salts	5747	1	1	1	3	2	1	1	3	X	1	1	1	3	1	1
Ammonium Sulfamate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Sulfate	5780	1	1	1	2	2	1	1	4	1	1	1	1	X	X	1
Ammonium Sulfate Nitrate	5747	1	1	1	4	2	1	2	4	X	1	1	1	X	X	1
Ammonium Sulfide	5747	1	1	1	4	2	1	2	4	X	1	1	1	X	X	1
Ammonium Sulfite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Thiocyanate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Thioglycolate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Thiosulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Tungstate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ammonium Valerate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Amyl Acetate	34860	4	4	3	4	3	4	4	4	4	3	4	4	4	4	1

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# Compound Selection Guide

## Compound Worksheet



Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Amyl Alcohol	23711	2	2	1	2	1	2	2	4	4	1	2	1	1	4	1
Amyl Borate	5780	1	1	4	1	X	1	4	X	X	4	4	1	X	X	1
Amyl Butyrate	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Amyl Chloride	9746	X	X	4	1	2	4	4	4	X	4	4	4	2	4	1
Amyl Chloronaphthalene	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Amyl Cinnamic Aldehyde	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Amyl Laurate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Amyl Mercaptan	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Amyl Naphthalene	9746	4	4	4	1	2	4	4	2	4	4	4	4	1	4	1
Amyl Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Amyl Nitrite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Amyl Phenol	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Amyl Propionate	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Anderol®, L- 774 (di-ester)	9746	2	2	4	1	2	4	4	2	4	4	4	4	2	4	1
Anderol®, L- 826 (di-ester)	9746	2	2	4	1	2	4	4	2	4	4	4	4	2	4	1
Anderol®, L- 829 (di-ester)	9746	2	2	4	1	2	4	4	2	4	4	4	4	2	4	1
Aniline	23711	4	4	1	3	1	4	4	4	4	1	4	3	3	4	1
Aniline Dyes	23711	4	4	1	2	2	2	2	4	4	2	2	2	2	3	1
Aniline Hydrochloride	23711	2	2	2	2	2	4	4	4	4	2	2	4	2	4	1
Aniline Oil	23711	4	4	2	3	2	4	4	4	4	2	4	4	3	4	1
Aniline Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Aniline Sulfite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Animal Fats	5780	1	1	2	1	1	2	4	1	1	2	4	2	1	2	1
Animal Oil (Lard Oil)	5780	1	1	2	1	2	2	4	1	1	2	4	4	1	2	1
Anisole	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Anisoyl Chloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ansul Ether 161 or 181	34860	3	3	3	4	3	4	4	4	2	3	4	4	3	4	1
Anthracene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Anthranilic Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Anthraquinone	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Anti-freeze Solutions	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Antimony Chloride	5747	1	1	4	1	1	2	4	1	1	4	4	2	1	4	1
Antimony Pentachloride	5747	1	1	4	1	1	2	4	1	1	4	4	2	1	4	1
Antimony Pentafluoride	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Antimony Sulfate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Antimony Tribromide	5747	1	1	4	1	1	2	4	1	1	4	4	2	1	4	1
Antimony Trichloride	5747	1	1	4	1	1	2	4	1	1	4	4	2	1	4	1
Antimony Trifluoride	5747	1	1	4	1	1	2	4	1	1	4	4	2	1	4	2
Antimony Trioxide	5747	1	1	4	1	1	2	4	1	1	4	4	2	1	4	1

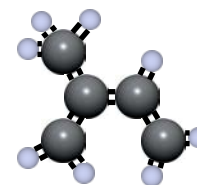
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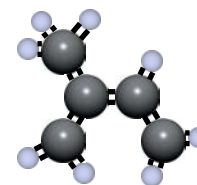
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Aqua Regia	34860	4	4	3	2	3	4	4	4	4	4	4	2	3	4	1
Arachidic Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Argon	13766	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Aroclor, 1248	9746	3	3	3	1	1	4	4	4	4	3	4	1	2	2	1
Aroclor, 1254	9746	4	4	3	1	1	4	4	4	4	4	4	4	2	3	1
Aroclor, 1260	9746	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Aromatic Fuel - 50%	9746	2	2	4	1	2	4	4	4	4	4	4	4	2	4	1
Arsenic Acid	23711	1	1	1	1	1	1	1	3	3	1	2	1	1	1	1
Arsenic Oxide	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Arsenic Trichloride	5780	1	1	3	4	X	1	4	X	X	3	4	X	X	X	1
Arsenic Trioxide	5747	1	1	4	4	X	1	X	X	X	X	X	X	X	X	1
Arsenic Trisulfide	5747	1	1	4	4	X	1	X	X	X	X	X	X	X	X	1
Arsenites	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Arsine	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Aryl Orthosilicate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ascorbic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Askarel Transformer Oil	9746	2	2	4	1	2	4	4	4	4	4	4	4	2	4	1
Aspartic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Asphalt	9746	2	2	4	1	2	2	4	2	2	4	4	2	2	4	1
Atlantic Dominion F	5767	1	1	4	1	2	2	4	1	2	4	4	4	1	4	1
Atlantic Utro Gear-EP Lube.	9746	1	1	4	1	2	2	4	1	1	4	4	4	1	4	1
Atlantic Utro Gear-e	5767	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Aure 903R (Mobil)	3716	1	1	4	1	2	2	4	1	1	4	2	4	4	4	1
Automatic Transmission Fluid (Type A)	3720	1	1	4	1	2	2	4	1	1	4	4	2	1	2	1
Automotive Brake Fluid	23747	3	3	1	4	2	2	1	4	4	2	X	2	4	3	1
Azobenzene	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bardol B	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Barium Carbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Barium Chlorate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Barium Chloride	5780	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Barium Cyanide	5747	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Barium Hydroxide	5780	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Barium Iodide	5747	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Barium Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Barium Oxide	5747	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Barium Peroxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Barium Polysulfide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Barium Salts	5747	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Barium Sulfate	5780	1	1	1	1	1	1	X	X	X	X	X	X	X	X	1

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# Compound Selection Guide

## Compound Worksheet



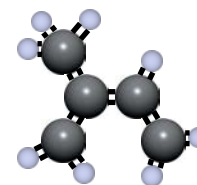
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Barium Sulfide	5780	1	1	1	1	1	1	2	4	1	1	1	1	1	1	1
Bayol 35	5747	1	1	4	1	2	2	4	1	2	4	4	4	1	4	1
Bayol D	5747	1	1	4	1	2	2	4	1	4	4	4	4	1	4	1
Beer	23744	1	1	1	1	1	1	1	4	2	1	1	1	1	1	1
Beet Sugar Liquids	3744	1	1	1	1	1	1	X	X	X	X	X	X	X	X	1
Beet Sugar Liquors	3744	1	1	1	1	1	2	1	4	4	1	1	1	1	1	1
Benzaldehyde	23711	4	4	1	4	2	4	4	4	4	1	4	1	3	2	1
Benzaldehyde Disulfonic Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Benzamide	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Benzanthrone	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Benzene	9746	4	4	4	1	3	4	4	4	3	4	4	4	3	4	1
Benzene Hexachloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Benzenesulfonic Acid 10%	8782	4	4	3	1	2	2	4	4	4	4	4	1	2	4	1
Benzidine	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Benzidine 3 Sulfonic Acid	8782	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Benzil	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Benzilic Acid	8782	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Benzine (Ligroin)	9746	1	1	4	1	2	2	4	1	2	4	4	3	1	4	1
Benzocatechol	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Benzochloride	9746	4	4	1	1	1	4	4	4	X	2	4	4	1	X	1
Benzoic Acid	8782	3	3	3	1	2	4	4	3	4	4	4	4	2	3	1
Benzoin	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	X
Benzonitrile	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Benzophenone	9746	X	X	2	1	2	X	4	4	4	2	X	X	1	X	1
Benzoquinone	9746	X	X	2	1	2	X	4	4	4	2	X	X	X	X	1
Benzotrichloride	9746	4	4	1	1	1	4	X	X	X	X	X	X	X	X	1
Benzotrifluoride	9746	4	4	1	1	1	4	X	X	X	X	X	X	X	X	1
Benzoyl Chloride	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Benzoyl Peroxide	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Benzoylsulfonic Acid	8782	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Benzyl Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Benzyl Alcohol	9746	4	4	1	1	1	2	4	4	4	1	4	2	2	2	1
Benzyl Amine	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Benzyl Benzoate	9746	4	4	2	1	2	4	4	4	4	2	4	4	1	4	1
Benzyl Bromide	9746	4	4	4	1	2	4	4	4	4	4	4	4	1	4	1
Benzyl Butyl Phthalate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Benzyl Chloride	9746	4	4	4	1	1	4	4	4	4	4	4	4	2	4	1
Benzyl Phenol	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Benzyl Salicylate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1

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# Compound Selection Guide

## Compound Worksheet



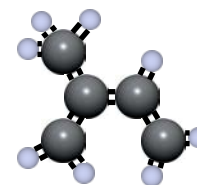
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Beryllium Chloride	5747	1	1	1	1	1	3	3	3	3	1	3	3	3	3	1
Beryllium Fluoride	5747	1	1	1	1	1	3	3	3	3	1	3	3	3	3	1
Beryllium Oxide	5747	1	1	1	1	1	3	3	3	3	1	3	3	3	3	1
Beryllium Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Bismuth Carbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Bismuth Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Bismuth Oxychloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Black Liquor	23711	2	X	1	1	1	1	X	X	X	X	X	X	X	X	3
Black Point 77	5747	1	1	1	1	1	3	3	3	3	1	3	3	3	3	1
Blast Furnace Gas	19711	4	4	4	1	2	4	4	4	4	4	4	4	2	1	1
Bleach Liquor	23711	3	3	1	1	1	2	3	4	4	1	3	1	2	2	1
Bleach Solutions	23711	4	2	1	1	1	4	4	4	4	1	4	1	2	2	1
Borax	23711	2	1	1	1	1	1	2	2	1	1	2	1	2	2	1
Borax Solutions	23711	X	X	1	1	X	X	X	X	X	X	X	X	X	X	1
Bordeaux Mixture	23711	2	2	1	1	1	2	2	4	4	1	2	1	2	2	1
Boric Acid	5780	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1
Boric Oxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Borneol	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Bornyl Acetate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Bornyl Chloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Bornyl Formate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Boron Fluids (HEF)	9746	2	2	4	1	2	4	4	4	4	4	4	4	2	4	1
Boron Hydride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Boron Phosphate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Boron Tribromide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Boron Trichloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Boron Trifluoride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Boron Trioxide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brake Fluid DOT3 (Glycol Type)	23747	3	3	1	4	2	2	1	X	4	2	X	2	4	3	4
Bray GG-130	9746	2	2	4	1	2	4	4	2	4	4	4	4	2	4	1
Brayco® 719-R (VV-H-910)	23747	3	3	1	4	2	2	X	4	4	2	2	2	2	2	4
Brayco® 885 (MIL-L-6085A)	9746	2	2	4	1	2	4	4	2	1	4	4	4	2	4	1
Brayco® 910	23711	2	2	1	4	2	2	2	3	3	1	1	1	4	4	1
Bret 710	23711	2	2	1	4	2	2	2	3	3	1	1	1	4	4	4
Brine	5767	1	1	1	1	X	1	1	4	2	1	1	1	1	1	1
Brine (Seawater)	23711	1	1	3	1	1	4	X	X	X	X	X	X	X	X	X
Bromic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Bromine	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Bromine Pentafluoride	N/A	4	4	4	4	3	4	4	4	4	4	4	4	4	4	2

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# Compound Selection Guide

## Compound Worksheet



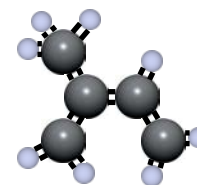
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Bromine Trifluoride	34860	4	4	4	4	3	4	4	4	4	4	4	4	4	4	1
Bromine Water	9746	4	3	2	1	3	4	4	4	4	3	4	1	2	4	1
Bromobenzene	9746	4	4	4	1	2	4	4	4	4	4	4	4	1	4	1
Bromobenzene Cyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Bromochloro Trifluoroethane (Halothane)	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Bromoform	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Bromomethane (Methyl Bromide)	9746	2	2	4	1	1	4	4	3	X	4	4	4	1	X	1
Bromotrifluoroethylene (BFE)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Bromotrifluoromethane (F-13B1)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Brucine Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Bunker Oil	5780	1	1	4	1	2	4	4	1	2	4	4	4	1	2	1
Bunker's "C" (Fuel Oil)	5780	1	1	4	1	X	2	4	1	2	4	4	2	1	4	1
Butadiene (Monomer)	9746	4	4	3	1	2	4	4	4	4	4	4	3	2	4	1
Butane	5780	1	1	4	1	2	1	4	1	1	4	4	2	1	4	1
Butane, 2, 2-Dimethyl	5747	1	1	4	1	2	2	3	1	4	4	4	2	3	4	1
Butane, 2, 3-Dimethyl	5747	1	1	4	1	2	2	3	1	4	4	4	2	3	4	1
Butanedial	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Butanol (Butyl Alcohol)	5747	1	1	2	1	1	1	1	4	4	2	1	1	1	2	1
Butene 2-Ethyl (1-Butene 2-Ethyl)	5747	1	1	4	1	1	4	4	1	4	4	4	4	3	4	1
Butter-Animal Fat	3741	1	1	1	1	1	2	4	1	1	2	4	2	1	2	1
Butyl Acetate or n-Butyl Acetate	34860	4	4	3	4	4	4	4	4	4	3	4	4	4	4	1
Butyl Acetyl Ricinoleate	23711	3	2	1	1	1	2	4	X	4	1	4	2	2	X	1
Butyl Acrylate	19711	4	4	4	4	4	4	4	4	X	4	4	4	4	2	1
Butyl Alcohol	5780	1	1	2	1	1	1	1	4	4	2	1	1	1	2	1
Butyl Alcohol (Secondary)	9746	2	2	2	1	1	2	2	4	4	2	2	2	2	2	1
Butyl Alcohol (Tertiary)	9746	2	2	2	1	1	2	2	4	4	2	2	2	2	2	1
Butyl Amine or N-Butyl Amine	23711	3	3	2	4	3	4	4	4	4	3	4	4	4	4	1
Butyl Benzoate	9746	4	4	2	1	X	4	2	4	4	2	3	4	1	2	1
Butyl Benzolate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Butyl Butyrate or n-Butyl Butyrate	23711	4	4	1	1	X	4	4	4	X	1	4	4	1	X	1
Butyl Carbitol	23711	4	4	1	3	2	3	4	4	X	1	4	2	4	4	1
Butyl Cellosolve	23711	3	3	2	4	2	3	4	4	4	2	4	4	4	X	1
Butyl Cellosolve Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Butyl Cellosolve Adipate	23711	4	4	2	2	2	4	4	4	4	2	4	4	2	2	1
Butyl Chloride	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Butyl Ether or n-Butyl Ether	34860	3	3	3	4	X	4	4	4	3	3	4	4	3	4	1
Butyl Glycolate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Butyl Lactate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Butyl Laurate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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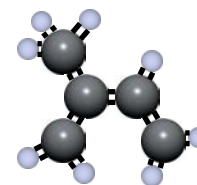
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Butyl Mercaptan (Tertiary)	9746	4	4	4	1	X	4	4	4	4	4	4	4	X	4	1
Butyl Methacrylate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Butyl Oleate	9746	4	4	2	1	2	4	4	X	X	2	4	4	2	X	1
Butyl Oxalate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Butyl Stearate	9746	2	2	3	1	1	4	4	X	X	3	4	4	2	X	1
Butylbenzoic Acid	8782	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Butylene	9746	2	4	4	1	2	3	4	4	4	4	4	4	2	4	1
Butyraldehyde	23711	4	4	2	4	2	3	4	4	4	2	4	4	4	4	1
Butyric Acid	8782	4	4	2	2	1	4	4	4	X	2	X	4	X	X	1
Butyric Anhydride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Butyrolactone	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Butyryl Chloride	8782	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Cadmium Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cadmium Cyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cadmium Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cadmium Oxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cadmium Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cadmium Sulfide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcine Liquors	3744	1	1	1	1	1	X	X	4	4	1	X	X	1	X	1
Calcium Acetate	23711	2	2	1	4	1	2	4	4	4	1	1	2	4	4	1
Calcium Arsenate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Benzoate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Calcium Bicarbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Bisulfide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Bisulfite	4751	4	1	4	1	1	1	2	4	1	4	4	1	1	1	1
Calcium Bromide	5747	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Calcium Carbide	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Calcium Carbonate	5747	1	1	1	1	1	1	1	3	3	1	1	1	1	1	1
Calcium Chlorate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Chloride	5780	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Calcium Chromate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Cyanamide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Calcium Cyanide	5747	1	1	1	X	1	1	1	X	X	1	1	1	X	1	1
Calcium Fluoride	5747	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Calcium Gluconate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Hydride	5747	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Calcium Hydrosulfide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Hydroxide	5780	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1
Calcium Hypochlorite	23711	2	2	1	1	1	3	3	4	4	1	3	1	2	2	1

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# Compound Selection Guide

## Compound Worksheet



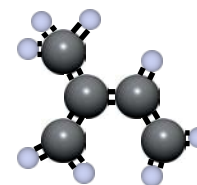
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Calcium Hypophosphite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Lactate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Naphthenate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Calcium Nitrate	5780	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1
Calcium Oxalate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Oxide	5747	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Calcium Permanganate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Calcium Peroxide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Calcium Phenolsulfonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Phosphate	5747	1	1	1	1	1	2	1	1	1	1	1	1	X	1	1
Calcium Phosphate Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Propionate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Pyridine Sulfonate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Calcium Salts	5747	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1
Calcium Silicate	5747	1	1	1	1	1	1	1	X	X	1	1	1	X	X	1
Calcium Stearate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Calcium Sulfamate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Calcium Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Sulfide	5780	1	1	1	1	1	1	2	4	1	1	2	1	1	1	1
Calcium Sulfite	5747	1	1	1	1	1	1	2	4	1	1	2	1	1	1	1
Calcium Thiocyanate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Calcium Thiosulfate	23711	2	2	1	1	1	1	2	4	1	1	2	1	1	1	1
Calcium Tungstate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Caliche Liquors	3744	1	1	1	1	1	1	1	1	1	1	1	1	1	2	1
Camphene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Camphor	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Camphoric Acid	8782	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Cane Sugar Liquors	3744	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Capric Acid	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Caproic Acid	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Caproic Aldehyde	23711	X	X	2	4	3	X	X	4	4	2	2	X	4	2	1
Caprolactam	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Capronaldehyde	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Carbamate	9746	3	3	2	1	1	2	4	4	4	2	4	2	1	X	1
Carbazole	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Carbitol	23711	2	2	2	2	1	2	2	4	4	2	2	2	2	2	1
Carbolic Acid (Phenol)	8782	4	4	2	1	1	3	4	4	3	2	4	4	1	4	1
Carbon Bisulfide	9746	3	4	4	1	1	4	4	3	X	4	4	4	1	4	1
Carbon Dioxide	5767	1	1	2	1	1	2	2	1	1	2	2	2	1	2	1

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# Compound Selection Guide

## Compound Worksheet



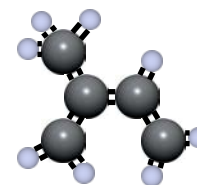
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Carbon Dioxide (RGD Use)	623906	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Carbon Disulfide	9746	4	4	4	1	2	4	4	3	X	4	4	4	1	4	1
Carbon Fluorides	9746	2	2	4	1	2	4	4	4	4	4	4	4	2	4	1
Carbon Monoxide	5780	1	1	1	1	1	2	2	X	1	1	2	2	2	1	1
Carbon Tetrabromide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Carbon Tetrachloride	9746	3	2	4	1	4	4	4	4	4	4	4	4	3	4	1
Carbon Tetrafluoride	9746	2	2	4	1	2	4	4	4	4	4	4	4	2	4	1
Carbonic Acid	23711	2	2	1	1	1	1	2	1	1	1	1	1	1	1	1
Casein	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Castor Oil	3744	1	1	2	1	1	1	1	1	1	2	1	2	1	1	1
Caustic Lime	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Caustic Potash	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Caustic Soda (Sodium Hydroxide)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cellosolve	23711	4	4	2	3	3	4	4	4	4	2	4	4	4	4	1
Cellosolve Butyl	23711	4	4	2	4	2	4	4	4	4	2	4	4	4	4	4
Cellosolve, Acetate	23711	4	4	2	4	2	4	4	4	4	2	4	4	4	4	1
Cellugard	5747	1	1	1	1	1	1	1	3	4	1	1	1	1	1	1
Cellulose Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cellulose Acetate Butyrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cellulose Ether	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cellulose Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cellulose Tripropionate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cellutherm™ 2505A	9746	2	2	4	1	2	4	4	2	4	4	4	4	2	4	1
Cerium Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cerous Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cerous Fluoride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cerous Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cetane (Hexadecane)	5747	1	1	4	1	2	2	4	1	4	4	4	2	3	4	1
Cetyl Alcohol	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Chaulmoogric Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
China Wood Oil (Tung Oil)	5780	1	1	3	1	2	2	4	X	3	3	4	3	2	4	1
Chloral	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Chloramine	23761	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Chloranthraquinone	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chlordane	9746	2	2	4	1	2	3	4	X	X	4	4	3	2	4	1
Chlorextol	9746	2	2	4	1	2	2	4	2	4	4	4	4	2	4	1
Chloric Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Chlorinated Solvents, Dry	9746	4	4	4	1	2	4	4	4	4	4	4	4	1	4	1
Chlorinated Solvents, Wet	9746	4	4	4	1	2	4	4	4	4	4	4	4	1	4	1

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# Compound Selection Guide

## Compound Worksheet



Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Chlorine Dioxide	9746	4	4	3	1	2	4	4	4	4	3	4	3	2	X	2
Chlorine Dioxide (8% Cl as NaClO <sub>2</sub> )	8782	4	4	4	1	2	4	4	4	4	4	4	4	2	X	1
Chlorine Trifluoride	N/A	4	4	4	4	4	4	4	4	4	4	4	4	4	4	2
Chlorine Water	8782	3	3	2	1	1	4	X	X	X	X	X	X	X	X	1
Chlorine, Dry	8782	4	3	4	1	2	3	4	4	4	4	4	2	1	4	1
Chlorine, Wet	34860	4	3	3	2	2	3	4	4	4	3	4	3	2	4	1
Chloro 1-Nitro Ethane	N/A	4	4	4	4	3	4	4	4	4	4	4	4	4	4	1
Chloro Oxyfluorides	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Chloro Xylenols	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chloroacetaldehyde	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	2
Chloroacetic Acid	23711	4	4	1	4	2	4	4	4	4	2	4	1	4	X	1
Chloroacetone	23711	4	4	1	4	2	3	4	4	4	2	4	4	4	4	1
Chloroacetyl Chloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chloroamino Benzoic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Chloroaniline	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Chlorobenzaldehyde	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Chlorobenzene	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Chlorobenzene (Mono)	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Chlorobenzene Chloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chlorobenzene Trifluoride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chlorobenzochloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chlorobenzotrifluoride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chlorobromo Methane	9746	4	4	2	1	1	4	4	4	4	2	4	4	2	4	1
Chlorobromopropane	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chlorobutadiene	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Chlorobutane (Butyl Chloride)	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Chlorododecane	9746	4	4	4	1	2	4	4	4	4	4	4	4	1	4	1
Chloroethane	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Chloroethane Sulfonic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Chloroethylbenzene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chloroform	9746	4	4	4	1	2	4	4	4	4	4	4	4	4	4	1
Chlorohydrin	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Chloronaphthalene or o-Chloronaphthalene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Chloronitrobenzene	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Chlorophenol or o-Chlorophenol	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Chloropicrin	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chloroprene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chlorosilanes	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chlorosulfonic Acid	N/A	4	4	4	4	1	4	4	4	4	4	4	4	4	4	1

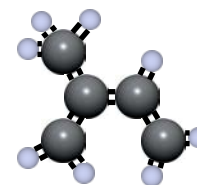
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# Compound Selection Guide

## Compound Worksheet



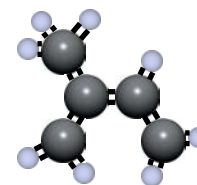
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Chlorotoluene	8782	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Chlorotoluene Sulfonic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Chlorotoluidine	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chlorotrifluoroethylene (CTFE)	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Chlorox	9746	2	2	2	1	1	1	4	4	4	2	4	2	2	2	1
Chloroxylols	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cholesterol	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Chrome Alum	5747	1	1	1	1	1	1	1	4	X	1	1	1	X	1	1
Chrome Plating Solutions	9746	4	4	2	1	1	4	4	4	4	2	4	4	2	2	1
Chromic Acid	9746	4	4	3	1	1	3	4	4	4	4	4	2	3	3	1
Chromic Chloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chromic Fluorides	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chromic Hydroxide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chromic Nitrates	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chromic Oxide	9746	4	4	2	1	1	4	X	X	X	X	X	X	X	X	1
Chromic Phosphate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chromic Sulfate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Chromium Potassium Sulfate (Alum)	9746	2	X	2	1	2	X	X	X	X	X	X	X	X	X	1
Chromyl Chlorides	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cinnamic Acid	8782	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Cinnamic Alcohol	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Cinnamic Aldehyde	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Circo Light Process Oil	5747	1	1	4	1	2	2	4	1	1	4	4	2	1	4	1
Citric Acid	4753	1	1	1	1	1	1	1	X	1	1	1	1	1	1	1
Clorox®	9746	2	X	2	1	X	X	X	X	X	X	X	X	X	X	1
Coal Tar	5780	1	X	4	1	X	2	4	1	3	4	4	4	1	4	1
Cobalt Chloride	5780	1	1	1	1	1	1	1	4	4	1	1	1	1	2	1
Cobalt Chloride, 2N	5780	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Cobaltous Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Cobaltous Bromide	5747	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Cobaltous Linoleate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cobaltous Naphthenate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cobaltous Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Coconut Oil	3744	1	1	3	1	2	2	4	1	2	3	4	3	1	1	1
Cod Liver Oil	3744	1	1	1	1	1	2	4	1	1	1	4	2	1	2	1
Codeine	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Coffee	3744	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Coke Oven Gas	9746	4	4	4	1	2	4	4	4	4	4	4	3	2	2	1
Coliche Liquors	4753	2	2	2	X	2	1	2	X	X	2	1	X	X	X	X

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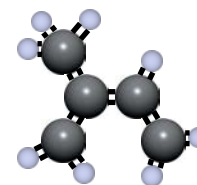
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU/EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Convelex 10	N/A	4	4	X	X	X	4	4	X	2	4	4	4	X	4	X
Coolanol™ 20 25R 35R 40& 45A (Mobil)	9746	1	1	3	1	2	2	4	4	1	4	4	2	1	4	1
Copper Acetate	23711	2	2	1	4	2	2	4	4	4	1	1	2	4	4	1
Copper Ammonium Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Copper Carbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Copper Chloride	5780	1	1	1	1	1	2	1	1	1	1	1	2	1	1	1
Copper Cyanide	5780	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Copper Gluconate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Copper Naphthenate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Copper Nitrate	9746	2	X	2	1	2	X	X	X	X	X	X	X	X	X	1
Copper Oxide	5747	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Copper Salts	5747	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Copper Sulfate	5780	1	1	1	1	1	1	2	4	1	2	2	1	1	1	1
Copper Sulfate 10%	5780	1	1	1	1	1	1	2	4	2	2	2	1	1	1	1
Copper Sulfate 50%	5780	1	1	1	1	1	1	2	4	3	2	1	1	1	1	1
Corn Oil	3744	1	1	3	1	2	3	4	1	1	3	4	2	1	1	1
Cottonseed Oil	5780	1	1	2	1	1	2	4	1	1	3	4	2	1	1	1
Creosote, Coal Tar	5780	1	1	4	1	2	2	4	1	3	4	4	4	1	4	1
Creosote, Wood	5780	1	1	4	1	2	2	4	1	3	4	4	4	1	4	1
Cresol (Methyl Phenol)	9746	4	X	4	1	1	3	4	4	4	4	4	4	2	4	1
Cresols	8782	4	4	4	2	2	4	4	4	X	4	4	4	X	4	X
Cresylic Acid	8782	4	1	4	1	1	3	4	4	4	4	4	4	2	4	1
Crotonaldehyde	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Crotonic Acid	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Crude Oil	9746	2	2	4	1	2	4	4	1	X	4	4	4	2	4	1
Cumaldehyde	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Cumene	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Cumene Hydroperoxide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cupric Sulfate	9746	2	X	2	1	2	X	X	X	X	X	X	X	X	X	1
Cutting Oil	5747	1	1	4	1	2	2	4	1	1	4	4	2	1	4	1
Cyanamide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyanides	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyanogen Chloride	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Cyanogen Gas	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyanohydrin	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyanuric Chloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyclohexane	5780	1	1	4	1	2	3	4	1	1	4	4	4	2	4	1
Cyclohexanol	4751	3	1	3	1	2	1	4	X	X	4	4	2	1	4	1
Cyclohexanone	23711	4	4	2	4	2	4	4	4	4	2	4	4	4	4	1

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## Compound Worksheet



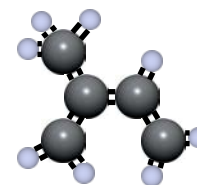
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Cyclohexene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Cyclohexylamine	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Cyclohexylamine Carbonate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Cyclohexylamine Laurate	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Cyclopentadiene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Cyclopentane	5747	1	1	4	1	2	3	4	2	1	4	4	4	1	4	1
Cyclopolyolefins	9746	1	1	4	1	2	3	4	2	1	4	4	4	1	4	1
Cymene or p-Cymene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
DDT (Dichlorodiphenyltrichloroethane)	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
DI Water	23711	1	1	1	1	1	1	1	4	3	1	1	1	1	1	1
D-Limonene Solvent	9746	2	2	4	1	2	4	4	3	2	4	4	4	4	1	X
Decalin	9746	4	4	4	1	2	4	4	X	X	4	4	4	1	4	1
Decane	5780	1	1	4	1	2	4	4	1	2	4	4	3	1	2	1
Delco® Brake Fluid	23747	3	3	1	4	2	2	1	X	X	2	X	2	4	3	1
Denatured Alcohol	23711	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Detergent, Water Solution	23711	1	1	1	1	1	2	2	4	4	1	2	2	1	1	1
Developing Fluids (Photo)	3744	1	1	2	1	1	1	2	X	X	2	1	1	1	1	1
Dexron®	3720	1	1	4	1	2	2	4	1	2	4	4	4	2	4	1
Dextrin	3744	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Dextro Lactic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Dextron	3720	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Dextrose	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Di-Tert-Butyl Peroxide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Di-ester Lubricant MIL-L-7808	9746	2	2	4	1	2	4	4	2	4	4	4	4	2	4	X
Di-ester Synthetic Lubricants	9746	2	2	4	1	2	4	4	2	4	4	4	4	2	4	X
Diacetone	23711	4	4	1	4	2	4	4	4	4	1	4	4	4	4	1
Diacetone Alcohol	23711	4	4	1	4	2	2	4	4	4	1	4	2	4	2	1
Dialkyl Sulfates	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Diallyl Ether	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Diallyl Phthalate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Diamylamine	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Diazinon	9746	3	3	4	2	2	3	4	X	X	4	4	3	2	4	1
Dibenzyl (sym-Diphenylethane)	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dibenzyl Ether	N/A	4	4	2	4	2	3	4	X	2	2	4	4	X	X	1
Dibenzyl Sebacate	9746	4	4	2	2	2	4	4	4	2	2	4	4	3	3	1
Diborane	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dibromoethane	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dibromoethyl Benzene	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Dibutyl Cellosolve Adipate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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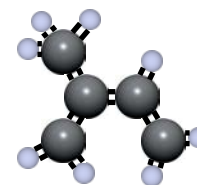
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Dibutyl Ether	N/A	4	4	3	3	3	3	4	3	2	3	4	4	3	4	1
Dibutyl Methyleneidithio Glycolate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dibutyl Phthalate	23711	4	4	2	3	3	4	4	4	3	3	4	4	3	2	1
Dibutyl Sebacate	23711	4	4	2	2	2	4	4	4	4	2	4	4	2	2	1
Dibutyl Thioglycolate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dibutyl Thiourea	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dibutylamine	23711	4	4	1	4	4	3	4	4	4	4	4	4	4	3	1
Dichloroacetic Acid	8782	2	2	4	1	X	4	4	4	3	4	4	4	2	X	2
Dichloroaniline	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Dichlorobenzene or o-Dichlorobenzene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Dichlorobenzene or p-Dichlorobenzene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Dichlorobutane	9746	2	2	4	1	2	4	4	4	4	4	4	4	2	4	1
Dichlorobutene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dichlorodiphenyl-Dichloroethane (DDD)	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dichloroethane	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dichloroethylene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dichlorohydrin	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Dichloroisopropyl Ether	N/A	4	4	3	3	3	4	4	3	2	4	4	4	3	4	1
Dichloromethane	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dichlorophenol	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dichlorophenoxyacetic Acid	8782	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dichloropropane	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dichloropropene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dichlorosilane	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Dicyclohexylamine	34860	3	3	4	4	4	4	4	4	4	4	4	4	4	X	1
Dicyclohexylammonium Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Dieldrin	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Diesel Exhaust Fluid (DEF)	23747	X	X	1	X	X	X	X	X	X	X	X	X	X	X	X
Diesel Oil	5747	1	1	4	1	2	3	4	1	3	4	4	3	1	4	1
Diethanolamine (DEA)	23711	2	X	2	4	X	2	2	4	3	2	2	3	4	2	1
Diethyl Benzene	9746	4	X	4	1	X	4	4	X	4	4	4	4	3	4	1
Diethyl Carbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Diethyl Ether	N/A	4	4	4	4	4	3	4	3	1	4	4	3	3	4	1
Diethyl Phthalate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Diethyl Sebacate	9746	2	2	2	2	2	4	4	4	4	2	4	4	2	2	1
Diethyl Sulfate	23711	4	X	1	3	2	4	X	X	X	X	X	X	X	2	1
Diethylamine	23711	2	X	1	4	X	1	1	4	4	1	1	1	1	2	1
Diethylaniline	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Diethylene Glycol	23711	1	1	1	1	1	1	1	2	4	1	1	1	1	2	1

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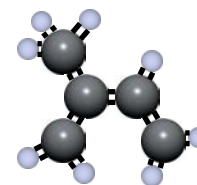
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Diethylenetriamine	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Difluorodibromomethane	23711	4	4	2	X	2	4	4	4	4	2	4	4	X	4	1
Difluoroethane	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Difluoromonochloroethane	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Diglycol Chloroformate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Diglycolic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Dihydroxydiphenylsulfone	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Diisobutyl Ketone	23711	X	X	1	X	1	X	X	X	X	1	X	X	X	X	1
Diisobutylcarbinol	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Diisobutylene	9746	2	1	4	1	2	4	4	4	4	4	4	4	3	4	1
Diisooctyl Sebacate	9746	3	3	3	2	2	4	4	4	4	4	4	4	3	3	1
Diisopropyl Ether (DIPE)	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Diisopropyl Ketone	23711	4	4	1	4	2	4	4	4	4	1	4	4	4	4	1
Diisopropylbenzene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Diisopropylidene Acetone	34860	4	X	3	4	X	4	4	4	4	4	4	4	4	4	1
Dimethyl Acetamide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Dimethyl Aniline (Xylidine)	23711	3	X	2	4	X	3	3	4	4	4	4	4	4	4	1
Dimethyl Disulfide (DMDS)	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Dimethyl Ether	5780	1	1	4	4	4	3	4	4	X	4	4	3	1	1	1
Dimethyl Formaldehyde	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Dimethyl Formamide (DMF)	23711	2	2	2	4	1	3	4	4	4	2	4	4	4	2	1
Dimethyl Hydrazine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Dimethyl Phenyl Carbinol	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dimethyl Phenyl Methanol	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dimethyl Phthalate	9746	4	4	2	2	2	4	4	4	X	2	4	4	2	X	1
Dimethyl Sulfoxide (DMSO)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Dimethyl Terephthalate (DMT)	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dimethylamine (DMA)	23711	2	2	1	4	2	2	2	4	3	2	2	3	4	2	2
Dinitrochlorobenzene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dinitrogen Tetroxide	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Dinitrotoluene (DNT)	34860	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1
Diocetyl Phthalate	9746	3	4	2	2	2	4	4	4	4	2	4	4	2	3	1
Diocetyl Sebacate	23711	4	4	2	2	1	4	4	4	2	2	4	4	3	3	1
Diocetylamine	5767	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Dioxane	23711	4	4	2	4	4	4	4	4	4	2	4	4	3	4	1
Dioxolane	23711	4	4	2	4	3	4	4	4	4	3	4	4	4	4	1
Dipentene	5780	2	2	4	1	2	4	4	4	4	4	4	4	3	4	1
Diphenyl	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	4	1
Diphenyl Oxides	9746	4	4	4	1	2	4	4	4	4	4	4	4	2	3	1

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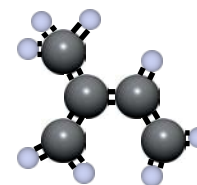
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Diphenylamine (DPA)	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Diphenylene Oxide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Diphenylpropane	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Disilane	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Dodecylbenzene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Dow® Chemical 50-4	23711	X	X	1	4	2	2	1	X	X	2	X	2	4	X	2
Dow® Chemical ET378	N/A	4	4	X	X	X	4	4	3	2	4	4	4	X	4	2
Dow® Chemical ET588	23711	3	3	1	4	2	2	1	X	X	2	X	2	4	X	2
Dow Corning® -11	23711	2	2	1	1	1	1	1	1	1	1	1	1	1	2	1
Dow Corning® -1265	23711	2	2	1	1	1	1	1	1	1	1	1	1	3	1	1
Dow Corning® -200	23711	2	2	1	1	1	1	1	1	1	1	1	1	2	3	1
Dow Corning® -3	23711	2	2	1	1	X	1	1	1	1	1	1	1	1	2	1
Dow Corning® -33	23711	2	2	1	1	X	1	1	1	1	1	1	1	2	3	1
Dow Corning® -4	23711	2	2	1	1	X	1	1	1	1	1	1	1	1	2	1
Dow Corning® -44	23711	2	2	1	1	X	1	1	1	1	1	1	1	2	3	1
Dow Corning® -5	23711	2	2	1	1	X	1	1	1	1	1	1	1	2	3	1
Dow Corning® -510	23711	2	2	1	1	X	1	1	1	1	1	1	1	2	3	1
Dow Corning® -55	23711	2	2	1	1	X	1	1	1	1	1	1	1	2	3	1
Dow Corning® -550	23711	2	2	1	1	X	1	1	1	1	1	1	1	2	3	1
Dow Corning® -704	23711	2	2	1	1	X	1	1	1	1	1	1	1	2	3	1
Dow Corning® -705	23711	2	2	1	1	X	1	1	1	1	1	1	1	2	3	1
Dow Corning® -710	23711	2	2	1	1	X	1	1	1	1	1	1	1	2	3	1
Dow Corning® 1208, 4050, 6620, F-60	3744	1	1	1	1	1	1	X	X	X	X	X	X	X	X	X
Dow Corning® 220	3744	1	1	1	1	1	1	X	X	X	X	X	X	X	X	X
Dow Corning® F-61	3744	1	1	1	1	1	1	X	X	X	X	X	X	X	X	1
Dow® Guard	3744	1	1	1	1	X	1	1	3	3	1	1	1	1	1	1
Dowtherm™ 209	23711	3	3	1	4	X	2	X	X	X	2	X	X	3	3	1
Dowtherm™ A	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Dowtherm™ E	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Drinking Water	23761	1	1	1	1	1	1	1	4	3	1	1	1	1	1	1
Dry Cleaning Fluids	9746	3	3	4	1	X	4	4	4	4	4	4	4	2	4	1
Elco 28-EP lubricant	3720	1	1	4	1	X	3	4	1	1	4	4	4	1	2	1
Epichlorohydrin	23711	4	4	2	4	X	4	4	4	4	2	4	4	4	4	1
Epoxy Resins	23711	X	X	1	4	X	1	X	X	X	1	X	X	X	X	1
Erucic Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Esam-6 Fluid	23711	X	X	1	4	X	2	1	X	X	2	X	2	4	X	1
Esso® XP90-EP lubricant	55715	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Esstic 42, 43	5747	1	1	4	1	X	2	4	1	2	4	4	4	1	4	1
Ethane	5747	1	1	4	1	X	2	4	1	3	4	4	2	2	4	1

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# Compound Selection Guide

## Compound Worksheet



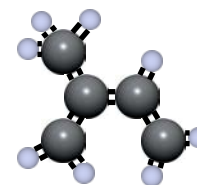
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Ethanol	23711	1	1	1	2	1	1	1	4	4	1	1	1	1	1	1
Ethanol Amine	23711	2	2	1	4	X	2	2	4	3	2	2	3	4	2	1
Ethers	34860	4	4	3	3	X	4	4	3	2	4	4	4	3	4	1
Ethoxyethyl Acetate (EGMEEA)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ethyl Acetate-Organic Ester	23711	4	4	2	4	4	3	4	4	4	2	4	4	4	2	1
Ethyl Acetoacetate	23711	4	4	2	4	X	3	3	4	4	2	3	4	4	2	1
Ethyl Acrylate	23711	4	4	2	4	X	4	4	4	4	2	4	4	4	2	1
Ethyl Alcohol	23711	1	1	1	2	1	1	1	4	4	1	1	1	1	1	1
Ethyl Ammonium Dichloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ethyl Benzene	9746	4	4	4	1	2	4	4	4	4	4	4	4	1	4	1
Ethyl Benzoate	23711	4	4	1	1	3	4	1	4	4	1	1	4	1	4	1
Ethyl Bromide	9746	2	2	4	1	X	4	X	X	X	4	4	4	1	X	1
Ethyl Cellosolve	34860	4	4	4	4	X	4	4	4	4	4	4	4	4	4	1
Ethyl Cellulose	5780	2	2	2	4	X	2	2	4	2	2	2	2	4	3	1
Ethyl Chloride	5780	1	1	3	1	X	4	4	4	2	4	4	4	1	4	1
Ethyl Chlorocarbonate	9746	4	4	2	1	X	4	4	4	4	3	4	4	2	4	1
Ethyl Chloroformate	23711	4	4	2	4	X	4	4	4	4	3	4	4	4	4	1
Ethyl Ether	34860	3	3	3	4	X	3	4	4	3	3	4	4	3	4	1
Ethyl Formate	9746	4	4	2	1	X	2	4	X	X	2	4	2	1	X	1
Ethyl Hexanol	5747	1	1	1	1	X	1	1	4	4	1	1	1	1	2	1
Ethyl Lactate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ethyl Mercaptan	9746	4	4	3	2	X	3	4	X	X	4	4	2	X	3	1
Ethyl Nitrite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ethyl Oxalate	23711	4	4	1	1	X	3	1	4	1	1	1	4	2	4	1
Ethyl Pentachlorobenzene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Ethyl Pyridine	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Ethyl Silicate	23711	1	1	1	1	X	1	2	X	X	1	2	2	1	X	1
Ethyl Stearate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Ethyl Sulfate	23711	X	X	1	4	1	X	X	X	X	X	X	X	X	X	1
Ethyl Tertiary Butyl Ether	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Ethyl Valerate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Ethylacrylic Acid	23711	4	4	2	X	X	2	4	4	4	2	4	4	4	4	X
Ethylamine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ethylcyclopentane	5747	1	1	4	1	X	3	4	2	1	4	4	4	1	4	X
Ethylene	5780	1	2	2	1	X	3	3	4	4	2	3	4	1	4	1
Ethylene Chloride	9746	4	4	3	2	X	4	4	4	4	3	4	4	3	4	1
Ethylene Chlorohydrin	9746	4	4	2	1	1	2	2	4	4	2	2	2	2	3	1
Ethylene Cyanohydrin	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Ethylene Diamine	23711	1	1	1	4	X	1	2	4	4	1	1	2	4	1	1

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# Compound Selection Guide

## Compound Worksheet



Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Ethylene Dibromide	9746	4	4	3	1	X	4	4	4	4	3	4	4	3	4	1
Ethylene Dichloride	9746	4	4	3	1	2	4	4	4	4	3	4	4	3	4	1
Ethylene Glycol	23711	1	1	1	1	X	1	1	3	4	1	1	1	1	1	1
Ethylene Hydrochloride	9746	4	4	3	1	X	4	4	4	4	3	4	4	3	4	1
Ethylene Oxide	34744	4	4	3	4	X	4	4	4	4	3	4	4	4	4	1
Ethylene Oxide, (12%) and Freon 12 (80%)	N/A	3	3	2	4	X	4	4	4	4	2	4	4	4	4	4
Ethylene Trichloride	9746	4	4	3	1	X	4	4	4	4	3	4	4	3	4	1
Ethylmorpholene Stannous Octotatate (50/50)	23711	4	4	2	4	X	X	4	X	X	2	X	X	X	X	1
Ethylmorpholine	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Ethylsulfuric Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
F-60 Fluid (Dow Corning®)	23711	1	1	1	1	X	1	1	1	1	1	1	1	1	4	X
F-61 Fluid (Dow Corning®)	23711	1	1	1	1	X	1	1	1	1	1	1	1	1	4	X
FC-43 Heptacosofluorotri-butylamine	5747	1	1	1	1	X	1	4	X	X	1	X	1	1	1	1
FC75 & FC77 (Fluorocarbon)	23711	1	1	1	2	X	1	4	X	X	1	X	1	2	1	4
Fatty Acids	9746	2	2	3	1	X	2	4	X	X	3	4	2	X	3	1
Ferric Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ferric Ammonium Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ferric Chloride	5780	1	1	1	1	X	1	1	1	1	1	1	1	1	2	1
Ferric Ferrocyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ferric Hydroxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ferric Nitrate	5780	1	1	1	1	X	1	1	1	1	1	1	1	1	2	1
Ferric Persulfate	5747	1	1	1	1	1	1	X	X	X	X	X	X	X	X	1
Ferric Sulfate	5780	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ferrous Ammonium Citrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ferrous Ammonium Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ferrous Carbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ferrous Chloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Ferrous Iodide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ferrous Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ferrous Tartrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Fish Oil	8748	2	2	4	1	X	4	4	4	3	4	4	4	1	1	1
Fisher Reagent	23711	X	X	2	X	X	X	X	X	X	X	X	X	X	X	X
Fluorine (Gas)	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Fluorine (Liquid)	8782	4	4	4	2	X	X	X	X	X	X	X	X	X	X	2
Fluorinert	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fluorobenzene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Fluoroboric Acid	5767	1	X	1	X	X	1	1	X	X	1	1	1	X	X	1
Fluorocarbon Oils	23711	X	X	1	X	X	2	2	X	X	1	2	X	X	X	2
Fluoroform (Trifluoromethane)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

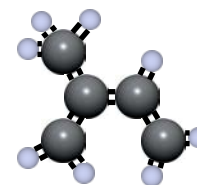
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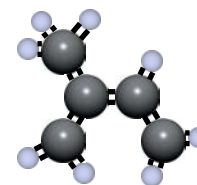
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Fluorolube®	23711	1	1	1	2	X	2	3	X	X	1	2	1	2	1	1
Fluorophosphoric Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Fluorosilicic Acid	5780	1	1	2	1	1	2	3	X	X	2	2	1	4	4	1
Fluorosulfonic Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Formaldehyde	23711	3	2	1	4	1	2	2	4	4	1	2	1	4	2	1
Formamide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Formic Acid	23711	2	X	1	3	2	1	1	X	3	1	2	1	3	2	1
Freon, 11	9746	2	2	4	2	X	3	4	4	4	4	4	1	2	4	2
Freon, 112	9746	2	2	4	2	X	3	3	X	X	4	4	2	X	4	2
Freon, 113	4751	1	1	3	3	X	1	2	X	2	4	3	1	4	4	2
Freon, 113 + High and Low Aniline Oil	55715	1	X	X	X	4	X	X	X	X	X	X	X	X	X	X
Freon, 114	4751	1	1	1	2	X	1	1	X	1	1	1	1	2	4	2
Freon, 114B2	4751	2	2	4	2	X	3	3	X	X	3	4	1	X	4	2
Freon, 115, 116	4751	1	1	1	2	X	1	1	X	X	1	1	1	X	X	2
Freon, 12	4751	1	1	2	2	X	1	1	1	1	2	2	1	3	4	2
Freon, 12 and ASTM Oil #2 (50/50)	9848	2	2	4	1	X	3	4	X	X	4	4	2	2	4	2
Freon, 12 and Suniso 4G (50/50)	9848	2	2	4	1	X	3	4	X	X	4	4	2	2	4	1
Freon, 123 (Dichlorotrifluoroethane)	4751	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Freon, 124 (Chlorotetrafluoroethane)	4751	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Freon, 125 (Pentafluoroethane)	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Freon, 13	4751	1	1	1	2	X	1	1	X	X	1	1	1	4	4	2
Freon, 134a (Tetrafluoroethane)	55834	X	1	1	X	X	1	X	X	X	X	X	X	X	X	1
Freon, 13B1	4751	1	1	1	2	X	1	1	X	1	1	1	1	2	4	2
Freon, 14	4751	1	1	1	1	X	1	1	X	1	1	1	1	X	4	1
Freon, 141b (Dichlorofluoroethane)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Freon, 142b	4751	1	2	2	2	4	1	2	X	X	1	2	1	X	X	2
Freon, 152a (Difluoroethane)	4751	1	X	1	4	X	1	1	X	X	1	1	3	X	X	2
Freon, 21	34744	4	4	4	4	X	4	4	X	X	4	4	4	X	4	1
Freon, 218	4751	1	X	1	2	X	1	1	X	X	1	1	1	X	X	2
Freon, 22	4751	4	4	3	4	X	1	1	2	4	3	1	1	4	4	1
Freon, 22 and ASTM Oil #2 (50/50)	4751	4	4	4	2	X	2	4	2	X	4	4	X	2	4	1
Freon, 23 (Fluoroform)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Freon, 31	4751	4	4	1	4	X	2	2	X	X	2	2	2	X	X	2
Freon, 32	4751	1	1	1	4	X	1	1	X	X	1	1	1	X	X	2
Freon, 502	4751	2	2	1	4	X	1	1	X	X	1	1	X	X	X	2
Freon, BF	9848	2	2	4	2	X	3	4	X	X	4	4	2	X	4	2
Freon, C316	4751	1	X	1	2	X	1	1	X	X	X	1	1	1	X	2
Freon, C318	4751	1	1	1	2	X	1	1	X	X	1	1	1	X	X	2
Freon, K-142b	4751	1	1	1	4	X	1	1	X	X	1	2	1	X	X	4

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## Compound Worksheet



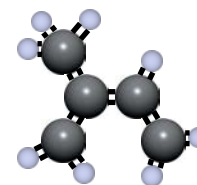
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Freon, K-152a	4751	1	1	1	4	X	1	1	X	X	1	1	4	X	X	4
Freon, MF	5747	1	2	4	2	X	3	4	X	3	4	4	2	X	4	2
Freon, PCA	4751	1	1	4	2	X	1	2	X	1	4	4	1	X	4	3
Freon, T-P35	4751	1	X	1	2	X	1	1	X	1	1	1	1	X	1	2
Freon, T-WD602	9848	2	X	2	2	X	2	3	X	1	2	4	2	X	4	2
Freon, TA	5747	1	X	2	4	X	2	3	X	1	2	3	1	X	3	2
Freon, TC	5747	1	X	2	2	X	1	3	X	1	2	4	1	X	4	2
Freon, TF	5747	1	1	4	2	4	1	3	X	1	4	4	1	X	4	2
Freon, TMC	9848	2	X	3	2	X	3	4	X	2	3	4	2	X	3	2
Fuel Oil, #6	9848	2	2	4	1	X	4	4	1	2	4	4	4	1	1	1
Fuel Oil, #1 and #2	5747	1	1	4	1	X	2	4	1	2	4	4	2	1	4	1
Fuel Oil, Acidic	5747	1	1	4	1	X	2	4	1	2	4	4	4	1	1	1
Fumaric Acid	5780	1	1	2	1	X	2	3	4	X	2	3	2	1	2	1
Fuming Sulphuric Acid (20/25% Oleum)	8782	4	4	4	1	X	4	4	4	4	4	4	4	X	4	X
Furaldehyde	23711	4	4	2	4	4	4	X	X	X	X	X	X	X	X	1
Furan (Furfuran)	34860	4	4	3	4	X	4	4	4	X	4	4	4	X	X	1
Furfural (Furfuraldehyde)	23711	4	4	2	4	2	3	4	4	3	2	4	3	X	4	1
Furfuraldehyde	23711	4	4	2	4	X	4	4	4	3	2	4	3	X	4	X
Furfuryl Alcohol	23711	4	4	2	X	X	4	4	4	4	2	4	4	4	4	1
Furoic Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Furyl Carbinol	23711	4	4	2	X	X	4	4	4	4	2	4	4	4	4	1
Fyrquel® 150 220 300 550	23811	4	4	1	1	X	4	4	4	4	1	4	4	2	1	1
Fyrquel® 90, 100, 500	23811	4	4	1	1	1	X	X	X	X	X	X	X	X	X	1
Fyrquel® A60	34860	4	4	2	4	2	4	X	X	X	X	X	X	X	X	1
Gallic Acid	8782	2	2	2	1	X	2	2	4	4	2	1	2	1	X	1
Gasahol	8780	3	4	4	1	4	4	4	4	4	4	4	4	4	1	1
Gasoline	9746	2	1	4	1	2	3	4	4	2	4	4	3	1	4	1
Gelatin	3744	1	1	1	1	X	1	1	4	4	1	1	1	1	1	1
Germane (Germanium Tetrahydride)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Girling Brake Fluid	23747	3	3	1	4	X	2	1	X	X	2	X	2	4	X	4
Glauber's Salt	9746	4	4	2	1	X	2	4	4	X	2	2	2	1	X	1
Gluconic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Glucose	3744	1	1	1	1	X	1	1	X	4	1	1	1	1	1	1
Glue	5780	1	X	1	1	X	1	2	X	1	2	2	1	1	1	1
Glutamic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Glycerine (Glycerol)	3744	1	1	1	1	1	1	1	3	1	1	1	1	1	1	1
Glycerol Dichlorohydrin	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Glycerol Monochlorohydrin	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Glycerol Triacetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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# Compound Selection Guide

## Compound Worksheet



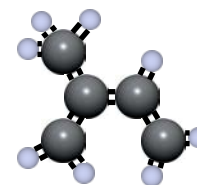
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Glycerophosphoric Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Glyceryl Phosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Glycidol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Glycol Monoether	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Glycolic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Glycols	23711	1	1	1	1	X	1	1	4	4	1	1	1	1	1	1
Glyoxylic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Grease Petroleum Base	3720	1	1	4	1	X	3	4	1	1	4	4	4	1	4	1
Green Sulfate Liquor	23711	2	2	1	1	X	2	2	2	1	1	2	2	2	1	1
HEF-2 (High Energy Fuel)	9746	2	2	4	1	X	4	4	4	4	4	4	4	2	4	1
Halothane	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	2
Halowax Oil	9746	4	4	4	1	X	4	4	X	X	4	4	4	1	4	1
Hannifin Lube A	5747	1	1	4	1	X	1	2	1	1	4	4	1	1	2	1
Heavy Water	3744	1	1	1	X	X	2	1	4	4	1	1	1	1	1	1
Helium	13766	1	1	1	1	X	1	1	1	1	1	1	1	1	1	1
Heptachlor	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Heptachlorobutene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Heptaldehyde (Heptanal)	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Heptane or n-Heptane	5747	1	1	4	1	X	2	4	1	2	4	4	2	3	4	1
Heptanoic Acid	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Hexachloroacetone	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Hexachlorobutadiene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Hexachlorobutene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Hexachloroethane	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Hexaethyl Tetraphosphate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hexafluoroethane (F-116)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hexafluoroxylene	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hexaldehyde or n-Hexaldehyde	23711	4	4	1	4	X	1	4	X	2	2	4	3	4	2	1
Hexamethyldisilazane	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hexamethylene (Cyclohexane)	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Hexamethylene Diammonium Adipate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Hexamethylenediamine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	2
Hexamethylenetetramine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	2
Hexane or n-Hexane	9746	1	1	4	1	X	2	4	1	2	4	4	2	1	4	1
Hexene-1 or n-Hexene-1	9746	2	2	4	1	X	2	4	1	2	4	4	2	1	4	1
Hexone (Methyl Isobutyl Ketone)	23711	4	4	2	4	4	4	4	4	4	3	4	4	4	4	1
Hexyl Acetate	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Hexyl Alcohol	5780	1	1	3	1	X	2	2	4	4	3	2	2	2	2	1
Hexylene Glycol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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# Compound Selection Guide

## Compound Worksheet



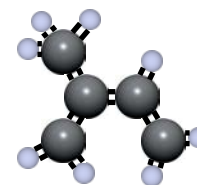
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU/EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Hexylresorcinol	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
HiLo MS #1	23711	4	4	1	4	X	4	4	4	4	2	4	4	3	3	4
High Viscosity Lubricant, H2	3720	1	1	1	1	X	2	1	4	4	1	X	X	2	1	1
High Viscosity Lubricant, U4	3720	1	1	1	1	X	2	1	4	4	1	X	X	2	1	1
Houghto-Safe® 1010 phosphate ester	23711	4	4	1	1	X	4	4	4	X	1	4	4	2	3	1
Houghto-Safe® 1055 phosphate ester	23711	4	4	1	1	X	4	4	4	X	1	4	4	2	3	1
Houghto-Safe® 1120 phosphate ester	9746	4	4	2	1	X	4	4	4	4	1	4	4	2	3	1
Houghto-Safe® 271 (Water & Glycol Base)	5747	1	1	1	2	X	2	1	4	4	2	X	X	2	2	1
Houghto-Safe® 416 & 500 Series	5747	1	1	1	X	X	X	X	X	X	X	X	X	X	X	X
Houghto-Safe® 5040 (Water/Oil emulsion)	5747	1	1	4	1	X	2	4	4	4	4	4	4	2	3	1
Houghto-Safe® 620 Water/Glycol	5747	1	1	1	2	X	2	1	4	4	2	X	X	2	2	1
Hydraulic Oil (Petroleum Base, Industrial)	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	3	1
Hydraulic Oils (Synthetic Base)	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Hydrazine	23711	2	4	1	4	X	2	1	X	4	1	1	2	4	3	1
Hydrazine (Anhydrous)	23711	4	4	2	4	2	2	1	4	4	2	4	2	4	X	1
Hydrazine Dihydrochloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Hydrazine Hydrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Hydriodic Acid	8782	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Hydro-Drive® MIH-10 (Petroleum Base)	3720	1	1	4	1	X	2	4	1	2	4	4	4	1	2	1
Hydro-Drive® MIH-50 (Petroleum Base)	3720	1	1	4	1	X	2	4	1	2	4	4	4	1	2	1
Hydroabietyl Alcohol	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hydrobromic Acid	23711	4	4	1	1	X	4	4	4	4	1	1	1	3	4	1
Hydrobromic Acid 40%	23711	4	X	1	1	X	2	4	4	4	1	1	1	3	4	1
Hydrocarbons, Saturated	3720	1	1	4	1	X	2	4	1	2	4	4	3	1	4	1
Hydrochloric Acid (cold) 37%	9848	3	X	1	1	1	2	2	4	4	1	2	1	2	3	1
Hydrochloric Acid (hot) 37%	9848	4	X	3	2	2	4	4	4	4	3	4	2	3	4	1
Hydrochloric Acid, 3 Molar to 158°F	9848	2	2	1	1	X	2	3	3	4	1	3	1	3	4	1
Hydrochloric Acid, Concentrated, Room Temp	8782	2	2	2	1	X	X	X	X	X	X	X	X	X	X	1
Hydrochloric Acid, Concentrated to 158°F	8782	4	4	4	1	X	4	4	4	4	4	4	X	4	4	1
Hydrocyanic Acid	23711	2	2	1	1	X	2	2	4	X	1	2	1	2	3	1
Hydrofluoric Acid (Anhydrous)	34860	4	X	3	4	X	4	4	4	4	3	4	1	4	4	1
Hydrofluoric Acid (conc.) Cold	34860	4	X	3	1	1	4	4	4	3	3	4	1	4	4	1
Hydrofluoric Acid (conc.) Hot	34860	4	X	4	4	X	4	4	4	4	4	4	3	4	4	1
Hydrofluorosilicic Acid	23711	1	1	2	1	X	2	3	X	X	2	2	1	4	4	1
Hydrogen Bromide (Anhydrous)	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Hydrogen Chloride (Anhydrous)	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Hydrogen Chloride gas	23711	4	X	1	1	1	2	X	X	X	X	X	X	X	X	1
Hydrogen Cyanide	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1

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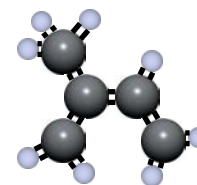
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Hydrogen Fluoride	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Hydrogen Fluoride (Anhydrous)	23711	4	4	1	4	2	X	4	4	X	1	4	X	4	X	2
Hydrogen Gas, Cold	23711	1	X	1	1	X	1	1	2	1	1	2	1	3	3	1
Hydrogen Gas, Hot	23711	1	X	1	1	X	1	2	2	1	1	2	1	3	3	1
Hydrogen Iodide (Anhydrous)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hydrogen Peroxide	9746	2	2	1	1	X	1	2	4	X	1	2	2	1	1	1
Hydrogen Peroxide 90%	9746	4	2	2	2	X	4	4	4	X	3	4	1	2	2	1
Hydrogen Selenide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Hydrogen Sulfide Dry Cold	23711	1	1	1	4	X	1	1	4	X	1	1	1	3	3	1
Hydrogen Sulfide Dry Hot	23711	4	4	1	4	X	2	4	4	X	1	4	3	3	3	1
Hydrogen Sulfide Wet Cold	23711	4	1	1	4	X	2	4	4	X	1	4	2	3	3	1
Hydrogen Sulfide Wet Hot	23711	4	4	1	4	X	3	4	4	X	1	4	3	3	3	1
Hydrolube®-Water/Ethylene Glycol	5747	1	1	1	1	X	2	1	4	4	2	X	X	2	2	1
Hydroxycitronellal	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Hydroquinol	9746	4	4	4	1	X	4	X	X	X	X	X	X	X	X	2
Hydroquinone	9746	3	4	2	2	X	4	4	4	X	2	2	4	2	X	1
Hydroxyacetic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Hdyne	23711	2	2	1	4	X	2	2	4	X	2	2	X	4	4	2
Hyjet™	23711	4	4	1	4	2	4	X	X	X	X	X	X	X	X	1
Hyjet™ IV and IVA	23711	4	4	1	4	X	4	4	4	4	2	4	4	4	4	4
Hyjet™ S4	23711	4	X	1	4	2	4	X	X	X	X	X	X	X	X	1
Hyjet™ W	23711	4	4	1	4	2	4	X	X	X	X	X	X	X	X	1
Hypochlorous Acid	8782	4	4	2	1	X	4	4	4	X	2	2	4	X	X	1
Indole	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Insulin	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Iodic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Iodine	9746	2	2	2	1	X	4	2	X	X	2	X	2	1	X	1
Iodine Pentafluoride	34860	4	4	4	4	X	4	4	4	4	4	4	4	4	4	1
Iodoform	34860	X	X	4	3	X	4	4	X	X	4	4	X	X	X	1
Isoamyl Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Isoamyl Butyrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Isoamyl Valerate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Isoboreol	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Isobutane	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Isobutyl Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Isobutyl Alcohol	23711	2	2	1	1	X	1	2	4	4	1	1	1	2	1	1
Isobutyl Chloride	9746	4	4	4	1	4	4	X	X	X	X	X	X	X	X	1
Isobutyl Ether	34860	2	2	4	4	4	3	X	X	X	X	X	X	X	X	1
Isobutyl Methyl Ketone	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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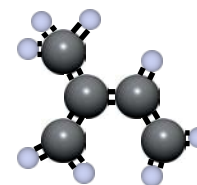
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Isobutyl Phosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Isobutyl n-Butyrate	23711	4	4	1	1	X	4	4	4	X	1	4	4	1	X	1
Isobutylene	9848	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Isobutyraldehyde	23711	3	2	2	4	4	3	X	X	X	X	X	X	X	X	2
Isobutyric Acid	5747	1	1	2	4	3	4	X	X	X	X	X	X	X	2	1
Isocrotyl Chloride	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Isodecanol	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Isododecane	5747	1	1	4	1	X	2	4	4	X	4	4	2	1	4	1
Isoeugenol	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Isooctane	5780	1	1	4	1	2	2	4	1	2	4	4	2	1	4	1
Isopentane	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Isophorone (Ketone)	23711	4	4	2	4	X	4	4	4	4	2	4	4	4	4	1
Isopropanol	23711	2	2	1	1	X	2	2	4	3	1	1	1	2	1	1
Isopropyl Acetate	23711	4	4	2	4	X	4	4	4	4	2	4	4	4	4	1
Isopropyl Alcohol	23711	2	2	1	1	X	2	2	4	3	1	1	1	2	1	1
Isopropyl Chloride	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Isopropyl Ether	5780	2	2	4	4	4	3	4	3	2	4	4	3	3	4	1
Isopropylacetone	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Isopropylamine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
JP-10	9746	3	3	4	1	X	4	4	4	3	4	4	X	1	4	1
JP-3 (MIL-J-5624)	5767	1	1	4	1	2	4	X	X	X	X	X	X	X	X	1
JP-4 (MIL-T-5624)	5767	1	1	4	1	X	4	4	2	2	4	4	4	2	4	1
JP-5 (MIL-T-5624)	5767	1	1	4	1	X	4	4	2	2	4	4	4	2	4	1
JP-6 (MIL-J-25656)	5767	1	1	4	1	X	4	4	2	2	4	4	4	2	4	1
JP-8 (MIL-T-83133)	5767	1	1	4	1	X	3	4	1	1	4	4	X	2	4	1
JP-9 (MIL-F-81912)	9746	3	3	4	1	X	4	4	4	3	4	4	X	2	4	1
JP-9 -11	9746	4	4	4	1	X	4	4	4	4	4	4	X	2	4	1
JPX(MIL-F-25604)	5747	1	1	4	4	2	2	X	X	X	X	X	X	X	X	1
Jet Fuel A	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Kel F® Liquids	23711	1	1	1	2	X	X	1	X	X	1	X	1	2	1	3
Kerosene (RP-1 and JP-1)	5780	1	1	4	1	1	2	4	1	1	4	4	3	1	4	1
Keystone™ #87HX-Grease	3720	1	1	4	1	X	4	4	1	1	4	4	4	1	4	1
LB 135	5747	1	1	1	1	1	1	X	X	X	X	X	X	X	X	1
Lacquer Solvents	34860	4	4	4	4	4	4	4	4	4	4	4	4	4	4	1
Lacquers	34860	4	4	4	4	X	4	4	4	4	4	4	4	4	4	1
Lactams-Amino Acids	23711	4	4	2	4	X	2	4	X	X	2	4	2	4	X	1
Lactic Acid Cold	5780	1	1	1	1	X	1	1	4	X	1	1	1	1	1	1
Lactic Acid Hot	9746	4	4	4	1	X	4	4	4	X	4	4	3	2	2	1
Lactones (Cyclic Esters)	23711	4	4	2	4	X	4	4	4	4	2	4	4	4	2	4

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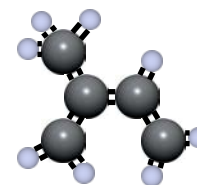
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Lard Animal Fat	3744	1	1	2	1	X	2	4	1	1	2	4	4	1	2	1
Lauric Acid	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Lavender Oil	9746	2	2	4	1	X	4	4	2	4	4	4	4	2	4	1
Lead Acetate	23711	2	2	1	4	X	2	4	4	4	1	1	4	4	4	1
Lead Arsenate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lead Azide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Lead Bromide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lead Carbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lead Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lead Chromate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lead Dioxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lead Linoleate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lead Nitrate	5780	1	1	1	1	X	1	1	X	X	1	1	1	1	2	1
Lead Oxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lead Sulfamate	4753	2	2	1	1	X	1	2	4	X	1	2	1	1	2	1
Lehigh X1169	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Lehigh X1170	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Light Grease	3720	1	1	4	1	1	4	X	X	X	X	X	X	X	X	1
Ligroin (Petroleum Ether or Benzene)	5780	1	1	4	1	X	2	4	1	2	4	4	3	1	4	1
Lime Bleach	5780	1	1	1	1	X	2	2	4	X	1	1	2	1	2	1
Lime Sulfur	23711	4	1	1	1	X	1	4	4	X	4	4	1	1	1	1
Lindol, Hydraulic Fluid(Phosphate ester)	23711	4	1	1	2	X	4	4	4	4	1	4	4	3	3	1
Linoleic Acid	19711	2	2	4	2	X	4	4	X	X	4	4	4	X	2	1
Linseed Oil	5780	1	1	3	1	X	2	4	1	2	3	4	2	1	1	1
Liquid Oxygen (LOX)	N/A	4	4	4	4	X	4	4	4	4	4	4	4	4	4	2
Liquid Petroleum Gas (LPG)	5747	1	1	4	1	X	2	4	3	1	4	4	2	3	3	1
Liqui Moly™	5747	1	1	4	1	X	2	4	1	2	4	4	4	1	4	1
Lithium Bromide (Brine)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lithium Carbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lithium Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lithium Citrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lithium Hydroxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lithium Hypochlorite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lithium Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lithium Nitrite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lithium Perchlorate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lithium Salicylate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lithopone	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Lubricating Oils (Crude & Refined)	9746	2	2	4	1	1	3	X	X	X	X	X	X	X	X	1

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# Compound Selection Guide

## Compound Worksheet



Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Lubricating Oils (Synthetic base)	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Lubricating Oils, Di-ester	9746	2	2	4	1	X	3	4	2	X	4	4	X	2	4	1
Lubricating Oils, SAE 10, 20, 30, 40, 50	3720	1	1	4	1	X	2	4	1	2	4	4	4	1	4	1
Lubricating Oils, petroleum base	3720	1	4	4	1	X	2	4	1	2	4	4	2	1	4	1
Lye Solutions	23711	2	2	1	2	X	2	2	4	4	1	2	1	1	2	1
MCS® 312	9746	4	4	4	1	X	4	4	4	X	4	4	X	1	1	1
MCS® 352	623706	4	4	1	4	X	4	4	4	4	2	4	4	3	3	4
MCS® 463	623706	4	4	1	4	X	4	4	4	4	2	4	4	3	3	4
MDI (Methylene di-p-phenylene isocyanate)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
MIL-A-6091	623706	2	2	1	1	X	1	1	4	4	1	1	1	1	1	1
MIL-C-4339	3716	1	1	4	1	X	4	4	1	1	4	4	4	1	3	1
MIL-C-7024	3716	1	1	4	1	X	2	4	2	2	4	4	3	1	4	1
MIL-C-8188	3716	1	2	4	1	X	3	4	3	3	3	4	3	1	3	1
MIL-E-9500	23711	1	1	1	1	X	1	1	4	4	1	1	1	1	1	1
MIL-F-16884	3716	1	1	4	1	X	3	4	1	3	4	4	3	1	4	1
MIL-F-17111	3716	1	X	4	1	X	2	4	1	2	4	4	2	1	3	1
MIL-F-25558 (RJ-1)	3716	1	1	4	1	X	2	4	1	1	4	4	2	1	3	1
MIL-F-25656	3716	1	X	4	1	X	3	4	X	3	4	4	3	2	4	1
MIL-F-5566	23711	1	X	1	1	X	2	1	X	2	1	1	2	1	1	1
MIL-F-81912 (JP-9)	9848	3	3	4	1	X	4	4	4	3	4	4	X	2	4	1
MIL-F-82522 (RJ-4)	3716	2	2	4	1	X	4	4	1	1	4	1	X	1	4	1
MIL-G-10924	3716	1	X	4	1	X	2	4	1	2	4	4	2	1	3	1
MIL-G-15793	3716	1	X	4	1	X	3	4	3	3	3	4	3	1	3	1
MIL-G-21568	23711	1	X	1	1	X	1	1	1	X	1	2	1	1	4	1
MIL-G-25013	9746	1	X	1	1	X	2	1	2	3	1	2	2	2	4	1
MIL-G-25537	3716	1	X	4	1	X	2	4	1	2	4	4	2	1	3	1
MIL-G-25760	9848	1	X	4	1	X	3	3	3	2	4	3	3	1	4	1
MIL-G-3278	20763	2	2	4	1	X	4	4	1	2	4	4	4	2	4	1
MIL-G-3545	3716	2	X	4	1	X	2	4	2	3	4	4	3	1	4	1
MIL-G-4343	9848	2	X	3	1	X	2	4	1	1	3	4	2	2	4	1
MIL-G-5572	3716	1	1	4	1	X	4	4	2	2	4	4	4	1	4	1
MIL-G-7118	3716	1	X	4	1	X	3	4	3	3	3	4	3	1	3	1
MIL-G-7187	3716	1	X	4	1	X	1	4	1	1	4	4	1	1	3	1
MIL-G-7421	20763	1	X	4	1	X	3	4	X	2	3	4	3	1	3	1
MIL-G-7711	3716	1	X	4	1	X	1	4	1	1	4	4	1	1	3	1
MIL-H-13910	5780	1	X	4	1	X	2	4	1	2	4	4	2	1	3	1
MIL-H-19457	23711	4	X	1	4	X	4	4	4	4	1	4	4	3	4	1
MIL-H-22251	23711	2	2	1	X	X	2	2	X	X	1	X	2	X	4	X
MIL-H-27601	9848	2	X	4	1	X	2	4	2	3	4	4	3	1	4	1

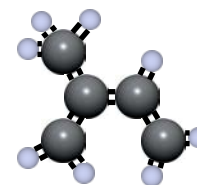
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# Compound Selection Guide

## Compound Worksheet



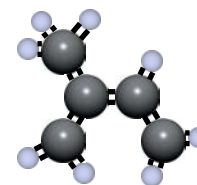
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
MIL-H-46170 -15°F to +400°F	9848	1	1	4	1	X	2	4	2	2	4	4	2	1	4	1
MIL-H-46170 -20°F to +275°F	3716	1	1	4	1	X	2	4	2	2	4	4	2	1	4	1
MIL-H-46170 -55°F to +275°F	3716	1	1	4	1	X	2	4	2	2	4	4	2	1	4	1
MIL-H-46170 -65°F to +275°F	3716	1	1	4	1	X	2	4	2	2	4	4	2	1	4	1
MIL-H-5606 -65°F to +235°F	3716	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
MIL-H-5606 -65°F to +275°F	3716	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
MIL-H-6083	3716	1	X	4	1	X	2	4	1	2	4	4	2	1	3	1
MIL-H-7083	23711	1	X	1	2	X	2	1	3	3	1	2	2	2	2	1
MIL-H-8446 (MLO-8515)	9848	2	X	4	1	X	2	4	3	4	4	4	X	1	4	1
MIL-J-5161	3716	1	X	4	1	X	3	4	X	3	4	4	3	1	4	1
MIL-L-15016	5716	1	1	4	1	X	2	4	1	1	4	4	2	2	4	1
MIL-L-15017	5716	1	X	4	1	X	3	4	X	3	4	4	3	1	4	1
MIL-L-17331	9848	1	X	4	1	X	1	4	1	1	4	4	1	1	3	1
MIL-L-2104	5716	1	X	4	1	X	1	4	1	1	4	4	1	1	3	1
MIL-L-21260	5716	1	X	4	1	X	1	4	1	1	4	4	1	1	3	1
MIL-L-23699	9848	1	X	4	1	X	3	4	3	3	3	4	3	1	3	1
MIL-L-25681	9848	1	X	1	1	X	2	1	2	3	1	2	2	2	4	1
MIL-L-3150	5716	1	X	4	1	X	1	4	1	1	4	4	1	1	3	1
MIL-L-6081	5716	1	X	4	1	X	2	4	1	2	4	4	2	1	3	1
MIL-L-6082	5716	1	X	4	1	X	1	4	1	1	4	4	1	1	3	1
MIL-L-6085	9848	2	2	4	1	X	3	4	3	3	3	4	3	1	3	1
MIL-L-6387	9848	1	X	4	1	X	3	4	X	2	3	4	3	2	3	1
MIL-L-7808	9848	1	2	4	1	X	3	4	3	3	3	4	3	1	3	1
MIL-L-7870	5716	1	X	4	1	X	2	4	1	2	4	4	2	1	3	1
MIL-L-9000	5716	1	X	4	1	X	2	4	2	3	4	4	3	1	4	1
MIL-L-9236	9848	1	X	3	1	X	3	3	3	2	3	3	3	1	4	1
MIL-O-3503	5716	1	X	4	1	X	2	4	1	2	4	4	2	1	3	1
MIL-P-27402	23711	2	2	1	X	X	2	2	X	X	1	X	2	X	4	X
MIL-R-25576 (RP-1)	3716	1	1	4	1	X	3	4	1	1	4	4	3	1	4	1
MIL-S-3136, Type I Fuel	3720	1	1	4	1	X	2	4	2	2	4	4	3	1	4	1
MIL-S-3136, Type II Fuel	3720	1	1	4	1	X	3	4	X	3	4	4	3	1	4	1
MIL-S-3136, Type III Fuel	3720	1	1	4	1	X	3	4	X	3	4	4	3	1	4	1
MIL-S-3136, Type IV Oil High Swell	5747	1	1	4	1	X	4	4	1	1	4	4	4	1	2	1
MIL-S-3136, Type IV Oil Low Swell	5747	1	1	4	1	X	1	4	1	1	4	4	1	1	3	1
MIL-S-3136, Type V Oil Medium Swell	5747	1	1	4	1	X	2	4	1	2	4	4	2	1	3	1
MIL-S-81087	23711	1	X	1	1	X	1	1	1	1	1	1	1	2	4	1
MIL-T-5624, JP-4, JP-5	3716	1	1	4	1	X	3	4	2	3	4	4	3	1	4	1
MIL-T-83133	3716	1	1	4	1	X	3	4	1	1	4	4	X	2	4	1
MLO-7277 Hydr.	9848	3	3	4	1	X	4	4	3	3	4	4	4	3	4	1

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# Compound Selection Guide

## Compound Worksheet



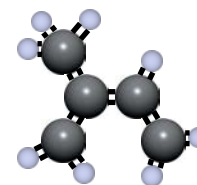
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
MLO-7557	9848	3	3	4	1	X	4	4	3	3	4	4	4	3	4	1
MLO-8200 Hydr.	9848	2	2	4	1	X	1	4	X	1	4	4	4	2	4	1
MLO-8515	9848	2	2	4	1	X	1	4	3	1	4	4	3	1	4	1
Magnesium Chloride	5747	1	1	1	1	X	1	1	X	1	1	1	1	1	1	1
Magnesium Hydroxide	23711	2	2	1	1	X	1	2	4	4	1	2	1	X	X	1
Magnesium Salts	5747	1	1	1	1	X	1	1	1	1	1	1	1	1	1	X
Magnesium Sulfite and Sulfate	5747	1	X	1	1	X	1	2	4	X	1	2	1	1	1	1
Magnesium Trisilicate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Malathion	9746	2	2	4	1	X	X	4	X	X	4	4	X	2	4	1
Maleic Acid	9746	4	4	2	1	X	3	3	4	X	2	3	4	X	X	1
Maleic Anhydride	23711	4	4	2	4	X	3	3	4	X	2	3	4	X	X	1
Maleic Hydrazide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Malic Acid	8782	1	1	2	1	X	3	3	4	X	2	3	2	1	2	1
Mandelic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganese Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganese Carbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganese Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganese Dioxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganese Gluconate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganese Hypophosphite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganese Linoleate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganese Phosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganese Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganous Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganous Phosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Manganous Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mannitol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mercaptan	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Mercaptobenzothiazole (MBT)	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Mercuric Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mercuric Chloride	5747	1	1	1	1	X	1	1	X	X	1	1	1	X	X	1
Mercuric Cyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mercuric Iodide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mercuric Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mercuric Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mercuric Sulfite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mercurous Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mercury	3744	1	1	1	1	X	1	1	X	1	1	1	1	X	X	1
Mercury Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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# Compound Selection Guide

## Compound Worksheet



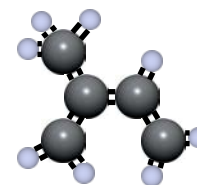
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Mercury Fulminate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mercury Salts	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mercury Vapors	3744	1	1	1	1	X	1	1	X	X	1	1	1	X	X	1
Mesityl Oxide (Ketone)	23711	4	4	2	4	4	4	4	4	4	2	4	4	4	4	1
Meta-Cresol	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	X
Meta-Nitroaniline	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Meta-Toluidine	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	X
Metalddehyde	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methacrylic Acid	23711	4	X	2	4	X	2	4	4	4	2	4	4	4	4	1
Methallyl Chloride	8782	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methane	5780	1	1	4	1	X	2	4	1	3	4	4	2	2	4	1
Methanol	23711	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Methoxychlor	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Methoxyethanol (DGMMA)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methyl Abietate	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methyl Acetate	23711	4	4	1	4	X	2	3	4	4	1	3	4	4	4	1
Methyl Acetoacetate	23711	4	4	2	4	X	4	X	4	4	2	X	4	4	2	1
Methyl Acetophenone	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methyl Acrylate	23711	4	X	2	4	X	2	4	4	4	2	4	4	4	4	1
Methyl Alcohol	23711	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Methyl Amylketone	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methyl Anthranilate	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methyl Benzoate	9746	4	4	4	1	X	4	4	4	4	4	4	4	1	4	1
Methyl Bromide	9746	2	2	4	1	X	4	4	3	X	4	4	4	1	X	1
Methyl Butyl Ketone	23711	4	4	1	4	X	4	4	4	4	1	4	4	4	3	1
Methyl Butyrate Cellosolve	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methyl Butyrate Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methyl Carbonate	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Methyl Cellosolve	23711	3	3	2	4	1	3	4	4	4	2	4	2	4	4	1
Methyl Cellulose	5747	2	2	2	4	X	2	2	4	2	2	2	2	4	2	1
Methyl Chloride	9746	4	4	3	2	X	4	4	4	4	3	4	4	2	4	1
Methyl Chloroacetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methyl Chloroform	9746	4	4	4	1	4	4	X	X	X	X	X	X	X	X	1
Methyl Chloroformate	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Methyl Cyanide (Acetonitrile)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methyl Cyclohexanone	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Methyl Dichloride	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methyl Ether	5780	1	1	4	4	X	3	4	4	X	4	4	3	1	1	1
Methyl Ethyl Ketone (MEK)	23711	4	4	1	4	4	3	4	4	4	2	4	4	4	4	1

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# Compound Selection Guide

## Compound Worksheet



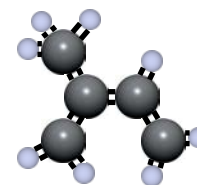
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Methyl Ethyl Ketone Peroxide	19711	4	4	4	4	X	4	4	4	4	4	4	4	4	2	1
Methyl Ethyl Oleate	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methyl Formate	4753	4	4	2	4	X	2	4	X	X	2	4	2	X	X	1
Methyl Hexyl Ketone (2-Octanone)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methyl Iodide	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Methyl Isobutyl Ketone (MIBK)	23711	4	4	2	4	4	4	4	4	4	3	4	4	4	4	1
Methyl Isocyanate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methyl Isopropyl Ketone	23711	4	4	2	4	X	4	4	4	4	2	4	4	4	4	1
Methyl Isovalerate	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methyl Lactate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methyl Mercaptan	23711	X	X	1	X	X	X	X	X	X	1	X	X	X	X	1
Methyl Methacrylate	34860	4	4	3	4	X	4	4	4	X	4	4	4	4	4	1
Methyl Oleate	9746	4	4	2	2	X	4	4	X	X	2	4	4	2	X	1
Methyl Pentadiene	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methyl Phenylacetate	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methyl Salicylate	23711	4	X	2	2	3	4	3	X	X	2	3	4	X	X	1
Methyl Tertiary Butyl Ether (MTBE)	34860	3	3	3	3	2	3	X	X	X	X	X	X	X	X	1
Methyl Valerate	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methyl-2-Pyrrolidone or n-Methyl-2-Pyrrolidone	23711	X	X	2	X	X	X	X	X	X	X	X	X	X	X	1
Methylacrylic Acid	23711	4	4	2	3	X	2	4	4	4	2	4	4	4	4	1
Methylal	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Methylamine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methylamyl Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methylcyclopentane	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Methylene Bromide	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methylene Chloride	9746	4	4	4	2	X	4	4	4	4	4	4	4	2	4	1
Methylene Iodide	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methylglycerol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Methylisobutyl Carbinol	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Methylpyrrolidine	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methylpyrrolidone	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Methylsulfuric Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Milk	3741	1	1	1	1	X	1	1	4	4	1	1	1	1	1	1
Mineral Oils	3720	1	1	3	1	X	2	4	1	1	3	4	2	1	2	1
Mixed Acids	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mobil™ 24dte	3720	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Mobil™ Delvac 1100, 1110, 1120, 1130	3720	1	1	4	1	1	2	X	X	X	X	X	X	X	X	X
Mobil™ HF	3720	1	1	4	1	X	2	X	X	X	X	X	X	X	X	1
Mobil™ Nivac 20, 30	3720	1	1	1	1	1	1	X	X	X	X	X	X	X	X	X

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## Compound Worksheet



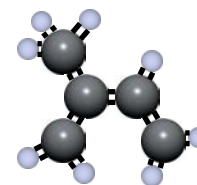
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Mobil™ SHC 500 Series	3720	3	3	4	1	X	2	X	1	2	4	X	2	2	2	1
Mobil™ SHC 600 Series	3720	3	3	4	1	X	2	4	1	1	4	X	2	2	3	1
Mobil™ Therm 600	3720	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Mobil™ Velocite c	3720	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Mobilgas™ WA200 ATF	3720	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Mobilgear™ 600 Series	9746	3	3	3	1	X	1	4	1	2	3	4	2	1	1	1
Mobilgear™ SHC ISO Series	9746	3	3	3	1	X	2	4	1	2	3	4	2	1	1	1
Mobilgrease™ HP	9746	2	2	4	1	X	2	4	1	1	4	4	3	1	2	1
Mobilgrease™ HTS	9746	2	2	4	1	X	2	4	1	1	4	4	3	1	2	1
Mobilgrease™ SM	9746	2	2	4	1	X	2	4	1	1	4	4	3	1	2	1
Mobilith™ AW Series	9746	2	2	4	1	X	2	4	1	1	4	4	3	1	2	1
Mobilith™ SHC Series	9746	2	2	4	1	X	3	4	1	1	4	4	3	1	2	1
Mobil Jet™ II Lubricant	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Mobil™ Mist Lube Series	9746	3	3	3	1	X	1	4	1	2	3	4	2	1	1	1
Mobil™ Oil SAE 20	3720	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Mobilux™	3720	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Molybdenum Disulfide Grease	3720	1	X	4	1	1	4	X	X	X	X	X	X	X	X	1
Molybdenum Oxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Molybdenum Trioxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Molybdic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Monobromobenzene	8706	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Monobromotoluene	8706	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Monobutyl Paracresol	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Monochloroacetic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	2
Monochlorobenzene	8706	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Monochlorobutene	8706	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Monochlorohydrin	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Monoethanolamine (MEA)	23711	4	X	1	4	X	4	2	4	4	2	2	4	4	2	1
Monoethyl Amine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Monoisopropylamine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Monomethyl Aniline	23711	4	X	1	2	X	1	1	4	4	1	1	1	1	2	1
Monomethyl Ether (Dimethyl Ether)	34860	1	X	4	4	X	3	4	4	X	4	4	2	1	1	1
Monomethyl Ether (Methyl Ether)	5780	1	X	4	4	X	3	4	4	X	4	4	2	1	1	1
Monomethyl Hydrazine	23711	2	2	1	X	X	2	2	X	X	1	X	2	X	4	2
Monomethylamine (MMA)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Monomethylaniline	8706	4	4	2	2	X	4	4	4	4	2	4	4	X	X	1
Mononitrotoluene	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Mononitrotoluene & Dinitrotoluene(40/60)	23711	4	4	1	3	X	4	4	4	4	4	4	4	3	4	2
Monovinyl Acetylene	5780	1	X	2	1	X	2	2	X	X	2	2	2	X	2	1

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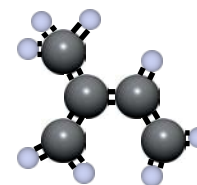
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Mopar® Brake Fluid	23747	3	3	1	4	X	2	1	X	X	2	X	2	4	3	1
Morpholine	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Motor Oils	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Mustard Gas	23711	X	X	1	1	X	1	2	X	X	1	1	1	X	1	1
Myristic Acid	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Naphthalene	9746	4	4	4	1	1	4	4	X	2	4	4	4	1	4	1
Naphthalene Chloride	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Naphthalene Sulfonic Acid	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Naphthalenic Acid	9746	2	X	4	1	2	4	4	X	X	4	4	4	1	4	1
Naphthalonic Acid	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Naphthenic Acid	9746	2	2	4	1	X	4	4	X	X	4	4	4	1	4	1
Naphthylamine	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Naphtha	9746	2	2	4	1	X	4	4	2	2	4	4	4	2	4	1
Natural Gas	5780	1	1	4	1	X	1	2	2	2	4	2	1	3	1	1
Neatsfoot Oil	5780	1	1	2	1	X	4	4	1	1	2	4	4	1	2	1
Neon	13766	1	1	1	1	X	1	1	1	1	1	1	1	1	1	1
Neville Acid	9746	4	4	2	1	X	4	4	4	X	2	4	4	2	4	1
Nickel Acetate	23711	2	2	1	4	X	2	4	4	4	1	1	4	4	4	1
Nickel Ammonium Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nickel Chloride	5767	1	1	1	1	X	1	1	3	3	1	1	1	1	1	1
Nickel Cyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nickel Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nickel Salts	5767	1	1	1	1	X	2	1	3	3	1	1	1	1	1	1
Nickel Sulfate	5767	1	1	1	1	X	1	2	4	3	1	2	1	1	1	1
Nicotinamide (Niacinamide)	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Nicotinamide Hydrochloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nicotine	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Nicotine Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Niter Cake	5747	1	1	1	1	X	1	1	4	1	1	1	1	1	1	1
Nitric Acid (0 - 50%)	8782	4	X	2	1	2	2	4	4	3	2	4	1	2	2	1
Nitric Acid (50 - 100%)	34860	4	4	4	2	2	4	4	4	4	4	4	2	3	4	1
Nitric Acid - Red Fuming	34860	4	4	4	3	2	4	4	4	4	4	4	4	4	4	2
Nitric Acid - White Fuming	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Nitric Acid 3 Molar to 158°F	23711	4	4	2	3	X	4	3	4	4	2	X	2	4	4	2
Nitric Acid Concentrated Room Temp.	8782	4	4	4	2	2	4	4	4	4	4	4	2	3	2	1
Nitric Acid Concentrated to 158°F	N/A	4	4	4	4	X	4	4	4	4	4	4	X	4	4	1
Nitroaniline	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitrobenzene	23711	4	4	1	2	1	4	4	4	4	1	4	4	4	4	1
Nitrobenzoic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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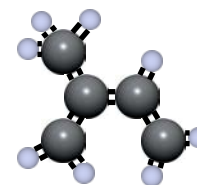
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Nitrocellulose	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitrochlorobenzene	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitrochloroform	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitrodiethylaniline	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitrodiphenyl Ether	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nitroethane	23711	4	X	2	4	2	3	2	4	4	2	2	2	4	4	1
Nitrofluorobenzene	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitrogen	13766	1	X	1	1	X	1	1	1	1	1	1	1	1	1	1
Nitrogen Oxides	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitrogen Trifluoride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nitroglycerine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitroglycerol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitroisopropylbenzene	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitromethane	23711	4	4	2	4	X	2	2	4	4	2	2	3	4	4	1
Nitrophenol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitropropane	23711	4	4	2	4	X	4	4	4	4	2	4	4	4	4	1
Nitrosyl Chloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nitrosylsulfuric Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Nitrothiophene	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitrotoluene	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitrous Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Nitrous Oxide	23711	1	1	1	1	X	X	X	X	X	X	X	X	X	1	1
Nonane	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Noryl® GE Phenolic	5747	1	1	1	X	X	X	X	X	X	X	X	X	X	X	X
Nyvac FR200 Mobil™	3720	1	1	1	1	X	2	4	X	X	4	4	3	X	X	1
OS 45 Type III (OS45)	9848	2	2	4	1	X	1	4	X	4	4	4	2	2	4	1
OS 45 Type IV (OS45-1)	9848	2	2	4	1	X	1	4	X	4	4	4	2	2	4	1
OS 70	9848	2	2	4	1	X	1	4	X	4	4	4	2	2	4	1
Octachloro Toluene	9848	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Octadecane	5780	1	4	4	1	X	2	4	2	1	4	4	2	1	4	1
Octanal (n-Octanaldehyde)	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Octane or n-Octane	9746	2	X	4	1	X	2	4	4	4	4	4	2	2	4	1
Octyl Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Octyl Alcohol	9746	2	2	3	1	X	1	2	4	4	3	2	2	2	2	1
Octyl Chloride	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Octyl Phthalate	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Olefins	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Oleic Acid	8782	3	1	4	2	1	3	4	4	2	4	4	3	X	4	1
Oleum (Fuming Sulfuric Acid)	8782	4	4	4	1	X	4	4	4	4	4	4	4	X	4	1

1 = Satisfactory, 2 = Fair, 3 = Poor, 4 = Unsatisfactory, X = Unknown



# Compound Selection Guide

## Compound Worksheet



Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU/EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Oleum Spirits	8782	2	2	4	1	X	3	4	X	3	4	4	2	2	4	1
Oleyl Alcohol	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Olive Oil	3744	1	1	2	1	X	2	4	1	1	2	4	2	1	3	1
Oronite® 8200	9746	2	2	4	1	X	1	4	X	1	4	4	4	1	4	1
Oronite® 8515	9746	2	2	4	1	X	1	4	X	1	4	4	4	1	4	1
Ortho-Chloro Ethyl Benzene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Ortho-Chloroaniline	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Ortho-Chlorophenol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Ortho-Cresol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Ortho-Dichlorobenzene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	X
Ortho-Nitrotoluene	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Orthophos Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Oxalic Acid	23711	2	2	1	1	X	2	2	X	X	1	2	2	1	2	1
Oxygen 200-300°F (Evaluate each application)	8748	4	4	4	2	X	X	X	X	X	X	X	X	X	X	X
Oxygen 300-400°F (Evaluate each application)	19711	4	4	4	2	X	4	4	4	4	4	4	4	4	1	X
Oxygen, Cold (Evaluate each application)	4753	2	2	1	1	X	1	2	2	1	1	2	1	1	1	1
Oxygen, Liquid	N/A	4	4	4	4	4	4	X	X	X	X	X	X	X	X	2
Ozonated Deionized Water	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ozone	23711	4	4	1	1	X	3	4	2	1	2	4	1	2	1	1
PRL-High Temp. Hydraulic Oil	9848	2	2	4	1	X	2	4	1	2	4	4	4	1	2	1
Paint Thinner	608804	4	4	4	2	X	4	4	4	4	4	4	4	2	4	1
Palmitic Acid	5780	1	1	2	1	X	2	2	X	1	2	2	3	1	4	1
Para-Aminobenzoic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Para-Aminosalicylic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Para-Bromobenzylphenyl Ether	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Para-Chlorophenol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Para-Dichlorobenzene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	X
Para-Formaldehyde	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Para-Nitroaniline	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Para-Nitrobenzoic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Para-Nitrophenol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Para-Toluene Sulfonic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Paracymene	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	X
Paraffins	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Paraldehyde	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Parathion	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Parker™ O Lube	3720	1	1	4	1	X	1	2	1	1	4	4	1	1	2	1
Peanut Oil	3744	1	X	3	1	X	3	4	1	2	3	4	2	1	1	1
Pectin (Liquor)	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1

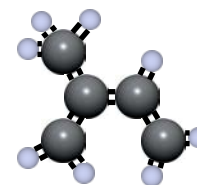
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# Compound Selection Guide

## Compound Worksheet



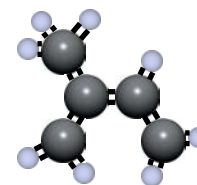
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Penicillin (Liquid)	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Pentachloroethane	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Pentachlorophenol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Pentaerythritol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Pentaerythritol Tetranitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Pentafluoroethane (F-125)	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Pentane or n-Pentane	5747	1	1	4	1	X	1	3	1	4	4	4	2	3	4	1
Pentane, 2 Methyl	5747	1	1	4	1	X	2	4	1	4	4	4	2	3	4	1
Pentane, 2-4 dimethyl	5747	1	1	4	1	X	2	4	1	4	4	4	2	3	4	1
Pentane, 3-Methyl	5747	1	1	4	1	X	2	4	1	4	4	4	2	3	4	1
Pentyl Pentanoate	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Peracetic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Perchloric Acid - 2N	23711	4	X	2	1	X	2	4	4	4	2	4	2	1	2	1
Perchloroethylene	9746	2	X	4	1	X	4	4	4	4	4	4	4	2	4	1
Perfluoropropane	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Perfluorotriethylamine	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Permanganic Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Persulfuric Acid (Caro's Acid)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Petrolatum	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Petrolatum Ether	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Petroleum Oil, Above 250°F	9746	4	X	4	2	X	2	4	4	4	4	4	4	4	4	1
Petroleum Oil, Below 250°F	3720	1	X	4	1	X	2	4	2	2	4	4	2	2	2	1
Petroleum Oil, Crude	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Phenol	9746	4	4	2	1	1	3	X	4	3	2	4	2	1	4	1
Phenol, 70%/30% H2O	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Phenol, 85%/15% H2O	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Phenolic Sulfonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Phenolsulfonic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Phenylacetamide	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Phenylacetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Phenylacetic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Phenylbenzene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Phenylethyl Alcohol	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Phenylethyl Ether	34744	4	4	4	4	X	4	4	4	4	4	4	4	4	4	1
Phenylethyl Malonic Ester	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Phenylglycerine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Phenylhydrazine	9746	4	X	2	2	X	4	2	4	X	2	1	4	X	X	1
Phenylhydrazine Hydrochloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Phenylmercuric Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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# Compound Selection Guide

## Compound Worksheet



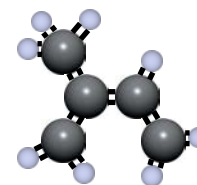
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Phorone	N/A	4	4	3	4	X	4	4	4	4	3	4	4	4	4	1
Phosphoric Acid 3 Molar to 158°F	23711	1	1	1	1	X	2	2	3	4	1	X	1	2	2	X
Phosphoric Acid Concentrated Room Temp	23711	2	2	1	1	X	2	1	2	4	1	X	1	3	3	1
Phosphoric Acid Concentrated to 158°F	23711	4	4	1	1	X	3	2	3	4	1	X	1	3	4	1
Phosphoric Acid, 20%	23711	2	X	1	1	X	2	2	X	1	2	2	1	2	2	1
Phosphoric Acid, 45%	8782	4	X	1	1	1	2	3	X	1	2	3	2	2	3	1
Phosphorus Oxychloride	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Phosphorus Trichloride	23711	4	4	1	1	X	4	4	X	X	1	4	4	1	X	1
Phosphorus Trichloride Acid	23711	4	4	1	1	1	4	X	X	X	X	X	X	X	X	1
Phthalic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Phthalic Anhydride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Pickling Solution	8782	4	4	3	2	X	4	4	4	4	3	4	2	4	4	1
Picric Acid (aq)	4753	2	X	2	1	X	1	2	X	2	2	2	2	2	4	1
Picric Acid Molten	8782	2	2	2	1	X	2	2	X	X	2	2	2	2	4	1
Pine Oil	9746	4	X	4	1	1	4	4	X	X	4	4	4	1	4	1
Pine Tar	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Pinene	9746	2	X	4	1	X	3	4	4	2	4	4	3	2	4	1
Piperazine	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Piperidine	34860	4	4	4	4	X	4	4	4	4	4	4	4	4	4	1
Plating Solution (Co,Cu,Au,In,Fe,Pb,Ni,Ag,Sn,Zn)	3744	1	1	1	1	X	4	4	X	X	1	4	1	X	4	1
Plating Solutions Chrome	9746	X	4	2	1	X	4	4	X	X	1	4	4	X	4	1
Plating Solutions Others	3744	1	1	1	1	X	4	4	X	X	1	4	1	X	4	1
Pneumatic Service	5747	1	1	1	1	X	1	4	4	1	1	4	1	4	4	1
Polyethylene Glycol	23711	2	2	1	3	1	2	X	X	X	X	X	X	X	X	1
Polyglycerol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Polyglycol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Polyvinyl Acetate Emulsion	23711	X	X	1	X	X	2	4	X	X	1	2	2	X	X	1
Potassium Acetate	23711	2	X	1	4	1	2	4	4	4	1	1	1	4	4	1
Potassium Acid Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Alum	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Aluminum Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Antimonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Bicarbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Bichromate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Bifluoride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Bisulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Bisulfite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Bitartrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Bromide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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# Compound Selection Guide

## Compound Worksheet



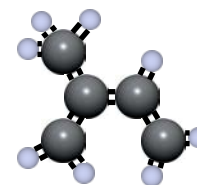
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Potassium Carbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Chlorate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Chloride	5780	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Potassium Chromates	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Citrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Cupro Cyanide	5747	1	1	1	1	X	1	1	1	1	1	1	1	1	1	1
Potassium Cyanate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Cyanide	5747	1	1	1	1	X	1	1	1	1	1	1	1	1	1	1
Potassium Dichromate	5747	1	1	1	1	X	1	2	1	2	1	2	1	1	1	1
Potassium Diphosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Ferricyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Fluoride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Glucocyanate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Hydroxide 50%	23711	2	2	1	4	1	2	2	4	4	1	2	1	3	3	1
Potassium Hypochlorite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Iodate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Iodide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Metabisulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Metachromate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Metasilicate	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Potassium Monochromate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Nitrate	5780	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Potassium Nitrite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Oxalate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Perchlorate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Perfluoro Acetate	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Potassium Permanganate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Peroxide	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Potassium Persulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Phosphate (Acid)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Phosphate (Alkaline)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Phosphate (Di/Tri Basic)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Pyrosulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Salts	5747	1	1	1	1	X	1	1	1	1	1	1	1	1	1	1
Potassium Silicate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Potassium Sodium Tartrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Stannate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Stearate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Sulfate	5780	1	1	1	1	X	1	1	4	1	1	2	2	1	1	1

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# Compound Selection Guide

## Compound Worksheet



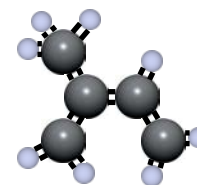
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Potassium Sulfide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Sulfite	5747	1	1	1	1	X	1	2	4	1	1	2	2	1	1	1
Potassium Tartrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Thiocyanate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Thiosulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Potassium Triphosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Prestone® Antifreeze	5767	1	1	1	1	X	1	1	4	4	1	1	1	1	1	1
Producer Gas	5780	1	X	4	1	X	2	4	2	1	4	4	2	2	2	1
Propane	5780	1	1	4	1	X	2	4	1	3	4	4	2	2	4	1
Propionaldehyde	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Propionic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Propionitrile	5747	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Propyl Acetate	23711	4	4	2	4	X	4	4	4	4	2	4	4	4	4	1
Propyl Acetone or n-Propyl Acetone	23711	4	4	1	4	X	4	4	4	4	1	4	4	4	3	1
Propyl Alcohol	5780	1	1	1	1	1	1	1	4	4	1	1	1	1	1	1
Propyl Nitrate	23711	4	1	2	4	X	4	4	4	X	2	4	4	4	4	1
Propyl Propionate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Propylamine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	2
Propylbenzene	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Propylene	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Propylene Chloride	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Propylene Chlorohydrin	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Propylene Dichloride	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Propylene Glycol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Propylene Imine	9746	X	X	X	1	X	4	4	4	3	4	4	4	2	X	1
Propylene Oxide	23711	4	4	2	4	X	4	4	4	4	2	4	4	4	4	1
Pydraul™ 10E (PCB's)	23711	4	4	1	1	X	4	4	4	4	1	4	4	4	4	1
Pydraul™ 29ELT 30E, 50E, 65E (PCB's)	9746	4	4	1	1	X	4	4	4	4	1	4	4	1	1	1
Pydraul™ 90e (PCB's)	23711	4	4	1	1	X	4	4	4	4	1	4	4	1	1	1
Pydraul™ 115E (PCB's)	9746	4	4	1	1	X	4	4	4	4	1	4	4	3	4	1
Pydraul™ 230C, 312C, 540C, A200 (PCB's)	9746	4	4	4	1	X	4	4	4	4	4	4	4	4	4	1
Pyranol® Transformer Oil (PCB's)	5767	1	1	4	1	X	2	4	1	2	4	4	3	1	4	1
Pyridine	23711	4	4	2	4	X	4	4	4	X	2	4	4	4	4	1
Pyridine Oil	23711	4	4	2	4	X	4	4	4	X	2	4	4	4	4	4
Pyridine Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Pyridine Sulfonic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Pyrogallol (Pyrogallic Acid)	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Pyrogard™ 42, 43, 55	23711	4	4	1	1	2	4	X	X	X	X	X	X	X	X	1
Pyrogard™ 53, Mobil Phosphate Ester	23711	4	4	1	1	X	4	4	4	4	1	4	4	4	4	1

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# Compound Selection Guide

## Compound Worksheet



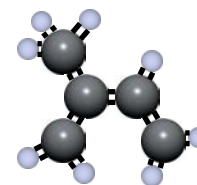
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Pyrogard™ D, Mobil Water-in-Oil Emulsion	3720	1	1	4	4	X	2	4	X	1	4	4	1	2	3	1
Pyroigneous Acid	23711	4	4	2	4	X	2	4	4	4	2	4	2	4	X	1
Pyrolube™	9746	4	4	2	1	X	4	4	4	4	2	4	4	2	2	1
Pyrosulfuric Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Pyrosulfuryl Chloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Pyrrole	23711	4	4	3	4	X	4	3	4	X	4	3	4	3	2	1
Pyruvic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Quinidine	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Quinine	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Quinine Bisulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Quinine Hydrochloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Quinine Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Quinine Tartrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Quinizarin	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Quinoline	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Quinone	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
RJ-1 (MIL-F-25558)	3716	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
RJ-4 (MIL-F-82522)	3716	2	2	4	1	X	4	4	2	2	4	4	X	1	4	X
RP-1 (MIL-R-25576)	3716	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Raffinate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Rapeseed Oil	23711	2	2	1	1	X	2	4	2	2	1	4	2	1	4	1
Red Line 100 Oil	9746	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Red Oil (MIL-H-5606)	9746	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Resorcinol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1.
Rhodium	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Riboflavin	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Ricinoleic Acid	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Rosin	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
SF 1154 GE Silicone Fluid™	23711	2	2	1	1	X	1	1	1	2	1	1	1	1	4	1
SF 1147 GE Silicone Fluid™	9746	2	2	3	1	X	X	X	X	X	3	X	X	X	4	1
SF 96 GE Silicone Fluid™	23711	2	2	1	1	X	1	1	1	2	1	1	1	1	4	1
SR-6 Fuel	9746	2	2	4	1	X	4	4	2	2	4	4	4	1	4	X
SR-10 Fuel	5747	1	1	4	1	X	4	4	2	2	4	4	4	1	4	X
Saccharin Solution	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sal Ammoniac	23711	1	1	1	1	X	1	1	1	1	1	1	1	1	2	1
Salicylic Acid	23711	2	2	1	1	X	1	2	X	X	1	1	X	1	X	1
Santo Safe 300	9746	4	4	3	1	X	4	4	4	X	3	4	X	1	1	1
Sea (Salt) Water	23711	1	1	1	1	X	2	1	4	2	1	1	1	1	1	1
Sebacic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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## Compound Worksheet



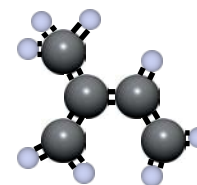
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Selenic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Selenous Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sewage	5747	1	1	2	1	X	2	2	4	4	2	2	1	1	2	1
Shell® 3XF Mine Fluid (Fire resist hydr.)	5747	1	1	4	1	X	2	4	4	4	4	4	2	1	X	1
Shell® Alvania Grease #2	5767	1	1	4	1	X	2	4	1	1	4	4	4	1	2	1
Shell® Carnea 19 and 29	3720	1	1	4	1	X	4	4	1	2	4	4	4	1	X	1
Shell® Diala	3720	1	1	4	1	X	2	4	1	2	4	4	4	1	4	1
Shell® Irus 905	3720	1	1	4	1	X	2	4	1	1	4	4	4	1	4	1
Shell® Lo Hydrax 27 and 29	3720	1	1	4	1	X	2	4	1	2	4	4	4	1	4	1
Shell® Macome 72	3720	1	1	4	1	X	2	4	1	2	4	4	4	1	4	1
Shell® Tellus #32 Pet. Base	3720	1	1	4	1	X	2	4	1	1	4	4	4	1	4	1
Shell® Tellus #68	3720	1	1	4	1	X	2	4	1	1	4	4	4	1	4	1
Shell® Tellus 27 (Petroleum Base)	3720	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Shell® Tellus 33	3720	1	1	4	1	1	2	X	X	X	X	X	X	X	X	1
Shell® UMF (5% Aromatic)	5747	1	1	4	1	X	2	4	1	1	4	4	4	1	4	1
Shellac	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Silane	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Silicate Esters	9746	2	2	4	1	X	1	4	X	1	4	4	1	1	4	1
Silicon Fluoride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Silicon Tetrachloride	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Silicon Tetrafluoride	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Silicone Greases	23711	1	1	1	1	X	1	1	1	1	1	1	1	1	3	1
Silicone Oils	23711	1	1	1	1	X	1	1	1	1	1	1	1	1	3	1
Silver Bromide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Silver Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Silver Cyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Silver Nitrate	23711	2	2	1	1	X	1	1	1	1	1	1	1	1	1	1
Silver Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sinclair™ Opaline CX-EP Lube	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Skelly™ Solvent B, C, E	5747	1	1	4	1	X	4	4	X	X	4	4	4	1	X	1
Skydrol® 500 B4	23811	4	4	1	4	X	4	4	4	4	2	4	4	3	3	1
Skydrol® 7000	23811	4	4	1	2	X	4	4	4	4	1	4	4	3	3	1
Skydrol® LD-4	23811	4	4	1	4	X	4	4	4	4	2	4	4	3	3	4
Soap Solutions	23711	1	1	1	1	X	2	1	4	3	1	2	1	1	1	1
Socony Mobile® Type A	3720	1	1	4	1	X	2	4	1	2	4	4	4	2	4	1
Socony Vacuum® AMV AC781 (grease)	3720	1	1	4	1	X	2	4	1	2	4	4	4	2	4	1
Socony Vacuum® PD959B	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Soda Ash	3720	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Sodium (Molten)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X

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# Compound Selection Guide

## Compound Worksheet



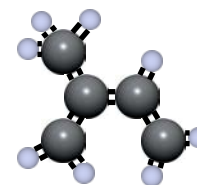
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Sodium Acetate	23711	2	2	1	4	X	2	4	4	4	1	1	1	4	4	1
Sodium Acid Bisulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Acid Fluoride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Acid Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Aluminate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Aluminate Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Anthraquinone Disulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Antimonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Arsenate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Arsenite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Benzoate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Bicarbonate (Baking Soda)	5780	1	1	1	1	1	1	1	X	X	1	1	1	1	1	1
Sodium Bichromate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Bifluoride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Bisulfate or Bisulfite	5780	1	1	1	1	1	1	2	4	X	1	1	1	1	1	1
Sodium Bisulfide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Bitartrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Borate	5780	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Sodium Bromate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Bromide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Carbonate (Soda Ash)	5780	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Sodium Chlorate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Chloride	5780	1	1	1	1	X	1	1	X	1	1	1	1	1	1	1
Sodium Chlorite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Chloroacetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Chromate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Citrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Cyanamide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Cyanate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Cyanide	5780	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Sodium Diacetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Diphenyl Sulfonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Diphosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Disilicate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Ethylate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Ferricyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Ferrocyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Fluoride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Fluorosilicate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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## Compound Worksheet



Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Sodium Glutamate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Hydride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sodium Hydrogen Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Hydrosulfide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Hydrosulfite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Hydroxide, 3 Molar	23711	2	2	1	2	1	1	1	3	4	1	1	1	2	2	1
Sodium Hypochlorite	23711	2	2	2	1	1	1	4	4	4	2	4	1	2	2	1
Sodium Hypophosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Hypophosphite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Hyposulfite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Iodide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Lactate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Metaphosphate	5780	1	1	1	1	X	2	1	X	X	1	1	2	1	X	1
Sodium Metasilicate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Methylate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Monophosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Nitrate	23711	2	X	1	1	1	2	1	X	X	1	2	1	X	4	1
Sodium Oleate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Orthosilicate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Oxalate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Perborate	23711	2	2	1	1	X	2	2	X	X	1	2	2	1	2	1
Sodium Percarbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Perchlorate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Peroxide	23711	2	2	1	2	X	2	2	4	4	1	2	2	1	4	1
Sodium Persulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Phenolate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Phenoxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Phosphate (Dibasic)	5747	1	1	1	1	X	2	1	1	1	1	1	1	X	4	1
Sodium Phosphate (Mono)	5780	1	1	1	1	1	2	1	1	1	1	1	1	X	4	1
Sodium Phosphate (Tribasic)	5747	1	1	1	1	X	2	1	1	1	1	1	1	X	1	1
Sodium Plumbite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Pyrophosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Resinate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Salicylate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Salts	5747	1	1	1	1	X	2	1	1	1	1	1	1	1	1	1
Sodium Sesquisilicate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sodium Silicate	5780	1	1	1	1	X	1	1	X	X	1	1	1	X	X	1
Sodium Silicofluoride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sodium Stannate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

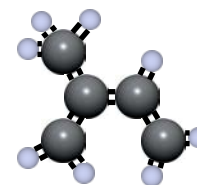
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# Compound Selection Guide

## Compound Worksheet



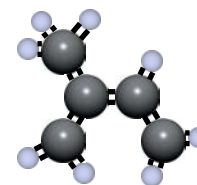
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Sodium Sulfate	5780	1	4	1	1	1	1	2	4	1	1	2	1	1	1	1
Sodium Sulfide and Sulfite	5747	1	1	1	1	X	1	2	4	1	1	2	1	1	1	1
Sodium Sulfoyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Tartrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Tetraborate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Tetraphosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Tetrasulfide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Thioarsenate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Thiocyanate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Thiosulfate	23711	2	X	1	1	X	1	2	4	1	1	2	1	1	1	1
Sodium Trichloroacetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sodium Triphosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Solvesso™ 100, 150	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Sorbitol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sour Crude Oil	N/A	3	3	4	1	X	4	4	4	4	4	4	X	4	4	1
Sour Natural Gas	N/A	3	3	4	1	X	4	4	4	4	4	4	X	4	4	1
Sovasol™ No. 1, 2, and 3	5747	1	1	4	1	X	2	4	2	2	4	4	2	1	4	1
Sovasol™ No. 73 and 74	9746	2	2	4	1	X	2	4	2	2	4	4	2	1	4	1
Soybean Oil	3744	1	1	3	1	X	2	4	1	2	3	4	3	1	1	1
Spry®	5747	1	1	2	1	X	2	4	1	1	2	4	4	1	1	1
Standard Oil Mobilube™ GX90-EP Lube	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Stannic Ammonium Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Stannic Chloride	5780	1	1	1	1	X	2	1	X	X	1	1	1	1	2	1
Stannic Chloride, 50%	5780	1	1	1	1	X	2	1	X	X	1	1	1	1	2	1
Stannic Tetrachloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Stannous Bisulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Stannous Bromide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Stannous Chloride (15%)	5747	1	1	1	1	X	1	1	X	X	1	1	1	1	2	1
Stannous Fluoride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Stannous Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Stauffer 7700	9848	2	2	4	1	X	4	4	2	X	4	4	4	2	4	1
Steam Below 400°F	23711	4	4	1	4	1	3	4	4	4	2	4	4	4	3	1
Steam, 400°-500°F	623906	4	4	3	4	X	4	4	4	4	4	4	4	4	4	1
Steam, Above 500°F	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Stearic Acid	5780	2	2	2	1	1	2	2	X	1	2	2	2	X	2	1
Stoddard Solvent	5780	1	1	4	1	X	2	4	1	1	4	4	4	1	4	1
Strontium Acetate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Strontium Carbonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Strontium Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1

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# Compound Selection Guide

## Compound Worksheet



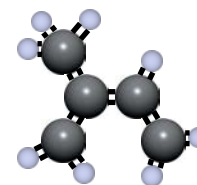
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Strontium Hydroxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Strontium Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Styrene (Monomer)	9746	4	4	4	2	2	4	4	4	3	4	4	4	3	4	1
Succinic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sucrose Solutions	3744	1	2	1	1	X	2	1	4	4	1	1	2	1	1	1
Sulfamic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sulfanilic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sulfanilic Chloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Sulfanilimide	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Sulfite Liquors	23711	2	X	2	1	X	2	2	4	4	2	2	2	2	4	1
Sulfolane	23711	2	2	1	2	1	2	X	X	X	X	X	X	X	X	1
Sulfonated Oils	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Sulfonic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sulfonyl Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	2
Sulfur	23711	4	4	1	1	X	1	4	4	X	1	4	1	1	3	1
Sulfur (Molten)	9746	4	4	3	1	X	3	4	4	4	3	4	4	3	3	1
Sulfur Chloride	9746	3	4	4	1	X	3	4	4	X	4	4	2	1	3	1
Sulfur Dioxide, Dry	23711	4	4	1	2	2	4	2	4	X	2	2	2	2	2	1
Sulfur Dioxide, Liquidified under pressure	23711	4	4	1	2	X	4	4	4	X	2	4	4	2	2	1
Sulfur Dioxide, Wet	23711	4	4	1	2	X	2	4	4	X	1	4	1	2	2	1
Sulfur Hexafluoride	23711	2	2	1	1	X	1	4	4	X	1	4	2	2	2	1
Sulfur Liquors	9746	2	2	2	1	X	2	2	4	X	2	2	2	2	4	1
Sulfur Monochloride	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Sulfur Tetrafluoride	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2
Sulfur Trioxide Dry	9746	4	4	2	1	X	4	2	4	X	2	2	4	2	2	1
Sulfuric Acid (20% Oleum)	8782	4	2	4	1	1	4	4	4	4	4	4	4	4	4	1
Sulfuric Acid, 3 Molar to 158°F	23711	3	X	2	1	1	2	3	2	3	2	3	1	3	4	1
Sulfuric Acid, Concentrated Room Temp	8782	4	X	3	1	1	4	4	4	4	4	4	1	4	4	1
Sulfuric Acid, Concentrated to 158°F	8782	4	X	4	1	X	4	4	4	4	4	X	X	4	4	1
Sulfuric Chlorohydrin (Chlorosulfonic Acid)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Sulfurous Acid	8782	2	2	2	3	X	2	2	4	3	2	2	1	X	4	1
Sunoco #3661	5767	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Sunoco All purpose grease	5767	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Sunoco SAE 10	5767	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Sunsafe® (Fire resist. hydr. fluid)	5767	1	1	4	1	X	2	4	4	4	4	4	2	1	X	1
Super Shell Gas	5747	1	1	4	1	X	2	4	2	2	4	4	4	2	4	1
Surfuryl Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Swan Finch EP Lube	3720	1	1	4	1	X	4	4	1	1	4	4	4	1	4	1
Swan Finch Hypoid-90	3720	1	1	4	1	X	2	4	1	1	4	4	4	1	4	1

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## Compound Worksheet



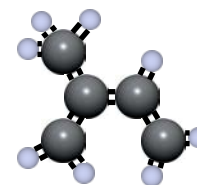
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Tallow	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Tannic Acid (10%)	5780	1	1	1	1	X	1	2	4	1	1	1	1	1	2	1
Tar, bituminous	9746	2	2	3	1	X	3	4	4	X	3	4	4	1	2	1
Tartaric Acid	5780	1	1	2	1	X	2	4	X	1	2	3	1	1	1	1
Tellone II	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Terephthalic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Terpineol	9746	2	2	3	1	X	4	4	X	2	3	4	4	1	X	1
Terpinyl Acetate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Tertiary Amyl Methyl Ether (TAME)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tertiary Butyl Catechol	9746	4	X	2	1	X	2	2	4	4	2	4	2	1	X	1
Tertiary Butyl Mercaptan	9746	4	4	4	1	X	4	4	4	4	4	4	4	X	4	1
Tetrabromoethane	9746	4	4	4	1	X	4	4	4	X	4	4	4	2	4	1
Tetrabromomethane	9746	4	X	4	1	X	4	4	X	X	4	4	X	2	4	1
Tetrabutyl Titanate	23711	2	2	1	1	X	2	2	X	X	2	2	1	1	X	1
Tetrachloroethylene	9746	4	4	4	1	4	4	4	4	4	4	4	4	2	4	1
Tetrachoroethane	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	X	1
Tetraethyl Lead	9746	2	2	4	1	X	2	4	X	X	4	4	4	2	X	1
Tetraethyl Lead "Blend"	9746	2	2	4	1	X	4	4	X	X	4	4	4	2	X	1
Tetraethyl Orthosilicate (TEOS)	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Tetrahydrofuran	34744	4	4	3	4	X	4	4	4	3	3	4	4	4	4	1
Tetralin	9746	4	4	4	1	X	4	4	X	X	4	4	4	1	4	1
Tetramethyl Ammonium Hydroxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Tetramethylcyclotetrasiloxane (TMCTS)	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Tetramethyldihydropyridine	9848	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Tetraphosphoglucosate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Tetraphosphoric Acid	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Therminol® 44	9746	4	4	4	1	X	4	X	4	X	4	X	X	X	4	1
Therminol® 55	9746	2	2	4	1	X	4	X	2	X	4	X	X	X	4	1
Therminol® 66	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Therminol® FR	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Therminol® VP-1, 60, 65	9746	4	4	4	1	X	4	X	4	X	4	X	X	X	2	1
Thio Acid Chloride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Thioamyl Alcohol	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Thiodiacetic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Thioethanol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Thioglycolic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Thiokol® TP-90B	23711	4	4	1	1	X	2	4	X	X	1	X	2	2	X	1
Thiokol® TP-95	23711	4	4	1	1	X	2	4	X	X	1	X	2	2	X	1
Thionyl Chloride	5747	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1

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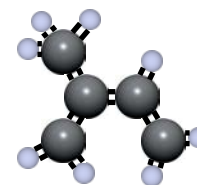
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Thiophene (Thiofuran)	5747	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Thiophosphoryl Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Thiourea	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Thorium Nitrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Tidewater® Multigear, 140 EP Lube	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Tidewater® Oil-Beedol	3720	1	1	4	1	X	2	4	1	1	4	4	4	1	2	1
Tin Ammonium Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Tin Chloride	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Tin Tetrachloride	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Titanic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Titanium Dioxide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Titanium Sulfate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Titanium Tetrachloride	9746	2	2	4	1	X	4	4	4	4	4	4	4	2	4	1
Toluene	8782	4	4	4	2	4	4	4	4	4	4	4	4	2	4	1
Toluene Bisodium Sulfite	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Toluene Diisocyanate (TDI)	23711	4	4	2	4	X	4	4	4	X	2	4	4	4	4	1
Toluene Sulfonyl Chloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	X
Toluenesulfonic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Toluidine	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	X
Toluol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Toluquinone	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	X
Tolylaldehyde	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Transformer Oil	55715	1	1	4	1	X	2	4	2	1	4	4	3	1	2	1
Transmission Fluid Type A	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Triacetin	23711	2	2	1	4	X	2	2	4	4	1	2	2	4	X	1
Triaryl Phosphate	23711	4	4	1	1	X	4	4	4	4	1	4	4	2	3	1
Tribromomethylbenzene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	X
Tributoxyethyl Phosphate	23711	4	4	1	1	X	4	2	4	4	1	2	4	2	X	1
Tributyl Citrate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Tributyl Mercaptan	9746	4	4	4	1	X	4	4	4	X	4	4	4	3	4	1
Tributyl Phosphate	23711	4	4	2	4	1	4	4	4	4	2	2	4	4	4	1
Tributylamine	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Trichloroacetic Acid	23711	2	2	2	4	X	4	2	4	4	2	3	4	4	X	1
Trichloroacetyl Chloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	X
Trichlorobenzene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	X
Trichloroethane	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Trichloroethanolamine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Trichloroethylene	9746	4	3	4	1	4	4	4	4	4	4	4	4	2	4	1
Trichloromethane	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	X

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## Compound Worksheet



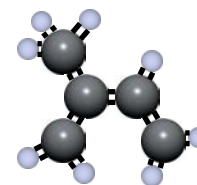
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Trichloronitromethane (Chloropicrin)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	X
Trichlorophenylsilane	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Trichloropropane	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	X
Trichlorosilane	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	X
Tricresyl Phosphate	9746	4	4	4	1	1	3	1	4	4	1	4	4	2	3	1
Triethanol Amine	23711	2	3	1	4	1	1	2	4	4	2	2	2	4	X	1
Triethyl Phosphate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Triethylaluminum	34860	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
Triethylborane	8782	4	X	3	1	X	4	4	4	4	3	4	4	X	X	1
Triethylene Glycol	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Triethylenetetramine	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Trifluoroacetic Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	2
Trifluoroethane	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Trifluoromethane	9746	4	4	4	1	X	4	4	4	4	4	4	4	2	4	1
Trifluorovinylchloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Triisopropylbenzylchloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Trimethylamine (TMA)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	2
Trimethylbenzene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Trimethylborate (TMB)	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Trimethylpentane	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Trinitrotoluene (TNT)	9746	4	4	4	2	X	2	4	4	X	4	4	2	2	X	1
Trioctyl Phosphate	23711	4	X	1	2	X	4	4	4	4	1	4	4	2	3	1
Triphenylphosphite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Tripoly Phosphate	23711	4	4	1	2	X	3	4	4	4	1	4	4	1	3	1
Tripotassium Phosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Trisodium Phosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Tung Oil (China Wood Oil)	3720	1	1	3	1	X	2	4	X	3	3	4	3	2	4	1
Turbine Oil	3720	2	1	4	1	X	4	4	1	1	4	4	4	2	4	1
Turbine Oil #15 (MIL-L-7808A)	9746	2	2	4	1	X	4	4	2	4	4	4	4	2	4	X
Turbo Oil #35	3720	1	1	4	1	X	2	4	1	1	4	4	4	1	4	1
Turpentine	5780	1	1	4	1	3	4	4	2	4	4	4	4	2	4	1
Type I Fuel (MIL-S-3136)(ASTM Ref. Fuel A)	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Type II Fuel (MIL-S-3136)	5747	2	2	4	1	X	4	4	3	2	4	4	4	2	4	1
Type III Fuel (MIL-S-3136)(ASTM Ref. Fuel B)	5747	2	2	4	1	X	4	4	3	2	4	4	4	2	4	1
UPDI (Ultra Pure Deionized Water)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Ucon™ Hydrolube J-4	3720	1	1	1	1	X	2	1	4	4	1	X	X	2	1	1
Ucon™ Lubricant 50-HB	3720	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Ucon™ Lubricant LB-1145	3720	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Ucon™ Lubricant LB-135	3720	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1

1 = Satisfactory, 2 = Fair, 3 = Poor, 4 = Unsatisfactory, X = Unknown



# Compound Selection Guide

## Compound Worksheet



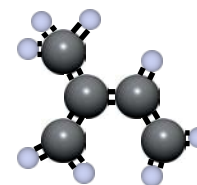
Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU /EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Ucon™ Lubricant LB-285	3720	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Ucon™ Lubricant LB-300X	3720	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Ucon™ Lubricant LB-625	3720	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Ucon™ Lubricant LB-65	3720	1	1	1	1	X	1	2	X	X	1	2	2	1	1	1
Ucon™ Oil 50-HB-280x	23711	2	2	1	3	1	2	X	X	X	X	X	X	X	X	1
Ucon™ Oil Heat Transfer Fluid 500	3720	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Ucon™ Oil LB-385	3720	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Ucon™ Oil LB-400X	3720	1	1	1	1	X	1	1	X	X	1	1	1	1	1	1
Undecylenic Acid	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Undecylic Acid	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Univis™ 40 (Hydr. Fluid)	3720	1	1	4	1	X	2	4	1	1	4	4	2	1	4	1
Univolt™ #35 (Mineral Oil)	5747	1	1	4	1	X	2	4	1	1	4	4	4	1	4	1
Unsymmetrical Dimethyl Hydrazine (UDMH)	23711	2	2	1	4	X	2	1	X	X	1	1	1	4	4	1
Uric Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
VV-H-910	23711	2	3	1	1	X	2	1	2	3	2	2	2	2	4	1
Valeraldehyde	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Valeric Acid	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Vanadium Oxide	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Vanadium Pentoxide	5747	1	1	4	1	X	2	4	1	1	4	4	2	1	2	1
Varnish	9848	2	2	4	1	X	4	4	4	3	4	4	4	2	4	1
Vegetable Oil	3741	1	1	3	1	X	3	4	1	X	3	4	2	1	2	1
Versilube® F-50	23711	1	1	1	1	X	1	1	1	1	1	1	1	1	3	1
Versilube® F44, F55	3720	1	1	1	1	1	1	X	X	X	X	X	X	X	X	1
Vinegar	23711	2	2	1	1	X	2	2	4	4	1	2	1	3	1	1
Vinyl Acetate	23711	2	2	1	3	1	2	X	X	X	X	X	X	X	X	1
Vinyl Benzene	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Vinyl Benzoate	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Vinyl Chloride	9746	4	X	4	1	2	4	4	4	4	4	4	4	X	X	1
Vinyl Fluoride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Vinylidene Chloride	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Vinylpyridine	9746	2	2	4	1	X	4	4	4	3	4	4	4	2	X	1
Vitriol - White (Zinc Sulfate)	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Wagner 21B Brake Fluid	23747	3	3	1	4	X	2	1	X	X	2	2	2	4	3	1
Water	23761	1	1	1	1	1	1	1	4	3	1	1	1	1	1	1
Wemco® C	3720	1	1	4	1	X	2	4	1	1	4	4	4	1	4	1
Whiskey and Wines	3741	1	1	1	1	X	1	1	4	2	1	1	1	1	1	1
White Liquor	3720	1	1	1	1	1	1	X	X	X	X	X	X	X	X	1
White Oil	3720	1	1	4	1	X	2	4	1	1	4	4	4	1	4	1
White Pine Oil	3720	2	X	4	1	X	4	4	X	X	4	4	4	1	4	1

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# Compound Selection Guide

## Compound Worksheet

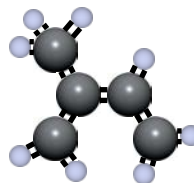


Fluid Name	Recommended Compound	Nitrile (NBR)	HNBR	EPDM	Fluorocarbon (FKM)	Aflas® (FEPM or TFE/P)	Neoprene® (CR)	SBR	Polyacrylate (ACM)	Polyurethane (AU/EU)	Butyl (IIR)	Natural (NR)	Hypalon® (CSM)	Fluorosilicone (FVMQ)	Silicone (VMQ)	Perfluorocarbon (FFKM)
Wolmar Salt	5747	1	1	1	1	X	2	1	2	1	1	1	1	1	1	1
Wood Alcohol	5747	1	1	1	4	X	1	1	4	4	1	1	1	1	1	1
Wood Oil	5780	1	X	4	1	X	2	4	1	3	4	4	3	2	4	1
Xenon	5747	1	1	1	1	X	1	1	1	1	1	1	1	1	1	1
Xylene	9746	4	4	4	1	3	4	4	4	4	4	4	4	1	4	1
Xylidenes-Mixed-Aromatic Amines	23711	3	3	2	4	X	3	3	4	4	3	3	4	4	4	1
Xylol	9746	4	4	4	1	X	4	4	4	4	4	4	4	1	4	1
Zeolites	5747	1	1	1	1	X	1	1	X	X	1	1	1	1	X	1
Zinc Acetate	23711	2	2	1	4	X	2	4	4	4	1	1	1	4	4	1
Zinc Ammonium Chloride	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Zinc Chloride	5780	1	1	1	1	1	1	1	4	1	1	1	1	1	1	1
Zinc Chromate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Zinc Cyanide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Zinc Diethyldithiocarbamate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Zinc Dihydrogen Phosphate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Zinc Fluorosilicate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Zinc Hydrosulfite	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Zinc Naphthenate	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Zinc Nitrate	5747	1	1	1	1	X	X	1	4	X	1	1	1	1	X	1
Zinc Oxide	5747	1	1	1	1	X	X	1	4	X	1	1	1	1	X	1
Zinc Phenolsulfonate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Zinc Phosphate	5747	1	1	1	1	X	1	1	4	1	1	1	1	1	1	1
Zinc Salts	5747	1	1	1	1	X	1	1	4	1	1	1	1	1	1	1
Zinc Silicofluoride	N/A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Zinc Stearate	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Zinc Sulfate	5780	1	1	1	1	1	1	2	4	X	1	2	1	1	1	1
Zinc Sulfide	23711	3	3	1	3	X	1	1	4	4	1	1	1	1	2	1
Zirconium Nitrate	5747	1	1	1	1	X	1	2	4	4	1	2	1	1	1	1

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Compound Selection Guide  
Compound Worksheet



Name \_\_\_\_\_ Address \_\_\_\_\_  
 Company \_\_\_\_\_ City/St/Zip \_\_\_\_\_  
 Phone \_\_\_\_\_ Fax \_\_\_\_\_

Application \_\_\_\_\_ Static \_\_\_\_\_  
 \_\_\_\_\_ Dynamic \_\_\_\_\_  
 \_\_\_\_\_ Rotary \_\_\_\_\_

Normal Operating Pressure Range \_\_\_\_\_ (psi) \_\_\_\_\_ (BAR)  
 Maximum Pressure \_\_\_\_\_ (°F) \_\_\_\_\_ (°C)  
 Vacuum \_\_\_\_\_ (Torr) \_\_\_\_\_

Normal Operating Temperature \_\_\_\_\_ (°F) \_\_\_\_\_ (°C)  
 Maximum Temperature \_\_\_\_\_ (°F) \_\_\_\_\_ (°C)  
 Minimum Temperature \_\_\_\_\_ (°F) \_\_\_\_\_ (°C)

Acids _____	Hydraulic Fluid _____
Bases _____	Phosphate Ester _____
Petroleum _____	Silicone Oil _____
Water/Glycol _____	Refrigerants _____
Chemicals _____	Water _____
Ozone _____	Fuels _____
Light _____	Food/Medical Contact _____
Steam _____	Low Friction _____
Abrasion Resistance _____	High Friction _____
Color _____	Conductive _____
Specification _____	Other _____

PAI Customer Service Representative: \_\_\_\_\_

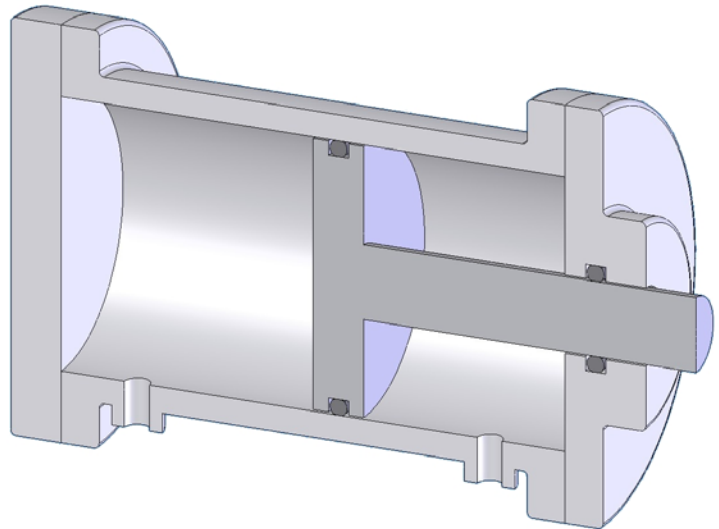
Please fax this form to 612-342-2417, or email to [Info@PrecisionAssoc.com](mailto:Info@PrecisionAssoc.com)





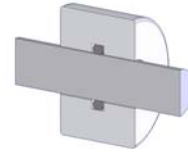
# *Application Data*

## Seal Gland Design





## Application Data



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### DESIGN DIMENSIONS FOR O-RING INSTALATION

O-Rings are normally used as seals in several ways, and dimensions of the groove or gland will also vary with the cross section of the ring, the type of operation, and the amount of the pressure used in the system. These dimensions will also be different if the O-Ring is sealing a liquid which has a low volume swell on the ring (0-15% Design Chart 1 & 3) or if it is sealing a liquid which has a high volume swell on the ring (15-25% Design Chart 2 & 4). It has not been practical to attempt to seal liquids, which will swell the O-Ring more than 25%, in most cases, since the rings will lose most of their desirable physical properties with such a high swell.

### STATIC SEALS (Design Charts 1, 2, 3, & 4)

In a static seal, where the O-Ring does not move and is used simply for containing pressure or maintaining a vacuum, the ring may be compressed AXIALLY or parallel to a line drawn through the center or axis of the ring. In this case, you will use the dimensions under AXIAL opposite the cross section of the ring you desire.

Although the depth and width of the groove will remain the same for all Axial static seals, the I.D. and O.D. of the groove will vary depending on whether you are sealing against internal pressure or external pressure (a vacuum in the vessel being sealed.).

In the case of internal pressure, the O.D. of the groove should be the same as the O.D. of the ring, plus the normal tolerance for that size ring.

In the case of external pressure (i.e., a vacuum in the vessel being sealed), the I.D. of the groove should be the same as the I.D. of the ring being used, plus the normal tolerance range for that size ring.

A static seal ring may also be compressed RADIALLY; that is, being compressed between the internal diameter (I.D.) and overall diameter (O.D.). In the case, you will use the dimensions under RADIAL opposite the appropriate cross section column for the ring you wish to use.

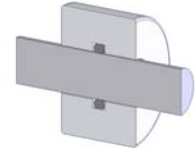
### DYNAMIC SEALS (Design Charts 1, 2, 3, 4 & 5)

Dynamic or moving seals basically fall into two classes; reciprocating (as in the case fo the piston and a cylinder), or rotating (as in the case of a shaft rotating in a housing). Reciprocating design data will be found in Charts 1, 2, 3 & 4. Rotating design data will be found in Chart 5.

Reciprocating seals may be designed so as to permit or prevent rolling of the ring within the groove. When the ring is allowed to roll within the groove, the breakaway force necessary to move the piston is usually lower; but some sacrifice must be made in the pressure, limitations of the seal and also in the life of the seal. This is caused by the constant flex of the O-Ring with each stroke of the piston.



# Application Data



## DIAMETRAL CLEARANCE (Design Chart 6)

Under the dynamic section, you will also find a section on diametrical clearance. This calls out the maximum clearance between a piston and cylinder for pressure to 1500 psi, using a 70-durometer compound (low swell fluid) or a 60-durometer compound (in a high swell fluid). If higher pressures are required, a different durometer O-Ring may be used, as shown in Design Chart 6; or back-up rings may be used (see next heading). Design Chart 6 gives an elaboration of the diametric clearance for various durometers and various pressures. Adherence to these clearances will largely prevent extrusion of the O-Ring between the piston and cylinder or shaft and groove, up to the 5,000 psi using a 90-durometer compound.

## BACK-UP RINGS

When you have a tendency for O-Rings to extrude between the sealing areas under pressure, there are three choices available to minimize this:

1. A harder O-Ring material may be used.
2. Clearances may be reduced to a minimum.
3. Back-up rings may be used.

O-Ring design Charts 1 and 2 show the groove widths necessary to accommodate the thickness of the back-up rings. PAI's Kurv-Bak™ or Teflon® back-up rings may be used. Good practice is to use a back-up ring on either side of the O-Ring, even though the pressure on the ring may be from one side only. The only time you will design for a back-up ring on one side is when there is not enough space for two rings.

## ROTATING SEALS (Design Chart 5)

Rotating seals should be limited to shafts having the following maximum rotational speed:

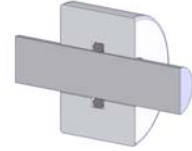
Shaft Diameter	Feet/Min
.125 - .280	350
.281 - .625	400
.626 - .687	450
.688 - 1.250	600

In rotating shaft seals, a higher durometer (80-90) compound is usually used. Preferably, it should have excellent abrasion resistance and quite often is internally lubricated with graphite or molybdenum disulfide to give maximum protection if run dry.

To find the groove dimensions in a rotating seal, use Design Chart 5. Find the shaft size in the second column. The groove root diameter and width will be found under their respective columns. The Precision Associates O-Ring size will be found in the first column next to shaft diameter.

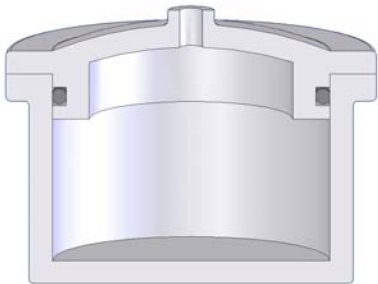


## Application Data



### STATIC SEAL: EXAMPLE RADIAL SEAL

It is desired to seal a pressure vessel filled with air at 200 psi. The I.D. of the vessel at the sealing lip is 3.000" and the thickness of the cover at the groove point is .250".



**First:** Pick a ring series that has a cross section, which can be cut into the cover without weakening the cover at this point. (100 series)

**Second:** Find an O-Ring in this series that has an O.D. closest to 3.000" (1-149-O.D. 3.006).

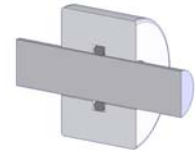
**Third:** Check the swell characteristics of air, with possible oil traces in it. (Low swell – 0-15%)

**Fourth:** In the normal swell Design Chart 1, find the cross section column for the 100 series rings (.103± .003).

**Fifth:** In this column, opposite the RADIAL section, find the groove depth (.083-.003) and the groove width (.125± .005).

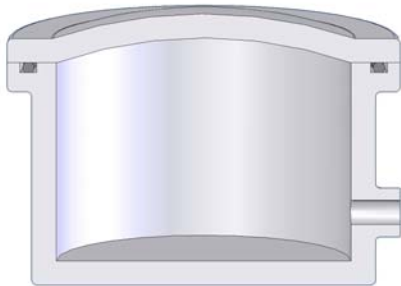


## Application Data



### STATIC SEAL- EXAMPLE: AXIAL SEAL

It is desired to seal a pressure vessel filled with hydraulic oil at 1200 psi. The I.D. of the vessel is 4 inches, and the flange is 1 inch wider and 3/8" thick (see drawing).



**First:** Find the O-Ring sizes that will fit within the sealing area. (1-244, 1-156)

**Second:** Pick the series O-ring desired, based on the thickness of the flange available to cut the groove depth desired. (1-244)

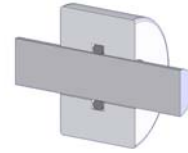
**Third:** Check the swell characteristics of the fluid on the rubber to determine whether the normal or high swell chart will be used for dimensions of the O-Rng groove. (In this case 0-15% or normal swell Chart 1.)

**Fourth:** Since this is an internal pressure application, the O.D. of the groove should be the O.D. of the ring (4.512) plus the tolerance (.015) or 4.527 inches.

**Fifth:** Since this is an axial squeeze, look in the AXIAL section, Design Chart #1, under the cross section of the ring (.139). The groove depth will be .110"-.008" and the width will be .185"  $\pm$  .005.

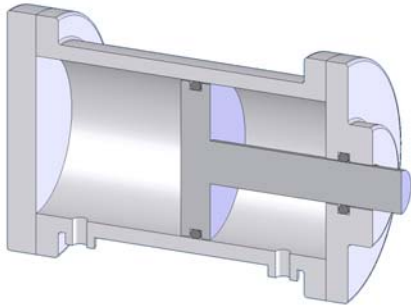


## Application Data



### DYNAMIC SEAL: RECIPROCATING, Low Pressure

A Piston moves back and forth in a 1.000" cylinder to pump acetone at a pressure of 200 psi, maximum. An O-Ring seal is required for this piston.



**First:** Find ring sizes whose O.D. is close to 1.000" (1-117,1-210).

**Second:** Check the swell characteristics of the liquid being pumped (acetone swells most rubbers but does not attack EPDM rubber, so an EPDM ring could be used with normal swell – table 1).

**Third:** Opposite the dynamic section under the cross section of the 100 series (.103± .003), find the depth of the groove (.090-.003) and the width of the groove (.120± .005). If it were desired that the ring roll in the groove, the width would be .145± .005.

### DYNAMIC SEAL: RECIPROCATING, High Pressure

A piston seal is desired for a high pressure piston at 3,000 psi using hydraulic oil. Piston diameter is .875".

**First:** Find a ring size with an O.D. approximately .875" (1-115 with an O.D. of .880).

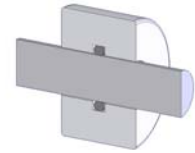
**Second:** Determine whether the swell characteristics will fall into the normal (0-15%) or high (15-25%) range (normal range Design Chart 31).

**Third:** Find under the cross section column (.103"±.003") opposite dynamic section, Design Chart #1, the groove depth (.090"-.003"),

**Fourth:** Since the pressure range is over the 1500 psi maximum, 2 back-up rings will be required – one on either side of the O-Ring. Under the column MS 28774 dash 110-149 the width of the groove, with 2 rings, will be .246". The rings to use will have the number MS 28774-115.

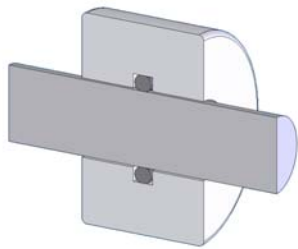


## Application Data



### DYNAMIC SEAL: ROTATING SEAL

It is desired to seal a mixer shaft with a rotor extending into the vessel through a housing seal and bearing combination and driven at 450 linear feet per minute. The shaft diameter is 1.000 inches. The material being mixed is a blend of oil and detergents.



**First:** In Design Chart 5, find in the second column the shaft size (1-inch).

**Second:** Under the Groove root Diameter, find the root diameter (1.265).

**Third:** Under the groove width column, find the groove width (.157).

**Fourth:** Under the radial clearance column, find the clearance of the shaft in the housing (.0015-.0012).

**Fifth:** Under the bearing I.D. tolerance, find the clearance of the shaft in the bearing (-.0000+.0012).

**Sixth:** On the extreme left column, find the PAI O-Ring size (1-215).

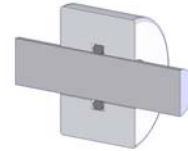
### LUBRICATION OF O-RINGS AND PARTS FOR EASE IN ASSEMBLY

In assembling O-Rings and components into a unit part, it is quite often necessary to lubricate the o-ring or seal in order to facilitate easy assembly. This is usually a temporary lubricant, since the liquid being sealed will generally provide lubrication when in operation. If the operating fluid does not provide sufficient lubricity, or if the seal is operating in a gas or a vacuum, it may be necessary to pre-lubricate the assembly for lower friction during operation.

Precision Associates is able to provide your seals pre-lubricated, or we can recommend lubricants for application at assembly. Contact Precision Associates' Customer Service for lubrication recommendations for your application.



# Application Data



## DESIGN CHART #1 - INDUSTRIAL O-RINGS - NORMAL SWELL (0 TO 15%)

O-RING CROSS SECTION	.040	.050	.060	.070	.103	.139	.176	.210	.275
PAI Size Number Range	1-001 and 40-70	1-002	1-003	1-004 thru 1-055	1-108 thru 1-178	1-202 thru 1-284	1-514 thru 1-572	1-312 thru 1-395	1-400 thru 1-476
O-Ring ID Size Range	1/32" and 1/16"	3/64"	1/16"	5/64" thru 6-1/2"	1/4" thru 9-3/4"	1/4" thru 18"	1" thru 4-7/8"	5/8" thru 26"	1-7/8" thru 27"
<b>AXIAL</b>									
Squeeze (min.)	.010	.012	.014	.017	.020	.025	.027	.030	.039
Gland Depth (max.)	.027 - .002	.035 - .002	.043 - .002	.050 - .004	.080 - .006	.110 - .008	.147 ± .003	.175 - .010	.230 - .010
Groove Width (wall to wall)	.063 ± .002	.073 ± .003	.084 ± .003	.095 ± .003	.145 ± .003	.185 ± .005	.235 ± .005	.285 ± .005	.375 ± .005
<b>RADIAL</b>									
Squeeze (min.) Per Side	.007	.010	.012	.015	.017	.020	.022	.025	.035
Gland Depth (max.)	.030 - .001	.037 - .001	.045 - .001	.052 - .002	.083 - .003	.115 - .004	.150 - .004	.180 - .005	.234 - .006
Groove Width (Wall to Wall)	.056 ± .002	.064 ± .003	.075 ± .003	.090 ± .003	.125 ± .003	.170 ± .005	.210 ± .005	.240 ± .005	.315 ± .005
<b>DYNAMIC</b>									
Squeeze (min.) Per Side	.005	.006	.008	.010	.010	.012	.015	.017	.029
Gland Depth (max.)	.032 - .001	.041 - .001	.049 - .001	.057 - .002	.090 - .003	.123 - .004	.156	.188 - .005	.240 - .006
Groove Width									
With Roll	.063 ± .003	.073 ± .003	.084 ± .003	.095 ± .003	.145 ± .005	.185 ± .005	.235 ± .005	.285 ± .005	.375 ± .005
No Roll	.056 ± .003	.064 ± .003	.075 ± .003	.090 ± .003	.120 ± .005	.160 ± .005	.210 ± .005	.235 ± .005	.310 ± .005
One Back-up				.149 ± .003	.183 ± .003	.225 ± .003		.334 ± .005	.440 ± .005
Two Back-ups				.207 ± .003	.245 ± .003	.304 ± .003		.424 ± .005	.579 ± .005
<b>DIAMETRAL CLEARANCE*</b>									
500 PSI	.005	.006	.007	.008	.010	.012	.013	.014	.016
1500 PSI	.0025	.003	.0035	.004	.005	.006	.007	.007	.008
R Radius (max.)	.005	.008	.012	.015	.020	.030	.040	.050	.060
Eccentricity (max.)	.001	.001	.001	.002	.002	.003	.004	.004	.005

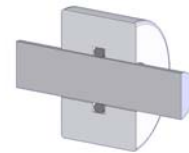
\* These maximum diametral clearances based on 70 Durometer compound.  
If harder compound is used see chart 6 for proper maximum clearance.

*The Gland dimensions provided are only intended to be a starting point for your design. We recommend that you test each application to meet your requirements.*





# Application Data



## DESIGN CHART #2 - INDUSTRIAL O-RINGS-HIGH SWELL (15 TO 25%)

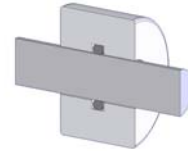
O-RING CROSS SECTION	.040	.050	.060	.070	.103	.139	.176	.210	.275
PAI Size Number Range	1-001 and 40-70	1-002	1-003	1-004 thru 1-055	1-108 thru 1-178	1-202 thru 1-284	1-514 thru 1-572	1-312 thru 1-395	1-400 thru 1-476
O-Ring ID Size Range	1/32" and 1/16"	3/64"	1/16"	3/32" thru 6-1/2"	1/4" thru 9-3/4"	1/4" thru 18"	1" thru 4-7/8"	5/8" thru 26"	1-7/8" thru 27"
<b>AXIAL</b>									
Squeeze (min.)	.012	.015	.017	.020	.024	.030	.034	.043	.056
Gland Depth (max.)	.025 -.002	.032 -.002	.040 -.002	.047 -.002	.076 -.003	.105 -.004	.139 -.004	.162 -.005	.213 -.006
Groove Width (wall to wall)	.065	.076	.088	.108	.162	.215	.267	.317	.418
<b>RADIAL</b>									
Squeeze (min.) Per Side	.010	.012	.014	.016	.020	.025	.027	.030	.040
Gland Depth (max.)	.027 -.001	.035 -.001	.043 -.001	.051 -.002	.080 -.003	.110 -.004	.146 -.004	.175 -.005	.229 -.006
Groove Width (Wall to Wall)	.065	.076	.088	.108	.162	.215	.273	.317	.418
<b>DYNAMIC</b>									
Squeeze (min.) Per Side	.008	.010	.012	.014	.017	.020	.023	.025	.035
Gland Depth (max.)	.029 -.001	.037 -.001	.045 -.001	.053 -.002	.083 -.002	.115 -.003	.149 -.003	.180 -.003	.234 -.004
Groove Width	.065	.076	.088	.103	.154	.204	.271	.305	.405
<b>DIAMETRAL CLEARANCE*</b>									
500 PSI	.004	.005	.006	.007	.009	.011	.011	.012	.014
1500 PSI	.002	.0025	.003	.004	.005	.006	.006	.007	.008
R Radius (max.)	.005	.008	.012	.015	.020	.030	.035	.040	.050
Eccentricity (max.)	.001	.001	.001	.002	.003	.004	.004	.005	.006

\* These maximum diametral clearances based on 60 Durometer compound.  
If harder compound is used see chart 6 for proper maximum clearance.

*The Gland dimensions provided are only intended to be a starting point for your design. We recommend that you test each application to meet your requirements.*



# Application Data



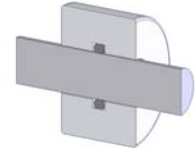
## DESIGN CHART #3 - 900 SERIES O-RINGS - NORMAL SWELL (0 TO 15%)

O-RING CROSS SECTION	.056	.064	.072	.078	.082	.087	.097	.116	.118
PAI Size Number Range	1-901	1-902 and 1-903	1-904 and 1-905	1-906	1-907	1-908	1-909 and 1-910	1-911 thru 1-918	1-920 thru 1-932
O-Ring ID Size Range	.185	.239 .301	.351 .451	.468	.530	.644	.706 .755	.863 1.355	1.475 2.337
<b>AXIAL</b>									
Squeeze (min.)	.012	.014	.016	.017	.018	.019	.020	.022	.022
Gland Depth (max.)	.040 -.002	.046 -.002	.051 -.004	.058 -.004	.065 -.005	.072 -.005	.080 -.006	.090 -.006	.090 -.006
Groove Width (wall to wall)	.079 ±.003	.088 ±.003	.095 ±.003	.107 ±.003	.120 ±.003	.130 ±.004	.145 ±.005	.158 ±.005	.158 ±.005
<b>RADIAL</b>									
Squeeze (min.) Per Side	.011	.013	.014	.014	.015	.016	.017	.018	.018
Gland Depth (max.)	.042 -.001	.047 -.001	.053 -.001	.063 -.001	.070 -.001	.078 -.002	.083 -.003	.094 -.003	.094 -.003
Groove Width (Wall to Wall)	.070 ±.003	.078 ±.003	.090 ±.003	.098 ±.003	.107 ±.005	.183 ±.005	.125 ±.006	.141 ±.006	.141 ±.006
<b>DYNAMIC</b>									
Squeeze (min.) Per Side	.007	.008	.009	.009	.009	.010	.010	.011	.011
Gland Depth (max.)	.046 -.001	.052 -.001	.058 -.001	.065 -.001	.068 -.001	.072 -.002	.083 -.003	.094 -.003	.094 -.003
Groove Width									
With Roll	.079 ±.003	.088 ±.003	.095 ±.003	.105 ±.003	.111 ±.004	.117 ±.004	.145 ±.005	.158 ±.005	.160 ±.005
No Roll	.068 ±.003	.078 ±.003	.090 ±.003	.098 ±.003	.139 ±.004	.109 ±.004	.120 ±.005	.158 ±.005	.160 ±.005
<b>DIAMETRAL CLEARANCE*</b>									
500 PSI	.006	.007	.008	.008	.009	.009	.010	.011	.011
1500 PSI	.003	.004	.004	.004	.004	.004	.005	.005	.005
R Radius (max.)	.010	.013	.015	.015	.015	.018	.020	.022	.022
Eccentricity (max.)	.001	.001	.001	.001	.001	.001	.002	.002	.002

\* These maximum diametral clearances based on 70 Durometer compound.  
If harder compound is used see chart 6 for proper maximum clearance.



# Application Data



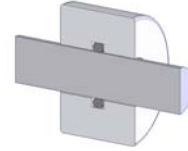
## DESIGN CHART #4 - 900 SERIES O-RINGS - HIGH SWELL (15 TO 25%)

O-RING CROSS SECTION	.056	.064	.072	.078	.082	.087	.097	.116	.118
PAI Size Number Range	1-901	1-902 and 1-903	1-904 and 1-905	1-906	1-907	1-908	1-909 and 1-910	1-911 thru 1-918	1-920 thru 1-932
O-Ring ID Size Range	.185	.239 .301	.351 .451	.468	.530	.644	.706 .755	.863 1.355	1.475 2.337
<b>AXIAL</b>									
Squeeze (min.)	.016	.016	.020	.021	.021	.022	.023	.025	.027
Gland Depth (max.)	.039 -.002	.042 -.002	.048 -.002	.053 -.002	.056 -.002	.061 -.002	.072 -.003	.088 -.003	.090 -.003
Groove Width (wall to wall)	.084	.092	.110	.121	.129	.138	.157	.186	.188
<b>RADIAL</b>									
Squeeze (min.) Per Side	.014	.015	.017	.018	.018	.018	.019	.0121	.022
Gland Depth (max.)	.042 -.001	.048 -.001	.054 -.001	.059 -.001	.062 -.001	.066 -.002	.078 -.003	.098 -.003	.100 -.003
Groove Width (Wall to Wall)	.084	.092	.110	.119	.125	.133	.156	.179	.189
<b>DYNAMIC</b>									
Squeeze (min.) Per Side	.011	.012	.015	.016	.016	.016	.016	.017	.018
Gland Depth (max.)	.042 -.001	.048 -.001	.054 -.001	.059 -.001	.062 -.001	.066 -.002	.078 -.003	.098 -.003	.100 -.003
Groove Width	.065	.076	.088	.103	.154	.204	.305	.405	.405
<b>DIAMETRAL CLEARANCE*</b>									
500 PSI	.005	.006	.007	.007	.007	.007	.008	.010	.010
1500 PSI	.002	.003	.004	.004	.004	.004	.004	.005	.005
R Radius (max.)	.010	.013	.015	.015	.015	.020	.020	.020	.020
Eccentricity (max.)	.001	.001	.002	.002	.002	.002	.002	.002	.003

\* These maximum diametral clearances based on 60 Durometer compound.  
If harder compound is used see chart 6 for proper maximum clearance.



# Application Data

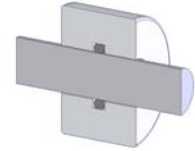


## DESIGN CHART #5 - ROTATING SHAFT SEAL

PAI Size	Shaft Size	O-Ring ID	O-Ring Cross Section	Actual Shaft Diameter +.0000	Groove Root Diameter -.000 +.002	Groove Width ±.003	Bearing Length	Radial Clearance Max	Bearing ID Tolerance -.0000
1-007	1/8	.145 ±.005	.070 ± .003	.125 -.001	.256	.080	5/8	.0008 -.001	+.0008
1-008	5/32	.176 ±.005	.070 ± .003	.156 -.001	.287	.080	5/8	.0008 -.001	+.0008
1-009	3/16	.208 ±.005	.070 ± .003	.1875 -.0014	.318	.080	5/8	.0008 -.001	+.0008
1-010	7/32	.239 ±.005	.070 ± .003	.2187 -.0014	.349	.080	5/8	.0008 -.001	+.0008
70-270	1/4	.270 ±.005	.070 ± .003	.2500 -.0014	.381	.080	5/8	.0008 -.001	+.0008
1-011	9/32	.301 ±.005	.070 ± .003	.2812 -.0014	.413	.080	5/8	.0008 -.001	+.0008
1-110	5/16	.362 ±.005	.103 ± .003	.3125 -.0015	.509	.117	7/8	.0010 -.0015	+.0010
1-111	3/8	.424 ±.005	.103 ± .003	.375 -.0015	.572	.117	7/8	.0010 -.0015	+.0010
1-112	7/16	.487 ±.005	.103 ± .003	.4375 -.0015	.634	.117	7/8	.0010 -.0015	+.0010
1-113	1/2	.549 ±.005	.103 ± .003	.500 -.002	.696	.117	7/8	.0010 -.0015	+.0010
1-114	9/16	.612 ±.005	.103 ± .003	.562 -.002	.758	.117	7/8	.0010 -.0015	+.0010
1-115	5/8	.674 ±.005	.103 ± .003	.625 -.002	.821	.117	7/8	.0010 -.0015	+.0010
1-116	11/16	.737 ±.005	.103 ± .003	.687 -.002	.883	.117	7/8	.0010 -.0015	+.0010
1-211	3/4	.796 ±.006	.139 ± .004	.750 -.002	1.016	.157	7/8	.0015 -.002	+.0012
1-212	13/16	.859 ±.006	.139 ± .004	.812 -.002	1.078	.157	7/8	.0015 -.002	+.0012
1-213	7/8	.921 ±.006	.139 ± .004	.875 -.002	1.141	.157	7/8	.0015 -.002	+.0012
1-214	15/16	.984 ±.006	.139 ± .004	.937 -.002	1.203	.157	7/8	.0015 -.002	+.0012
1-215	1	1.046 ±.006	.139 ± .004	1.000 -.002	1.265	.157	7/8	.0015 -.002	+.0012
1-216	1 1/16	1.109 ±.006	.139 ± .004	1.063 -.002	1.329	.157	7/8	.0015 -.002	+.0012
1-217	1 1/8	1.171 ±.006	.139 ± .004	1.125 -.002	1.391	.157	7/8	.0015 -.002	+.0012
1-218	1 3/16	1.234 ±.006	.139 ± .004	1.188 -.002	1.454	.157	7/8	.0015 -.002	+.0012
1-219	1 1/4	1.296 ±.006	.139 ± .004	1.250 -.002	1.516	.157	7/8	.0015 -.002	+.0012



# Application Data

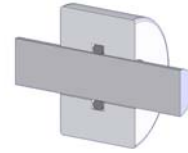


## DESIGN CHART #6 - DIAMETRAL CLEARANCE VS. DUROMETER HARDNESS

Shore A Durometer Hardness	Maximum Psi	O-Ring Cross Section							
		.056 .064	.070 .078	.082 .087	.097 .103	.116 .118	.139	.210	.275
60	250	.006	.007	.008	.009	.010	.011	.012	.014
	500	.004	.005	.006	.007	.008	.009	.010	.012
	1000	.003	.004	.004	.005	.005	.006	.007	.008
	1500	.002	.002	.002	.003	.003	.004	.005	.006
70	500	.007	.008	.009	.010	.011	.012	.014	.016
	1000	.005	.006	.006	.007	.008	.009	.010	.012
	1500	.003	.004	.004	.005	.005	.006	.007	.008
	2000	.002	.002	.002	.003	.003	.004	.004	.0045
	2500	.001	.001	.001	.0015	.002	.002	.0025	.0025
80	500	.009	.010	.011	.012	.014	.016	.018	.020
	1000	.007	.008	.009	.010	.011	.012	.014	.016
	1500	.004	.005	.006	.007	.007	.008	.010	.012
	2000	.003	.004	.004	.005	.005	.006	.007	.008
	2500	.002	.003	.003	.004	.004	.005	.006	.007
	3000	.001	.002	.002	.003	.003	.004	.0045	.005
90	500	.012	.014	.015	.016	.017	.018	.020	.020
	1000	.010	.012	.013	.014	.015	.016	.018	.018
	1500	.008	.010	.011	.012	.013	.014	.015	.016
	2000	.006	.008	.008	.009	.009	.010	.012	.016
	2500	.005	.006	.006	.007	.007	.008	.010	.012
	3000	.004	.005	.005	.006	.006	.007	.008	.010
	5000	.002	.003	.003	.004	.004	.005	.006	.006



# Application Data

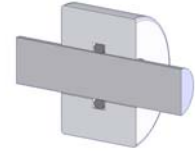


## Design Chart #7 - U-Cup Glands

PAI U-Cup Series	Nominal Cross-Section	Groove Depth +/- .003	Groove Width +/- .005	Maximum Piston Clearance
626-0xx	1/16	.062	.093	.002
666-0xx				
626-1xx	3/32	.093	.126	.002
666-1xx				
626-2xx	1/8	.125	.157	.002
666-2xx				
6226-	5/32	.156	.189	.0025
626-5xxxx				
666-5xxxx	3/16	.187	.219	.0025
626-3xx				
666-3xx	7/32	.219	.251	.0025
6226-				
626-7xxxx	1/4	.250	.282	.0025
666-7xxxx				
626-4xx	9/32	.281	.313	.0025
666-4xx				
6226-	5/16	.312	.344	.003
626-9xxxx				
666-9xxxx	11/32	.344	.376	.003
626-10xxxx				
666-10xxxx	3/8	.375	.407	.003
6226-				
626-11xxxx	13/32	.406	.438	.003
666-11xxxx				
626-12xxxx	7/16	.437	.470	.003
666-12xxxx				
6226-	1/2	.500	.532	.003
626-13xxxx				
666-13xxxx	626-14xxxx	666-14xxxx	626-16xxxx	666-16xxxx
626-14xxxx				
666-14xxxx				
626-16xxxx				
666-16xxxx				



# Application Data



## Gland Design for X-Ring and Multiseal® Low Friction Seals

While both X-Rings and Multiseals® will work well in standard O-Ring grooves, you should get enhanced performance in a customized gland. Due to differences in material finishes, operating pressures, lubricity, and material compatibility, every sealing application is different. The following tables are for designing glands for Static and Reciprocating Dynamic sealing applications. They are intended only as a starting point for the engineer. Each design should be proven in your specific application.

### Design Chart #8 - X-Ring Glands

PAI Size Number Range	4444-004 thru -042	4444-102 thru-159	4444-201 thru -265	4444-312 thru -352	4444-433 thru -451
<b>X-Ring Cross Section</b>	.070 ±.003	.103 ±.003	.139 ±.004	.210 ±.005	.275 ±.006
<b>Dynamic Seal</b>					
Groove Depth	.062 -.002	.093 -.002	.126 -.002	.190 -.002	.254 -.002
Groove Width (wall to wall)	.080 ±.003	.117 ±.003	.157 ±.005	.237 ±.005	.310 ±.005
<b>Static Seal</b>					
Groove Depth	.057 -.002	.089 -.002	.120 -.002	.195 -.002	.250 -.002
Groove Width (wall to wall)	.080 ±.003	.117 ±.003	.157 ±.005	.237 ±.005	.310 ±.005
<b>Diametric Clearance (max.)</b>	.002	.003	.003	.004	.005
<b>Radius (max.)</b>	.010	.010	.015	.015	.015
<b>Eccentricity (max)</b>	.002	.002	.003	.004	.005

### Design Chart #9 - Multiseal® Glands

PAI Size Number Range	4-006 thru 4-044	4-109 thru 4-166	4-204 thru 4-270	4-324 thru 4-369	4-425 thru 4-453
<b>Multiseal Cross Section</b>	.070 ±.003	.103 ±.003	.139 ±.004	.210 ±.005	.275 ±.006
<b>Piston Groove</b>					
Groove Depth	.055 -.002	.091 -.002	.126 -.002	.191 -.002	.245 -.002
Groove Width (wall to wall)	.080 ±.003	.117 ±.003	.175 ±.005	.255 ±.005	.295 ±.005
<b>Housing Groove</b>					
Groove Depth	.057 -.002	.093 -.002	.129 -.002	.195 -.002	.250 -.002
Groove Width (wall to wall)	.080 ±.003	.117 ±.003	.175 ±.005	.255 ±.005	.295 ±.005
<b>Rotating Seal (Housing Only)</b>					
Groove Depth	.057 -.002	.093 -.002	.129 -.002	.195 -.002	.250 -.002
Groove Width (wall to wall)	.075 ±.003	.115 ±.003	.168 ±.005	.247 ±.005	.285 ±.005
<b>Diametric Clearance (max.)</b>	.002	.003	.003	.004	.005
<b>Radius (max.)</b>	.010	.010	.015	.015	.015
<b>Eccentricity (max.)</b>	.002	.002	.003	.004	.005

*The Gland dimensions provided are only intended to be a starting point for your design. We recommend that you test each application to meet your requirements.*



# SELLING TERMS

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## Order and Line Minimums

Invoice minimum is \$50.00 exclusive of freight charges

Line minimum is \$15 for stock parts, \$50 for items that have to be manufactured.

## Set-Up Charges

Each Product Line has, at minimum, 1 compound considered to be a stock standard and as such will not require set-up charges unless customer has special manufacturing or cure date requirements. The Product Lines and their respective stock standard materials are:

**Standard O-Rings:** 5747 (70 NBR), 9727 (70 Brown FKM), 9746 (70 Black FKM), 19711 (70 Silicone) and 23711 (70 EPDM)

**X-Rings:** 5716 (70 NBR)

**Multiseal® Low Friction Seals:** 5716 (70 NBR)

**Kurv-Bak™ Hard Rubber Back-up Rings:** 5939 (90 NBR)

**V-Rings:** 5747 (70 NBR) and 5939 (90 NBR)

**U-Cups:** 5747 (70 NBR) and 3847 (80 NBR)

**H-Wipers:** 3847 (80 NBR)

**Rod Wipers:** 5939 (90 NBR)

**Hol-Mask™ Masking Plugs:** 23511 (50 EPDM)

**Balls:** 5716 (70 NBR)

**8-Rings:** 55857 (75 HNBR)

Set-Up charges are normally waived when the line amount reaches a predetermined level. The Set-up Charge amount and waiver level varies by Product Line and Compound.

If we have parts on hand and must make new parts due to special customer requirements (cure date, material certifications, etc.), a set-up will apply.

## Blanket Orders

Precision Associates accepts Blanket Orders with releases not to exceed one year. We reserve the right to limit the number of releases. In any case, each release must honor our invoice minimum.





# SELLING TERMS

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## Special Requirements

Requirements for Certification, Test Slabs or Buttons, Special Packaging, Color Coding, Cure Date and/or Shelf Life, etc., must be spelled out in complete detail at time of product quotation and at time of order placement.

## Cash Terms

Standard terms are Net 30 days. A 1½% Finance Service Charge will be assessed on all unpaid balances 30 days after date of invoice.

## F.O.B. Point

All product is shipped F.O.B. our plant in Minneapolis, MN unless specifically quoted otherwise. Customers requiring protection exceeding that provided by carrier are encouraged to purchase freight insurance.

## Returned Goods

Merchandise returned for any reason without a Returned Goods Authorization (RGA) number will not be accepted. Precision Associates retains the right to assess a re-stocking fee for non-defective merchandise.

## Over / Under Shipments

For items that are not stock standard, we reserve the right to over-ship 10% and under-ship 5%, unless otherwise negotiated.

## Claims and Liability

To preserve any claim it may have, buyer shall promptly inspect all material and notify Precision Associates within thirty days of shipment of any non-confirming material. In no event shall Precision Associates have any liability for claims by buyer if suit is not filed within one year of accrual of claim.

## Warranty

Precision Associates Inc. warrants that our parts are free of defects in material and workmanship at the time of shipment. We honor this warranty for one year after the date of sale. We do not guarantee fitness for use or any application. Purchaser is responsible for determining suitability of function. Precision Associates, Inc. limits our liability to replacement of defective product, or when necessary, refund of the purchase price and freight costs related to shipment of our product to our customer. Damages exceeding the cost of product and freight are excluded, whether consequential or otherwise and regardless of cause.

## Specialty Products

See PAI Specialty Products Selling Terms for additional information about Medical and Perfluoroelastomer items.

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# SPECIALTY PRODUCTS SELLING TERMS

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## Order and Line Minimums

Invoice minimum is \$75.00 exclusive of freight charges

Line minimum is \$25 for stock parts, \$75 for items that have to be manufactured.

## Set-Up Charges

Set-Up charges are normally waived when the line amount reaches a predetermined level. The Set-up Charge amount and waiver level varies by Product Line and Compound. If we have parts on hand and must make new parts due to special customer requirements (cure date, material certifications, etc.), a set-up may apply.

## Blanket Orders

Precision Associates accepts Blanket Orders with releases not to exceed one year. We reserve the right to limit the number of releases. In any case, each release must honor our invoice minimum.

## Special Requirements

Requirements for Mold Validation, Material Conformance Testing, Certification, Test Slabs or Buttons, Special Packaging, Color Coding, Cure Date and/or Shelf Life, etc., must be spelled out in complete detail at time of product quotation and at time of order placement.

## Body Implant

Customer must receive prior permission from Precision Associates and/or our material supplier before using any PAI products for bodily implant applications.

## Over / Under Shipments

For items that are not stock standard, we reserve the right to over-ship 10% and under-ship 5%, unless otherwise negotiated.

## Cash Terms

Standard terms are Net 30 days. A 1½% Finance Service Charge will be assessed on all unpaid balances 30 days after date of invoice.

## F.O.B. Point

All product is shipped F.O.B. our plant in Minneapolis, MN unless specifically quoted otherwise. Customers requiring protection exceeding that provided by carrier are encouraged to purchase freight insurance.

## Returned Goods

Merchandise returned for any reason without a Returned Goods Authorization (RGA) number will not be accepted. Non-defective merchandise will not be accepted without prior permission and only if it is in the original sealed packaging. Precision Associates retains the right to assess a re-stocking fee for non-defective merchandise.

## Claims and Liability

To preserve any claim it may have, buyer shall promptly inspect all material and notify Precision Associates within thirty days of shipment of any non-confirming material. In no event shall Precision Associates have any liability for claims by buyer if suit is not filed within one year of accrual of claim.

## Warranty

Precision Associates Inc. warrants that our parts are free of defects in material and workmanship at the time of shipment. We honor this warranty for one year after the date of sale. We do not guarantee fitness for use or any application. Purchaser is responsible for determining suitability of function. Precision Associates, Inc. limits our liability to replacement of defective product, or when necessary, refund of the purchase price and freight costs related to shipment of our product to our customer. Damages exceeding the cost of product and freight are excluded, whether consequential or otherwise and regardless of cause.



# SELLING TERMS

## Tooling Policy

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This document describes various types of charges for Molds and/or Tooling along with Precision Associate's policy regarding the use of each type. A description of each transaction is provided along with examples. The items shown below in bold capitol letters are examples of how the charge for tooling will appear on quotations, invoices, and shipping papers.

### Full Tool Charge, Custom Parts – **TOOL CHARGE, FULL**

- Mold is the property of, and is reserved for the sole use of, the customer buying the Mold and/or its designee.
- PAI will request written confirmation of permission to use mold for any designee company.
- PAI will provide regular care and maintenance of the mold and will be responsible for any repairs to the mold due damages caused by our negligence.
- The Mold Owner will be responsible for the cost of maintaining and/or replacing the mold when we are unable to produce acceptable parts due to normal wear and tear.

### Partial Tool Fee, Custom (Proprietary) Parts - **TOOL FEE, PROPRIET**

- Mold is reserved for the sole use of the customer paying the fee and/or its designee.
- PAI will request written confirmation of permission to use Mold for any designee company.
- PAI retains title to Mold.
- PAI maintains the Mold as long as it is in regular use. After 5 years of non-use, the MOLD status will be evaluated by PAI for recycling or repurposing. Normal effort to contact the customer for input will be done before this takes place.

### Partial Tool Fee, Catalog Items – **TOOL FEE, PARTIAL**

- Used to offset some of PAI's cost for a standard item that is expected to have demand too small to justify PAI paying for full cost of a production mold.
- PAI retains title to Mold and will maintain, replace, and/or upgrade it as long as there is demand for product
- Item will be included in PAI Catalog and is available for use by the public

### Non-Recurring Set-up Charge, Custom Items – **NRSUC**

- One-Time charge for fixturing or other equipment
- Any device or fixtures manufactured remain the property of PAI unless specifically agreed to at time of purchase order

This document is effective as of March 1, 2012. Any catalog items invoiced prior to this date will be treated as if they were "TOOL FEE, PARTIAL".

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SELLING TERMS  
**Proprietary  
Information  
Policy**

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All Drawings, Specifications, and Customer Part Numbers provided by customers are considered proprietary to the customer providing the information.

Precision Associates will not reveal any information contained on any customer provided documents that contain trade secret information except as necessary to produce product acceptable to the customer. Exceptions include PAI material vendors, etc.

Any request for information, quotation, or purchase, by another customer or potential customer using Part Numbers or Specification Numbers provided by the original customer will be denied.

Precision Associates reserves the right to sell identical or similar items (Mold & Compound) to a second customer, provided the second customer supplies enough information so that PAI would be able to manufacture that item without prior knowledge.

### **Example Scenarios**

**All Products** - Customer 2 asks to purchase PAI product referencing only Customer 1's P/N. PAI will not sell the item to customer 2 unless written permission from customer 1 is obtained.

**Catalog Items** - Customer 2 provides PAI Product Number and/or Dimensional data plus a compound number and/or a complete material description. PAI will sell Customer 2 the item similar to item purchased by customer 1.

**Custom Items** - Customer 2 provides Fully Dimensioned Drawing and/or Sample Part plus a PAI compound number and/or a complete material description. PAI will sell Customer 2 item similar to item purchased by customer 1, provided Customer 2 pays Tooling Fee for appropriately sized production mold. (see also proprietary compound)

**Proprietary Compounds, Customer Developed** – PAI will occasionally use customer supplied compound or a customer provided recipe to produce rubber compounds. PAI will not sell these materials to anyone else without written consent of the customer that provided the original information. PAI does reserve the right to produce compounds with similar physical properties, provided a second customer approached PAI with a similar material specification requirement.

**Rubber Compounds, PAI developed** – PAI retains full rights to most compounds developed by us or by our agents. These recipes are typically the trade secret property of PAI and will not normally be divulged to customers or others except in the case of 3<sup>rd</sup> party certification, etc. In some very special cases, PAI will reserve the use of a compound for a specific customer. In such case, a proprietary compound number will be assigned to said compound. The item will not go into our catalog and will not be available for other companies without the written consent of the original customer.

This policy may be superceded by individual agreements between Precision Associates and customer companies.

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# CREDIT APPLICATION

## For New Customer Accounts

Company Name: \_\_\_\_\_ Date: \_\_\_\_\_  
 Billing Address: \_\_\_\_\_  
 City: \_\_\_\_\_ State: \_\_\_\_\_ Zip: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

Business Structure:  Corporation  Partnership  Individual Years in Business: \_\_\_\_\_

Type of Business: \_\_\_\_\_ Employer ID: \_\_\_\_\_  
 Principle or Officers: \_\_\_\_\_ Position: \_\_\_\_\_  
 Purchasing Agent: \_\_\_\_\_

Bank Name: \_\_\_\_\_ Account #: \_\_\_\_\_  
 Address: \_\_\_\_\_ Bank Officer: \_\_\_\_\_  
 City/ST/Zip: \_\_\_\_\_  
 Phone: \_\_\_\_\_ Fax: \_\_\_\_\_

### Businesses Where Credit is Now Extended

Name: _____	Name: _____
Address: _____	Address: _____
City/ST/Zip: _____	City/ST/Zip: _____
Phone/Fax: _____	Phone/Fax: _____

Name: _____	Name: _____
Address: _____	Address: _____
City/ST/Zip: _____	City/ST/Zip: _____
Phone/Fax: _____	Phone/Fax: _____

Terms: 1% 15 Days, Net 30 Days. Cash discounts may be taken strictly on the basis of shipping dates. Must be within 15 Days of invoice date. Past due accounts are assessed a finance charge of 1.5% per month. Customers not honoring finance charge will be placed on COD. Should outside efforts become necessary, customer agrees to pay any reasonable collection costs incurred.

Credit Amount Requested: \$ \_\_\_\_\_

We certify that all information on this form is correct and that we fully understand the terms and agree to the proper payment in consideration of extended credit.

Signature: \_\_\_\_\_  
 Title: \_\_\_\_\_  
 Date: \_\_\_\_\_

Precision Associates, Inc. Phone: 612-333-7464  
 3800 N. Washington Ave. Fax: 612-342-2417  
 Minneapolis, MN 55412 Toll: 800-394-6590





**PRODUCT DATA**  
**3-A SANITARY COMPOUNDS**  
**STANDARD 18-03**



The organization known as 3-A Sanitary Standards, Inc. (3-A SSI) formulates sanitary standards and accepted practices for the sanitary design, fabrication, installation and cleanability of dairy and food equipment or systems used to handle, process and package consumable products where a high degree of sanitation is required. These sanitary standards and accepted practices are developed through the cooperative efforts of industry experts. 3-A Sanitary Standards provide material specifications, design criteria and other necessary information for equipment types to satisfy public health concerns.

Precision Associates, has been issued authorization number 1384 by 3-A SSI stating that the PAI compounds listed below comply with the 3-A Sanitary Standard 18-03.

Compound	Polymer	Color	Duro	Class				Compound	Polymer	Color	Duro	Class			
				I	II	III	IV					I	II	III	IV
3425	NBR	White	40				X	19424	VMQ	Trans	40				X
3441	NBR	Black	40				X	19448	VMQ	Salmon	40				X
3541	NBR	Black	50				X	19513	VMQ	White	50				X
3575	NBR	White	50				X	19624	VMQ	Transl	60	X	X	X	X
3625	NBR	White	60	X	X	X	X	19724	VMQ	Transl	70	X	X	X	X
3741	NBR	Black	70			X	X	19725	VMQ	White	70			X	X
3725	NBR	White	70			X	X	19741	VMQ	Salmon	70	X	X	X	X
3825	NBR	White	80			X	X	19748	VMQ	Salmon	70			X	X
3925	NBR	White	90			X	X	19770	VMQ	Blue	70			X	X
7770	NBR	Blue	70			X	X	19825	VMQ	White	80				X
8648	FKM	Black	60	X	X	X	X	23625	EPDM	White	60				X
8748	FKM	Black	70	X	X	X	X	23725	EPDM	White	70	X	X	X	X
8775	FKM	White	70	X	X	X	X	23741	EPDM	Black	70	X	X	X	X
9737	FKM	Brown	70	X	X	X	X	23770	EPDM	Blue	70	X	X	X	X
9744	FKM	Black	70	X	X	X	X	423725	EPDM	White	70	X	X	X	X
9765	FKM	Cream	70	X	X	X	X	23841	EPDM	White	80	X	X	X	X
9770	FKM	Blue	70	X	X	X	X	35725	EU	White	70			X	X
9771	FKM	Rust	70	X	X	X	X	49526	VMQ	Clear	50			X	X
48725	FKM	White	70	X	X	X	X	49626	VMQ	Clear	60	X	X	X	X
9965	FKM	Cream	90	X	X	X	X	49726	VMQ	Clear	70			X	X
19365	VMQ	White	30				X	49762	VMQ	Blue	70			X	X

All of the compounds shown here are formulated with materials sanctioned under the FDA Code of Federal Regulations, Title 21, Part 177.2600 and are free of Animal Derived Ingredients. Compounds 48725, 49762 and 423725 are compliant with USP VI and ISO 10993-1 requirements.



## PRODUCT DATA FDA Compounds



PAI produces materials that we label FDA compounds. The FDA does not specifically approve rubber compounds. The FDA, in Title 21, Part 177.2600 of the Code of Federal Regulations, specifies rubber compound ingredients that are considered to be non-toxic and non-carcinogenic when used in the amounts specified. Compounds must also pass the extraction tests outlined by the FDA.

Materials meeting these requirements are said to "meet the requirements of the FDA". Each of the compounds shown here is formulated with materials sanctioned under the FDA Code of Federal Regulations, Title 21, Part 177.2600. Contact PAI for additional FDA compliant rubber materials.

Compound	Polymer	Color	Duro
3425	NBR	White	40
3544	NBR	Black	50
3625	NBR	White	60
3641	NBR	Black	60
3644	NBR	Black	60
3765	NBR	White	70
3741	NBR	Black	70
3742	NBR	Rust Red	70
3744	NBR	Black	70
3825	NBR	Cream	80
3844	NBR	Black	80
3925	NBR	White	90
3944	NBR	Black	90
4525	CR	White	50
4566	CR	Black	50
4625	CR	White	60
4666	CR	Black	60
4725	CR	White	70
4766	CR	Black	70
4725	CR	White	70
4766	CR	Black	70
4825	CR	White	80
8648	FKM	Black	60
8748	FKM	Black	70
9737	FKM	Brown	70
9744	FKM	Black	70
9765	FKM	Cream	70
9771	FKM	Rust Red	70
9844	FKM	Black	80
9871	FKM	Rust Red	80
8948	FKM	Black	90
9937	FKM	Brown	90
9944	FKM	Black	90
9965	FKM	Cream	90

Compound	Polymer	Color	Duro
13644	IIR	Black	60
13744	IIR	Black	70
15744	SBR	Black	70
19348	VMQ	Salmon	30
19365	VMQ	White	30
19424	VMQ	Transluc	40
19448	VMQ	Salmon	40
19449	VMQ	Red	40
19465	VMQ	White	40
19513	VMQ	White	50
19524	VMQ	Transluc	50
19548	VMQ	Salmon	50
19549	VMQ	Red	50
19624	VMQ	Transluc	60
19635	VMQ	White	60
19648	VMQ	Salmon	60
19649	VMQ	Red	60
19724	VMQ	Transluc	70
19725	VMQ	White	70
19741	VMQ	Salmon	70
19748	VMQ	Salmon	70
19749	VMQ	Red	70
19825	VMQ	White	80
19875	VMQ	Salmon	80
23544	EPDM	Black	50
23644	EPDM	Black	60
23741	EPDM	Black	70
23744	EPDM	Black	70
23775	EPDM	White	70
23841	EPDM	Black	80
23844	EPDM	Black	80
23944	EPDM	Black	90
35725	EU	White	70
55744	HNBR	Black	70

NBR = Nitrile CR = Neoprene® FKM = Fluoroelastomer VMQ = Silicone IIR = Butyl HNBR = Highly Saturated Nitrile



The National Sanitation Foundation (NSF) is an independent not-for profit organization that certifies products and writes standards for food, water, air, and consumer goods. NSF standards are also recognized by the American National Standards Institute (ANSI).

Rubber products are typically tested and/or certified as component parts used in food processing or water handling systems. The NSF may approve Rubber Seals as component parts for use in a specific application, or give blanket certification to specific compounds for use in all applicable applications.

**Precision Associates compound 23761 is certified by the NSF to meet NSF/ANSI 61 covering Drinking Water System Components.** Contact Precision Associates for a Product Data Sheet covering compound 23761.

Additionally, Precision Associates compounds have been submitted and approved as parts of specific applications in the following NSF programs:

NSF / ANSI Standard	Program Name
50	Circulation System Components and Related Materials for Swimming Pools, Spas/Hot Tubs
51	Food Equipment Materials
61	Drinking Water System Components

### Component Approval Process

When using rubber materials that are not already certified by the NSF, device manufacturers may receive component approval for a compound. The device manufacturer initiates the NSF approval process by petitioning the NSF for device approval. The NSF will send the manufacturer an application form, which is divided into two parts.

The device manufacturer fills out the first half of the form, which defines the application parameters, including the amount of contact area of our rubber seal that is exposed. The manufacturer forwards the form to us to be completed.

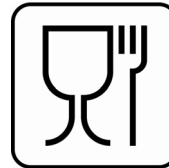
We fill out the rest of the form, including a listing of the rubber compound ingredients and when applicable the section of the U.S Code of Federal Regulations under which the material is sanctioned. PAI then sends the completed form directly to NSF.

After completing their device evaluation, the NSF will report the results directly to the manufacturer. Precision Associates is not typically involved at this point unless additional information or material testing is required.

*PAI can also develop a compound specifically for your special application – Contact us with your requirements.*







The European Union created Regulation (EC) 1935/2004 to provide a common understanding within the EU marketplace regarding the use of certain materials which come in contact with food and the necessary safety measures that must be in place to ensure protection of human health and the best interests of consumers.

The underlying principle is that any material or article intended to come into contact directly or indirectly with food must be sufficiently inert to preclude substances from the following:

- Being transferred to food in quantities large enough to endanger human health
- Bringing about an unacceptable change in the composition of the food
- Causing deterioration in its sensory properties. (smell, taste, etc.)

The regulation also directs that materials must be manufactured in compliance with good manufacturing practices. All materials must be traceable through each step of the manufacturing process in the event of product recall. It also provides marketing directives for labelling, advertising, and presentation that is not misleading to consumers.

The regulation covers 17 groups of materials and articles. Rubber, plastics, ceramics, and paper are just some of the materials listed however; there is no specific legislation in Europe for rubber other than that of rubber feeding teats/soothers. In the absence of this law, EC 1935/2004 allows for the member countries to create specific measures/tests for rubber sealing materials that must be passed in order to gain approval for food contact within their nation. As an example, in Germany, the Federal Institute for Risk Assessment (BfR) system is widely followed and well respected for proving rubber food contact credentials in the EU. BfR recommendation XXI covers natural/synthetic rubber.

Some examples of the specific measures that may be considered are:

- A list of substances authorized for use in manufacturing of materials or articles and the purity standards applicable to each.
- Specific and overall limits allowed regarding migration of constituents into or on to food.
- Basic rules for checking compliance of the above and collection of samples to perform analysis.
- Provisions related to traceability of all materials and the duration for retention of records.
- Provisions related to labelling materials and articles including correct use of the wine glass/fork symbol.

In the United States, compounds formulated with the materials listed under the FDA Code of Federal Regulations, Title 21, Part 177.2600 are generally considered acceptable for food contact applications. Compliance with the code is self regulated meaning that the compounder certifies the material was made with the approved ingredients. The FDA does not test or specifically approve rubber compounds.

It should not be assumed that all FDA materials will meet the EC1935/2004 requirements.

EC1935/2004 regulation compliance is more difficult in that compounds themselves must be tested to specific requirements that are determined by each country. Users intending to export products for food contact into Europe, are required to use materials that have been tested and deemed EC1935/2004 compliant.

***Precision Associates compound 623717 has been tested and is compliant with EC1935/2004 regulations.***

***Contact PAI for a detailed Product Data Sheet on this material!***

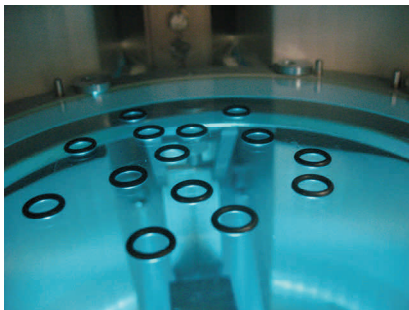


## Metal & X-Ray Detectable Rubber Materials



Stringent government regulations mandate that food, beverage, and pharmaceutical manufacturers keep foreign material out of ingredients to ensure food and drug safety for consumers. Preventing foreign material from entering the processing stream is of the utmost concern but there must also be measures in place to detect contaminated product and quarantine it before it is distributed.

Component parts that are used in food and drug processing equipment can become damaged by improper installation and/or excessive shear experienced during operation that causes fragments of rubber, plastic, and metal to contaminate ingredients. Chemicals used for cleaning and sterilization of equipment can cause rubber seals to degrade increasing the probability of particles breaking off and entering the consumable products. Part failures causing product contamination can lead to machine down time, scrap product, product recalls and result in legal problems and negative media attention. All of which have a significant financial impact and can compromise brand loyalty within the market.



Many processing operations now employ HACCP (Hazard Analysis Critical Control Point) programs which stipulate that all parts have to be metal and X-ray detectable. This made it necessary to develop special rubber materials that would allow food processors to conduct routine inspections for this type of contamination utilizing in-line metal detectors and X-ray machines. Rubber must be compounded with special additives to make detection possible. However, certain foods have phase angles similar to metal detectable rubber so a complete understanding of the rubber product's application is necessary for proper compound selection.

**Precision Associates** has developed four Metal and X-Ray detectable materials made with ingredients sanctioned under FDA Title 21 CFR 177.2600. All four are 3A Sanitary 18-03 approved. Available in Silicone, Nitrile, EPDM, and FKM, all are 70 durometer and blue in color. The industry standard color is blue but materials can be colored for specific customer requirements and any polymer can be made metal detectable. All compounds were tested by an independent laboratory and found to have magnetic properties that exceed industry standards.



	19770	7770	23770	9770
<b>Polymer</b>	<b>VMQ</b>	<b>NBR</b>	<b>EPDM</b>	<b>FKM</b>
<b>Durometer</b>	<b>70</b>	<b>70</b>	<b>70</b>	<b>70</b>
<b>Color</b>	<b>Blue</b>	<b>Blue</b>	<b>Blue</b>	<b>Blue</b>



Contact us for product data sheets!



PRODUCT DATA  
UL APPROVED COMPOUNDS



Underwriters Laboratories Inc. (UL) is an independent, not-for-profit product-safety testing and certification organization. UL has developed more than 800 Standards for Safety.

UL Standard 157 covers Gaskets and Seals. The requirements outlined in UL 157 cover test procedures and performance criteria for the evaluation of nonmetallic gasket and seal materials such as elastomers, composite gasket material, flexible cellular material, thermoplastics and thermoplastic elastomers for specific end products.

Precision Associates is assigned File Number MH7332, covering the three PAI compounds that have been approved under category code JOHX2 of Standard 157. The three compounds and their approved uses are listed below:

Compound	Polymer	Color	Duro	Approved Uses
5747	NBR	Black	70	Gasoline, Kerosene, Naphtha, Fuel Oils, LP Gas, Manufactured and natural (city) gas, Anhydrous Ammonia
8847	FKM	Black	80	Gasoline, Kerosene, Naphtha, Fuel Oils, LP Gas, Manufactured and Natural (city) gas
23711	EPDM	Black	70	Water, Steam, Air, Inert Gases

As a result these compounds may be identified with the UL Component seal:



For more information contact Precision Associates or Underwriters Laboratories at: <http://www.ul.com>



**N-Dure™**  
**Extended Wear Compounds**

Today's customers demand longer lived pneumatic devices. Medical and Food Processing operations require dry air to prevent contamination. Both of these properties are also desirable in the general market, as "green" products are more in demand.

In response to these requirements, Precision Associates has developed two new Extended Wear materials. Compounds 55657 and 55857 are manufactured from a Highly Saturated Nitrile (HSN or HNBR) polymer incorporated with our proprietary internal lubricant package .

Due to the combination of HNBR's natural wear resistance, and our proprietary internal lubricant package, most users have experienced 3 to 5 times longer service life than with standard Nitrile seals. In some applications, seal life has been extended more than 5 fold.

In addition to extended wear, N-Dure™ compound's internal lubrication results in lower breakaway and lower operating friction, allowing applications to function at lower air pressures.

The saturated polymer, coupled with improved modulus, enable N-Dure™ compounds to perform at higher temperatures and pressures than standard Nitrile materials providing a wider range of sealing opportunities.

Precision Associates N-Dure™ compounds are available in these standard seal configurations.



*X-Rings*



*O-Rings*



*8-Rings*



*V-Rings*



*U-Cups*



*H-Wipers*



*Multiseals®*



*Rod Wipers*

**Ask us about using N-Dure™ compounds for *your custom seal.***



## PRODUCT DATA

### FLEX FUELS & FLUOROELASTOMERS

The changes currently in process in automotive fuels systems are requiring new sealing solutions. Alcohol blends that may cause significant deterioration in traditional rubber seal materials are becoming common. Due to differences in state laws and operating environments, one seal material may not be suitable for all applications. Increasingly, Fluoroelastomers are the best solution for these systems. Precision Associates offers several types of Fluoroelastomers for fuel systems.

The following data are provided to assist engineers in determining a Fluoroelastomer solution for your application. As always, this test data is provided as a guide only. Testing of compounds in the actual application must be performed prior to specification of material.

PAI Compound		8748	9746	8706	8780	8782	8703	8758	9758	608804
Fluoroelastomer Type		A	*	B	F	GF	GLT	GFLT	LTFE	ETP
Durometer		75	75	75	75	75	70	75	75	80
Compression Set: 22 Hrs @ 392°F		12.1%	11.7%	12.1%	36.5%	10.8%	11.8%	13.3%	13.1%	31.7%
Ref Fuel C	Volume Chg	+3.9%	+3.2%	+2.5%	+2.1%	+1.3%	+5.9%	+4.3%	+5.9%	+3.1%
	Duro Chg	-3	-2	-2	0	0	-2	-2	-4	-4
Ethanol	Volume Chg	+2.4%	+2.1%	+1.3%	+8%	+6%	+3.9%	+1.7%	+2.5%	+2%
	Duro Chg	-2	-3	-1	-1	-1	-2	-2	-2	0
Methanol	Volume Chg	+99.1%	+150.8%	+18.6%	+3.6%	+1.7%	+113.9%	+7.2%	+5.0%	+7%
	Duro Chg	-12	-24	-9	-1	-2	-21	-5	-5	-2
15% Ethanol 85% Fuel C	Volume Chg	+10.1%	+8.8%	+5.9%	+4.1%	+2.6%	+13.0%	+7.4%	+9.5%	+3.6%
	Duro Chg	-6	-9	-5	-2	-2	-6	-3	-6	-3
85% Ethanol 15% Fuel C	Volume Chg	+4.2%	+3.8%	+2.1%	+1.6%	+9%	+6.2%	+3.1%	+4.6%	+1.0%
	Duro Chg	-3	-4	-2	-2	-1	-3	-3	-6	0
50% Methanol 50% Fuel C	Volume Chg	+69.6%	+95.7%	+19.7%	+8.9%	+4.5%	+74.5%	+13.9%	+11.7%	+3.9%
	Duro Chg	-11	-24	-9	-6	-5	-14	-5	-9	-4
TR-10		-5°F	-5°F	9°F	19°F	21°F	-30°F	-11°F	-40°F	1°F
Brittle Point		-10°F	-6°F	-25°F	-37°F	-33°F	-48°F	-40°F	-43°F	-25°F
Price		\$	\$	\$\$	\$\$	\$\$\$	\$\$\$	\$\$\$	\$\$\$\$	\$\$\$\$\$
Polymer Brand Name		Viton®	Fluorel®	Viton®	Viton®	Viton®	Viton®	Viton®	Fluorel®	Viton®
Polymer Fluorine Content		66%	66%	68.5%	69.5%	70%	64%	66.5%	67.1%	67%

Volume swell tests performed for 70 hrs @ 70°F. See reverse for results at extended periods. Contact Precision Associates for complete Product Data Sheets on individual compounds.

\* Dyneon does not specify a Type for this material; it is a co-polymer similar to DuPont's Type A.



3800 North Washington Ave.  
Minneapolis, MN 55412-2142

Toll Free: 1-800-394-6590  
612-333-7464  
Sales: 612-334-9190  
FAX: 612-342-2417

## Extended Ageing Results in Various Fuel Mixtures

PAI Compound Fluoroelastomer Type	8748	9746	8706	8780	8782	8703	8758	9758	608804
	A	*	B	F	GF	GLT	GFLT	LTIFE	ETP
	Change Vol Duro	Change Vol Duro	Change Vol Duro	Change Vol Duro	Change Vol Duro	Change Vol Duro	Change Vol Duro	Change Vol Duro	Change Vol Duro
<b>ASTM</b>	3.9% -3	3.2% -2	2.5% -2	2.1% 0	1.3% 0	5.9% -2	4.3% -2	5.9% -4	3.1% -4
	6.2% -4	5.4% -3	4.0% -4	3.5% -3	2.0% -3	9.4% -4	6.4% -4	8.1% -5	5.1% -6
<b>Ref Fuel C</b>	11.4% -4	10.0% -7	7.2% -4	6.8% -3	3.9% -3	12.5% -4	9.0% -4	8.7% -6	7.8% -6
	14.4% -5	12.2% -8	9.5% -4	9.6% -3	5.8% -3	16.6% -5	9.2% -4	9.0% -6	8.4% -6
	2.4% -2	2.1% -3	1.3% -1	.8% -1	.6% -1	3.9% -2	1.7% -2	2.5% -2	.2% 0
<b>Ethanol</b>	4.1% -2	3.5% -3	1.9% -3	1.2% -1	.8% -1	6.2% -3	2.8% -2	3.5% -3	.5% 0
	7.3% -4	6.4% -4	3.8% -4	2.6% -1	1.7% -1	9.5% -3	4.7% -2	4.4% -3	1.0% 0
	9.8% -5	8.3% -7	5.3% -4	4.0% -2	2.8% -2	9.5% -3	5.1% -2	4.2% -3	1.7% 0
	99.1% -12	150.8% -24	18.6% -9	3.6% -1	1.7% -2	113.9% -21	7.2% -5	5.0% -5	.7% -2
<b>Methanol</b>	98.7% -12	149.6% -28	24.0% -11	5.6% -4	2.9% -4	111.6% -21	9.9% -6	6.2% -6	1.3% -2
	98.9% -13	148.1% -28	23.6% -11	9.9% -5	4.7% -4	107.6% -21	9.9% -6	6.1% -6	2.3% -2
	97.4% -14	144.3% -28	21.3% -11	11.7% -5	5.2% -4	103.9% -21	9.2% -6	5.7% -6	3.1% -1
	10.1% -6	8.8% -9	5.9% -5	4.1% -2	2.6% -2	13.0% -6	7.4% -3	9.5% -6	3.6% -3
<b>15% Ethanol</b>	16.4% -7	14.1% -12	9.2% -6	6.9% -6	4.3% -4	18.7% -8	11.1% -3	10.9% -9	5.9% -4
<b>85% Fuel C</b>	21.7% -7	18.8% -14	13.9% -7	12.3% -7	8.0% -5	19.3% -8	12.3% -4	11.0% -8	8.7% -6
	21.9% -7	18.8% -14	14.2% -7	13.8% -9	9.1% -6	19.2% -7	12.3% -4	11.2% -9	7.4% -6
	4.2% -3	3.8% -4	2.1% -2	1.6% -2	.9% -1	6.2% -3	3.1% -3	4.6% -6	1.0% 0
<b>85% Ethanol</b>	6.9% -5	6.0% -6	3.3% -3	2.8% -4	1.7% -3	9.9% -4	5.0% -4	6.2% -6	1.5% -2
<b>15% Fuel C</b>	12.6% -4	10.7% -9	6.5% -4	5.2% -5	3.3% -3	13.3% -5	7.4% -4	6.9% -7	2.8% -3
	14.2% -4	12.0% -10	8.1% -4	7.1% -5	4.8% -4	12.8% -5	7.3% -5	6.5% -6	3.8% -3
	69.6% -11	95.7% -24	19.7% -9	8.9% -6	4.5% -5	74.5% -14	13.9% -5	11.7% -9	3.9% -4
<b>50% Methanol</b>	68.6% -10	94.2% -24	25.1% -10	14.3% -8	7.4% -7	73.1% -15	17.0% -8	13.3% -11	5.9% -6
<b>50% Fuel C</b>	67.5% -12	91.3% -26	24.8% -13	18.6% -11	10.8% -8	70.0% -15	16.6% -7	13.1% -10	9.5% -7
	64.3% -12	84.4% -26	23.6% -13	18.5% -11	10.6% -8	65.6% -14	16.4% -7	13.0% -11	10.6% -7

Volume swell tests performed at 70°F



## PRODUCT BULLETIN

# Compound 8758

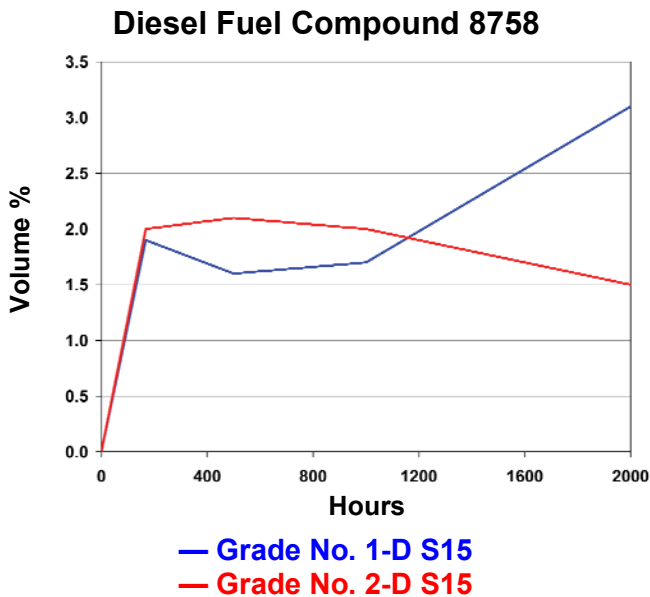
## Ultra Low Sulfur Diesel Fuel Compatibility

### ULSD Rubber Compatibility

Ultra Low Sulfur Diesel (ULSD) is diesel fuel that has a substantially lower sulfur content. The allowable sulfur content for ULSD is 15ppm. The US and other nations have been moving to ULSD for some time. The change to lower sulfur content is expected to allow the application of newer emissions control technologies that should substantially lower emissions of particulate matter from diesel engines.

The US EPA has mandated that all *highway* diesel fuels sold in the USA since December 1, 2010 must be ULSD. After December 1, 2014, all diesel fuel produced and imported into the US for *highway, non-road, locomotive and marine* use must be ULSD.

While sulfur in diesel fuel contributes to increased emissions, it has the benefit of combining with the nickel content in many metal alloys to form a low melting point eutectic alloy that can increase lubricity. The process for producing ULSD also removes naturally-occurring lubricity agents in diesel fuel. The end result is that ULSD causes degradation and failures to standard engine rubber seals.



### Volume Change @175°F

ASTM International adopted the lubricity specification ASTM D975, this specification covers seven grades of diesel fuels. ULSD will run in any engine designed for ASTM D975 diesel fuels. The two most common grades are Grade No. 1-D S15 and Grade No. 2-D S15.

PAI has carried out extensive long term aging at elevated temperatures on a variety of different polymers and compounds in Grade No. 1-D S15 and Grade No. 2-D S15. Based on our analysis of the resulting data, we are confident that compound 8758 will satisfy all the requirements of a rubber seal exposed to ULSD. PAI compound 8758 is a peroxide cured low temperature Fluoroelastomer. The accompanying graph displays volume change data at 2,000 hours for compound 8758 in both fuels.



## TECHNICAL BULLETIN

# Low Temperature Compounds

Low temperature performance can be a very important characteristic of an elastomeric compound. Reducing the temperature of the environment surrounding the rubber article will have a negative impact on the rubber properties. With decreasing temperatures, the movements of the molecular chains are reduced. At a certain temperature the molecular chains will no longer be able to move and the rubber loses all its rubber characteristics. The rubber will embrittle and become plastic like, reducing or eliminating the ability of the material to act as a seal.

Some elastomers possess inherently good low temperature properties, while others do not. Silicones and Fluorosilicones generally have very good low temperature characteristics, with low range operating temperatures being as low as  $-100^{\circ}\text{F}$  and below. EDPM materials are also pretty good with lower range temperatures being in the  $-50^{\circ}\text{F}$  to  $-75^{\circ}\text{F}$  range. On the other hand, most Fluoroelastomers and Perfluoroelastomers become stiff at temperatures above  $0^{\circ}\text{F}$  with some even above  $32^{\circ}\text{F}$ . Most of the other elastomers range somewhere between these two extremes. A couple of them - including Neoprenes, require extended time to become completely stiff at lower temperatures.

Many materials can be modified chemically to dramatically improve the low temperature performance of a given compound. Formulating a compound to improve its low temperature performance may result in sacrificing some of its other properties, however. For example improving the low temperature properties of NBR compounds will result in less oil and fuel resistance.

Twenty-five Precision Associates compounds specifically formulated to improve low temperature performance are listed on the back of this page.

For general low temperature properties for elastomer families, please refer to the Polymer Comparison page in Precision Associates' Compound Selection Guide. For individual compound test results, you may request a Product Data Sheet from your PAI Customer Service representative.

There are several different ways to measure the low temperature properties of a rubber compound. The three most common methods used in the rubber industry are:

The **Glass Transition** temperature is the point at which a particular rubber compound becomes crystalline and is stiff and brittle. At this point many molecules will be aligned and the compound will cease to be liquid or elastic. Time at a given temperature may also be required as some polymers need time to develop this crystallization. Testing is performed per ASTM E 1640

The **Brittle Point** of a compound is the temperature at which the material breaks upon impact. Testing is performed per ASTM D 1329.

**Temperature Retraction** is the temperature at which frozen rubber returns to an elastic state. Testing is performed per ASTM D2137.

Precision Associates typically tests our seal compounds for Brittle Point and for Temperature Retraction, specifically TR-10. We can also provide other retraction results if desired.

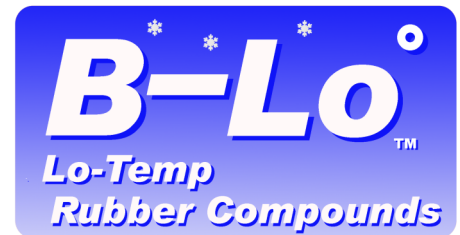
Precision Associates considers the TR-10 test to be the best indicator for the performance of seals at low temperatures.







3800 North Washington Ave.  
Minneapolis, MN 55412-2142



**Precision Associates' B-Lo° Compounds Formulated Specifically for Improved Low Temperature Properties**

Compound	Polymer	Duro	Color	Brittle Point		TR-10	
				° F	° C	° F	° C
<b>3314</b>	NBR	30	Black	-74° F	-52° C	-45° F	-43° C
<b>7501</b>	NBR	50	Black	-67° F	-55° C	-46° F	-43° C
<b>7601</b>	NBR	60	Black	-74° F	-59° C	-61° F	-52° C
<b>5716</b>	NBR	70	Black	-53° F	-47° C	-44° F	-42° C
<b>3716</b>	NBR	70	Black	-81° F	-63° C	-50° F	-46° C
<b>603721</b>	NBR	70	Black	-90° F	-68° C	-58° F	-50° C
<b>5816</b>	NBR	80	Black	-51° F	-46° C	-48° F	-44° C
<b>5916</b>	NBR	90	Black	-47° F	-44° C	-44° F	-42° C
<b>4503</b>	CR	50	Black	-67° F	-55° C	-65° F	-54° C
<b>4603</b>	CR	60	Black	-76° F	-60° C	-74° F	-59° C
<b>4705</b>	CR	70	Black	-67° F	-55° C	-43° F	-42° C
<b>8703</b>	Viton GLT	70	Black	-48° F	-44° C	-30° F	-34° C
<b>9701</b>	FKM	70	Black	-49° F	-45° C	-41° F	-41° C
<b>9703</b>	FKM	75	Purple	-49° F	-45° C	-40° F	-40° C
<b>9901</b>	FKM	90	Black	-49° F	-45° C	-41° F	-41° C
<b>19301</b>	Silicone	30	Rust Red	< -130° F	< -90° C	< -103° F	< -75° C
<b>19401</b>	Silicone	40	Rust Red	< -130° F	< -90° C	< -103° F	< -75° C
<b>19566</b>	Silicone	50	Red	< -130° F	< -90° C	< -103° F	< -75° C
<b>19601</b>	Silicone	60	Rust Red	< -130° F	< -90° C	< -103° F	< -75° C
<b>19701</b>	Silicone	70	Rust Red	< -130° F	< -90° C	< -103° F	< -75° C
<b>19801</b>	Silicone	80	Rust Red	< -130° F	< -90° C	< -103° F	< -75° C
<b>22716</b>	EA (Vamac®)	75	Black	-62° F	-52° C	-50° F	-46° C
<b>34703</b>	FFKM	75	Black	N/A	N/A	-29° F	-34° C
<b>55703</b>	HNBR	70	Black	-55° F	-48° C	-40° F	-40° C
<b>55903</b>	HNBR	90	Black	-55° F	-48° C	-44° F	-42° C

Test results are typical. Customer should determine the suitability of our compound in their own application.

**After 60 years in the rubber business, we've learned to be flexible. We'll bend over backwards to design custom solutions that meet your needs *precisely*. PAI is the company you can trust for rubber seal solutions YOUR WAY!**

- Over 1,000 different compounds
- More than 2,600 O-Ring Sizes
- On-Site Mold Shop
- Custom Molding
- 99% on-time delivery
- ISO 14644-1 Class 7 Clean Room

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## TECHNICAL BULLETIN

### Seal Lubrication

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Rubber Seals benefit from temporary or permanent lubrication for a variety of reasons. Dynamic sealing applications require some type of lubrication to prevent premature seal failure - often the media being sealed will provide the required lubrication. In compressed air applications, a lubricant may be added to the air to provide system wide lubrication. Additional lubrication may be desirable when:

- Lubrication is either insufficient or impossible due to the medium being sealed
- Operating environment prevents exhaust of lubricants from compressed air systems
- Reduced Friction and/or Breakaway pressure is desired
- Product assembly operations are difficult

Lubrication of seals can be achieved by adding a lubricant to the rubber compound before molding, or by treating the seal after molding. Seals that have a lubricant molded into them are considered to be Internally Lubricated.

Post molded lubrications fall into these categories:

- Temporary Coatings
- Semi-Permanent Coating
- Surface Modification
- Polymer Modification

Precision Associates offers the following lubrication options:

#### Temporary Coatings

Silicone Oil or Molybdenum Disulfide can be applied to the surface of molded rubber products. These options are low cost and work with most polymers. Temporary coatings are an excellent choice for aid in assembly. Moly's grimy nature may preclude it from some uses. Silicone Oil cannot be used on silicone compounds.

#### Semi-permanent Coating

A PTFE coating, approximately .0004 thick, may be applied to the surface of the rubber seal. This provides excellent lubrication for devices that do not cycle often, but must actuate when called upon. Heat activated fire sprinklers are a good example of this application. PTFE Coating is also a good choice where lubrication is required for device assembly when other external lubricants might contaminate the system. PTFE is compatible with most polymers, but will eventually wear off with continued use.

#### Surface Modification

The surface of most rubber seals can be permanently modified using a chlorination process. The result is a decrease in surface friction. Chlorination may also help seals to retain system lubricants. Chlorination does not work well with EPDM or Fluoroelastomers



# TECHNICAL BULLETIN

## Seal Lubrication

### Z-APT™

Continued

**Z-APT™ advanced polymer treatment** is a permanent modification of the rubber component's surface at a molecular level. Surface cross linking enhances the performance of the polymer without changing the bulk properties of the material. Unlike other lubricants that are susceptible to dissipation over time, **Z-APT™** enhancements remain intact if the surface is abraded. **Z-APT™** creates a substantial reduction in surface tack and coefficient of friction. Improved lubricity of the material enhances the performance and promotes longevity of treated seals. Almost all materials can be **Z-APT™** although some polymer types will see greater results than others.

### Internal Lubricants

Internal lubricants are a good choice for applications requiring a longer-term solution. Internal lubricants can be divided into two classes; both are mixed into the rubber compound. When molded, the first type deposits some of the material on the seal surface. These lubricants act as bearing surfaces. Graphite, Molybdenum Disulfide (Moly) and Teflon® are included in this group. Teflon® is a good choice for FDA applications. The lubricants falling in the second group are proprietary organic semi-solids. These lubricants typically are not compatible with the rubber compound. Resultantly they will bleed or bloom to the seal surface over time. They are particularly good in continuously operated dry air applications as the sealing surface continues to be replenished with lubricant over a long period. Design engineers should be aware that as this lubricant bleeds out, seal volume will be reduced. As this usually amounts to no more than 2-3%, it is not usually a problem when designs accommodate this change.

The table below indicates the polymer/lubricant combinations currently in production. If your application requires a material choice not listed, Precision Associates can develop a compound especially for you.

Polymer	Durometer					
	40	50	60	70	80	90
NR	T		T			
NBR	MT	MTW	GMT	CGMTW	GMTW	GMTW
XNBR				GMTW	MW	GTW
HNBR			C	C	C	
CR		M	M	MT	M	T
FKM			T	GMT	GT	GMT
VMQ	T	T	T	MT	T	
FVMQ				T		
EPDM	T	T	T	GMTW	MTW	
EU/AU				M		M

Contact Precision Associates, Inc. for Compound Numbers and materials not listed

### Lubricant Code

G = Graphite, M = Molybdenum Disulfide, T = Teflon®, W = Proprietary Organic Semi-solid, C= Combination of W and one of G, M or T

Technical Bulletin D20TB108C



## TECHNICAL BULLETIN

# RoHS 2

On February 13, 2003 the European Union Directives on Waste Electrical and Electronic Equipment (WEEE) and Restrictions on Hazardous Substances in Electrical and Electronic Equipment (RoHS) were adopted. These are most commonly referred to as "RoHS."

The basic goal of this legislation was to require producers of electronic and electrical equipment to generally eliminate the use of 6 substances from equipment.

On June 4, 2015 the EU Commission published a new Directive (EU) 2015/863 that added four phthalates\* to the list of restricted substances bringing the list to a total of ten.

These substances are:

- Lead and its compounds
- Mercury and its compounds
- Cadmium and its compounds
- Chromium VI and its compounds (hexavalent chromium)
- PBB (polybrominated biphenyls)
- PBDE (polybrominated biphenyl ether)
- DEHP Bis(2-Ethylhexyl) phthalate\*
- BBP Benzyl butyl phthalate\*
- DBP Dibutyl phthalate\*
- DIBP Diisobutyl phthalate\*

By far the most significant issue of environmental impact which motivated this initiative was the use of these substances in electrical soldering materials. Illustrative of this is the specific exclusion of any restriction of cadmium when used as a component of paint.

Although we at Precision Associates produce only molded rubber products, which are not truly the intended targets of the European legislation, we have received numerous inquiries as to whether our products are "RoHS compliant."

We produce thousands of different products. The vast majority of these products contain NONE of the restricted substances. Customers concerned about RoHS compliance should inquire with Customer Service at the time of quotation to ensure that the proper materials are selected.

Precision Associates' materials that meet RoHS requirements contain a statement to that fact on the Product Data Sheet for the compound and will also have this symbol:



D20TB112c

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: (612) 333-7464  
Fax: (612) 342-2417  
Toll: (800) 394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



Over the last several years, Precision Associates has received many requests regarding REACH compliance of our rubber products. This document addresses the subject and explains our methods of compliance with the legislation. Precision Associates authors this document purely as an attempt to explain REACH and we do not assume any liability for its contents. For a short overview of this law, please see the reverse of this document, with links to the ECHA website.

REACH is European law. There are no comparable laws in the United States. We are frequently asked if our products, or more commonly if a specific product, is "REACH compliant." Another common and similar question is if our products, or a specific product, contains any amounts of REACH Substances of Very High Concern (SVHC). The later question is becoming more common and is probably more relevant. As of this writing, REACH SVHC are called "Annex XIV" and are substances that are currently acceptable but may be destined to become "Annex XVII". Annex XVII materials are generally prohibited in Europe, with certain permitted exceptions. Experience has shown that the time frame for evolving from Annex XIV to Annex XVII is usually a few years.

PAI manufactures thousands of different products, all of which are at least partially rubber. More commonly, the products are entirely rubber. A small percentage of these products contain small amounts of SVHC. Sale of these items is neither illegal, nor improper in the United States.

ECHA has thus far identified over 70 SVHC. To date, only three of these substances are found in a few PAI products. Two of these, *DEHP* and *DBP* (CAS# 117-81-7 and 84-74-2) are plasticizers, substances added to rubber (or more commonly, to plastics) to soften the material. The original REACH legislation stated that these materials were not to be used in toys and childcare products. As Precision Associates does not make toys or childcare products, we have generally answered that we are "compliant." These plasticizers are widely used in the rubber industry. In virtually every instance PAI will have comparable products that do not contain SVHC, however.

The third SVHC in some of our products is *lead sulfochromate* (CAS# 1344-37-2). This is a component of a yellow colorant used in a few of our compound formulations. It is unclear as to exactly what the magnitude of the European prohibition is regarding this substance, but the point is somewhat moot as lead is prohibited in Europe by a similar European legislation called Restriction of Hazardous Substances (RoHS). RoHS is another European legislation that addresses the use of heavy metals. RoHS was intended mainly to address metals used in electrical products, usually as solders. Like REACH, RoHS grants many specific exemptions. For example, you can use cadmium in paints, but not as a colorant in rubber products.

Our Customer Service operatives are fully trained and equipped to advise our customers when any particular product has any REACH SVHC or is cited by RoHS. In this context, if any SVHC are contained, we refer to it as "non-compliant", despite the disclaimer mentioned above. We address RoHS in similar fashion. If a PAI product contains a RoHS material, it is "non-compliant", though an exemption is a possibility that we have not fully investigated.

Precision Associates actively monitors the REACH website regarding updates on their SVHC list and our operators are equipped to answer any queries regarding compliance.



3800 North Washington Ave.  
Minneapolis, MN 55412-2142

Toll Free: 1-800-394-6590

612-333-7464

Sales: 612-334-9190

FAX: 612-342-2417

[info@PrecisionAssoc.com](mailto:info@PrecisionAssoc.com)

**The following is taken from the European Chemicals Agency (ECHA) website:**

**REACH** is the European Community Regulation on chemicals and their safe use ([EC 1907/2006](#)). It deals with the **R**egistration, **E**valuation, **A**uthorisation and **R**estriction of **C**hemical substances. The law entered into force on June 1st 2007.

The aim of REACH is to improve the protection of human health and the environment through the better and earlier identification of the intrinsic properties of chemical substances. At the same time, REACH aims to enhance innovation and competitiveness of the EU chemicals industry. The benefits of the REACH system will come gradually, as more and more substances are phased into REACH.

The REACH Regulation places greater responsibility on industry to manage the risks from chemicals and to provide safety information on the substances. Manufacturers and importers are required to gather information on the properties of their chemical substances, which will allow their safe handling, and to register the information in a central database run by the European Chemicals Agency (ECHA) in Helsinki. The Agency acts as the central point in the REACH system: it manages the databases necessary to operate the system, co-ordinates the in-depth evaluation of suspicious chemicals and is building up a public database in which consumers and professionals can find hazard information.

The Regulation also calls for the progressive substitution of the most dangerous chemicals when suitable alternatives have been identified. For more information read: [REACH in Brief](#).

One of the main reasons for developing and adopting the REACH Regulation was that a large number of substances have been manufactured and placed on the market in Europe for many years, sometimes in very high amounts, and yet there is insufficient information on the hazards that they pose to human health and the environment. There is a need to fill these information gaps to ensure that industry is able to assess hazards and risks of the substances, and to identify and implement the risk management measures to protect humans and the environment.

REACH provisions are being phased-in over 11 years. Companies can find explanations of REACH on the [ECHA website](#), in particular in the [guidance documents](#), and can contact national [helpdesks](#).

Or contact Precision Associates, Inc. laboratory personnel for additional information regarding our compounds.

**After 57 years in the rubber business, we've learned to be flexible. We'll bend over backwards to design custom solutions that meet your needs *precisely*. PAI is the company you can trust for rubber seal solutions **YOUR WAY!****

- Over 1,000 different compounds
- More than 2,400 O-Ring Sizes
- In-house Mold Shop
- Custom Molding
- 99% on-time delivery
- ISO 14644-1 Class 7 Clean Room

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## TECHNICAL BULLETIN

# Material Safety Data Sheets

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Rubber articles are exempt from Material Safety Data Sheet (MSDS) labeling requirements as explained below.

MSDS labeling is a requirement of the Code of Federal Regulations – 29 CFR 1910.1200 – Hazard Communication. The purpose of the regulation is described in Paragraph (a), Section (1) as follows:

The purpose of this section is to ensure that the hazards of all chemicals produced or imported are evaluated, and that information concerning their hazards is transmitted to employers and employees.

This transmittal of information is to be accomplished by means of comprehensive hazard communication programs, which are to include container labeling and other forms of warning, material safety data sheets and employee training.

Exemptions are defined in Paragraph (b), Section (6) as follows:

This section does not require labeling of the following chemicals:

Subparagraph (v) – **Articles** (as that term is defined in paragraph (c) of this section).

### Paragraph (c) – Definitions.

"**Article**" means a manufactured item other than a fluid or particle: (i) which is formed to a specific shape or design during manufacture; (ii) which has end use function(s) dependent in whole or in part upon its shape or design during end use; and (iii) which under normal conditions of use does not release more than very small quantities, e.g., minute or trace amounts of a hazardous chemical (as determined under paragraph (d) of this section), and does not pose a physical hazard or health risk to employees.

Please contact Precision Associates, Inc. laboratory personnel for additional information.



## TECHNICAL BULLETIN

# Contract Review System Levels

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Precision Associates is an ISO 9001: 2008 registered company. The needs of our customers vary greatly depending on the industry they serve and the requirements of their quality system. To assure we can fulfill the requirements of customers with the most rigorous requirements, while not over-burdening those that don't need them, we have designed our contract review system around 4 different sets of requirements.

### Level 1

Customer may not have Part Numbers (P/N) assigned to their products, or in any case does not usually reference them on purchase orders to us. Products are ordered by our P/N, or with a general description like O-Ring, 1/8 C/S x 1" ID, 70 Duro Buna N. For these customers we are not required to enter a customer P/N into the sales order, but may if one is referenced on the Customer's PO. Our system does no cross checking. Only PAI catalog product specifications apply.

### Level 2

The Customer always references their P/N, but does not keep revision control. Customer may not have prints - P/Ns are often coded to reflect product dimensions and rubber properties. Our system requires that the Customer P/N be entered into the sales order, but does no cross checking. Only PAI catalog product specifications apply.

### Level 3

Customer has assigned P/Ns for all items ordered, but may not have revision level control. Product substitution is not allowed. A cross-reference record for each P/N is entered in our system. Any special requirements or instructions related to product are entered. When a sales order is entered, a Customer P/N and PAI P/N must both be entered and must match the cross-reference record. Customer must reference P/N when ordering.

### Level 4

Customer has assigned P/Ns for all items ordered and requires revision level control. Customer drawings may call out specific tolerances and/or material requirements. Drawing may also reference additional quality requirements or specifications. Precision Associates requires a drawing or some other some form of documentation issued by the Customer for each P/N. A cross-reference record is entered into our system for each P/N. Engineering personnel assure that PAI can meet all requirements outlined by the Customer, and that any special requirements or instructions related to the product are entered. Customer must reference P/N and Revision when ordering. Customer P/N and Revision must both be entered into the PAI sales order system and must match the cross-reference record.

As with most systems, there is a provision to override the requirements. When samples are requested, or parts are ordered that for some reason do not need to meet the customer's normal requirements, the sales order is automatically placed on hold until reviewed by our Engineering Department. The order is released only when engineering is satisfied that it is appropriate. If a customer P/N is entered in the sales order without the corresponding cross-reference record, a disclaimer is printed on customer paperwork stating that the Customer P/N is entered without regard to any specifications that may be called out by the Customer's system.

Please contact Precision Associates, Inc. engineering personnel for additional information.

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Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: (612) 333-7464  
Fax: (612) 342-2417  
Toll: (800) 394-6590



[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)





# TECHNICAL BULLETIN

## SHELF LIFE

The Shelf Life of cured rubber compounds is dependent on the polymer type and storage conditions. In general, it is best to store rubber products shielded from light, ozone and humidity at a temperature lower than 90°F. The Society of Aerospace Engineers has issued Aerospace Recommended Practice (ARP) 5316 as their industry standard for establishing polymer shelf lives. Precision Associates has adopted this standard for our use. The Shelf Life details are listed below:

ASTM Designation	Chemical Name	Common or Trade Names	Recommended Shelf Life
AU	Polyester Urethane	Urethane	5 Years
CR	Chloroprene	Neoprene®	15 Years
CSM	Chlorosulfonated Polyethylene	Hypalon®	Unlimited
EPDM	Ethylene Propylene	EPDM	Unlimited
EU	Polyether Urethane	Urethane	5 Years
FEPM	Tetrafluoroethylene Propylene	Aflas®	Unlimited
FFKM	Perfluorocarbon	Kalrez®	Unlimited
FKM	Fluorocarbon	Viton®, Fluorel®	Unlimited
FVMQ	Fluoro Methyl Vinyl Silicone	Fluorosilicone	Unlimited
IIR	Isobutylene Isoprene	Butyl	15 Years
NBR	Butadiene Acrylonitrile	Buna N, Nitrile	15 Years
PVMQ	Phenyl Methyl Vinyl Silicone	Silicone	Unlimited
VMQ	Methyl Vinyl Silicone	Silicone	Unlimited

For items not included in ARP 5316, we use the previously established MIL-HDBK-695

ACM	Polyacrylate	Acrylic	20 Years
AEM	Ethylene Acrylate	Vamac®	10 Years
CIIR	Chlorobutyl	Butyl	10 Years
CM	Chlorinated Polyethylene	Tyrin®	10 Years
ECO	Epichlorohydrin	Hydrin®	10 Years
EOT	Polysulfide	Thiokol®	20 Years
HNBR	Hydrogenated Nitrile	Highly Saturated Nitrile	15 Years
IIR	Isoprene	Synthetic Natural	5 Years
NR	Isoprene	Natural	5 Years
SBR	Styrene Butadiene	Buna S	5 Years

Neither specification establishes limitations for storage in assembled components, nor do they provide any guide to the operating life span of any polymers.



## TECHNICAL BULLETIN

# Rubber Product Sizes and Tolerances

Rubber products shrink after molding and during post molding processes. The rate at which they shrink varies, but is mostly determined by the compound. Operating parameters also affect shrinkage, but usually to a lesser extent. Rubber molds are cut to compensate for shrinkage, but shrink rates vary so that parts may be smaller or larger than parts ran in the compound the mold was designed for.

Variations in tolerance need to be considered as well as the product shrinkage. Due to a variety of reasons, the tolerances of molded items tend to be greater than those for machined products. The mold used to produce parts will be manufactured with some tolerances. The operating parameters and post molding operations required may have some affect. Finally, certain compounds are more prone to variances in size.

Design engineers need to consider both of these factors when designing seal glands. If standard tooling does not meet your needs, special shrink molds designed specifically to run one compound may be produced. In extreme cases, we take additional measures to control tooling and manufacturing parameters. Precision Associates can provide size and tolerance ranges for most of the compounds we run.

The table below indicates the ranges of shrinkage for each polymer family.

ASTM Designation	Common or Trade Names	Shrinkage Range
ACM	Acrylic	2.0-4.0%
AEM	Vamac®	2.0-4.0%
AU / EU	Urethane	1.6-3.3%
CR	Neoprene®	1.0-3.0%
CSM	Hypalon®	1.8-3.0%
ECO	Hydrin®	2.0-3.0%
EPDM	EPDM	1.9-3.5%
FEPM	Aflas®	3.0-4.5%
FKM	Viton®, Fluorel®	2.0-4.5%
FVMQ	Fluorosilicone	2.8-4.7%
HNBR	Highly Saturated Nitrile	2.0-3.0%
IIR / CIIR	Butyl	1.0-2.5%
NBR	Buna N, Nitrile	1.5-3.5%
NR / IIR	Natural	2.0-3.5%
PVMQ / VMQ	Silicone	2.0-5.0%
SBR	Buna S	2.0-3.0%

Please contact Precision Associates, Inc. for Size and Tolerance information on specific compounds.

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Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: (612) 333-7464  
Fax: (612) 342-2417  
Toll: (800) 394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



PRODUCT BULLETIN  
*Compound 8782*  
**Improved Acid Resistance**

For many years, litharge incorporated Viton® was the economical choice for sealing concentrated sulfuric acid. Precision Associates' compound 8745 has been used successfully in these applications for more than 30 years.

PAI now introduces compound 8782, an even better solution with improved properties and performance, that is RoHS compliant.

For comparison, we tested both of the compounds in concentrated (+98%) sulfuric acid. Test results are listed below. A picture of our test samples is shown at right.

Contact Precision Associates Customer Service group to receive a complete Product Data sheet for compound 8782.

Similar Viton® compounds are also available in 55, 60 and 90 Durometer materials.

**Compound 8745**

**Compound 8782**



ASTM D 471 Volume Swell sample after aging 480 hours @ 250° F . (Samples shown 3/4 size)

<i>8745</i>	Original Properties	Sulfuric Acid 70 hrs @ 250° F		Sulfuric Acid 168 hrs @ 250° F		Sulfuric Acid 480 hrs @ 250° F	
Tensile Strength, psi	1606	1331	-17.2%	901	-43.9%		
Elongation, %	203	234	+15.2%	171	-16.0%		
Hardness, pts	78	75	-3	73	-5	not measurable	
Modulus at 100% Elongation, psi	774	639		607			
Volume Change			+9.0%		+22.7%		+109%
Appearance		slight surface decomposition		slight surface decomposition		severe decomposition	

<i>8782</i>	Original Properties	Sulfuric Acid 70 hrs @ 250° F		Sulfuric Acid 168 hrs @ 250° F		Sulfuric Acid 480 hrs @ 250° F	
Tensile Strength, psi	2741	2423	-11.6%	2211	-19.3%		
Elongation, %	216	237	+9.5%	231	+6.9%		
Hardness, pts	77	77	0	77	0	77	0
Modulus at 100% Elongation, psi	1008	941		891			
Volume Change			+3.5%		+4.2%		+7.5%
Appearance		No Change		No Change		No change	



Test results are typical. Customer should determine the suitability of our compound in their own application.



# Medical Seal Solutions *YOUR WAY!*

Precision Associates specializes in close tolerance, custom molded precision rubber components and standard seals for medical, dental, and pharmaceutical industries.

Items intended for medical use are produced in our 6,000 sq. ft. ISO 14644-1 Class 7 (10,000) Clean room complete with HEPA filtration, atmospheric pressure, air-flow, temperature, and humidity monitoring systems. Specially treated water used to wash parts prior to packaging is tested for electrical resistivity to ensure purity and prevent the introduction of pyrogens (fever inducing bacteria) during the cleaning process.



All stages of rubber production from mixing of the compound through packaging are performed within the Clean Room facility, including, cryogenic and mechanical de-flashing. Segregated equipment and work rooms are maintained for silicone and non-silicone mixing and secondary operations.

PAI manufactures a number of compounds that are suitable for use in medical applications requiring body or bodily fluid contact. Many materials meet FDA, USP Class VI and ISO 10993 requirements. Biomedical grade silicone elastomers undergo additional biocompatibility testing and are suitable for short term implantation up to 29 days.

Silicone grades suitable for long term implantation are also available. Each application requires prior approval from Precision Associates and the material manufacturer.

	Silicone	EPDM	Viton® (FKM)	FFKM	HNBR	NBR
FDA	X	X	X	X	X	X
USP VI	X	X	X	X		
Biomedical	X					



PAI can develop a proprietary compound to function in specific operating parameters if an existing material cannot meet the requirements.

With over 2,500 O-Ring sizes and many other catalog seals, we can provide parts from existing tools out of medical grade compounds. For special items, our in-house tooling facility can readily make a mold to meet customer specifications.

As with all products manufactured by PAI, 100% visual inspection is automatically included. Applicable certifications are provided with each shipment and all material and process traceability is maintained indefinitely.





# Medical Seal Solutions *YOUR WAY!*

Precision Associates currently provides products in these applications:



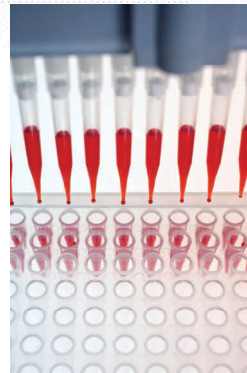
- ◆ Gas Handling
- ◆ Electronic Monitoring
- ◆ Blood Handling
- ◆ Vaccine/Medicine Delivery
- ◆ Surgical Instruments

- ◆ Hearing Aids
- ◆ Laser Devices
- ◆ Drainage Systems
- ◆ Laboratory Equipment
- ◆ Medical Electronics



- ◆ Dialysis/Renal Care
- ◆ Urologic/Gynecologic Equipment
- ◆ Ophthalmic Lens Production
- ◆ Endoscopy
- ◆ CTO Recanalization

- ◆ Dental Instruments
- ◆ Dental Implants
- ◆ Veterinary Equipment
- ◆ Pharmaceutical
- ◆ Biotech
- ◆ Prosthetics





## PRODUCT DATA

# Medical Grade Compounds

Precision Associates manufactures a number of compounds that are suitable for use in medical applications requiring body or body fluid contact. These materials have been tested by independent laboratories and/or our material suppliers to assess their ability to meet requirements as defined by several standards organizations. The definitions of our medical grades are listed below. PAI compounds that meet these requirements are outlined on the back of this document.

### USP VI / ISO 10993 Grade

The United States Pharmacopeia (USP) is an official public standards setting authority for medicines and other health care products manufactured or sold in the United States. PAI rubber compounds have been tested to meet USP <87> and <88> Biological Reactivity Tests for Class VI materials and USP <661> Physicochemical Tests for plastics. ISO 10993 is a 20 part series of biological evaluations used to confirm suitability in Medical Devices (see below). Additionally, PAI USP VI / ISO 10993 compounds are formulated with materials sanctioned under the FDA Code of Federal Regulations, Title 21, Part 177.2600. Each lot undergoes physical property testing.

Precision Associates recommends the use of the above materials in medical devices requiring contact with pharmaceuticals, human or animal bodies and body fluids. Although tested for short term implantation, we do not recommend their use for implantation without further testing.

### Biomedical Grade

In addition to meeting all of the requirements of the USP VI Grade materials, Biomedical Grade silicone elastomers undergo additional biocompatibility testing including 90 day implantation. Each lot is screen strained to remove particulate contamination, and is subjected to a tissue culture testing.

Biomedical grades are suitable for use in the same applications as USP VI materials and for short term implantation (up to 29 days).

### Implantable Grade

Silicone grades suitable for long term implantation are also available. Each application must be approved by Precision Associates and the material manufacturer prior to purchase. Please contact PAI for additional information on Implantable Silicone Grades.



ISO 10993 is a series of standards for evaluating the effects of medical devices and their component materials on the body. Those commonly requested for rubber products are -5 (vitro cytotoxicity), -10 (irritation and skin sensitization), -11 (systemic toxicity).

Precision Associates' medical grade products are produced and packaged in our ISO 14644-1 Class 7 certified clean room. Although manufacture takes place in a clean room, it is not a sterile environment. Precision Associates medical grade materials may be sterilized by EtO, autoclave or gamma radiation.

Precision Associates does not guarantee fitness for use or any application. Purchaser is responsible for determining suitability of function. Certification is supplied with each shipment.



Toll Free: **1-800-394-6590**

**612-333-7464**

Sales: **612-334-9190**

FAX: **612-342-2417**

***info@PrecisionAssoc.com***

3800 N Washington Ave, Mpls, MN 55412-2142

### USP VI / ISO 10993 Materials

Durometer	EPDM		Fluoroelastomer		Perfluoroelastomer	
	White	Black	White	Black	White	Black
70	423725	*	48725	48748*	434725	*

Durometer	Bromobutyl		Polyisoprene		Urethane	
	Cream		Cream		Clear	
40			41424*			
50	413524*		41524*		435524	
75					435724	

### Dow Corning Platinum Cured Silicone Compounds

Durometer	Base Material	Clear	White <sup>†</sup>	Black <sup>†</sup>	Red <sup>†</sup>	Blue <sup>†</sup>	Green <sup>†</sup>	Yellow <sup>†</sup>
15	MED-4014	49124	*	*	*	*	*	*
50	C6-135	49526	49525	49529	49559	49562	49523	49556
60	C6-150	49626	49625	49629	49659	49662	49623	49656
70	C6-165	49726 <sup>∞</sup>	49725	49729	49759	49762	49723	49756
80	C6-180	49826	49825	49829	49859	49862	49823	49856

### Biomedical Grade Materials

#### Dow Corning Q7 Platinum Cured Silicone Compounds

Durometer	Base Material	Clear	Red <sup>†</sup>	Black <sup>†</sup>	Blue <sup>†</sup>
40	Q7-4635	49470	49449	*	*
55	Q7-4650	49670	49549	*	*
75	Q7-4675	49770	49749	49767	*
80	Q7-4680	49870	49849	*	*

◆ Tested to meet ISO 10993-5.

∞ Tested to meet ISO 10993-5, 10993-10, 10993-11

\* Contact Precision Associates for information on this formulation.

† Colored silicone compounds use applicable grade polymer and colorants tested to meet USP VI and ISO 10993.



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TECHNICAL BULLETIN

Medical Grade Polymer Comparison Chart

Precision Associates manufactures compounds in a variety of polymers that are suitable for use in medical applications requiring body or body fluid contact. The chart below indicates, in general terms, the performance of these polymers in various applications. Specifically formulated compounds may function better or worse in actual usage. These ratings are guidelines only. Customer should determine the suitability of our compounds in their own applications.

Polymer:	Silicone	EPDM	Fluoroelastomer	Perfluoroelastomer	Polyisoprene	Butyl	Urethane
ASTM Designation:	VMQ	EPDM	FKM	FFKM	IR	IIR	EU
Acids (Dilute) resistance	1	3	3	3	2	2	1
Aliphatic Solvents resistance	1	2	3	3	0	2	2-3
Alkalis (Dilute) resistance	1	3	1	3	2	2	1
Animal Fats & Oils resistance	2	1	3	3	0	1	2
Aromatic Solvents resistance	1	1	3	3	0	0	1-2
Compression recovery	2	2	2	2	3	2	2
Coring (fragmentation) resistance	2	1	1	1	3	2-3	1
Gas Transmission resistance	0	1	2	2	0	3	2
Heat resistance	3	2	3	3	1	2	1
Mineral Oil resistance	2	0	3	3	0	0	3
Moisture Vapor Barrier performance	0	1	2	2	2	3	1
Ozone resistance	3	3	3	3	0	0	3
Radiation resistance	3	2	2	2	2	2	2-3
Water Absorption resistance	3	2	2	3	1	3	1
<b>Implantable Device (long term)</b>	3*	0	0	0	0	0	0

0 = Poor 1 = Fair 2 = Good 3 = Excellent

\* Requires compound approved for LTI



# P-REX™ Perfluoroelastomer

## Precision Molded Rubber Seals for Extreme Environments

Today's rubber seals are being required to perform in increasingly extreme conditions; sealing harsh chemicals at progressively higher temperatures. These extreme conditions require special materials to provide an acceptable seal in these environments. Perfluoroelastomers are often the best option for reliability, longevity and economy.



Perfluoroelastomers have been available for some time, but due to difficulties in processing, have not been readily available in all of the shapes that other polymers are. Custom tooling has been required for almost all products.

Precision Associates, long a leader in precision molded rubber seals, is now applying our unique rubber molding processes and skills to making Perfluoroelastomer seals. Our proprietary molding process allows us to produce smaller molded seals in shapes that other molding methods do not permit, with the added capability of holding tighter than industry standard tolerances.



We successfully manufacture P-REX™ X-Rings and other complex shapes requiring undercuts, that are not readily produced by traditional compression molding methods.

For applications without ultra low particulate requirements, we can, in many cases, use standard tooling. With molds for over 2,500 O-Ring sizes, we are able to quickly produce proto-type and short-run quantities in sizes that you are already using.

Our on-site mold making facility enables us to tool up for special items readily at a modest fee.

Standard P-REX™ compounds are:

P-REX™ 34860 for applications requiring a broad range of chemical resistance in applications at temperatures up to 428°F (220°C)

P-REX™ 34831 for applications that require chemical resistance and excellent compression set in applications at temperatures up to 572°F (300°C)

P-REX™ compounds for special applications include: 34624 - Clear, 34703 - Low Temp, 34765 - White FDA, 34744 - Black FDA, 34795 - Steam Resistant, and 34931 - a 90 Duro high temperature material.

Contact your P-REX™ distributor or Precision Associates for additional information about these and other materials.



# P-REX™ Perfluoroelastomer

## Precision Molded Rubber Seals for Extreme Environments



### Standard P-REX™ Compounds

#### For Best Chemical Resistance

#### P-REX™ 34860

Low permeation and swell  
in a broad range of chemicals

Low extractables in a wide  
range of chemicals

Low to no metal ion extractables

Upper temperature use  
of 428°F (220°C)

#### For Best Heat Resistance

#### P-REX™ 34831

Upper temperature use  
over 572°F (300°C)

Excellent compression set

Excellent plasma resistance

Good Chemical Resistance

Low to no metal ion extractables

Typical Physical Properties	
Shore A Hardness	75 Durometer
Color	Black
Tensile Strength	2,250 psi
Ultimate Elongation	145 %
Modulus 100% Elongation	1,200 psi
<b>Compression Set</b>	
70 Hrs @ 392°F ( 200°C)	26 %
70 Hrs @ 450°F ( 232°C)	37 %
70 Hrs @ 500°F ( 260°C)	55 %

Typical Physical Properties	
Shore A Hardness	75 Durometer
Color	Black
Tensile Strength	1,500 psi
Ultimate Elongation	130 %
Modulus 100% Elongation	1,125 psi
<b>Compression Set</b>	
70 Hrs @ 446°F ( 230°C)	19 %
70 Hrs @ 518°F ( 270°C)	26 %
70 Hrs @ 572°F ( 300°C)	38 %

Data shown is typical for these materials. It should not be used for specification purposes.

Contact your P-REX™ distributor or Precision Associates for additional information about these or other high performance materials.

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: (612) 333-7464  
Fax: (612) 342-2417  
Toll: (800) 394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



PRODUCT BULLETIN  
34860 Chemical Resistance



Precision Associates P-REX™ compound 34860 is our Perfluoroelastomer with the widest range of chemical resistance and is the most affordable of our FFKM compounds. 34860 features:

**Low permeation and swell  
in a broad range of chemicals**

**Low extractables in a wide  
range of chemicals**

**Low to no metal ion extractables**

**Upper temperature use  
of 428°F (220°C)**

Typical Physical Properties	
Shore A Hardness	75 Durometer
Color	Black
Tensile Strength	1800 psi
Ultimate Elongation	150 %
Modulus 100% Elongation	875 psi
Compression Set	
70 Hrs @ 392°F ( 200°C)	26 %
70 Hrs @ 450°F ( 232°C)	37 %
70 Hrs @ 500°F ( 260°C)	55 %

The test data and advice shown here was provided by PAI supplier personnel and are based on information and tests believed reliable. They are intended for persons with knowledge and technical skills sufficient to analyze test types and conditions. **Customers should determine the suitability of our compounds in their own applications.** Please contact Precision Associates for samples suitable for testing purposes.

Chemical Name	Conditions		Rating	% Volume Change	Durometer Change
	Time (hrs)	Temp (°C)			
Acetic Acid, Glacial	168	40°	A	+2.3	+1
Acetic Acid, 10%	168	reflux	A	+1.5	0
Acetic Anhydride	168	23°	A	-0.2	+1
Acetone	24	23°	A	+0.4	0
Acetone	168	23°	A	-0.2	-1
Acetone	720	40°	A	+4.7	-7
Ammonium Hydroxide	168	23°	B	+0.4	0
Ammonium Hydroxide	168	100°	C	+15.0	+10
Benzene	168	50°	A	+1.4	-3
Benzene	168	100°	A	+6.2	-5
Black Liquor	168	150°	A	+5.0	-1
Butyl Acetate	168	23°	A	-0.5	-1
Carbon Tetrafluoride	168	23°	A	-0.4	-2
Cyclohexanone	168	23°	A	-0.7	-2

Rating  
**A - Recommended for continuous application**  
**B - Capable for continuous application**  
**C - Limited application usage**  
**D - Not Recommended**



Chemical Resistance Compound 34860

Chemical Name	Conditions		Rating	% Volume Change	Durometer Change
	Time (hrs)	Temp (°C)			
Dimethylamine	168	40°	A	+3.6	-6
Dimethyl Formamide (DMF)	168	23°	A	-0.1	0
Ethanol	720	40°	B	+2.1	-4
Ethanol Amine	168	23°	A	-0.8	-2
Ethyl Acetate	168	23°	A	+0.4	-1
Ethylene Diamine	70	40°	A	+0.6	0
Ethylene Diamine	168	40°	A	-0.9	0
Ethylene Oxide	168	23°	A	+2.0	-5
Freon 11	168	15°	B	+8.0	-9
Freon 134A	168	23°	B	+14.7	-10
Freon 134A	168	100°	C	+25.6	-15
Furfural, (Furfuraldehyde)	168	40°	A	+0.5	+1
Furfural, (Furfuraldehyde)	720	40°	B	+0.5	-2
Hexamethylene Diamine	70	40°	A	-0.4	-2
Hexamethylene Diamine	168	40°	A	-0.5	-1
Hexane	168	23°	A	+0.8	+1
Hydrochloric Acid 10%	168	40°	A	+1	-1
Hydrochloric Acid 37%	72	23°	A	-1.1	0
Hydrochloric Acid 37%	72	80°	C	+19.8	-8
Hydrochloric Acid 37%	720	80°	D	+47.6	-7
Hydrofluoric Acid (48%)	720	80°	C	+28.4	-7
Hydrofluoric Acid (60%)	168	23°	A	+1.0	+1
Hydrogen Peroxide (30%)	168	70°	C	+37.0	-28
IRM-903	70	230°	A	+2.8	-1
Isopropyl Alcohol	168	40°	A	+0.3	-4
Methanol	168	23°	A	-0.6	0
Methanol	168	40°	A	+1.0	0
Methylene Chloride	168	23°	A	+2.0	-4
Methy Ethyl Ketone (MEK)	70	23°	A	-0.2	-1
Methy Ethyl Ketone (MEK)	168	23°	A	+1.0	0
Methy Ethyl Ketone (MEK)	720	40°	B	+4.8	-5
Methyl Isobutyl Ketone	168	23°	A	-0.3	0
MTBE	168	23°	A	-0.6	0

Rating  
**A - Recommended for continuous application**  
**B - Capable for continuous application**  
**C - Limited application usage**  
**D - Not Recommended**

Customers should determine the suitability of our compounds in their own applications.

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



Chemical Resistance Compound 34860

Chemical Name	Conditions		Rating	% Volume Change	Durometer Change
	Time (hrs)	Temp (°C)			
Mobil 254	70	200°	A	+2.1	+1
Mobil 254	250	200°	B	+9.5	0
Mobil 254	500	200°	B	+18.3	+2
Nitric Acid (55%)	72	23°	A	+0.8	0
Nitric Acid (69%)	168	40°	A	+6.0	-3
Propylene Oxide	168	23°	A	+2.0	-3
Pyridine	168	23°	A	-0.4	-1
Skydrol 500	70	121°	A	+3.9	-2
Skydrol 500	70	150°	D	+14.0	-8
Skydrol 500	168	121°	A	+3.4	-2
Skydrol 500	168	150°	D	+14.2	-9
Sodium Hydroxide (20%)	168	23°	A	+1.0	-1
Sodium Hydroxide (20%)	168	100°	A	+1.0	0
Sodium Hydroxide (50%)	168	23°	A	0.0	+1
Sodium Hydroxide (50%)	168	150°	A	-1.9	+4
Steam	168	160°	C	+9.5	-3
Steam	168	200°	D	+12.1	-4
Steam	168	232°	D	+44.7	-7
Steam	168	250°	D	+22.6	-16
Styrene	168	23°	A	-0.2	+1
Styrene	168	40°	A	+1.6	-2
Tetrahydrofuran (THF)	168	23°	A	+0.8	-3
Tetrahydrofuran (THF)	168	40°	A	+2	-2
Toluene	168	23°	A	-0.8	0
Toluene	168	40°	A	+1.0	-1
Toluene	720	40°	C	+3.5	-6
Triethanol amine (TEA)	168	23°	A	+0.3	-1
Wagner 21B Brake fluid	168	23°	A	+0.5	+1
Water	168	160°	C	+11.2	-3
Water	168	200°	C	+14.3	-5
Water	168	232°	C	+11.8	-4
Water	168	250°	D	+34.9	-32
Xylene	168	23°	A	+1.0	-1
Xylene	720	40°	B	+1.0	-11

Rating  
**A - Recommended for continuous application**  
**B - Capable for continuous application**  
**C - Limited application usage**  
**D - Not Recommended**

Customers should determine the suitability of our compounds in their own applications.



PRODUCT BULLETIN  
*Chemical Resistance  
Compound 34831*



Precision Associates P-REX™ Perfluoroelastomer compound 34831 allows a high service temperature range, while still providing resistance to a wide variety of chemicals. The inside of this bulletin shows the results of accelerated ageing tests for compound 34831 using a number of chemicals.

### 34831 Features

**Upper temperature use  
over 572°F (300°C)**

**Excellent compression set**

**Excellent plasma resistance**

**Good Chemical Resistance**

**Low to no metal ion extractables**

Typical Physical Properties	
Shore A Hardness	75 Durometer
Color	Black
Tensile Strength	1,500 psi
Ultimate Elongation	130 %
Modulus 100% Elongation	1,125 psi
Compression Set	
70 Hrs @ 446°F ( 230°C)	19 %
70 Hrs @ 518°F ( 270°C)	26 %
70 Hrs @ 572°F ( 300°C)	38 %

### Thermal Expansion Considerations

In addition to chemical resistance, the thermal expansion of the polymer should be anticipated when using rubber seals at extreme temperatures, Perfluoroelastomer are of special concern due to the fact that they are able to perform at higher temperatures than other polymers, while having a higher tendency toward thermal expansion in general.

This thermal expansion needs to be considered when designing a seal gland, or seal failure will result. When designing O-Ring glands for instance, a wider groove must be provided to prevent the O-Ring from rupturing due to over packing of the cavity.

The table below shows the Coefficient of Linear Thermal Expansion for compound 34831 at various temperatures.

Temperature (C)	Linear Expansion
100°	2.0 %
150°	4.7 %
200°	7.6 %
250°	10.9 %
300°	14.7 %

*We suggest starting with a standard O-Ring groove design, altering as needed to achieve the proper balance of compression and expansion.*



PRODUCT BULLETIN  
*Chemical Resistance  
 Compound 34831*

**P-REX**  
 Perfluoroelastomer

The test data and advice shown here was provided by PAI supplier personnel and are based on information and tests believed reliable. They are intended for persons with knowledge and technical skills sufficient to analyze test types and conditions. **Customers should determine the suitability of our compounds in their own applications.** Please contact Precision Associates for samples suitable for testing purposes.

Chemical	Conditions		Rating	% Volume	% Hardness
	Time (hrs)	Temp (°C)		Change	Change
Ammonium Hydroxide (NH <sub>4</sub> OH)	70	100°	1	+4.6	-1.3
Ammonium Hydroxide (NH <sub>4</sub> OH)	168	100°	1	+7.6	0.0
Ammonium Hydroxide (NH <sub>4</sub> OH)	672	100°	2	+10.7	-1.3
Aniline	70	70°	1	+0.9	1.3
Butyraldehyde	70	70°	3	+19.3	-10.0
Butyraldehyde	168	70°	3	+32.7	-16.0
Butyraldehyde	672	70°	3	+40.7	-20.0
Carbamide	500	140°	1	+2.4	-9.8
Carbamide	672	140°	1	+3.4	-3.7
Carbamide	168	175°	2	+0.8	-10.9
Chlorosulfuric Acid	2000	23°	1	+4.0	-8.8
Dichlorobenzene (o-)	70	40°	1	+0.3	-5.0
Dichlorobenzene (o-)	168	40°	1	+0.3	-5.0
Dichlorobenzene (o-)	672	40°	1	+0.3	-2.5
Dichlorobenzene (o-)	2000	179° (boiling)	1	+7.6	-8.8
Epichlorohydrin	70	100°	1	-0.1	-2.7
Epichlorohydrin	168	100°	2	+14.9	-5.3
Epichlorohydrin	672	100°	3	+25.9	-5.3
Ethylene Diamine	70	100°	1	+0.1	0.0
Ethylene Diamine	168	100°	3	+24.6	-26.8
Ethylene Diamine	672	100°	3	+37.1	-46.3
Ethylene Diamine	1000	100°	3	+175.6	-58.8
Ethylene Oxide (EtO)	70	50°	3	+11.8	-22.1
Ethylene Oxide (EtO)	168	50°	3	+14.0	-22.1
Ethylene Oxide (EtO)	672	50°	3	+35.5	-23.4

Rating **1 - Recommended for continuous application**  
**2 - Marginally Recommended**  
**3 - Not Recommended**



Chemical Resistance Compound 34831  
continued

Chemical	Conditions		Rating	% Volume Change	% Hardness Change
	Time (hrs)	Temp (°C)			
Freon HCFC 134a	672	23°	3	+15	-15.8
Glacial Acetic Acid	672	100°	1	+3.8	-5.0
Hydrochloric Acid	70	80°	1	+0.6	-1.2
Hydrochloric Acid	168	80°	1	+1.1	-4.9
Hydrochloric Acid	672	80°	1	+2.2	-4.9
Hydrochloric Acid	1000	80°	1	+3.0	-6.2
Maleic Acid	672	90°	1	+1.8	0.0
Nitric Acid (HNO <sub>3</sub> )	70	85°	1	+0.3	0.0
Nitric Acid (HNO <sub>3</sub> )	168	85°	1	+1.6	-2.6
Nitric Acid (HNO <sub>3</sub> )	672	85°	1	+5.2	-4.0
Nitrotoluene	70	223°	1	+3.6	-3.8
Nitrotoluene	2000	223° (boiling)	1	+9.9	-3.8
Propylene Oxide	70	50°	2	+8.8	-11.7
Propylene Oxide	168	50°	2	+10.3	-11.7
Propylene Oxide	672	50°	3	+27.8	-16.9
Skydrol	125	70°	1	+2.5	-2.5
Steam	2000	151.6°	1	+3.6	-7.4
Steam	168	200°	1	+0.9	-6.3
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	1000	70°	2	+5.8	-13.0
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	70	100°	1	0.0	0.0
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	168	100°	1	+0.1	0.0
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	672	100°	1	+0.2	+5.2
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	70	175°	1	+1.5	0.0
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	168	175°	1	+3.5	-2.6
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	672	175°	1	+4.0	-5.2
Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> )	1000	175°	1	+0.2	+5.2
Toluene diisocyanate (TDI)	672	100°	3	+50.5	-6.6
Water	672	225°	3	+62.4	-34.0
Xylene (o-)	70	40°	1	0.0	-1.2
Xylene (o-)	168	40°	1	+0.5	-1.2
Xylene (o-)	672	40°	1	+0.7	-4.9

Rating 1 - Recommended for continuous application  
 2 - Marginally Recommended  
 3 - Not Recommended





# **T-Coat™**

## **Low Friction Colored Coatings**

Precision Associates' T-Coat™ is a resin bonded PTFE based dry film lubricant. Designed especially for rubber seals, this flexible coating is available in a number of colors. T-Coat™ may be applied to O-Rings, U-Cups, X-Rings and other rubber seals made in most common polymers.

The benefits of T-Coat™ PTFE coatings include:

- Easier seal installation, even while using automatic feeder systems
- Low initial breakaway friction after extended non-use
- Much cleaner than oils or greases
- Unlike oils and greases, will not cause swell or shrink of rubber compounds



Precision Associates' T-Coat™  
is available in medium and dark blue colors.

Please contact your Precision Associates customer service representative for pricing or additional information regarding T-Coat™.



# Micro-Miniature and Close Tolerance O-Rings and Seals

Precision Associates is the source for Micro-Miniature and Close Tolerance O-Rings and seals.

## Micro-Miniature

The drive for smaller and lighter equipment has compelled the need for smaller, more precise rubber seals.

Precision Associates' proprietary molding process, state of the art deflashing equipment and in-house tooling facility allow us to accurately produce quality molded O-Rings and seals smaller than .1" ( 2.5 mm). At present our smallest O-Ring has a major diameter of .030", with a cross section and ID of .010" each. (This O-Ring is pictured below just to the left and slightly below the head of the pin).



## Micro-Miniature Seals

Head of pin is .072" diameter

Our Micro-Miniature seals are inspected under magnification and like all PAI seals - 100% are visually inspected for flash and flaws.

## Close Tolerance Seals

Lean manufacturing, defect reduction and other quality practices may require rubber parts held to tolerances tighter than the AS-568 standard.

The same equipment and processes that are used to produce minute seals enable us to manufacture O-Rings and seals held to close tolerances. Tolerances better than AS-568 can be held to specified dimensions. Specific rubber properties may also be designated for control.

Close tolerance seals start with a precise tool and intimate knowledge of our compounds and production processes. Precision Associates' in-house tool shop will produce a mold to precisely match the shrink characteristics of the desired rubber material. Production parameters are tightly controlled to minimize variation.

In addition to our standard 100% visual inspection - when the size and configuration of the seal permit - PAI uses automated measuring equipment to ensure compliance with your specification. When necessary, gauging may be performed to verify dimensional integrity.

Close Tolerance and Micro-Miniature O-Rings and Seals are available in the following Polymers

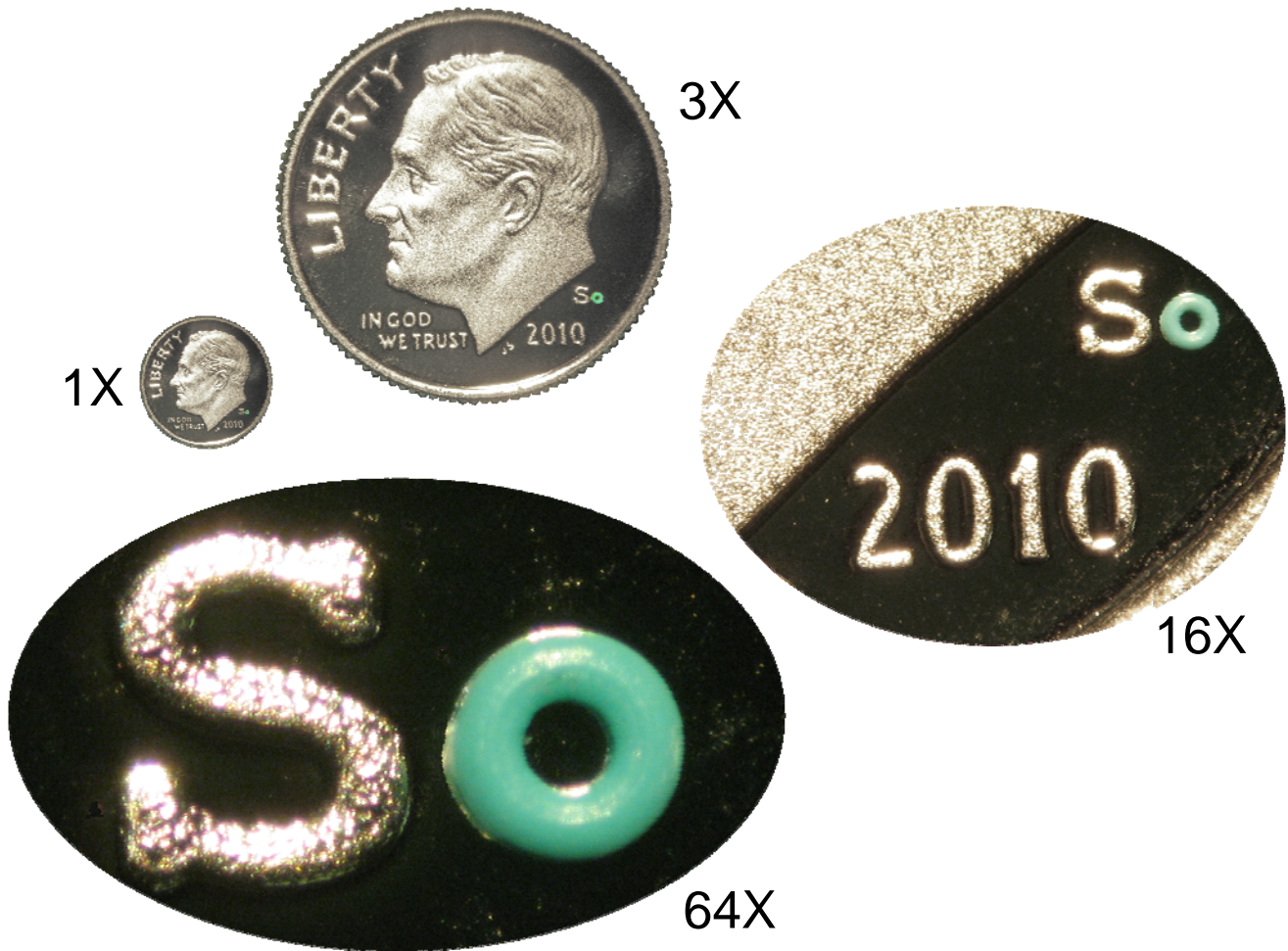
- Nitrile (Buna N, NBR)
- Carboxylated Nitrile (XNBR)
- Hydrogenated Nitrile (HNBR)
- Styrene Butadiene
- Butyl
- Hypalon®
- Fluoroelastomer (Viton®)
- Fluorosilicone
- Silicone
- Perfluoroelastomer (P-REX™)
- Aflas®
- Vamac®
- Chloroprene (Neoprene®)
- EPDM
- Millable Gum Urethane
- Polyacrylate
- Hydrin
- Natural Rubber



PRODUCT BULLETIN  
*The World's  
Smallest O-Ring*

Precision Associates has always been known for making precision molded rubber seals, as well as tiny O-Rings and other microminiature products. Now we've produced what we believe to be is the **World's Smallest O-Ring**, our new 6-8. This new O-Ring has a cross section of only .006" (.15 mm) and an Inside Diameter of .008" (.2 mm). With a .020" (.5 mm) Outside Diameter, this O-Ring is 2/3 the size of our previous smallest O-Ring, a 10-10 (.010" C/S x .010" ID).

The pictures shown here are of our actual 6-8 O-Ring on a U.S. dime.



Like all of our other O-Rings, the 6-8 was manufactured completely at PAI, including machining of the mold used to produce it. Extra care and precision are required at every step to make a part this size. While you may not require an O-Ring this small, you can be assured that the same processes used in the manufacture of this microminiature seal are used in every O-Ring and seal we make.

Note: Microminiature O-Rings may not be available in all PAI compounds



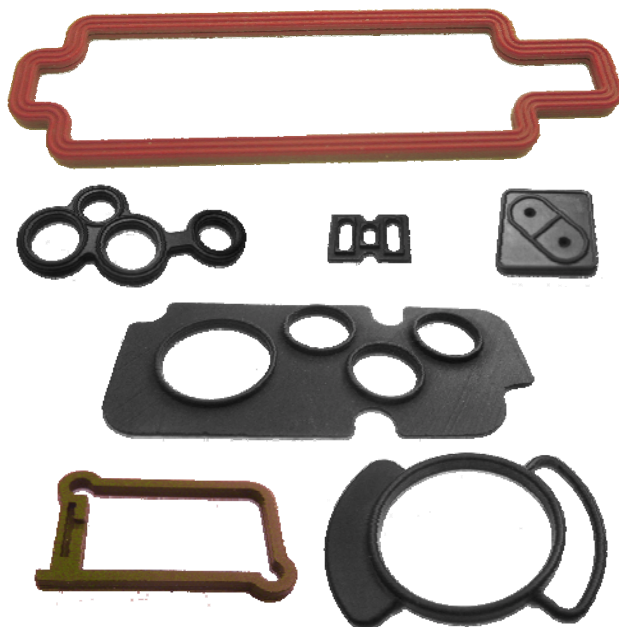
# Molded Gaskets



By far the majority of gaskets, whether made of rubber or other materials, are cut from sheet goods. While this is acceptable for most gaskets, there are several good reasons that molded gaskets are a superior option.

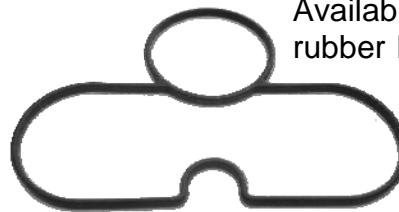
- Gasket Profile
- Tolerance Requirements
- Material Selection

The profile of cut gaskets is limited to the thickness of the available sheet materials. By molding gaskets, additional features can be included on the top and/or bottom face. Rounded or O-Ring style cross sections and locating devices can also be molded into the gasket. Cut gaskets often have concave, or angled edges due to the manufacturing method. Molded gaskets may be produced to any shape the designer specifies.



Examples of special profile molded gaskets

Thickness tolerances for gaskets made from calendared sheet are dependant on the sheet rubber. These may vary by as much as  $\pm 0.015$ . Precision Associates' proprietary molding process is capable of holding tolerances as tight as  $\pm 0.002$  for thickness.

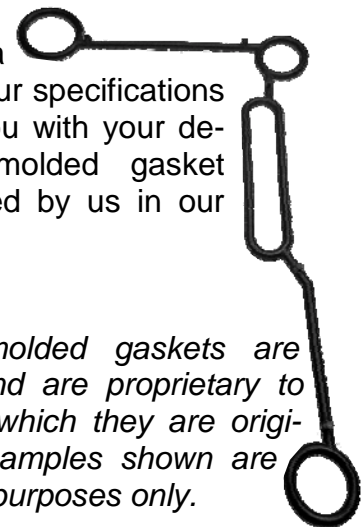


Availability of calendared rubber limits the material selection of cut or machined gaskets. PAI has more than 1,000 compounds

in production. Most likely, one of those will be exactly what you need. But if it not, we can develop a compound especially for you.

Producing gaskets from sheet goods can produce a lot of waste material. Expensive polymers like Fluoroelastomer, Fluorosilicone and especially Perfluoroelastomer can often be produced more efficiently by molding than by cutting.

PAI can produce a mold directly to your specifications or we can help you with your design. Precision molded gasket tooling is machined by us in our on-site mold shop.



*Note: All PAI molded gaskets are "custom" items and are proprietary to the customer for which they are originally produced. Samples shown are for demonstrative purposes only.*



# Oil Field Custom Moldings

Precision Associates  
is now your source for  
Custom Moldings designed  
for Oil Field applications.



PAI Custom Molded rubber products feature compounds developed especially for down-hole use including HNBR, NBR, Viton®, Perfluoroelastomer, L'Garde EPDM, and Natural Rubber polymers.



Our On-Sight  
Tooling facility  
allows us to  
produce your molds  
quickly and  
economically.





## PRODUCT BULLETIN

# Machined Plastic Components



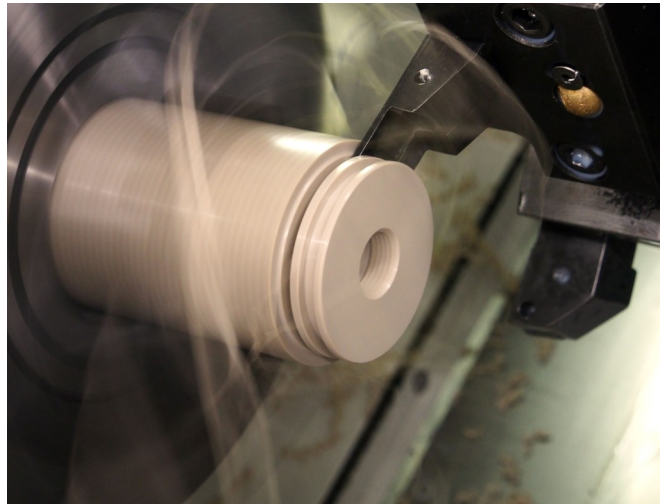
Machined Engineered Plastics are frequently your best choice for use as seals, seal housings, back-up rings, piston rings and bearings in applications that require pressure, temperature, and chemical resistance in various environments.

Plastic machining provides several advantages:

- Low to medium quantities
- Minimal or no tooling charge
- Close tolerance & dimensional stability
- Fast delivery
- Design flexibility

Choosing the correct material and manufacturing methods can be especially important for these products. Machined components have less internal stress than injection molded parts. Parts machined from extruded stock have less directionality and therefore less stress, while those machined from compression molded stock have almost no directionality, and the least amount of stress. This provides the greatest stability in a manufactured product. Cut items like back-up rings develop less spring in/spring out tendencies when manufactured from low stress stocks.

In combination with state-of-the-art machining equipment, our facilities are temperature and humidity controlled to provide the utmost in material stability.



In addition to our machining services, PAI is your rubber seal provider of choice. We can pre-assemble your seal housings with our premium quality rubber seals, made in the USA.

In some cases, we are able to hold  $\pm 0.0005$ " dimensional tolerances. All products manufactured by Precision Associates are lot controlled and 100% visually inspected for defects. Materials can be virgin or filled for additional strength or to increase wear properties, including self-lubricating options.

We regularly machine these and a variety of other plastic materials:

- PEEK - Virgin and filled
- POM (Delrin®) - Virgin and filled
- PTFE (Teflon®) - Virgin and filled
- Hydex® 4101
- Vespel®
- UHMW Polyethylene

®Delrin & Vespel are registered trademarks of Dupont.    ®Hydex is a registered trademark of A.L. Hyde Company  
®Teflon is a registered trademark of Chemours.

**Precision Associates, Inc.**  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: (612) 333-7464  
Fax: (612) 342-2417  
Toll: (800) 394-6590

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



## TECHNICAL BULLETIN **Oil & Gas Compounds**

Seal Engineers designing components for energy applications encounter a wide variety of environments. Those with elastomer seal elements can often require a number of different Sealing Solutions.

Precision Associates has more than 60 years experience developing material solutions for diverse industries including oil, gas and geothermal. Several polymers are particularly well suited for Energy applications. Our chemists have developed specialty compounds in each of these polymers for specific applications.



### Typical concerns include:

- Corrosive Environments
- High Pressure
- High Temperature
- Low Temperature
- Steam
- Rapid Gas Decompression (RGD)

### Desirable properties include:

- Abrasion Resistance
- Controlled Swell

Choosing the wrong material can have dire consequences. The picture below illustrates the effects of Rapid Gas Decompression (RGD) on a standard FKM O-Ring.

While no single rubber compound will be able to provide a universal sealing solution, designers should be able to achieve the most cost effective material solution for each application. Contact Precision Associates for help determining the best material for yours.



**The Precision Associates compounds listed on the reverse of this page have been selected for their suitability in various Energy related applications.**



3800 North Washington Ave.  
Minneapolis, MN 55412-2142

Toll Free: **1-800-394-6590**

**612-333-7464**

Sales: **612-334-9190**

FAX: **612-342-2417**

***info@PrecisionAssoc.com***

### Precision Associates' Compounds Formulated Specifically for Oil & Gas Applications

Compound No	Duro	Polymer	Temperature Range (°C)	Applications/Properties
<b>1790</b>	70	NR	-15° - +100°	Mud Pump Rod Packer
<b>3790</b>	70	NBR	-20° - +125°	General Oil Field Nitrile
<b>3890</b>	80	NBR	-20° - +125°	General Oil Field Nitrile
<b>9701</b>	70	FKM	-40° - +204°	Low Temperature
<b>9901</b>	90	FKM	-40° - +204°	Low Temperature
<b>9705</b>	70	FKM	-50° - +204°	Extreme Low Temp
<b>9905</b>	90	FKM	-50° - +204°	Extreme Low Temp, Sour Service <sup>†</sup>
<b>608905</b>	90	FKM—Viton <sup>®</sup>	+15° - +204°	RGD Resistant**, Sour Service <sup>†</sup>
<b>8990</b>	95	FKM -Viton <sup>®</sup>	+15° - +204°	Extrusion Resistant, RGD Resistant**, Sour Service <sup>†</sup>
<b>23967</b>	90	L'Garde EPDM	-50° - +150°	Steam (up to +300° C), Geothermal
<b>25796</b>	70	FEPM - Aflas <sup>®</sup>	-20° - +232°	General Oil Field Aflas <sup>®</sup>
<b>25895</b>	85	FEPM - Aflas <sup>®</sup>	-20° - +232°	RGD Resistant**, Sour Service <sup>†</sup>
<b>25897</b>	80	FEPM - Aflas <sup>®</sup>	-20° - +232°	ESP Bags
<b>25998</b>	90	FEPM - Aflas <sup>®</sup>	-20° - +232°	Extrusion Resistant
<b>34795</b>	70	FFKM	-10° - +300°	Steam & Improved Heat Resistant
<b>34995</b>	90	FFKM	-10° - +300°	Steam & Improved Heat Resistant
<b>55703</b>	70	HNBR	-40 - +160°	Low Temperature
<b>55803</b>	80	HNBR	-40 - +160°	Low Temperature
<b>55857</b>	75	HNBR	-25 - +160°	Abrasion Resistant, Internally Lubricated
<b>55890</b>	80	HNBR	-25 - +160°	Extrusion Resistant
<b>55903</b>	90	HNBR	-40 - +160°	Low Temperature
<b>55995</b>	95	HNBR	-25 - +160°	RGD* and Extrusion Resistant
<b>55997</b>	95	XHNBR	-25 - +160°	Abrasion Resistant, Internally Lubricated

Test results are typical. Customer should determine the suitability of any compound in their own application.

\*Compounds achieved the best possible Overall Rating of 1 when tested to NACE TMO 192-2012.

\*\*Compounds achieved the best possible Overall Rating of 1 when tested to NACE TMO 192-2012 and 0000 when tested per ISO 23936-2 / NORSOK M-710, Edition 3 (Media 10% CO<sub>2</sub> & 90% CH<sub>4</sub>), by an Independent Lab.

<sup>†</sup>Qualified to API 6A 20th Edition and ISO 10423:2009 according to Annex F Section 1.13.5.2 immersion testing for Material Class FF/HH 10% H<sub>2</sub>S .

***www.PrecisionAssoc.com***





# RGD and Extrusion Resistant Compounds

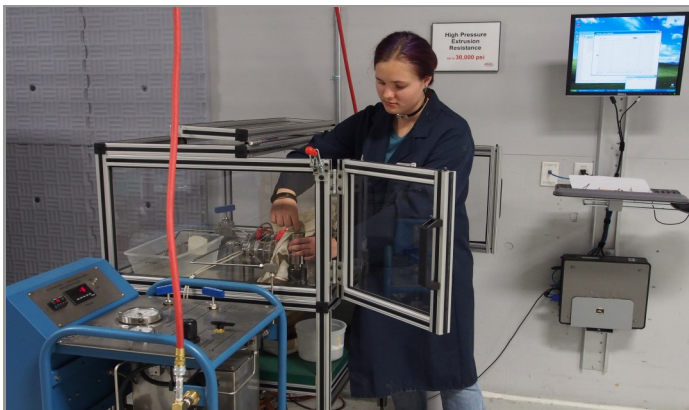
Oil and gas applications present some of the most challenging seal environments due to extreme temperatures, high pressures, and harsh chemicals. Understanding the service conditions and designing materials for optimal performance are the first steps in successful sealing.

Because of their critical nature, compounds used in this market require extensive testing and qualification before use in the field.

Precision Associates provides materials with proven performance in High Pressure Extrusion Resistance and Rapid Gas Decompression (RGD) applications.

**Extrusion** occurs when system pressure forces the seal from its groove and into the clearance gap within the seal housing. Proper groove dimensions and seal selection combined with elastomers designed to resist extrusion can prevent this type of failure. The potential for extrusion to occur is greater with a larger gap.

There is no standard test method to measure extrusion resistance. With the guidance and expertise of oil and gas industry professionals, Precision Associates developed a High Pressure Extrusion device to facilitate the testing of O-Rings at various temperatures and pressures to quantify a material's suitability for this type of environment. One AS568-325 O-Ring is installed in a groove using a .005 to .009 inch radial extrusion gap and tested at various temps. The fixture is pressurized to a maximum of 30,000 psi until the O-Ring extrudes and fails.



A technician is shown preparing the High Pressure Extrusion Device to run O-Rings through a test cycle.

Precision Associates developed **8990** (95 duro) a Viton® FKM compound to resist extrusion at high pressures.

O-Rings were molded from this material for testing in the High Pressure chamber. For comparison purposes, a general purpose FKM **9944** (90 duro) and a typical oil field RGD FKM **608905** (90 duro) were also tested.

Results are shown below:

GAP	Compound tested @300F PSI at failure		
	<b>8990 (95)</b>	<b>608905 (90)</b>	<b>9944 (90)</b>
.005	<b>29,500</b>	26,000	12,000
.009	<b>24,000</b>	19,000	10,000

GAP	Compound tested @392F PSI at failure		
	<b>8990 (95)</b>	<b>608905 (90)</b>	<b>9944 (90)</b>
.005	<b>27,000</b>	19,000	9,000
.009	<b>16,000</b>	14,000	5,000

Compound 8890 showed consistently superior results in all tests.

Selecting the proper material at the design stage to prevent extrusion during operation can significantly improve seal life; reducing maintenance and system down time.

Contact **Precision Associates** for more information!



# RGD and Extrusion Resistant Compounds

## What is RGD?

Pressurized gas can permeate an elastomer seal within a well or other system. If the pressure is released or decompressed rapidly, the gas rushes to exit the elastomer causing it to rupture. This is known as Rapid Gas Decompression (RGD) or Explosive Decompression (ED).

Splits, cracks, and blisters are generally evident in the seal when this occurs but there can be internal damage that is not visible.

Example of a damaged O-Ring made from FKM that was not RGD Resistant.



Measuring the resistance of a compound to RGD failure is typically done by an independent test laboratory utilizing a variety of industry standards:

Precision Associates successfully developed two materials that passed the requirements of the ISO 23936 -2 ANNEX B standard that has been adopted as the internationally accepted method of testing. All tests were performed using AS568-325 O-Rings as specimens. Test parameters are shown below.

### Rapid Gas Decompression (RGD) Test Conditions

Media	Volume %
Carbon Dioxide CO <sub>2</sub>	10%
Methane CH <sub>4</sub>	90%
<b>Pressure</b>	<b>150 bar (reduced 30 bar/min.)</b>
<b>Temperature</b>	<b>100°C</b>

Precision Associates, Inc.  
3800 N. Washington Ave.  
Minneapolis, MN 55412

Phone: (612) 333-7464  
Fax: (612) 342-2417  
(800) 394-6590

Each specimen is cut with a razor blade into 8 radial cross sections and ranked by this scale:

RGD Damage criteria per ISO 23936-2 Annex B	Rating	Pass/Fail
No cracks, holes or blisters permitted	0	Pass
Any # of cracks, each <25% CSD; total crack length shall not exceed CSD. External cracks shall be <10% CSD; no splits permitted.	1	Pass
Any # of cracks, each < 50% CSD; total crack length shall not exceed 2xCSD. External cracks shall be <25% CSD; no splits permitted.	2	Pass
Any number of cracks of which 2 internal cracks can each have length 50% to 80% CSD; total crack length shall not exceed 3x CSD. External cracks shall be <50% CSD; no splits permitted.	3	Pass
Any number of cracks having total length greater than 3 x CSD or at least 2 internal cracks >80% CSD or 3 or more internal cracks each>50% CSD or any external crack >50% CSD. No splits permitted.	4	Fail
Any split, regardless of location and length.	5	Fail

Compound #	Duro	Type	Rating	ISO
8990	95	FKM	0	Pass
608905	90	FKM	0	Pass
25895	85	Aflas®	0	Pass

Precision Associates tests materials to NACE TMO 192-2012 to gauge their suitability for RGD resistance prior to submitting them for ISO 23936-2 testing.

The best overall rating for this test is a "1". Results are shown below.

Compound #	Duro	Type	Rating	NACE
55995	95	HNBR	1	Pass

\*ISO 23936-2 results pending.



## Low Temperature Sealing for Energy Applications

Precision Associates line of B-Lo<sup>o</sup> rubber sealing compounds are developed especially for low temperature environments. We produce four compounds, two each in FKM & HNBR that have proven to be a good fit for Energy applications in frigid climes. These materials are designed not just for low temperatures, but for resistance to gases and fluids encountered in the industry.

Low temperature performance can be a very important characteristic of an elastomeric compound. Reducing the temperature of the environment surrounding the rubber article will have a negative impact on the rubber properties. With decreasing temperatures, the movements of the molecular chains are reduced. At a certain temperature the molecular chains will no longer be able to move and the rubber loses all its rubber characteristics. The rubber will embrittle and become plastic like, reducing or eliminating the ability of the material to act as a seal.



There are several different ways to measure the low temperature properties of a rubber compound. The three most common methods used in the rubber industry are:

**Glass Transition (T<sub>g</sub>)** is the temperature at which a particular rubber compound becomes crystalline and is stiff and brittle. At this point many molecules will be aligned and the compound will cease to be liquid or elastic. Time at a given temperature may also be required as some polymers need time to develop this crystallization. Testing is performed per ASTM E 1640.

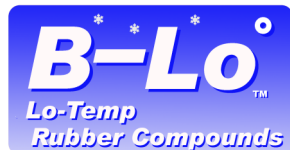
**Brittle Point** is the temperature at which the material breaks upon impact. Testing is performed per ASTM D 1329.

**Temperature Retraction** is the temperature at which frozen rubber returns to an elastic state.

Testing is performed per ASTM D2137.

Precision Associates typically tests our seal compounds for Brittle Point and for Temperature Retraction, specifically TR-10. We can also provide other retraction results if desired. We consider the TR-10 test to be the best indicator for the performance of seals at low temperatures.

Note: high pressures tend to raise the temperature at which rubber compounds become crystalline. This needs to be considered when choosing materials for high pressure-low temperature applications. A generally accepted rule is that the T<sub>g</sub> will rise by 1°C (1.8° F) for each 5.1 MPa (740 psi) of pressure applied.



	9701	9901	9705	9905	55703	55903
<b>Polymer</b>	FKM	FKM	FKM	FKM	HNBR	HNBR
<b>Duro</b>	70	90	70	90	70	90
<b>TR-10</b>	-41° F -41° C	-41° F -41° C	-51° F -46° C	-51° F -46° C	-41° F -41° C	-44° F -42° C
<b>Brittle Point</b>	-49° F -45° C	-49° F -45° C	-67° F -55° C	-67° F -55° C	-55° F -48° C	-55° F -48° C



**What is Z-APT™?**

Z-APT advanced polymer treatment is a permanent modification of a rubber component's surface at a molecular level that does not change the physical properties of the material.

Z-APT creates a substantial reduction of surface tack and coefficient of friction (COF). Improved lubricity after treatment enhances the performance and promotes longevity of seal life. Unlike other coatings, Z-APT does not crack or flake off. This is a proprietary process that can be used on almost all materials although some polymer types will see greater results than others.

Z-APT treated compounds have been evaluated for potential cytotoxic effects following the guidelines of ISO 10993-5 and found to show no evidence of cytotoxicity. Z-APT also meets the FDA requirements of CFR Title 21, Part 177.2600 that classifies ingredients as suitable for rubber articles intended for repeated use.



**Slip and Friction Tester**

The Slip and Friction Tester pictured left, measures the sliding resistance of sheet goods, such as, rubber, plastic film, paper, and coated surfaces. It is important to understand that COF is the interaction between the rubber compound and a "test surface".

Precision Associates has the capability to test coefficient of friction (COF) per ASTM D-1894 which uses 2.5" square pieces of molded rubber cut from ASTM Sheets. A variety of rubber materials were tested "as molded" and after being treated with Z-APT for STATIC coefficient of friction measurements.

Test results using a polycarbonate surface are illustrated in the table below. Data for stainless steel, aluminum, and steel is also available.

**STATIC COF POLYCARBONATE SURFACE**

	5780 NBR 70	19411 SIL 40	19711 SIL70	4753 CR 70	23711 EPDM 70	9746 FKM 70	9946 FKM 90
<b>As Molded</b>	.473	.685	.788	1.279	1.532	1.337	1.143
<b>Z-APT</b>	.314	.381	.277	.188	.785	.666	.380
<b>PERCENT REDUCTION COF</b>	<b>34%</b>	<b>44%</b>	<b>65%</b>	<b>85%</b>	<b>49%</b>	<b>50%</b>	<b>67%</b>



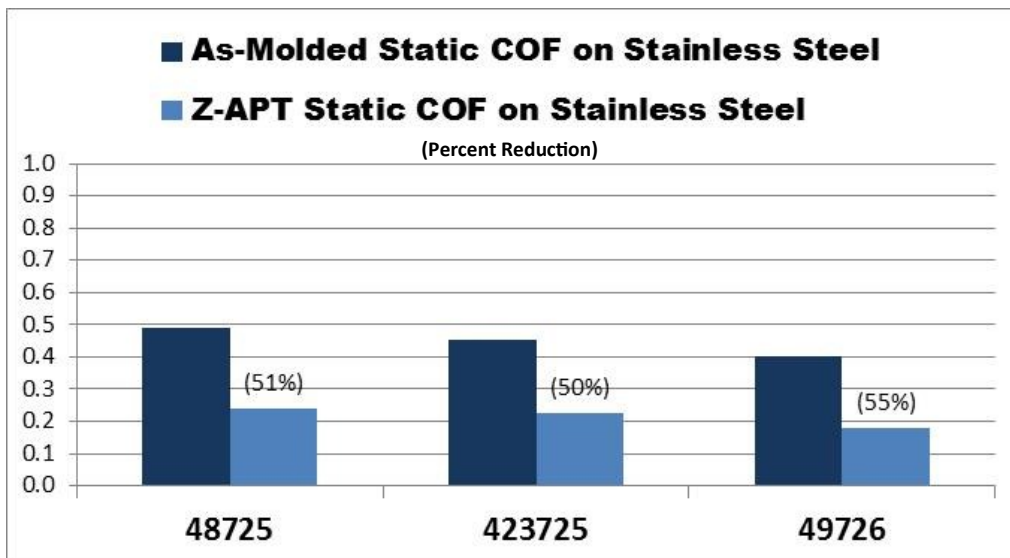
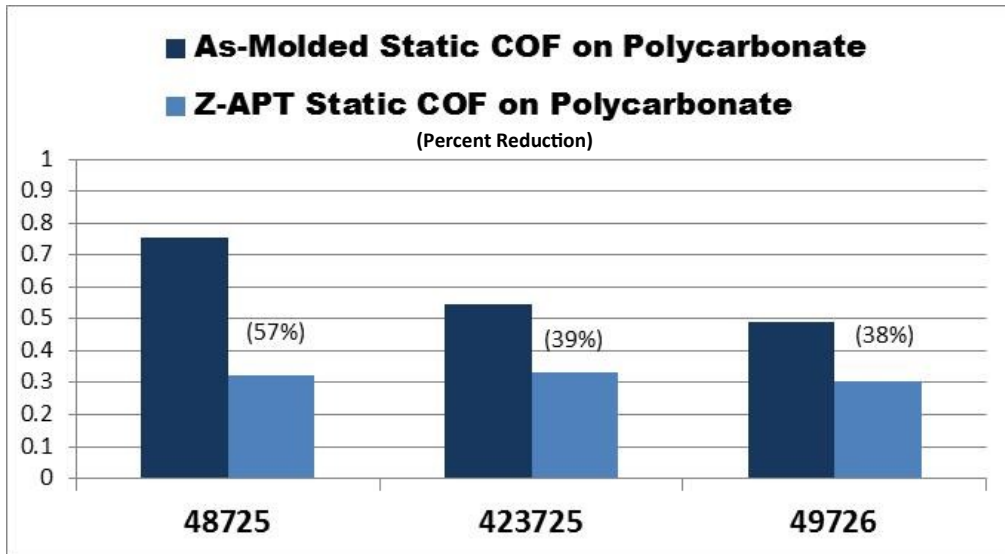
**Advanced Polymer Treatment**

Precision Associates manufactures a number of compounds that are suitable for use in medical applications requiring body or body fluid contact. These materials have been tested by independent laboratories or our material suppliers to assess their ability to meet requirements as defined by several standards organizations.

ISO 10993 is a 20 part standard developed to evaluate the effects of medical devices and their component materials on the body. Precision Associates compounds have been tested to meet the requirements for ISO 10993-5 (cytotoxicity) both "as molded" and with the Z-APT treatment applied.

ISO 10993-5 Materials			
Durometer 70	FKM	EPDM	Silicone
Color	White	White	Clear
Compound #	48725	423725	49726

Precision Associates' lab performed Coefficient of Friction testing on samples of the above ISO 10993-5 Materials on both polycarbonate and stainless steel surfaces. Those results are presented below.





# TECHNICAL BULLETIN

## Rubber Product Identification

There are several reasons why it may be important to consider Rubber Product Identification methods when designing seal applications: • In systems that seal toxic materials, it may be imperative that the proper seal material is installed. • More than one polymer type may be used in the same device that is designed to work with a number of fluids. • The age of a rubber product may be important to know when installing a seal that might have been inventoried for some time. • Trouble shooting failed systems can be made easier when the seals are properly identified. • Finally, knowing which cavity a molded part was produced in may be helpful in reducing problems resulting from variation between cavities in a mold.

PAI uses several methods to identify molded rubber parts. The best method for a specific application will likely depend on the type of seal and the information required. O-Rings, for example, do not lend themselves well to most methods involving lettering because the entire part is often a sealing surface which must remain pristine. Items like U-cups and other types of lip seals usually have several areas that may be used to apply markings.

This bulletin explores the different methods we employ to mark parts. In addition to the methods described here, ask us about character printing and individual packaging. End users will need to decide which method is most appropriate for their application.

### Color Coding

Color coding is used most often to distinguish between different polymers or compounds when a manufacturer requires the same size manufactured in a variety of materials

Painted marks are applied as dots or lines to identify different compounds. Most manufactures develop their own systems using different colors and numbers of markings.



Custom Seals with Three Red Dots

T-Coat™ PTFE coatings in varied colors may be applied to the seal surface. In addition to providing identification, T-Coat™ coatings provide lubrication; beneficial for automated assembly operations.



PAI offers six T-Coat™ colors

Colored Compounds may be used to distinguish different compounds or different (end user) products. The items at right are all made from essentially the same compound - only their color is different. The manufacturer uses the colors to identify product model sizes.



Custom Seals made using three colors to identify end user products



3800 North Washington Ave.  
Minneapolis, MN 55412-2142

Toll Free: 1-800-394-6590  
612-333-7464  
Sales: 612-334-9190  
FAX: 612-342-2417

[info@PrecisionAssoc.com](mailto:info@PrecisionAssoc.com)

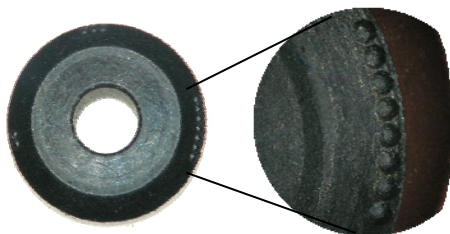
## Mold Engraving

Individual Characters may be engraved into rubber product molds. Typical uses are for part numbers, or cavity identification.

This method has can be done at a reasonable cost, depending on the size of the item and where the marking is desired. Lettering is generally raised on the part, inset lettering is typically more expensive. Cavity inserts may be used to change lettering for different P/Ns, but these inserts tend to leave lines on the product. The location of engraving can be critical, as it will affect the seal if in the wrong location. O-Rings, for example are not a good choice for engraving due to their application.



Actual Size  
Viton® &  
Buna N Seals



Very tiny parts may preclude standard mold engraving methods. For precise applications requiring that mold cavities be identified, PAI may be able to use coded micro dots to identify individual cavities.

Custom Seal with Micro Dot Cavity Marking

## Laser Engraving

Laser Engraving provides the widest variety of options for product marking. Part Numbers, Batch Numbers, Cure Dates, Expiration Dates, Logos or any number of things can be permanently engraved into an item.

Unlike most mold engraving, laser engraving does not extend out from the parts, allowing heel of lip seals to be marked.



ASTM Polymer Designation engraved into Piston Cups to prevent mix-up in assembly



Detailed P/N  
Laser Engraved



Batch Number Laser  
Engraved into Heel of U-Cup

**After 57 years in the rubber business, we've learned to be flexible. We'll bend over backwards to design custom solutions that meet your needs *precisely*. PAI is the company you can trust for rubber seal solutions **YOUR WAY!****

- Over 1,000 different compounds
- More than 2,400 O-Ring Sizes
- In-house Mold Shop
- Custom Molding
- 99% on-time delivery
- ISO 14644-1 Class 7 Clean Room

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



# Technical Bulletin Shipping Card

The standard procedure for Precision Associates is to include a unique Shipping Card in each individual package of product shipped. Over the years this Shipping Card has evolved to include a number of items useful to many customers. Not all of them are immediately obvious to casual viewers of these cards, so we decided to highlight them in this bulletin.

Counting very small rubber parts is always a challenge. Some of the features on our cards were developed to help us and our customers trouble shoot counting issues. Others are intended to assist your receiving process. A typical Shipping Card is shown below with the full descriptions of each section described on the back of this page.

1	I.M.A. Customer			8
2	Purchase Order No ABC54321	Packed By MCL	Scale Data Scale 108	
3	Part Number 123-156/789	Rev C	Mfg Lot Control 357257 1	9
4	Quantity 1,000	Batch No 61945F	Cure Date 1Q15	10
5	Product Description O-Ring, 1/16 C/S x 1/4 ID x 3/8 OD 70 Duro Black FDA Buna N	FDA RoHS Compliant	ADI FREE REACH Compliant	11
6	1-010 3744 04/06/15 08:32	COO: US	SO 524497 1	12
7	524497 01 001 61945F 01 Precision Associates, Inc. 3800 Washington Ave N Minneapolis, MN 55412-2142 (612) 334-9190 (800) 394-6590			13

All Bar Codes on the  
Shipping Card are  
Extended 3 of 9





3800 North Washington Ave.  
Minneapolis, MN 55412-2142

Toll Free: 1-800-394-6590

612-333-7464

Sales: 612-334-9190

FAX: 612-342-2417

[info@PrecisionAssoc.com](mailto:info@PrecisionAssoc.com)

- 1 Our customer's name as listed for the billing location.
- 2 Our customer's PO Number in alpha characters and 3 of 9 bar code
- 3 Customer Part Number and Revision in alpha characters, plus P/N in 3 of 9 bar code
- 4 Product Quantity billed against PO in Alpha & 3 of 9 bar Code.

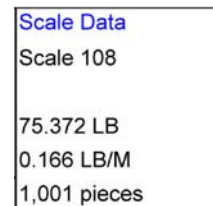


- 5 Precision Associates' Product Description. First line typically describes item type and dimensional information, while the 2nd line generally describes the product material.
- 6 Precision Associates Product Number plus Date and Time the item was packaged.
- 7 Precision Associates name address and telephone numbers

- 8 Initials of PAI employee that packaged the order and our Product Control ID. The Product Control ID is used to track every single operation performed in our factory on this specific lot of product.



- 9 Scale Data, including Scale No. used, Total Weight in lbs. the calculated weight of 1,000 parts, plus our count of the actual parts shipped.



- 10 PAI rubber compound Batch Number In alpha characters and bar code, plus The Quarter and Year in which the parts were cured—also alpha and bar coded.



- 11 Logos indicating certification or compliance to specifications or requirements. Logos shown on this card are for FDA Compliance, Animal Derived Ingredient Free (ADI), RoHS and REACH compliance . Additional logos Include Underwriters Laboratories (UL) certification, NSF 61 approval, 3-A Certification and EC1935 Compliance.



- 12 Precision Associates Sales Order and Order line number, Country of Origin, plus a code indicating the area packed parts were stored at PAI immediately prior to shipment.

- 13 A unique, traceable identifier code for each package is displayed in bar code and alpha characters.

[www.PrecisionAssoc.com](http://www.PrecisionAssoc.com)



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**612-333-7464**

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***info@PrecisionAssoc.com***

## Ask us about our complete line of product literature:

- ***Standard O-Rings***
- ***Special Size O-Rings***
- ***U-Cups***
- ***V-Rings***
- ***Rod Wipers***
- ***X-Rings***
- ***8-Rings™***
- ***Multiseal® Low Friction Seals***
- ***Kurv-Bak™ Hard Rubber Backup Rings***
- ***Rubber Balls***
- ***Medical Seals***
- ***Custom Moldings***
- ***Machined Engineered Plastics***

After more than 60 years in the rubber business, we've learned to be flexible. We'll bend over backwards to design custom solutions that meet your needs *precisely*. PAI is the company you can trust for seal solutions ... ***YOUR WAY!***

- Over 1,000 different compounds
- Custom Molding
- More than 2,600 O-Ring Sizes
- 99% on-time delivery
- On-Site Mold Shop
- ISO 14644-1 Class 7 Clean Room