About Seal Science

Seal Science's success is based on our design and manufacturing experitse in rubber and plastics with special emphasis on materials, seals and seal systems. Seal Science's engineering, molding, stamping, machining, and specialty fabrication operations can provide you with quality products on a timely basis. We've got your solutions, call Seal Science 1-800-576-SEAL.

How To Use This Catalog

Seal Science has endeavored, in this catalog, to provide the design engineer and purchaser with information about its standard O-rings and compounds, ordering instructions, and data on most widely used seal glands.

Standard AS-568 O-ring sizes are tabulated in Table IV, "Seal Science O-Ring Dimensions and Gland Sizes for Industrial Static Seals". The nominal seal section widths are:

DASH NO.	CROSS SECTION
-0XX	1/16"
-1XX	3/32"
-2XX	1/8"
-3XX	3/16"
-4XX	1/4"

Additionally, Industrial Reciprocating Seal glands are shown in Table V and Mil-G-5514-F glands are shown in Table VI. In most cases the O-ring sizes shown in Table IV can be used dash number - for dash number in the Table V and Table VI glands.

Sections following describe materials available in Seal Science O-rings, design and assembly recommendations, and ordering imformation. An Engineering Applications Form is included as well as a list of other Seal Science seals.

Materials

Table I shows a partial list of standard Seal Science elastomer and thermoplastic compounds with their recommended area of application. Table II shows a list of various elastomeric specifications for which Seal Science has compounds. Table III Shows plastic compounds. You may specify your Seal Science O-ring using any of the elastomeric compounds or thermoplastic (including TFE) compounds. When using TFE O-rings, use the TFE static O-ring gland recommendations shown in Figure 2. For any other thermoplastic O-ring compounds, always contact Seal Science for gland recommendations.

Seal Science O-Rings

The O-ring is the simplest, most economical, easiest installed, and most effective of all seals. The design engineer should consider the O-ring first for sealing applications and use other alternatives after the limitations of an O-ring disqualify it due to inability to withstand the environment or due to excessive related friction. Seal products shown on page 22 can often be used in these situations. Seal Science manufactures and maintains an inventory of the finest quality O-rings in all standard sizes and in most special sizes.

In dealing with wide-ranging applications varying from the simplest to the most demanding, Seal Science has developed a strong expertise in the specification and molding of O-ring elastomeric compounds as well as the machining of O-rings from TFE and high-strength engineering thermoplastics.

The versatile O-ring is a good choice for most sealing requirements. Recently new compounds have been developed that extend the temperature range, fluid compatibility, and reduce friction. Seal Science engineers are ready to assist you in specification and rapidly furnish products that meet your needs.

Design and Assembly Recommendations

O-ring glands: This catalog shows gland detail for Industrial and Military O-ring glands in Tables IV, V, and VI. Glands recommendations for TFE O-rings are shown in Figure 2. Avoid sharp edges in gland machining. Cross-drilled parts or any discontinuty in the sealing surface should not be used. Hardened wear surfaces are preferred (Rc 40-48 for moderate pressures, Rc 55-60 for high pressures). Contact Seal Science for recommendations when softer surfaces must be employed. 8 - 16 micro-inch finishes are preferred on dynamic surfaces; 32 micro-inch on static surfaces.

Assembly/Lubrication: No special assembly tools are needed for O-rings but lubrication prior to installation is recommended. Contact Seal Science for specific lubrication recommendations. O-rings can be stretched into external grooves and folded into internal grooves. Stretching in excess of 50% should be avoided.

Cleanliness: Cleanliness is essential for proper O-ring seal action and long life. Filtering systems should be used in the fluid systems if dynamic installations when feasible.

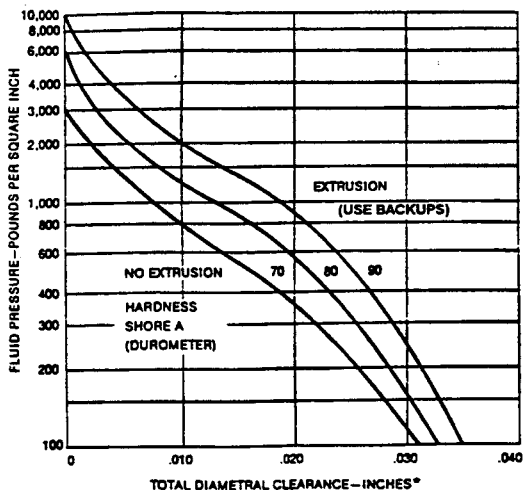
Friction and Pressure

Friction is an important factor when considering the use of O-rings and their material specifications. Breakout friction is higher than running friction and can yield coefficients in excess of 1.0. Seal Science can assist the designer in evaluating the O-ring friction load or by furnishing newer low friction O-ring compounds.

Pressure causes the O-ring to move to the opposite side of the groove and distort. At pressures less than 1500 psi O-rings should function adequately in well-designed glands. For a well-designed gland the dimension "E" should be honored (Tables IV, V and VI). At pressure in excess of 1500 psi backup rings are often necessary. With high pressure or excessive "E" dimensions O-ring extrusion can occur which will destroy the seal.

Seal Science will assist in the specification of and furnish backup rings if necessary due to high pressure and/or excessive "E" (extrusion gap) dimension. Figure 1 below shows the relation between clearance, pressure, O-ring hardness, and the need for backup rings.

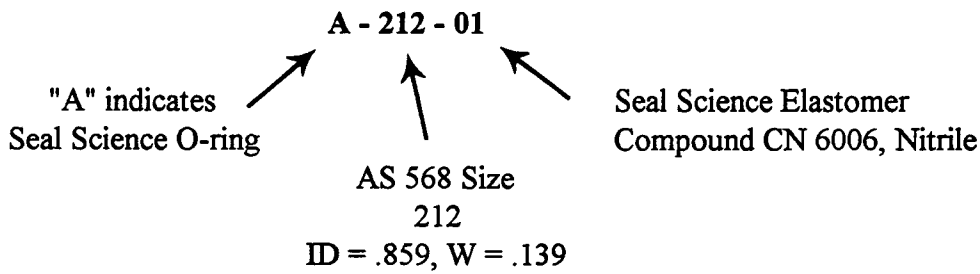
FIGURE 1
EXTRUSION GAP LIMITS FOR O-RINGS



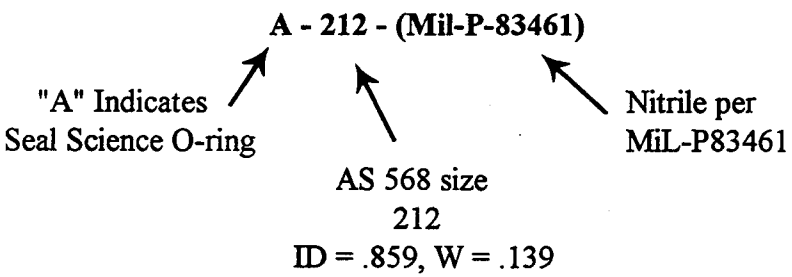
HOW TO SPECIFY SEAL SCIENCE O-RINGS

1) If system pressure exceeds 1500 psi, contact Seal Science for recommendations.
2) Choose a standard compound or specification compound that meets your need (See Table I, II, II(a) or III).
3) Choose a size which meets your need from Table IV (remember, your O-ring dash number is normally the same, dash-for-dash for use in Tables IV, Table V or Table VI glands).
4) You may now order your Seal Science O-ring in either of three ways; by Seal Science compound number (Table I), or by other material specification (Table II), or by direct Military Specification (Table II(a)).

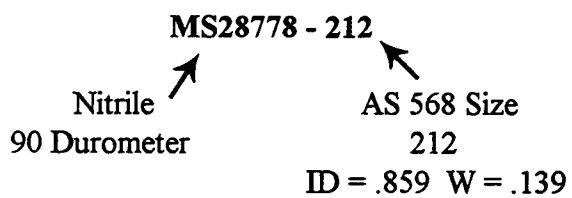
4a) Seal Science Compound:



4b) Other Material Specification:



4c) Direct Military Specification. Choose a compound from Table II(a) and a size from Table IV.



Should your design require a special size, or compound other than those tabulated, call Seal Science at 1-800-576-SEAL for assistance. Always contact the factory for assistance when using thermoplastic O-rings other than TFE (Figure 2) or when your pressure exceeds 1500 psig.

POLYMER DESCRIPTION AND GENERAL INFORMATION CHART 3

	Material	Chemical Group	Generally Resistant to	Generally Attacked by
		Thermosets		
NR, IR	Natural Rubber. Isoprene	Polyisoprene	Most moderate wet or dry chemicals, organic acids, alcohols, ketones, aldehydes	Ozone, strong acids, fats, oils, greases, most hydrocarbons
SBR, BR	Butadiene, Styrene butadiene	Styrene, Butadiene copolymer, Polybutadiene	Similar to Natural Rubber	Similar to natural rubber
IIR	Butyl	Isobutylene, Isoprene polymer	Water and steam	Petroleum solvents, coal, tar, solvents, aromatic hydrocarbons
EPM, EPDM	Ethylene Propylene	Ethylene Propylene copolymer and terpolymer	Water, steam and brake fluids	Mineral oils and solvents, aromatic hydrocarbons
NBR	Nitrile	Butadiene, Acrylonitrile copolymer	Many hydrocarbons, fats, oils, greases, hydraulic fluids, chemicals	Ozone, ketones, esters, aldehydes, chlorinated and nitro hydrocarbons
HNBR	Hydrogenated Nitrile	Butadiene, Acrylonitrile copolymer	Similar to NBR but with improved chemical resistance and higher service temperature	Ozone, ketones, esters, aldehydes, chlorinated and nitro hydrocarbons
CO, ECO	Epichlorohydrin	Epichlorohydrin polymer and copolymer	Similar to NBR with ozone resistance	Ketones, esters, aldehydes, chlorinated and nitro hydrocarbons
CR	Neoprene®	Chloroprene polymer	Moderate chemicals and acids, ozone, fats, greases, many oils and solvents	Strong oxidizing acids, ketones, esters, chlorinated, aromatic and nitro hydrocarbons
CSM	Hypalon®	Chlorosulfonated polyethylene	Similar to Neoprene with improved acid and ozone resistance	Concentrated oxidizing acids, esters, ketones, chlorinated, aromatic and nitro hydrocarbons
CM, CPE	Tyrin®	Chlorinated polyethylene	Similar to Neoprene with improved acid and ozone resistance	Concentrated oxidizing acids, esters, ketones, chlorinated, aromatic and nitro hydrocarbons
T	Polysulfide	Organic Polysulfide polymer	Ozone, oils, solvents, thinners, esters, ketones, aromatic hydrocarbons	Mercaptons, chlorinated and nitro hydrocarbons, esters, amines, hetercocyclics
SI, VQM	Silicone	Organic Silicone polymer	Moderate or oxidizing chemicals, ozone, concentrated sodium hydroxide	Many solvents, oils, concentrated acids, dilute sodium hydroxide
FSI, FVMQ	Fluorosilicone	Fluorinated organic Silicone polymer	Moderate or oxidizing chemicals, ozone, aromatics chlorinated solvents, bases	Brake fluids, hydrazine, ketones

POLYMER DESCRIPTION AND GENERAL INFORMATION CHART 3

	Material	Chemical Group	Generally Resistant to	Generally Attacked by
		Thermosets		
TFE/P	Tetrafluoroethylene-propylene	Fluorinated copolymer	Steam, amines and amine corrosion inhibitors, caustics, high pH media. wet sour gas, oil	Aromatic hydrocarbons, chlorinated solvents, ethers, limited in low temperatures
ACM	Polyacrylate	Copolymer of acrylic ester and acrylic halide	Ozone, extreme pressure, lubricants, hot oils, petroleum solvents, animal and vegetable fats	Water, alcohol, glycols, alkali, esters, aromatic hydrocarbons, halogenated hydrocarbons, phenol
FKM# 1	Fluoroelastomer	Standard fluorocarbon dipolymer 66% fluorine	All aliphatic, aromatic and halogenated hydrocarbons, acids, animal and vegetable oils	Ketones, low molecular weight esters and alcohols and nitrogen containing compounds
FKM# 2	Fluoroelastomer	Standard or special type fluorocarbon. Typically >66% fluorine	Same as FKM #1. Greater chemical resistance	Ketones, low molecular weight esters and nitrogen containing compounds
	Zalak®	Proprietary fluorocarbon	Greater resistance to acid, base, alcohol, amine and esters than FKM	Nitrogen containing compounds
FFKM	Perfluoroelastomer	Fully fluorinated fluorocarbon	Best fluid resistance of any elastomer	Fluorocarbon containing refrigerants cause minor effects
		Thermoplastics		
AU, EU	Urethane	Urethane polymer	Ozone, hydrocarbons, moderate chemicals, fats, oils and greases	Concentrated acids, esters, ketones, chlorinated and nitro hydrocarbons and hot water
PTFE	Polytetrafluoroethylene		Nearly inert	Metallic sodium, fluorocarbon containing refrigerants cause minor swelling
UHM W	Ultra High Molecular Weight	Polyethylene	Water, oils, weak acids, alcohols	Ethers, ozone, strong acids, toluene, turpentine, vinyl acetate and chlorinated solvents
PA	Nylon	Polyamide	Oils, esters, ketones hydrocarbons	Hydroscopic, acids and alcohols
PK		Polyketone		
PEEK	Polyetheretherketone		Alcohols, aldehydes, ketones, bases, esters, hydrocarbons, oils.	Strong acids, halogens, phenol and sodium

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TABLE II

WIDELY USED ELASTOMER SPECIFICATIONS

Seal Science compounds are available for nearly every military, aerospace, ASTM, SAE, automotive, petroleum industry and commercial specification. Most types, classes, and grades are available. Some of the most widely specified are listed below. They are arranged by agency and ordered numerically. Should you need information on any of the below listed specifications or require conformance to others not listed call Seal Science at 1-800-576-SEAL.

AMS SPECIFICATIONS	
Specification	**Elastomer Type**
AMS 3201	Nitrile
AMS 3205	Nitrile
AMS 3208	Neoprene
AMS 3209	Neoprene
AMS 3214	Nitrile
AMS 3215	Nitrile
AMS 3220	Neoprene
AMS 3227	Nitrile
AMS 3228	Nitrile
AMS 3238	Butyl
AMS 3241	Neoprene
AMS 3242	Neoprene
AMS 3301	Silicone
AMS 3302	Silicone
AMS 3303	Silicone
AMS 3304	Silicone
AMS 3305	Silicone
AMS 3307	Silicone
AMS 3326	Fluorosilicone
AMS 3327	Fluorosilicone
AMS 3305	Silicone
AMS 3307A	Silicone
AMS 3349	Silicone
AMS 3356A	Silicone
AMS 3357C	Silicone
AMS 7267	Silicone
AMS 7270	Nitrile
AMS 7271	Nitrile
AMS 7274	Nitrile
AMS 7276	Fluorocarbon
AMS 2777	Butyl
AMS 7278	Fluorocarbon
AMS 7279	Fluorocarbon
AMS 7280	Fluorocarbon

MIL SPECIFICATIONS	
Specification	**Elastomer Type**
MIL-P 5510	Nitrile
MIL-P 5315	Nitrile
MIL-P 5510	Nitrile
MIL-P 5516, CL B	Nitrile
MIL-R 6855C, CL 1	Nitrile
MIL-R 6855C, CL 2A/2B	Neoprene
MIL-R 7362, TYPE I	Nitrile
MIL-P 25732	Nitrile
MIL-R 25897	Fluorocarbon
MIL 25988, CL 1 GR 60	Fluorosilicone
MIL-R 83248	Fluorocarbon
MIL-P 83461	Nitrile
MIL-G 1149B, TYPE I CL 1	Neoprene
MIL-G 1149, TYPE 1 CL 5	Nitrile
MIL-G 1149B, TYPE II CL 1	Neoprene
MIL-G 1149B, TYPE II CL 3	Butyl
MIL-G 1149B, TYPE II CL 5	Nitrile

NAS SPECIFICATIONS	
Specification	*Elastomer Type*
NAS 1613, CL 1	Ethylene Propylene
NAS 1613, CL 2	Ethylene Propylene

MILITARY SPECIFICATIONS (General)	
Specification	*Elastomer Type*
ZZ-R-765B	Silicone

TABLE II(a)
MILITARY SPECIFICATION TABLE

STANDARD MILITARY COMPOUNDS					
O-RING SERIES	BASE POLYMER	DURO-METER	TEMPERATURE LIMITS	MILITARY SPECIFICATION	SERVICE
AN6227B AN6230B	NITRILE (BUNA N)	75	-65 to 225 / 250° F	MIL-P-5516 Class B	Air Force and Navy hydraulic fluid. MIL-H-5606
MS28775	NITRILE (BUNA N)	75	-65 TO 225 / 250°F	MIL-P-25732	
MS29512 MS29513	NITRILE (BUNA N)	70	-70 to 180 / 225°F	MIL-P-5315	Air Force and Navy aircraft fuel, JP-4, JP-5
MS29561 NAS617	NITRILE (BUNA N)	70	-55 to 180 / 225°F	MIL-R-7362 Type 1	Synthetic lubricants, MIL-L-7808
AN6290 MS28778	NITRILE (BUNA N)	90	-65 to 180 / 250°F	MIL-P-5510	Hydraulic oil, MIL-H-5606
M83248/1	Fluorocarbon Elastomer	75	-15 to 400 / 500°F	MIL-R-83248 CL 1	High Temperature fluid and compression set resistant
M83248/2	Fluorocarbon Elastomer	90	-15 to 400 / 500°F	MIL-R-83248 CL 2	High temperature fluid and compression set resistant
M25988/1	Fluoro- Silicone	70	-100 to 350 / 400°F	MIL-R-25988 CL 1 Gr. 70	Oil and fuel resistant
M25988/3	Fluoro- Silicone	60	-100 to 350 / 400°F	MIL-R-25988 CL 1 Gr. 60	Oil and fuel resistant
M25988/4	Fluoro- Silicone	80	-100 to 350 / 400°F	MIL-R-25988 CL 1 Gr. 80	Oil and fuel resistant

TABLE III
SEAL SCIENCE TFE/ENGINEERED PLASTIC COMPOUNDS (Note 1)

NUMBER CODE	SEAL SCIENCE COMPOUND	DESCRIPTION
80	SS9000	Virgin TFE for static seal application -80°F to +500°F (Note 2) (Note 3).
81	SS9010	Virgin TFE with wear resistant additive -80°F to +500°F.
82	SS9020	TFE/glass compound for reduced cold flow.
83	SS9022	TFE/carbon-graphite compound. Low friction and stiction - long wearing.
84	SS9023	TFE/carbon compound for potable water use.
85	SS9024	Long wearing TFE compound for use on soft surfaces.
86	SS9025	Same as SS9024 with additional additive for reduced wear.
87	SS9026	TFE/bronze compound for long wear, high PV, low cold flow.
88	SS9030	Abrasion resistant, UHMW compound for applications to 120°F.
89	SS9033	Reinforced nylon compound for high strength, low wear for applications to 120°F.
90	SS9036	Same type as number 89 with greater temperature stability.
91	SS9038	High strength temperature resistant PEEK™ (polyetheretherketone) compound for very high stress applications. Steam and radiation resistant.

NOTE:

1. These compounds are but a small sample of those available at Seal Science. Contact Seal Science for a compound that meets your specific needs.

2. All TFE-based compounds have a general useable range form -80°F to +500°F. Specific compound choice should be based on an analysis as stresses and life requirements. Contact Seal Science at 1-800-576-7325 for assistance.

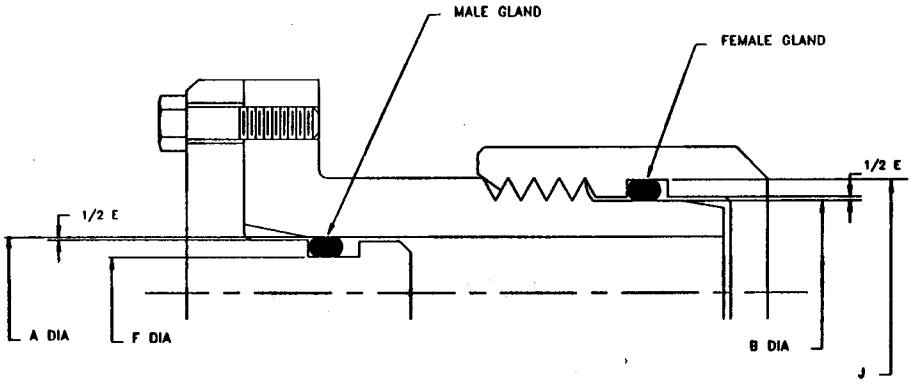
3. Compound SS9000 is the usual choice for TFE O-rings. It will be furnished for all TFE O-rings unless other compounds are specified.

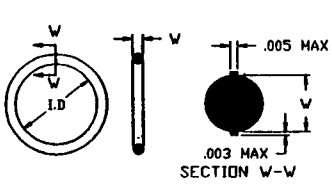
SEAL SCIENCE

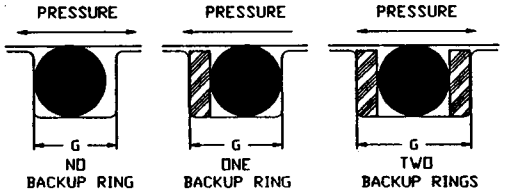
TABLE IV

DESIGN CHART FOR STATIC O-RING GLANDS
GLAND CODE S

GLAND AND O-RING DESIGNATION	O-RING CROSS SECTION W		O-RING SQUEEZE		E	G			R
	Nominal	Actual	ACTUAL	%	DIAMETRAL CLEARANCE (MAX)	GROOVE WIDTH NO BACKUP RINGS	GROOVE WIDTH ONE BACKUP RING	GROOVE WIDTH TWO BACKUP RINGS	GROOVE RADIUS
004 through 050	1/16	.070 ±.003	.015 to .023	22 to 32	.005	.093 to .098	.138 to .143	.205 to .210	.005 to .015
102 through 178	3/32	.103 ±.003	.017 to .025	17 to 24	.005	140 to 145	.171 to .176	.238 to .243	.005 to .015
201 through 284	1/8	.139 ±..004	.022 to .032	16 to 23	.006	.187 to .192	.208 to .213	.275 to .280	.010 to .025
309 through 395	3/16	.210 ±.005	.032 to .045	15 to 21	.006	.281 to .286	.311 to .316	.410 to .415	.020 to .035
425 through 475	1/4	.275 ±.006	.040 to .055	15 to 20	.007	.375 to .380	.408 to .413	.538 to .543	.020 to .035







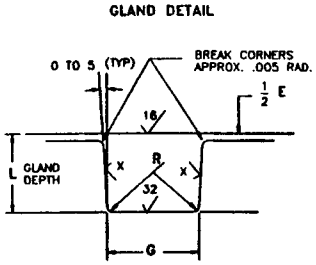


TABLE IV

GLAND DIMENSIONS AND O-RING SIZES FOR INDUSTRIAL STATIC SEALS (CODE S)

GLAND NUMBER AND O-RING SIZE	SEAL SCIENCE AND AS568 O-RING DIMENSIONS				A	J	B	F
					BORE DIA. (male gland)	GROOVE DIA. (female gland)	TUBE OD (female gland)	GROOVE DIA. (male gland)
	ID	±	W	Mean OD (Ref)	+.002 -.000	+.002 -.000	+.000 -.002	+.000 -.002
001	.029	.004	.040	.109	.105	.101	.040	.044
002	.042	.004	.050	.142	.138	.132	.053	.059
003	.056	.004	.060	.176	.172	.162	.067	.077
004	.070	.005		.210	.206	.181	.081	.106
005	.101	.005		.241	.237	.212	.112	.137
006	.114	.005		.254	.250	.225	.125	.150
007	.145	.005		.285	.281	.256	.156	.181
008	.176	.005		.316	.312	.287	.187	.212
009	.208	.005		.348	.343	.318	.215	.243
010	.239	.005		.379	.375	.350	.250	.275
011	.301	.005		.441	.437	.412	.312	.337
012	.364	.005		.504	.500	.475	.375	.400
013	.426	.005		.566	.562	.537	.437	.462
014	.489	.005		.629	.625	.600	.500	.525
015	.551	.007		.691	.687	.662	.562	.587
016	.614	.009		.754	.750	.725	.625	.650
017	.676	.009		.816	.812	.787	.687	.712
018	.739	.009		.879	.875	.850	.750	.775
019	.801	.009		.941	.937	.912	.812	.837
020	.864	.009		1.004	1.000	.975	.875	.900
021	.926	.009		1.066	1.062	1.037	.937	.962
022	.989	.010	.070	1.129	1.125	1.100	1.000	1.025
023	1.051	.010	±.003	1.191	1.187	1.162	1.062	1.087
024	1.114	.010		1.254	1.250	1.225	1.125	1.150
025	1.176	.011		1.316	1.312	1.287	1.187	1.212
026	1.239	.011		1.379	1.375	1.350	1.250	1.275
027	1.301	.011		1.441	1.437	1.412	1.312	1.337
028	1.364	.013		1.504	1.500	1.475	1.375	1.400
029	1.489	.013		1.629	1.625	1.600	1.500	1.525
030	1.614	.013		1.754	1.750	1.725	1.625	1.650
031	1.739	.015		1.879	1.875	1.850	1.750	1.775
032	1.864	.015		2.004	2.000	1.975	1.875	1.900
033	1.989	.018		2.129	2.125	2.100	2.000	2.025
034	2.114	.018		2.254	2.250	2.225	2.125	2.150
035	2.239	.018		2.379	2.375	2.350	2.250	2.275
036	2.364	.018		2.504	2.500	2.475	2.375	2.400
037	2.489	.018		2.629	2.625	2.600	2.500	2.525
038	2.614	.020		2.754	2.750	2.725	2.625	2.650
039	2.739	.020		2.879	2.875	2.850	2.750	2.775
040	2.864	.020		3.004	3.000	2.975	2.875	2.900
041	2.989	.024		3.129	3.125	3.100	3.000	3.025
042	3.239	.024		3.379	3.375	3.350	3.250	3.275
043	3.489	.024		3.629	3.625	3.600	3.500	3.525
044	3.739	.027		3.879	3.875	3.850	3.750	3.775
045	3.989	.027	.070	4.129	4.123	4.100	4.000	4.025
046	4.239	.030	±.003	4.379	1.375	4.350	4.250	4.275
047	4.489	.030		4.629	4.625	4.600	4.500	4.525
048	4.739	.030		4.879	4.875	4.850	4.750	4.775
049	4.989	.037		5.129	5.125	5.100	5.000	5.025
050	5.239	.037		5.379	5.375	5.350	5.250	5.275
102	.049	.005		.255	.247	.224	.062	.085
103	.081	.005		.287	.278	.256	.094	.116
104	.112	.005		.318	.310	.287	.125	.148
105	.143	.005		.349	.342	.318	.156	.180
106	.174	.005		.380	.374	.349	.187	.212
107	.206	.005		.412	.405	.381	.219	.243
108	.237	.005		.443	.437	.412	.250	.275
109	.299	.005		.505	.500	.474	.312	.338
110	.362	.005		.568	.562	.537	.375	.400
111	.424	.005		.630	.625	.599	.417	.463
112	.487	.005		.693	.687	.662	.500	.525
113	.549	.007		.755	.750	.724	.562	.588
114	.612	.009		.818	.812	.787	.625	.650
115	.674	.009		.880	.875	.849	.687	.713
116	.737	.009		.943	.937	.912	.750	.775
117	.799	.010		1.005	1.000	.974	.812	.838
118	.862	.010		1.068	1.052	1.037	.875	.900
119	.924	.010	.103	1.130	1.125	1.099	.937	.963
120	.987	.010	±.003	1.193	1.187	1.162	1.000	1.025
121	1.049	.010		1.255	1.250	1.224	1.062	1.088
122	1.112	.010		1.318	1.312	1.287	1.125	1.150
123	1.174	.012		1.380	1.375	1.349	1.187	1.213
124	1.237	.012		1.443	1.437	1.412	1.250	1.275

TABLE IV
GLAND DIMENSIONS AND O-RING SIZES FOR INDUSTRIAL STATIC SEALS (CODE S)

GLAND NUMBER AND O-RING SIZE	SEAL SCIENCE AND AS568 O-RING DIMENSIONS				A	J	B	F
					BORE DIA. (male gland)	GROOVE DIA. (female gland)	TUBE OD (female gland)	GROOVE DIA. (male gland)
	ID	±	W	Mean OD (Ref)	+.002 -.000	+.002 -.000	+.000 -.002	+.000 -.002
125	1.299	.012		1.505	1.500	1.474	1.312	1.338
126	1.362	.012		1.568	1.562	1.537	1.375	1.400
127	1.424	.012		1.630	1.625	1.599	1.437	1.463
128	1.487	.012		1.693	1.687	1.662	1.500	1.525
129	1.549	.015		1.755	1.750	1.724	1.562	1.588
130	1.612	.015		1.818	1.812	1.787	1.625	1.650
131	1.674	.015		1.880	1.875	1.849	1.687	1.713
132	1.737	.015		1.943	1.937	1.912	1.750	1.775
133	1.799	.015		2.001	2.000	1.974	1.812	1.838
134	1.862	.015		2.068	2.062	2.037	1.875	1.900
135	1.925	.017		2.131	2.125	2.099	1.937	1.963
136	1.987	.017		2.193	2.187	2.162	2.000	2.025
137	2.050	.017		2.256	2.250	2.224	2.062	2.088
138	2.112	.017		2.318	2.312	2.287	2.125	2.150
139	2.175	.017		2.381	2.375	2.349	2.187	2.213
140	2.237	.017		2.443	2.437	2.412	2.250	2.275
141	2.300	.020		2.506	2.500	2.474	2.312	2.338
142	2.362	.020		2.568	2.562	2.537	2.375	2.400
143	2.425	.020		2.631	2.625	2.599	2.437	2.463
144	2.487	.020		2.693	2.687	2.662	2.500	2.525
145	2.550	.020		2.756	2.750	2.724	2.562	2.588
146	2.612	.020		2.818	2.812	2.787	2.625	2.650
147	2.675	.022		2.881	2.875	2.849	2.687	2.713
148	2.737	.022		2.943	2.937	2.912	2.750	2.775
149	2.800	.022		3.006	3.000	2.941	2.812	2.838
150	2.862	.022		3.068	3.062	3.037	2.875	2.900
151	2.987	.024		3.193	3.187	3.162	3.000	3.025
152	3.237	.024		3.443	3.437	3.412	3.250	3.275
153	3.487	.024		3.693	3.687	3.662	3.500	3.525
154	3.737	.028	.103	3.943	3.937	3.912	3.750	3.775
155	3.987	.028	±.003	4.193	4.187	4.162	4.000	4.025
156	4.237	.030		4.443	4.437	4.412	4.250	4.275
157	4.487	.030		4.693	4.687	4.662	4.500	4.525
158	4.737	.030		4.943	4.937	4.912	4.750	4.775
159	4.987	.035		5.193	5.187	5.162	5.000	5.025
160	5.237	.035		5.443	5.437	5.412	5.250	5.275
161	5.487	.035		5.693	5.687	5.662	5.500	5.525
162	5.737	.035		5.943	5.937	5.912	5.750	5.775
163	5.987	.035		6.193	6.193	6.162	6.000	6.025
164	6.237	.040		6.443	6.443	6.412	6.250	6.275
165	6.487	.040		6.693	6.693	6.662	6.500	6.525
166	6.737	.040		6.943	6.943	6.912	6.750	6.775
167	6.987	.040		7.193	7.193	7.162	7.000	7.025
168	7.237	.045		7.443	7.443	7.412	7.250	7.275
169	7.487	.045		7.493	7.693	7.662	7.500	7.525
170	7.737	.005		7.943	7.943	7.912	7.750	7.775
171	7.987	.045		8.193	8.193	8.162	8.000	8.025
172	8.237	.050		8.443	8.443	8.412	8.250	8.275
173	8.487	.050		8.693	8.693	8.662	8.500	8.525
174	8.737	.050		8.943	8.943	8.912	8.750	8.775
175	8.987	.050		9.193	9.193	9.162	9.000	9.025
176	9.237	.055		9.443	9.443	9.412	9.250	9.275
177	9.487	.055		9.693	9.693	9.662	9.500	9.525
178	9.737	.055		9.943	9.943	9.912	9.750	9.775
201	.171	.005	.139	.449	.437	.409	.187	.215
202	.234	.005	±.004	.512	.500	.472	.250	.278
203	.296	.005		.574	.562	.534	.312	.340
204	.359	.005		.637	.625	.597	.375	.403
205	.421	.005		.699	.687	.659	.437	.465
206	.484	.005		.762	.750	.722	.500	.528
207	.546	.007		.824	.812	.784	.562	.590
208	.609	.009		.887	.875	.847	.625	.653
209	.671	.009		.949	.937	.909	.687	.715
210	.734	.010		1.012	1.000	.972	.750	.778
211	.796	.010		1.074	1.062	1.034	.812	.840
212	.859	.010		1.137	1.125	1.097	.875	.903
213	.921	.010		1.199	1.187	1.159	.937	.965
214	.984	.010		1.262	1.250	1.220	1.000	1.028
215	1.046	.010		1.324	1.312	1.284	1.062	1.090
216	1.109	.012		1.387	1.375	1.347	1.125	1.153
217	1.171	.012		1.449	1.437	1.409	1.187	1.215
218	1.234	.012		1.512	1.500	1.472	1.250	1.278
219	1.296	.012		1.574	1.562	1.534	1.312	1.340

TABLE IV
GLAND DIMENSIONS AND O-RING SIZES FOR INDUSTRIAL STATIC SEALS (CODE S)

GLAND NUMBER AND O-RING SIZE	SEAL SCIENCE AND AS568 O-RING DIMENSIONS				A	J	B	F
					BORE DIA. (male gland)	GROOVE DIA. (female gland)	TUBE OD (female gland)	GROOVE DIA. (male gland)
	ID	±	W	Mean OD (Ref)	+.002 -.000	+.002 -.000	+.000 -.002	+.000 -.002
220	1.359	.012	.139	1.637	1.625	1.597	1.375	1.403
221	1.421	.012	±.004	1.700	1.687	1.659	1.437	1.465
222	1.484	.015		1.762	1.750	1.722	1.500	1.528
223	1.609	.015		1.887	1.875	1.847	1.625	1.653
224	1.734	.015		2.012	2.000	1.972	1.750	1.778
225	1.859	.015		2.137	2.125	2.097	1.875	1.903
226	1.984	.018		2.262	2.250	2.222	2.000	2.028
227	2.109	.018		2.387	2.375	2.347	2.125	2.153
228	2.234	.020		2.512	2.500	2.472	2.250	2.278
229	2.359	.020		2.637	2.625	2.597	2.375	2.403
230	2.484	.020		2.762	2.750	2.722	2.500	2.528
231	2.609	.020		2.887	2.875	2.847	2.625	2.653
232	2.734	.024		3.012	3.000	2.972	2.750	2.778
233	2.859	.024		3.137	3.125	3.097	2.875	2.903
234	2.984	.024		3.262	3.250	3.222	3.000	3.028
235	3.109	.024		3.387	3.375	3.347	3.125	3.153
236	3.234	.024		3.512	3.500	3.472	3.250	3.278
237	3.359	.024		3.637	3.625	3.597	3.375	3.403
238	3.484	.024		3.762	3.750	3.722	3.500	3.528
239	3.609	.028		3.887	3.875	3.847	3.625	3.653
240	3.734	.028		4.012	4.000	3.972	3.750	3.778
241	3.859	.028		4.137	4.120	4.097	3.875	3.903
242	3.984	.028		4.262	4.250	4.222	4.000	4.028
243	4.109	.028		4.387	4.375	4.347	4.125	4.153
244	4.234	.030		4.512	4.500	4.472	4.250	4.278
245	4.359	.030		4.637	4.625	4.597	4.375	4.403
246	4.484	.030		4.762	4.750	4.722	4.500	4.528
247	4.609	.030		4.887	4.875	4.847	4.625	4.653
248	4.734	.030		5.012	5.000	4.972	4.750	4.778
249	4.859	.035		5.137	5.125	5.097	4.875	4.903
250	4.984	.035		5.262	5.250	5.222	5.000	5.028
251	5.109	.035		5.387	5.375	5.347	5.125	5.153
252	5.234	.035		5.512	5.500	5.472	5.250	5.278
253	5.359	.035		5.637	5.625	5.597	5.375	5.403
254	5.484	.035		5.762	5.750	5.722	5.500	5.528
255	5.609	.035		5.887	5.875	5.847	5.625	5.653
256	5.734	.035		6.012	6.000	5.972	5.750	5.778
257	5.859	.035		6.137	6.125	6.097	5.875	5.903
258	5.984	.035		6.262	6.250	6.222	6.000	6.028
259	6.234	.040		6.512	6.500	6.472	6.250	6.278
260	6.484	.040		6.762	6.750	6.722	6.500	6.528
261	6.734	.040		7.012	7.000	6.967	6.750	6.778
262	6.984	.040		7.262	7.250	7.222	7.000	7.028
263	7.234	.045		7.512	7.500	7.472	7.250	7.278
264	7.484	.045		7.762	7.750	7.722	7.500	7.528
265	7.734	.045	.139	8.012	8.000	7.972	7.750	7.778
266	7.984	.045	±.004	8.262	8.250	8.222	8.000	8.028
267	8.234	.050		8.512	8.500	8.472	8.250	8.278
268	8.484	.050		8.762	8.750	8.722	8.500	8.528
269	8.734	.050		9.012	9.000	8.972	8.750	8.778
270	8.984	.050		9.262	9.250	9.222	9.000	9.028
271	9.234	.055		9.512	9.500	9.472	9.250	9.278
272	9.484	.055		9.762	9.750	9.722	9.500	9.528
273	9.734	.055		10.012	10.000	9.972	9.780	9.778
274	9.984	.055		10.262	10.250	10.220	10.000	10.028
275	10.484	.055		10.762	10.750	10.722	10.500	10.528
276	10.984	.065		11.262	11.250	11.222	11.000	11.028
277	11.484	.065		11.762	11.750	11.722	11.500	11.528
278	11.984	.065		12.262	12.250	12.222	12.000	12.028
279	12.984	.065		13.262	13.250	13.222	13.000	13.028
280	13.984	.065		14.262	14.250	14.222	14.000	14.028
281	14.984	.065		15.262	15.250	15.222	15.000	15.028
282	15.955	.075		16.233	16.250	16.222	16.000	16.028
283	16.955	.080		17.233	17.250	17.222	17.000	17.028
284	17.955	.085		18.233	18.250	18.222	18.000	18.028

TABLE IV

GLAND DIMENSIONS AND O-RING SIZES FOR INDUSTRIAL STATIC SEALS (CODE S)

GLAND NUMBER AND O-RING SIZE	SEAL SCIENCE AND AS568 O-RING DIMENSIONS				A	J	B	F
					BORE DIA. (male gland)	GROOVE DIA. (female gland)	TUBE OD (female gland)	GROOVE DIA. (male gland)
	ID	±	W	Mean OD (Ref)	+.002 -.000	.004 .000	+.000 -.002	+.000 -.004
309	.412	.005	.210 ±.005	.832	.812	.777	.437	.472
310	.475	.005		.985	.875	.840	.500	.535
311	.537	.007		.957	.937	.902	.562	.597
312	.600	.009		1.020	1.000	.965	.625	.660
313	.662	.009		1.082	1.062	1.027	.687	.722
314	.725	.010		1.145	1.125	1.090	.750	.785
315	.788	.010		1.207	1.187	1.152	.812	.847
316	.850	.010		1.270	1.250	1.215	.875	.910
317	.912	.010		1.332	1.312	1.277	.937	.972
318	.968	.010		1.395	1.375	1.340	1.000	1.035
319	1.037	.010		1.457	1.437	1.402	1.062	1.097
320	1.100	.012		1.520	1.500	1.465	1.125	1.160
321	1.162	.012		1.582	1.562	1.527	1.187	1.222
322	1.225	.012		1.645	1.625	1.590	1.250	1.285
323	1.287	.012		1.707	1.687	4.652	1.312	1.347
324	1.350	.012		1.770	1.750	1.715	1.375	1.410
325	1.475	.015		1.895	1.875	1.840	1.500	1.535
326	1.600	.015		2.020	2.000	1.965	1.625	1.660
327	1.725	.015		2.145	2.125	2.090	1.750	1.785
328	1.850	.015		2.270	2.250	2.215	1.875	1.910
329	1.975	.018		2.395	2.375	2.340	2.000	2.035
330	2.400	.018		2.520	2.500	2.465	2.125	2.160
331	2.225	.018		2.645	2.625	2.590	2.250	2.285
332	2.350	.018		2.770	2.750	2.715	2.375	2.410
333	2.475	.020		2.895	2.875	2.840	2.500	2.535
334	2.600	.020		3.020	3.000	2.965	2.625	2.660
335	2.725	.020		3.145	3.125	3.090	2.750	2.785
336	2.850	.020	.210 ±.005	3.270	3.250	3.215	2.875	2.910
337	2.975	.020		3.395	3.375	3.340	3.000	3.035
338	3.100	.024		3.520	3.500	3.465	3.125	3.160
339	3.225	.024		3.645	3.625	3.590	3.250	3.285
340	3.350	.024		3.770	3.750	3.715	3.375	3.410
341	3.475	.024		3.895	3.875	3.840	3.500	3.535
342	3.600	.028		4.020	4.000	3.965	3.625	3.660
343	3.725	.028		4.145	4.125	4.090	3.750	3.785
344	3.850	.028		4.270	4.250	4.215	3.875	3.910
345	3.975	.028		4.395	4.375	4.340	4.000	4.035
346	4.100	.028		4.520	4.500	4.465	4.125	4.160
347	4.225	.030		4.645	4.625	4.590	4.250	4.285
348	4.350	.030		4.770	4.750	4.717	4.375	4.410
349	4.475	.030		4.895	4.875	4.840	4.500	4.535
350	4.600	.030		5.020	5.000	4.965	4.625	4.660
351	4.725	.030		5.145	5.125	5.090	4.750	4.785
352	4.850	.030		5.270	5.250	5.125	4.875	4.910
353	4.975	.037		5.395	5.375	5.340	5.000	5.035
354	5.100	.037		5.520	5.500	5.465	5.125	5.160
355	5.225	.037		5.645	5.625	5.590	5.250	5.285
356	5.350	.037		5.770	5.750	5.715	5.375	5.410
357	5.475	.037		5.895	5.875	5.840	5.500	5.535
358	5.600	.037		6.020	6.000	5.965	5.625	5.660
359	5.725	.037		6.145	6.125	6.090	5.750	5.785
360	5.850	.037		6.270	6.250	6.215	5.875	5.910
361	5.975	.037		6.395	6.375	6.340	6.000	6.035
362	6.225	.040		6.645	6.625	6.590	6.250	6.285
363	6.475	.040		6.895	6.875	6.840	6.500	6.535
364	6.725	.040		7.145	7.125	7.090	6.750	6.785
365	6.975	.040		7.395	7.375	7.340	7.000	7.035
366	7.225	.045		7.645	7.625	7.590	7.250	7.285
367	7.475	.045		7.895	7.875	7.840	7.500	7.535
368	7.725	.045		8.145	8.125	8.090	7.750	7.785
369	7.975	.045		8.395	8.375	8.340	8.000	8.035
370	8.225	.050		8.645	8.625	8.590	8.250	8.285
371	8.475	.050		8.895	8.875	8.840	8.500	8.535
372	8.725	.050		9.145	9.125	9.090	8.750	8.785
373	8.975	.050		9.395	9.375	9.340	9.000	9.035
374	9.225	.055		9.645	9.625	9.590	9.250	9.285
375	9.475	.055		9.895	9.875	9.840	9.500	9.535
376	9.725	.055		10.145	10.125	10.090	9.750	9.785
377	9.975	.055	.210 ±.005	10.395	10.375	10.340	10.000	10.035
378	10.475	.060		10.895	10.875	10.840	10.500	10.535
379	10.975	.060		11.395	11.375	11.340	11.000	11.035
380	11.475	.065		11.895	11.875	11.840	11.500	11.535
381	11.975	.065		12.395	12.375	12.340	12.000	12.035

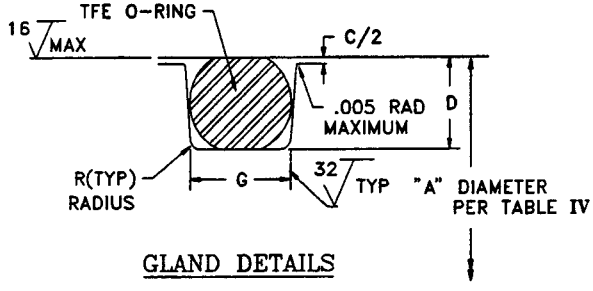
TABLE IV

GLAND DIMENSIONS AND O-RING SIZES FOR INDUSTRIAL STATIC SEALS (CODE S)

GLAND NUMBER AND O-RING SIZE	SEAL SCIENCE AND AS568 O-RING DIMENSIONS				A BORE DIA. (male gland)	J GROOVE DIA. (female gland)	B TUBE OD (female gland)	F GROOVE DIA. (male gland)
	ID	±	W	Mean OD (Ref)	+.002 -.000	.004 .000	+.000 -.002	+.000 -.004
382	12.975	.065		13.395	13.375	13.340	13.000	13.035
383	13.975	.070		14.395	14.375	14.340	14.000	14.035
384	14.975	.070		15.395	15.375	15.340	15.000	15.035
385	15.955	.075		16.375	16.375	16.340	16.000	16.035
386	16.955	.080		17.375	17.375	17.340	17.000	17.035
387	17.955	.085		18.375	18.375	18.340	18.000	18.035
388	18.955	.090		19.373	19.375	19.340	19.000	19.035
389	19.955	.095		20.373	20.375	20.340	20.000	20.035
390	10.955	.095		21.373	21.375	21.340	21.000	21.035
391	21.955	.100		22.373	22.375	22.340	22.000	22.035
392	22.940	.105		23.360	23.375	23.340	23.000	23.035
393	23.940	.110		24.360	24.375	24.340	24.000	24.035
394	24.940	.115		25.360	25.375	25.340	25.000	25.035
395	25.940	.120		26.360	26.375	26.340	26.000	26.035
425	4.475	.033		5.025	5.000	4.952	4.500	4.548
426	4.600	.033		5.150	5.125	5.077	4.625	4.673
427	4.725	.033	.275	5.275	5.250	5.202	4.750	4.798
428	4.850	.033	±.006	5.400	5.375	5.327	4.875	4.923
429	4.975	.037		5.525	5.500	5.452	5.000	5.048
430	5.100	.037		5.650	5.625	5.577	5.125	5.173
431	5.225	.037		5.775	5.750	5.702	5.250	5.298
432	5.350	.037		5.900	5.875	5.827	5.375	5.423
433	5.475	.037		6.025	6.000	5.952	5.500	5.548
434	5.600	.037		6.150	6.125	6.077	5.625	5.673
435	5.725	.037		6.275	6.250	6.202	5.750	5.798
436	5.850	.037		6.400	6.375	6.327	5.875	5.923
437	5.975	.037		6.525	6.500	6.452	6.000	6.048
438	6.225	.040		6.775	6.750	6.702	6.250	6.298
439	6.475	.040		7.025	7.000	6.952	6.500	6.548
440	6.725	.040		7.275	7.250	7.202	6.750	6.798
441	6.975	.040		7.525	7.500	7.452	7.000	7.048
442	7.225	.045		7.775	7.750	7.702	7.250	7.298
443	7.475	.045		8.025	8.000	7.952	7.500	7.548
444	7.725	.045		8.275	8.250	8.202	7.750	7.798
445	7.975	.045		8.525	8.500	8.452	8.000	8.048
446	8.475	.055		9.025	9.000	8.952	8.520	8.548
447	8.975	.055		9.525	9.500	9.452	9.000	9.048
448	9.475	.055		10.025	10.000	9.952	9.500	9.548
449	9.975	.055		10.525	10.500	10.452	10.000	10.048
450	10.475	.060		11.025	11.000	10.952	10.500	10.548
451	10.975	.060		11.525	11.500	11.452	11.000	11.048
452	11.475	.060		12.025	12.000	11.952	11.500	11.548
453	11.975	.060	.275	12.525	12.500	12.452	12.000	12.048
454	12.475	.060	±.006	13.025	13.000	12.952	12.500	12.548
455	12.975	.060		13.525	13.500	13.452	13.000	13.048
456	13.475	.070		14.025	14.000	13.952	13.500	13.548
457	13.975	.070		14.525	14.500	14.452	14.000	14.048
458	14.475	.070		15.025	15.000	14.952	14.500	14.548
459	14.975	.070		15.525	15.500	15.452	15.000	15.048
460	15.475	.070		16.025	16.000	15.952	15.500	15.548
461	15.955	.075		16.505	16.500	16.452	16.000	16.048
462	16.455	.075		17.005	17.000	16.952	16.500	16.548
463	16.955	.080		17.505	17.500	17.452	17.000	17.048
464	17.455	.085		18.005	18.000	17.952	17.500	17.548
465	17.955	.085		18.505	18.500	18.452	18.000	18.048
466	18.455	.085		19.005	19.000	18.952	18.500	18.548
467	18.955	.090		19.505	16.500	19.452	19.000	19.048
468	19.455	.090		20.005	20.000	19.952	19.500	19.548
469	19.955	.095		20.505	20.500	20.452	20.000	20.048
470	20.955	.095		21.505	21.500	21.452	21.000	21.048
471	21.956	.100		22.505	22.500	22.452	22.000	22.048
472	22.640	.105		23.490	23.500	23.452	23.000	23.048
473	23.640	.110		24.490	24.500	24.452	24.000	24.048
474	24.940	.115		25.490	25.500	25.452	25.000	25.048
475	25.940	.120		26.490	26.500	26.452	26.000	26.048

FIGURE 2

GLAND RECOMMENDATIONS FOR SEAL SCIENCE TFE O-RINGS



Dash No. per AS-568 (Table III)	Seal Science O-Ring Cross Sectional Diameter (in.)	Minimum Cross Section Squeeze (in.)	Gland Depth D (in.) +.000 -.005	Diametral Clearance C (in.)	Groove Radius R (in.)	Groove Width G (in.) ±.003
-0XX	0.070 ± .003	.005	.065	.005 max.	.005/.015	0.080
-1XX	0.103 ± .003	.005	.098	.005 max.	.005/.015	0.110
-2XX	0.139 ± .004	.006	.133	.006 max.	.010/.025	0.160
-3XX	0.210 ± .005	.008	.202	.006 max.	.020/.035	0.240
-4XX	0.275 ± .006	.010	.265	.007 max.	.020/.035	0.315

NOTES:

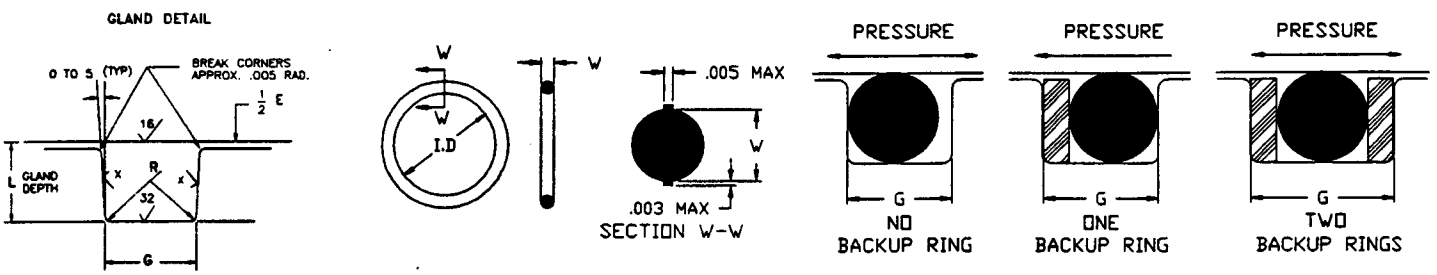
1. These gland recommendations employ reduced squeeze to account for the higher stiffness of TFE O-rings.
2. Stretch of TFE O-rings exceeding 10% is not recommended.
3. Contact Seal Science for gland recommendations where temperature exceeds 200°F, is less than –20°F, or pressure exceeds 2500 PSI.
4. For gland recommendations using other thermoplastic materials, contact Seal Science at 1-800-576-SEAL.
5. Contact Seal Science for Face Seal gland recommendations.

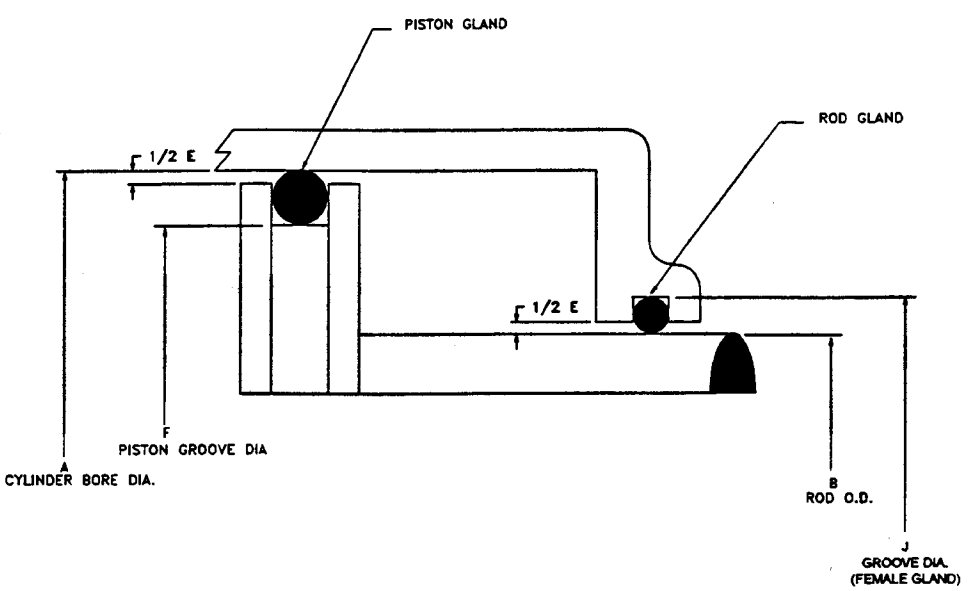
SEAL SCIENCE

TABLE V

DESIGN CHART FOR INDUSTRIAL DYNAMIC GLANDS
GLAND CODE D

	E	G			R
GLAND SIZE	DIAMETRAL CLEARANCE (MAX)	GROOVE WIDTH NO BACKUP RINGS	GROOVE WIDTH ONE BACKUP RING	GROOVE WIDTH TWO BACKUP RINGS	GROOVE RADIUS
006 through 012	.005	.093 to .098	.138 to .143	.205 to .210	.005 to .015
104 through 116	.005	140 to 145	.171 to .176	.238 to .243	.005 to .015
201 through 222	.006	.187 to .192	.208 to .213	.275 to .280	.010 to .025
309 through 349	.006	.281 to .286	.311 to .316	.410 to .415	.020 to .035
425 through 460	.007	.375 to .380	.408 to .413	.538 to .543	.020 to .035





SEAL SCIENCE

TABLE V

INDUSTRIAL DYNAMIC GLANDS (CODE D)

GLAND SIZE	A BORE DIA (CYLINDER)	J GROOVE DIA (FEMALE GLAND)	B ROD O.D.	F GROVE DIA (PISTON)
	+.002 -.000	+.002 -.000	+.000 -.002	+.000 -.002
006	.249	.234	.124	.139
007	.280	.265	.155	.170
008	.311	.296	.186	.201
009	.343	.328	.218	.233
010	.374	.359	.249	.264
011	.436	.421	.311	.326
012	.499	.484	.374	.389
104	.312	.300	.124	.136
105	.343	.331	.155	.167
106	.374	.362	.186	1.980
107	.406	.394	.218	.230
108	.437	.425	.249	.261
109	.499	.487	.311	.323
110	.562	.550	.374	.386
111	.624	.612	.436	.448
112	.687	.675	.499	.511
113	.749	.737	.561	.573
114	.812	.800	.624	.636
115	.874	.862	.686	.698
116	.937	.925	.749	.761
201	.437	.427	.185	.195
202	.500	.490	.248	.258
203	.562	.552	.310	.320
204	.625	.615	.373	.383
205	.687	.677	.485	.445
206	.750	.740	.198	.508
207	.812	.802	.560	.570
208	.875	.865	.623	.633
209	.937	.927	.685	.695
210	1.000	.990	.748	.758
211	1.062	1.052	.810	.820
212	1.125	1.115	.873	.883
213	1.187	1.177	.935	.945
214	1.250	1.240	.998	1.008
215	1.312	1.302	1.060	1.070
216	1.375	1.365	1.123	1.133
217	1.437	1.427	1.185	1.195
218	1.500	1.490	1.248	1.258
219	1.562	1.552	1.310	1.320
220	1.625	1.615	1.373	1.383
221	1.687	1.677	1.435	1.445
222	1.750	1.740	1.498	1.508
309	.812	.805	.435	.442
310	.875	.868	.498	.505
311	.937	.930	.560	.567
312	1.000	.993	.623	.630
313	1.062	1.055	.685	.692
314	1.125	1.118	.748	.755
315	1.187	1.180	.810	.817
316	1.250	1.243	.873	.880
317	1.312	1.305	.935	.942
318	1.375	1.368	.998	1.005
319	1.437	1.430	1.060	1.067
320	1.500	1.493	1.123	1.130
321	1.562	1.555	1.185	1.192
322	1.625	1.618	1.248	1.255
323	1.687	1.680	1.310	1.317
324	1.750	1.743	1.373	1.380

SEAL SCIENCE

TABLE V

INDUSTRIAL DYNAMIC GLANDS (CODE D)

GLAND SIZE	A BORE DIA (CYLINDER)	J GROOVE DIA (FEMALE GLAND)	B ROD O.D.	F GROVE DIA (PISTON)
	+.002 -.000	+.004 -.000	+.000 -.002	+.000 -.004
325	1.875	1.868	1.498	1.505
326	2.000	1.993	1.623	1.630
327	2.125	2.118	1.748	1.755
328	2.250	2.243	1.873	1.880
329	2.375	2.368	1.998	2.005
330	2.500	2.493	2.123	2.130
331	2.625	2.618	2.248	2.255
332	2.750	2.743	2.373	2.380
333	2.875	2.868	2.498	2.505
334	3.000	2.993	2.623	2.630
335	3.125	3.118	2.748	2.755
336	3.250	3.243	2.873	2.880
337	3.375	3.368	2.998	3.005
338	3.500	3.493	3.123	3.130
339	3.625	3.618	3.248	3.255
340	3.750	3.743	3.373	3.380
341	3.875	3.868	3.498	3.505
342	4.000	3.993	3.623	3.630
343	4.125	4.118	3.748	3.755
344	4.250	4.243	3.873	3.880
345	4.375	4.368	3.998	4.005
346	4.500	4.493	4.123	4.130
347	4.625	4.618	4.248	4.255
348	4.750	4.743	4.373	4.380
349	4.875	4.868	4.498	4.505
425	5.002	4.971	4.497	4.528
426	5.127	5.096	4.622	4.653
427	5.252	5.221	4.747	4.778
428	5.377	5.346	4.872	4.903
429	5.502	5.471	4.997	5.028
430	5.627	5.596	5.122	5.153
431	5.752	5.721	5.247	5.278
432	5.877	5.846	5.372	5.403
433	6.002	5.971	5.497	5.528
434	6.127	6.096	5.622	5.653
435	6.252	6.221	5.747	5.778
436	6.377	6.346	5.872	5.903
437	6.502	6.471	5.997	6.028
438	6.752	6.721	6.247	6.278
439	7.002	6.971	6.497	6.528
440	7.252	7.221	6.747	6.778
441	7.502	7.471	6.997	7.028
442	7.752	7.721	7.247	7.278
443	8.002	7.971	7.497	7.528
444	8.252	8.221	7.747	7.778
445	8.502	8.471	7.997	8.028
446	9.002	8.971	8.497	8.528
447	9.502	9.471	8.997	9.028
448	10.002	9.971	9.497	9.528
449	10.502	10.471	9.997	10.028
450	11.002	10.971	10.497	10.528
451	11.502	11.471	10.997	11.028
452	12.002	11.971	11.497	11.528
453	12.502	12.471	11.997	12.028
454	13.002	12.971	12.497	12.528
455	13.502	13.471	12.997	13.028
456	14.002	13.971	13.497	13.528
457	14.502	14.471	13.997	14.028
458	15.002	14.971	14.497	14.528
459	15.502	15.471	14.997	15.028
460	16.002	15.971	15.497	15.528

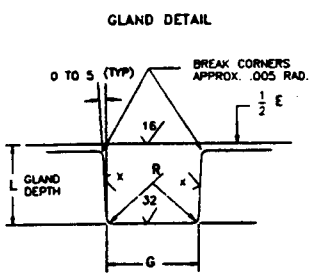
SEAL SCIENCE

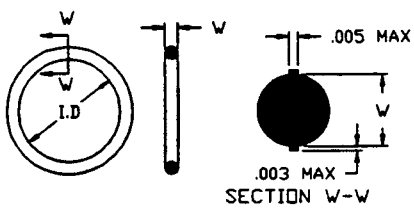
TABLE VI

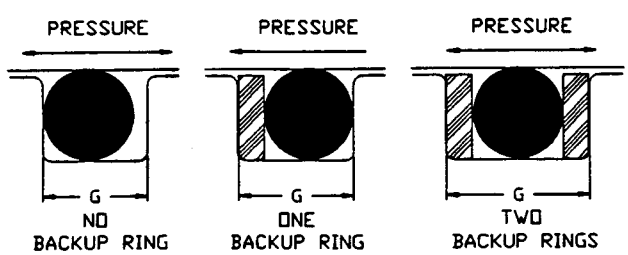
DESIGN CHART FOR MIL-G-5514F MILITARY HYDRAULIC GLANDS

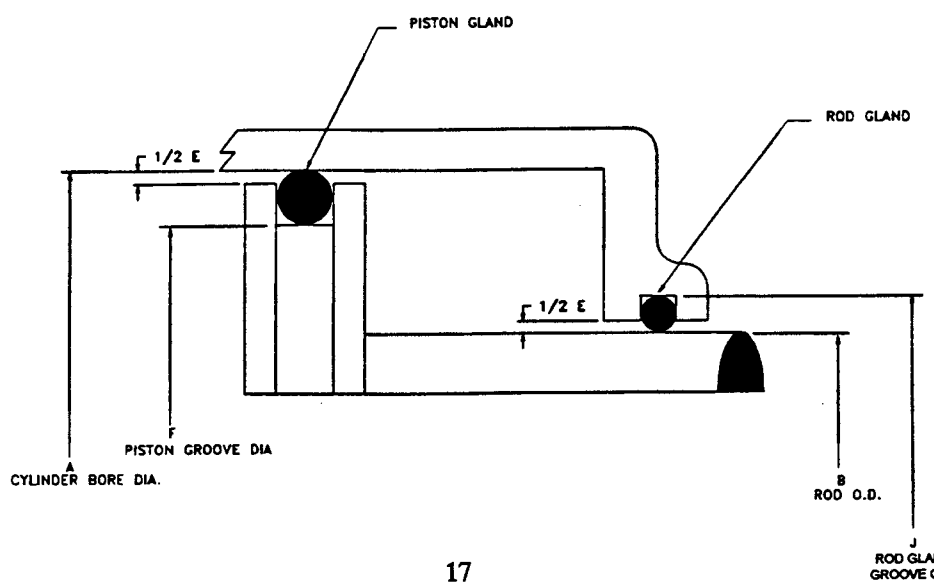
SEAL SCIENCE GLAND CODE M

GLAND SIZE	L GLAND DEPTH	E DIAMETRAL CLEARANCE MAX.	G +.010 −.000 GROOVE WIDTH			R GROOVE RADIUS	ECCEN-TRICITY MAX.
			NO BACK-UP RINGS	ONE BACK-UP RING	TWO BACK-UP RINGS		
001	.031 to .032	.004	.063			.005 to .015	.002
002	.040 to .041	.004	.073			.005 to .015	.002
003	.048 to .049	.004	.083			.005 to .015	.002
004	.057 to .058	.004	.094	.149	.207	.005 to .015	.002
005	.0565 to .0575	.004	.094	.149	.207	.005 to .015	.002
006 Through 012	.056 to .057	.004	.094	.149	.207	.005 to .015	.002
013 Through 028	.056 to .058	.005	.094	.149	.207	.005 to .015	.002
110 Through 116	.089 to .091	.005	.141	.183	.245	.005 to .015	.002
117 Through 149	.089 to .091	.005(c) to .007	.141	.183	.245	.005 to .015	.002
210 Through 222	.121 to .123	.006	.188	.235	.304	.010 to .025	.003
223 Through 247	.121 to .123	.006(c) to .008	.188	.235	.304	.010 to .025	.003
325 Through 349	.186 to .188	.006(c) to .008	.281	.334	.424	.020 to .035	.004
425 Through 460	.238 to .241	.009(c) to .011	.375	.475	.579	.020 to .035	.005









SEAL SCIENCE

TABLE VI
MIL-G-5514F GLANDS
SEAL SCIENCE GLAND CODE M

	A		F		B		J	
GLAND NUMBER	CYLINDER BORE		PISTON GROOVE DIA		ROD O.D.		ROD GLAND GROOVE O.D.	
001	.095		.033		.033		.095	
002	.128	+.001	.048	+.000	.048	+.000	.128	+.001
003	.159	-.000	.063	-.001	.063	-.001	.159	-.000
004	.190		.076		.076		.190	
005	.221		.108		.108		.221	
006	.235		.123		.123		.235	
007	.266		.154		.154		.266	
008	.297	+.001	.185	+.000	.185	+.000	.297	+.001
009	.329	-.000	.217	-.001	.217	-.001	.329	-.000
010	.360		.248		.248		.360	
011	.422		.310		.310		.422	
012	.485		.373		.373		.485	
*013	.550		.438		.435		.547	
*014	.613		.501		.498		.610	
*015	.675		.563		.560		.672	
*016	.738		.626		.623		.735	
*017	.800		.688		.685		.797	
*018	.863		.751		.748		.860	
*019	.925		.813		.810		.922	
*020	.991	+.002	.879	+.000	.873	+.000	.985	+.002
*021	1.053	-.000	.941	-.002	.935	-.002	1.047	-.000
*022	1.116		1.004		.998		1.110	
*023	1.178		1.066		1.060		1.172	
*024	1.241		1.129		1.123		1.235	
*025	1.303		1.191		1.185		1.297	
*026	1.366		1.254		1.248		1.360	
*027	1.428		1.316		1.310		1.422	
*028	1.491		1.379		1.373		1.485	
110	.550		.372		.373		.551	
111	.613		.435		.435		.613	
112	.675	+.002	.497	+.000	.498	+.000	.676	+.002
113	.738	-.000	.560	-.002	.560	-.002	.738	-.000
114	.800		.622		.623		.801	
115	.863		.685		.685		.863	
116	.925		.747		.748		.926	
*117	.991		.813		.810		.988	
*118	1.053	+.002	.875	+.000	.873	+.000	1.051	+.002
*119	1.116	-.000	.938	-.002	.935	-.002	1.113	-.000
*120	1.178		1.000		.998		1.176	
*121	1.241		1.063		1.060		1.238	
*122	1.303		1.125		1.123		1.301	
*123	1.366		1.188		1.185		1.363	
*124	1.428		1.250		1.248		1.426	
*125	1.491		1.313		1.310		1.488	
*126	1.553		1.375		1.373		1.551	
*127	1.616		1.438		1.435		1.613	
*128	1.678		1.500		1.498		1.676	
*129	1.741		1.563		1.560		1.738	
*130	1.805		1.627		1.623		1.801	
*131	1.867		1.689		1.685		1.863	
*132	1.930		1.752		1.748		1.926	
*133	1.992		1.814		1.810		1.988	
*134	2.055		1.877		1.873		2.051	
*135	2.118	+.002	1.940	+.000	1.936	+.000	2.114	+.002
*136	2.180	-.000	2.002	-.002	1.998	-.002	2.176	-.000
*137	2.243		2.065		2.061		2.239	
*138	2.305		2.127		2.123		2.301	
*139	2.368		2.190		2.186		2.364	
*140	2.430		2.252		2.248		2.426	
*141	2.493		2.315		2.311		2.489	
*142	2.555		2.377		2.373		2.551	
*143	2.618		2.440		2.436		2.614	
*144	2.680		2.502		2.498		2.676	
*145	2.743		2.565		2.561		2.739	
*146	2.805		2.627		2.623		2.801	

* To be used for static applications only.

SEAL SCIENCE

TABLE VI
MIL-G-5514F GLANDS
SEAL SCIENCE GLAND CODE M

	A		F		B		J	
GLAND NUMBER	CYLINDER BORE		PISTON GROOVE DIA		ROD O.D.		ROD GLAND GROOVE O.D.	
*147	2.868	+.002	2.690	+.002	2.686	+.002	2.864	
*148	2.930	-.000	2.752	-.000	2.748	-.000	2.926	
*149	2.993		2.815		2.811		2.989	
210	.991		.748		.748		.991	
211	1.053		.810		.810		1.053	
212	1.116		.873		.873		1.116	
213	1.178	+.002	.935	+.000	.935	+.000	1.178	+.002
214	1.241	-.000	.998	-.002	.998	-.002	1.241	-.000
215	1.303		1.060		1.060		1.303	
216	1.366		1.123		1.123		1.366	
217	1.428		1.185		1.185		1.428	
218	1.491		1.248		1.248		1.491	
219	1.553		1.310		1.310		1.553	
220	1.616		1.373		1.373		1.616	
221	1.678		1.435		1.435		1.678	
222	1.741		1.498		1.498		1.741	
*223	1.867	+.002	1.624	+.000	1.623	+.000	1.866	+.002
*224	1.992	-.000	1.749	-.002	1.748	-.002	1.991	-.000
*225	2.118		1.875		1.873		2.116	
*226	2.243		2.000		1.998		2.241	
*227	2.368		2.125		2.123		2.366	
*228	2.493		2.250		2.248		2.491	
*229	2.618		2.375		2.373		2.616	
*230	2.743		2.500		2.498		2.741	
*231	2.868		2.625		2.623		2.866	
*232	2.993		2.750		2.748		2.991	
*233	3.118		2.875		2.873		3.116	
*234	3.243		3.000		2.997		3.240	
*235	3.368		3.125		3.122		3.365	
*236	3.493	+.002	3.250	+.000	3.247	+.000	3.490	+.002
*237	3.618	-.000	3.375	-.002	3.372	-.002	3.615	-.000
*238	3.743		3.500		3.497		3.740	
*239	3.868		3.625		3.622		3.865	
*240	3.993		3.750		3.747		3.990	
*241	4.118		3.875		3.872		4.115	
*242	4.243		4.000		3.997		4.240	
*243	4.368		4.125		4.122		4.365	
*244	4.493		4.250		4.247		4.490	
*245	4.618		4.375		4.372		4.615	
*246	4.743		4.500		4.497		4.740	
*247	4.868		4.625		4.622		4.865	
325	1.867		1.495		1.498		1.870	
326	1.992		1.620		1.623		1.995	
327	2.118		1.746		1.748		2.120	
328	2.243		1.871		1.873		2.245	
329	2.368		1.996		1.998		2.370	
330	2.493		2.121		2.123		2.495	
331	2.618		2.246		2.248		2.620	
332	2.743		2.371		2.373		2.745	
333	2.868	+.002	2.496	+.000	2.498	+.000	2.870	+.002
334	2.993	-.000	2.621	-.002	2.623	-.002	2.995	-.000
335	3.118		2.746		2.748		3.120	
336	3.243		2.871		2.873		3.245	
337	3.368		2.996		2.997		3.369	
338	3.493		3.121		3.122		3.494	
339	3.618		3.246		3.247		3.619	
340	3.743		3.371		3.372		3.744	
341	3.868		3.496		3.497		3.869	
342	3.993		3.621		3.622		3.994	
343	4.118		3.746		3.747		4.119	
344	4.243		3.871		3.872		4.244	
345	4.368		3.996		3.997		4.369	
346	4.493	+.002	4.121	+.000	4.122	+.000	4.494	+.002
347	4.618	-.000	4.246	-.002	4.247	-.002	4.619	-.000
348	4.743		4.371		4.372		4.744	
349	4.868		4.496		4.497		4.869	

* To be used for static applications only.

SEAL SCIENCE

TABLE VI
MIL-G-5514F GLANDS
SEAL SCIENCE GLAND CODE M

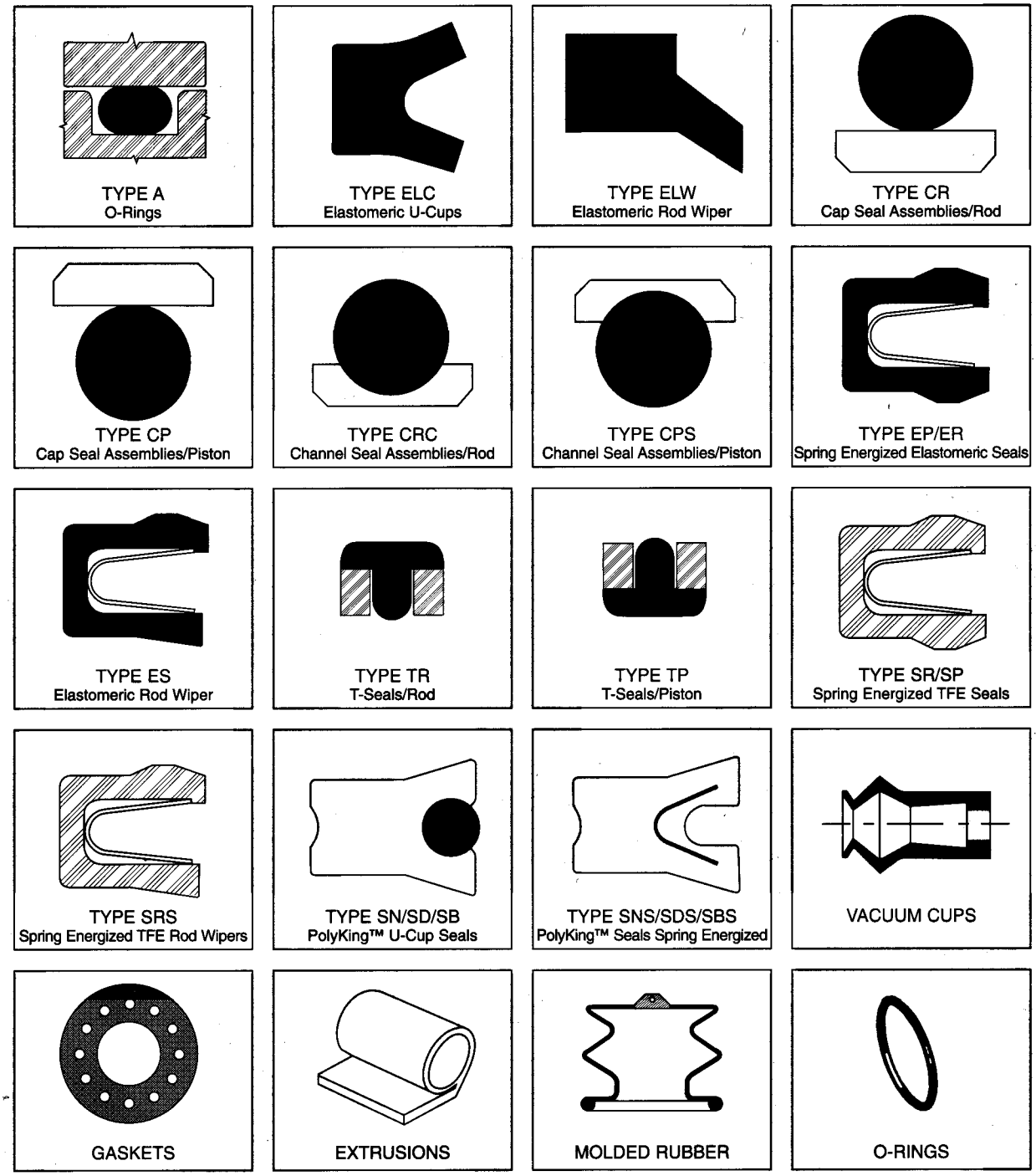
	A		F		B		J	
GLAND NUMBER	CYLINDER BORE		PISTON GROOVE DIA		ROD O.D.		ROD GLAND O.D.	
425	4.974		4.497		4.497		4.974	
426	5.099		4.622		4.622		5.099	
427	5.224		4.747		4.747		5.224	
428	5.349		4.872		4.872		5.349	
429	5.474		4.997		4.997		5.474	
430	5.599		5.122		5.122		5.599	
431	5.724		5.247		5.247		5.724	
432	5.849		5.372		5.372		5.849	
433	5.974		5.497		5.497		5.974	
434	6.099		5.622		5.622		6.099	
435	6.224		5.747		5.747		6.224	
436	6.349		5.872		5.872		6.349	
437	6.474		5.997		5.997		6.474	
438	6.724	+.003	6.247	+.000	6.247	+.000	6.724	+.003
439	6.974	-.000	6.497	-.003	6.497	-.003	6.974	-.000
440	7.224		6.747		6.747		7.224	
441	7.474		6.997		6.997		7.474	
442	7.724		7.247		7.247		7.724	
443	7.974		7.497		7.497		7.974	
444	8.224		7.747		7.747		8.244	
445	8.474		7.997		7.997		8.474	
446	8.974		8.497		8.497		8.974	
447	9.474		8.997		8.997		9.474	
448	9.974		9.497		9.497		9.974	
449	10.474		9.997		9.997		10.474	
450	10.974		10.497		10.497		10.974	
451	11.474		10.997		10.997		11.474	
452	11.974	+.004	11.497		11.497		11.974	
453	12.474	-.000	11.997		11.997		12.474	+.004
454	12.974		12.497		12.497		12.974	-.000
455	13.474		12.997		12.997		13.474	
456	13.974		13.497		13.497		13.974	
457	14.474		13.997		13.997		14.474	
458	14.974		14.497		14.497		14.974	
459	15.474		14.997		14.997		15.474	
460	15.974		15.497		15.497		15.974	

* To be used for static applications only.

ABOUT SEAL SCIENCE

Seal Science's success is based on our design and manufacturing expertise in rubber and plastics, with special emphasis on materials, seals and seal systems. Seal Science's engineering, molding, stamping, machining, and specialty fabrication operations can provide you with quality products on a timely basis. We've got your solutions. Call Seal Science at 1-800-576-SEAL. **YOUR VACUUM CUP AND SEAL SPECIALISTS.**

SEAL SCIENCE PRODUCTS VIEW



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ENGINEERING APPLICATION FORM

CUSTOMER INFORMATION

COMPANY _____ REQUESTOR'S NAME _____
TELEPHONE _____ FAX _____
ADDRESS _____ CITY _____ STATE _____ ZIP CODE _____

APPLICATION TYPE

❑ EXISTING, is the current seal working? _____ What is the current design? _____ What is the current cost? _____

❑ NEW DESIGN	❑ VENDOR PROBLEM	QUANTITY PER YEAR _____	
❑ STATIC	❑ DYNAMIC	❑ UNIDIRECTIONAL	❑ BIDIRECTIONAL
❑ RECIPROCATING	❑ ROTARY	❑ OSCILLATORY	WHEN IS INPUT REQUIRED ? _____
❑ PISTON	❑ ROD	❑ FACE	WHEN ARE PROTOTYPES NEEDED ? _____
❑ O-RING	❑ GASKET (PROVIDE SKETCH)		

❑ OTHER, DESCRIBE (PROVIDE SKETCH) _____

_____

ENGINEERING DETAILS

TEMPERATURE: LOW _____ NORMAL _____ MAX _____
PRESSURE: OPERATING _____ PROOF _____ BURST _____
STROKE (TOTAL) _____ FREQUENCY _____ DUTY CYCLE _____
ROTATION (DEGREES) _____ RPM _____ DUTY CYCLE _____
MEDIA TO BE SEALED _____
LEAKAGE REQUIREMENT _____ FRICTION LIMITATIONS _____
SEAL LIFE REQUIRED _____

HARDWARE INFORMATION

❑ SEAL SCIENCE TO PROVIDE GROOVE DETAILS

BORE DIA. _____ MAT'L _____ HARDNESS _____ FINISH _____ MAT'L _____
ROD DIA. _____ TOLERANCE _____ HARDNESS _____ FINISH _____ MAT'L _____
GROOVE DIA. _____ TOLERANCE _____ GROOVE WIDTH _____ TOLERANCE _____
PISTON DIA. _____ TOLERANCE _____ OR THROAT DIA. _____ TOLERANCE _____
EXTRUSION GAP: MAX _____ MIN _____ Are any bearings required? _____

Are there any current recommendations/quotes? _____
What does your company make? _____
What does this equipment do? _____
Can you provide a sketch or drawings? _____
Is there anything else you can tell me about this application? _____
Are there any other projects I can help you with? _____

USEFUL CONVERSION FACTORS

multiply	by	to obtain
acre	43,560	ft^2
angstrom	1×10^{-10}	m
atm	1.01325	bar
atm	29.92	in Hg
atm	14.696	lbf/in^2
bar	1×10^{5}	Pa
BTU	778.17	ft-lbf
BTU	1.055	kJ
BTU/h	0.293	W
BTU/lbm	2.326	kJ/kg
BTU/lbm-°R	4.1868	kJ/kg·K
cm	0.3937	in
cm^3	0.061024	in^3
eV	1.602×10^{-19}	J
ft	0.3048	m
ft^3	7.481	gal
ft^3	0.028317	m^3
ft-lbf	1.35582	J
gal	0.13368	ft^3
gal	3.7854×10^{-3}	m^3
gal/min	0.002228	ft^3/sec
g/cm^3	1000	kg/m^3
g/cm^3	62.428	lbm/ft^3
hp	2545	BTU/hr
hp	33,000	ft-lbf/min
hp	550	ft-lbf/sec
hp	0.7457	kW
in	2.54	cm
in^3	16.387	cm^3
J	6.2415×10^{18}	eV
J	0.73756	ft-lbf
kg	2.20462	lbm
kg	0.06852	slug
kip	1000	lbf
kJ	0.9478	BTU
kJ	737.56	ft-lbf
kJ/kg	0.42992	BTU/lbm
kJ/kg·K	0.23885	BTU/lbm-°R
km	3280.8	ft
km/h	0.62137	mi/hr
kPa	0.14504	lbf/in^2
kW	737.6	ft-lbf/sec
kW	1.341	hp
l	0.03531	ft^3
l	0.001	m^3
lbf	4.4482	N
lbf/ft^2	144	lbf/in^2
lbf/in^2	6894.8	Pa
lbm	0.4536	kg
lbm/ft^3	0.016018	g/cm^3
lbm/ft^3	16.018	kg/m^3
m	3.28083	ft
m^3	35.3147	ft^3
mi/h	1.6093	km/h
micron	1×10^{-6}	m
N	0.22481	lbf
Pa	1.4504×10^{-4}	lbf/in^2
slug	32.174	lbm
torr	133.32	Pa
W	3.413	BTU/hr

Temperature Conversion Table

°C	°F	°C	°F	°C	°F	°C	°F
−273	−459.4	190	+374	740	+1364	1880	+3416
−260	−436	200	+392	750	+1382	1900	+3452
−240	−400	204	+400	760	+1400	1920	+3488
−220	−364	210	+410	780	+1436	1940	+3524
−200	−328	220	+428	800	+1472	1960	+3560
−180	−292	230	+446	820	+1508	1980	+3596
−160	−256	232	+450	840	+1544	2000	+3632
−140	−220	240	+464	860	+1580	2020	+3668
−120	−184	250	+482	880	+1616	2040	+3704
−100	−148	260	+500	900	+1652	2060	+3740
−90	−130	270	+518	920	+1688	2080	+3776
−80	−112	280	+536	940	+1724	2100	+3812
−70	−94	290	+554	960	+1760	2120	+3848
−57	−70	300	+572	980	+1796	2140	+3884
−55	−67	310	+590	1000	+1832	2160	+3920
−54	−65	316	+600	1020	+1868	2180	+3956
−40	−40	320	+608	1040	+1904	2200	+3992
−34	−30	330	+626	1060	+1940	2220	+4028
−30	−22	340	+644	1080	+1976	2240	+4064
−29	−20	350	+662	1100	+2012	2260	+4100
−20	−4	360	+680	1120	+2048	2280	+4136
−10	+14	370	+698	1140	+2084	2300	+4172
0	+32	380	+716	1160	+2120	2320	+4208
1	+33.8	390	+734	1180	+2156	2340	+4244
5	+41.0	400	+752	1200	+2192	2360	+4280
10	+50.0	410	+770	1220	+2228	2380	+4316
15	+59.0	420	+788	1240	+2264	2400	+4352
20	+68.0	430	+806	1260	+2300	2420	+4388
23	+73.4	440	+824	1280	+2336	2440	+4424
25	+77.0	450	+842	1300	+2372	2460	+4460
30	+86.0	460	+860	1320	+2408	2480	+4496
35	+95.0	470	+878	1340	+2444	2500	+4532
40	+104.0	480	+896	1360	+2480	2520	+4568
45	+113.0	490	+914	1380	+2516	2540	+4604
50	+122.0	500	+932	1400	+2552	2560	+4640
55	+131.0	510	+950	1420	+2588	2580	+4676
60	+140.0	520	+968	1440	+2624	2600	+4712
65	+149.0	530	+986	1460	+2660	2620	+4748
70	+158.0	540	+1004	1480	+2696	2640	+4784
75	+167.0	550	+1022	1500	+2732	2660	+4820
80	+176.0	560	+1040	1520	+2768	2680	+4856
82	+180.0	570	+1058	1540	+2804	2700	+4892
85	+185.0	580	+1076	1560	+2840	2720	+4928
90	+194.0	590	+1094	1580	+2876	2740	+4964
95	+203.0	600	+1112	1600	+2912	2760	+5000
100	+212.0	610	+1130	1620	+2948	2780	+5036
107	+225.0	620	+1148	1640	+2984	2800	+5072
110	+230.0	630	+1166	1660	+3020	2820	+5108
120	+248.0	640	+1184	1680	+3056	2840	+5144
121	+250.0	650	+1202	1700	+3092	2860	+5180
130	+266.0	660	+1220	1720	+3128	2880	+5216
135	+275.0	670	+1238	1740	+3164	2900	+5252
140	+284.0	680	+1256	1760	+3200	2920	+5288
149	+300.0	690	+1274	1780	+3236	2940	+5324
150	+302.0	700	+1292	1800	+3272	2960	+5360
160	+320.0	710	+1310	1820	+3308	2980	+5396
170	+338.0	720	+1328	1840	+3344	3000	+5432
180	+356	730	+1346	1860	+3380