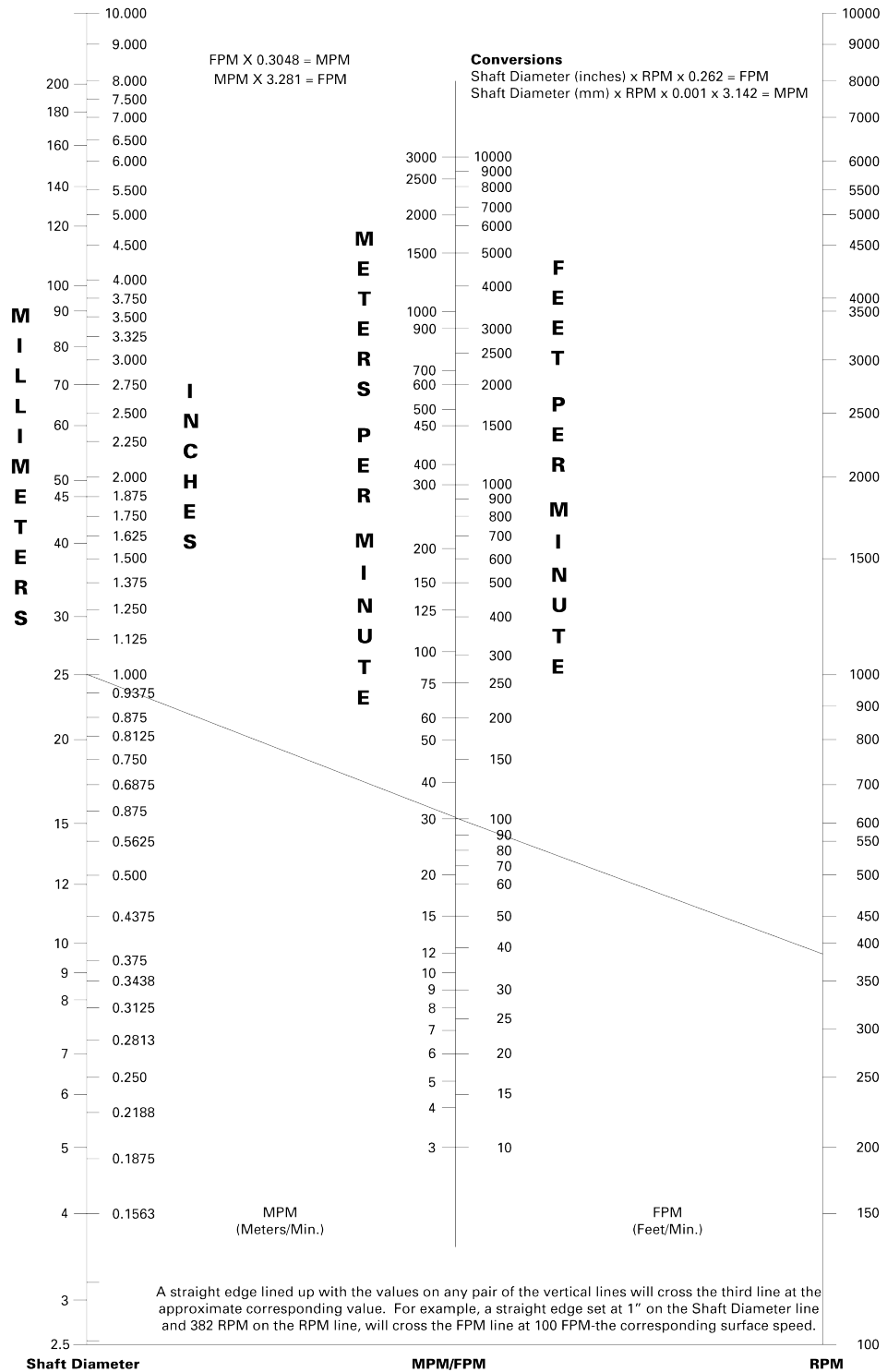


RELATION BETWEEN SHAFT DIAMETER, FPM, MPM AND RPM



DECIMAL & MILLIMETER EQUIVALENTS

Decimals		Millimeters		Decimals		Millimeters	
$\frac{1}{64}$	0.015625	—	0.397	$\frac{33}{64}$	0.515625	—	13.097
$\frac{1}{32}$	0.03125	—	0.794	$\frac{17}{32}$	0.53125	—	13.494
$\frac{3}{64}$	0.046875	—	1.191	$\frac{35}{64}$	0.546875	—	13.891
$\frac{1}{16}$	0.0625	—	1.588	$\frac{9}{16}$	0.5625	—	14.288
$\frac{5}{64}$	0.078125	—	1.984	$\frac{37}{64}$	0.578125	—	14.684
$\frac{3}{32}$	0.09375	—	2.381	$\frac{19}{32}$	0.59375	—	15.081
$\frac{7}{64}$	0.109375	—	2.778	$\frac{32}{32}$	0.609375	—	14.478
$\frac{1}{8}$	0.1250	—	3.175	$\frac{39}{64}$	0.6250	—	15.875
$\frac{9}{64}$	0.140625	—	3.572	$\frac{41}{64}$	0.640625	—	16.272
$\frac{5}{32}$	0.15625	—	3.969	$\frac{21}{32}$	0.65625	—	16.669
$\frac{11}{64}$	0.171875	—	4.366	$\frac{43}{64}$	0.671875	—	17.066
$\frac{3}{16}$	0.1875	—	4.763	$\frac{11}{16}$	0.6875	—	17.463
$\frac{13}{64}$	0.203125	—	5.159	$\frac{16}{16}$	0.703125	—	17.859
$\frac{7}{32}$	0.21875	—	5.556	$\frac{23}{32}$	0.71875	—	18.256
$\frac{15}{64}$	0.234375	—	5.953	$\frac{32}{32}$	0.734375	—	18.653
$\frac{1}{4}$	0.2500	—	6.350	$\frac{47}{64}$	0.7500	—	19.050
$\frac{17}{64}$	0.265625	—	6.747	$\frac{3}{4}$	0.765625	—	19.447
$\frac{9}{32}$	0.28125	—	7.144	$\frac{49}{64}$	0.78125	—	19.844
$\frac{19}{64}$	0.296875	—	7.541	$\frac{25}{32}$	0.796875	—	20.241
$\frac{5}{16}$	0.3125	—	7.938	$\frac{32}{32}$	0.8125	—	20.638
$\frac{21}{64}$	0.328125	—	8.334	$\frac{13}{16}$	0.828125	—	21.034
$\frac{11}{32}$	0.34375	—	8.731	$\frac{53}{64}$	0.84375	—	21.431
$\frac{23}{64}$	0.359375	—	9.128	$\frac{27}{32}$	0.859375	—	21.828
$\frac{3}{8}$	0.3750	—	9.525	$\frac{32}{32}$	0.8750	—	22.225
$\frac{25}{64}$	0.390625	—	9.922	$\frac{55}{64}$	0.890625	—	22.622
$\frac{13}{32}$	0.40625	—	10.319	$\frac{29}{32}$	0.90625	—	23.019
$\frac{27}{64}$	0.421875	—	10.716	$\frac{32}{32}$	0.921875	—	23.416
$\frac{7}{16}$	0.4375	—	11.113	$\frac{59}{64}$	0.9375	—	23.813
$\frac{29}{64}$	0.453125	—	11.509	$\frac{15}{16}$	0.953125	—	24.209
$\frac{15}{32}$	0.46875	—	11.906	$\frac{16}{16}$	0.96875	—	24.606
$\frac{31}{64}$	0.484375	—	12.303	$\frac{31}{32}$	0.984375	—	25.003
$\frac{1}{2}$	0.5000	—	12.700	$\frac{32}{32}$	1.000	—	25.400

1 mm= 0.03937"

0.001"=0.0254 mm

REFERENCE

CONVERSION FACTORS

Prefixes for SI Units	Symbol = Prefix	Factor by which unit is multiplied
	T = tera	10^{12}
	G = giga	10^9
	M = mega	10^6
	k = kilo	10^3
	h = hecto	10^2
	da = deka	10
	d = deci	10^{-1}
	c = centi	10^{-2}
	m = milli	10^{-3}
	μ = micro	10^{-6}
	n = nano	10^{-9}
	p = pico	10^{-12}
	f = femto	10^{-15}
	a = atto	10^{-18}
Mass	1 kg = 2.2046 lb _m 1 g = 2.2046 x 10 ⁻³ lb _m 1 slug = 14.59 kg	1 lb _m = 0.4536 kg 1 lb _m = 453.6 g 1 kg = 0.06852 slug
Density	1 kg / m ³ = 0.0624 lb _m / ft ³ 1 g / cm ³ = 62.4 lb _m / ft ³ 1 g / cm ³ = 0.0361 lb _m / in ³ 1 slug / ft ³ = 515.4 kg / m ³	1 lb _m / ft ³ = 16.02 kg / m ³ 1 lb _m / ft ³ = 1.602 x 10 ⁻² g / cm ³ 1 lb _m / in ³ = 27.7 g / cm ³ 1 kg / m ³ = 0.00194 slug / ft ³
Length	1 mm = 0.03937 in 1 m = 3.2808 ft	1 in = 25.4 mm 1 ft = 0.3048 m
Velocity	1 m / s = 3.281 ft / s 1 km / h = 0.9113 ft / s 1 km / h = 0.62137 mile / h	1 ft / s = 0.3048 m / s 1 ft / s = 1.097 km / h 1 mile / h = 1.6093 km / h
Volume	1 m ³ = 1000 liters 1 m ³ = 61,020 in ³ 1 m ³ = 35.31 ft ³ 1 m ³ = 264.2 gal 1 gal = 231.0 in ³ 1 gal = 0.1337 ft ³ 1 in ³ = 578 x 10 ⁻⁶ ft ³	1 liter = 0.001 m ³ 1 in ³ = 16.39 x 10 ⁻⁶ m ³ 1 ft ³ = 0.02832 m ³ 1 gal = 0.003785 m ³ 1 in ³ = 0.004329 gal 1 ft ³ = 7.481 gal 1 ft ³ = 1728 in ³
Flow Rate	1 gal / min = 0.06309 liters / s 1 gal / min = 0.002228 ft ³ / s 1 liter / s = 0.03531 ft ³ / s	1 liter / s = 15.85 gal / min 1 ft ³ / s = 448.8 gal / min 1 ft ³ / s = 28.32 liters / s
Force	1 N = 1 kg · m / s ² 1 N = 10 ⁵ dynes 1 N = 0.22481 lb _f	1 kip = 1000 lb _f 1 lb _f = 32.174 lb _m · ft / s ² 1 dyne = 10 ⁻⁵ N 1 lb _f = 4.4482 N

REFERENCE

CONVERSION FACTORS

Energy	1 J = 1 N · m	1 Btu = 778.17 ft · lb _f
	1 J = 0.73756 ft · lb _f	1 ft · lb _f = 1.35582 J
	1 kJ = 0.9478 Btu	1 Btu = 1.0551 kJ 1 kcal = 4.1868 kJ
Pressure	1 Pa = 1 N / m ²	1 ksi = 1000 lb _f / in ²
	1 bar = 10 ⁵ N / m ²	1 lb _f / in ² = 144 lb _f / ft ²
	1 Pa = 1.4504 x 10 ⁻⁴ lb _f / in ²	1 lb _f / in ² = 6894.8 Pa
	1 MPa = 145 lb _f / in ²	1 lb _f / in ² = 6.90 x 10 ⁻³ MPa
	1 atm = 1.01325 bar	1 atm = 14.696 lb _f / in ²
Power	1 W = 1 J / s	1 hp = 2545 Btu / h
	1 W = 3.413 Btu / h	1 Btu / h = 0.293 W
	1 kW = 1.341 hp	1 hp = 0.7457 kW
		1 hp = 550 ft · lb _f / s
Temp.	T(K) = 273.15 + T(°C)	T(°C) = T(K) - 273.15
	T(K) = 5/9[T(°F) - 32] + 273.15	T(°F) = 9/5[T(K) - 273] + 32
	T(°C) = 5/9[T(°F) - 32]	T(°F) = 9/5[T(°C)] + 32
	T(°R) = 459.67 + T(°F)	T(°F) = T(°R) - 459.67
Specific Heat	1 kJ / kg · K = 0.238846 Btu / lb _m · °R	1 Btu / lb _m · °R = 4.1868 kJ / kg · K
	1 kcal / kg · K = 1 Btu / lb _m · °R	
Thermal Conductivity	1 W / m · K = 2.39 x 10 ⁻³ cal / cm · s · K	1 cal / cm · s · K = 418.4 W / m · K
	1 W / m · K = 0.578 Btu / ft · h · °F	1 Btu / ft · h · °F = 1.730 W / m · K
	1 cal / cm · s · K = 241.8 Btu / ft · h · °F	1 Btu / ft · h · °F = 4.136 x 10 ⁻³ cal / cm · s · K
Universal Gas Constant	R = 8.314 kJ / kmol · K	
	R = 1545 ft · lb _f / lbmol · °R	
	R = 1.986 Btu / lbmol · °R	
Standard Acceleration of Gravity	g = 9.80665 m / s ²	
	g = 32.174 ft / s ²	
Standard Atmospheric Pressure	1 atm = 1.01325 bars	
	1 atm = 14.696 lb _f / in ²	

REFERENCE

EQUATIONS FROM GEOMETRY

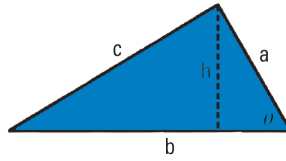
Triangle

$$h = a \sin \theta$$

$$\text{Area} = 1/2bh$$

(Law of Cosines)

$$c^2 = a^2 + b^2 - 2ab \cos \theta$$

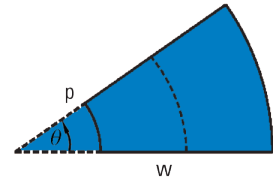


Sector of Circular Ring

(p = average radius,
 w = width of ring,

θ in radians)

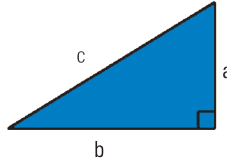
$$\text{Area} = \theta pw$$



Right Triangle

(Pythagorean Theorem)

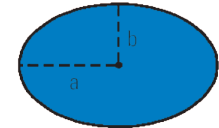
$$c^2 = a^2 + b^2$$



El-

$$\text{Area} = \pi ab$$

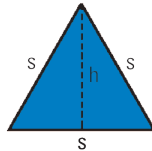
$$\text{Circumference} \approx 2\pi \sqrt{\frac{a^2 + b^2}{2}}$$



Equilateral Triangle

$$h = \frac{\sqrt{3}s}{2}$$

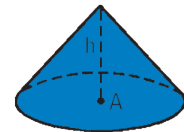
$$\text{Area} = \frac{\sqrt{3}s^2}{2}$$



Cone

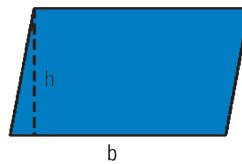
(A = area of base)

$$\text{Volume} = \frac{Ah}{3}$$



Parallelogram

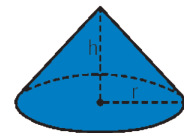
$$\text{Area} = bh$$



Right Circular Cone

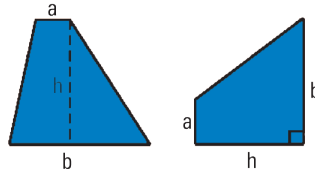
$$\text{Volume} = \frac{\pi r^2 h}{3}$$

$$\text{Lateral Surface Area} = \pi r \sqrt{r^2 + h^2}$$



Trapezoid

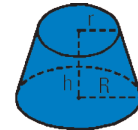
$$\text{Area} = \frac{h}{2}(a + b)$$



Frustum of Right Circular Cone

$$\text{Volume} = \frac{\pi(r^2 + rR + R^2)h}{3}$$

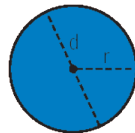
$$\text{Lateral Surface Area} = \pi s(R + r)$$



Circle

$$\text{Area} = \pi r^2 = \frac{\pi d^2}{4}$$

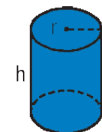
$$\text{Circumference} = 2\pi r = \pi d$$



Right Circular Cylinder

$$\text{Area} = \pi r^2 h$$

$$\text{Lateral Surface Area} = 2\pi rh$$

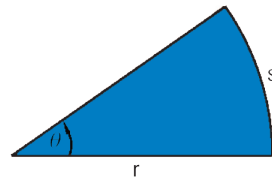


Sector of Circle

(θ in radians)

$$\text{Area} = \frac{\theta r^2}{2}$$

$$s = r\theta$$



Sphere

$$\text{Volume} = \frac{4}{3} \pi r^3$$

$$\text{Surface Area} = 4\pi r^2$$

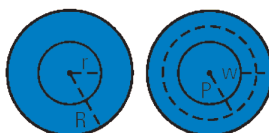


Circular Ring

(p = average radius,
 w = width of ring)

$$\text{Area} = \pi(R^2 - r^2)$$

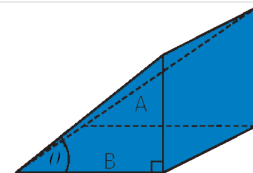
$$= 2\pi pw$$



Wedge

(A = area of upper face,
 B = area of base)

$$A = B \sec \theta$$



REFERENCE

REFERENCE MATERIALS

Approximate Physical Properties of Some Common Liquids (BG Units)

Liquid	Temperature (°F)	Density, ρ (slugs/ft ³)	Specific Weight, γ (lb/ft ³)	Dynamic Viscosity, μ (lb/ft ²)	Kinematic Viscosity, ν (ft ² /s)	Surface Tension, σ (lb/ft)	Vapor Pressure, P_v (lb/in ² (abs))	Bulk Modulus, E_v (lb/in ²)
Carbon tetrachloride	68	3.09	99.5	2.00 E-5	6.47 E-6	1.84 E-3	1.9 E+0	1.91 E+5
Ethyl alcohol	68	1.53	49.3	2.49 E-5	1.63 E-3	1.56 E-3	8.5 E-1	1.54 E+5
Gasoline ^c	60	1.32	42.5	6.5 E-6	4.9 E-6	1.5 E-3	8.0 E+0	1.9 E+5
Glycerin	68	2.44	78.6	3.13 E-2	1.28 E-2	4.34 E-3	2.0 E-6	6.56 E+5
Mercury	68	26.3	847	3.28 E-5	1.25 E-6	3.19 E-2	2.3 E-5	4.14 E+6
SAE 30 oil ^c	60	1.77	57.0	8.0 E-3	4.5 E-3	2.5 E-3		2.2 E+5
Seawater	60	1.99	64.0	2.51 E-5	1.26 E-5	5.03 E-3	2.56 E-1	3.39 E+5
Water	60	1.94	62.4	2.34 E-5	1.21 E-5	5.03 E-3	2.56 E-1	3.12 E+5

^aIn contact with air

^bIsentropic bulk modulus calculated from speed of sound

^cTypical values. Properties of petroleum products vary.

Approximate Physical Properties of Some Common Liquids (SI Units)

Liquid	Temperature (°C)	Density, ρ (kg/m ³)	Specific Weight, γ (kN/m ³)	Dynamic Viscosity, μ (N x s/m ²)	Kinematic Viscosity, ν (m ² /s)	Surface Tension, σ (N/m)	Vapor Pressure, P_v (N/m ² (abs))	Bulk Modulus, E_v (N/m ²)
Carbon tetrachloride	20	1,590	15.6	9.58 E-4	6.03 E-7	2.69 E-2	1.3 E+4	1.31 E+9
Ethyl alcohol	20	789	7.74	1.19 E-3	1.51 E-6	2.28 E-2	5.9 E+3	1.06 E+9
Gasoline ^c	15.6	680	6.67	3.1 E-4	4.6 E-7	2.2 E-2	5.5 E+4	1.3 E+9
Glycerin	20	1,260	12.4	1.50 E+0	1.19 E-3	6.33 E-2	1.4 E-2	4.52 E+9
Mercury	20	13,600	133	1.57 E-3	1.15 E-7	4.66 E-1	1.6 E-1	2.85 E+10
SAE 30 oil ^c	15.6	912	8.95	3.8 E-1	4.2 E-4	3.6 E-2		1.5 E+9
Seawater	15.6	1,030	10.1	1.20 E-3	1.17 E-6	7.34 E-2	1.77 E+3	2.34 E+9
Water	15.6	999	9.80	1.12 E-3	1.12 E-6	7.34 E-2	1.77 E+3	2.15 E+9

^aIn contact with air

^bIsentropic bulk modulus calculated from speed of sound

^cTypical values. Properties of petroleum products vary.

REFERENCE

REFERENCE MATERIALS

Approximate Physical Properties of Some Common Gases at Standard Atmospheric Pressure (BG Units)

Gas	Temperature (°F)	Density, ρ (slugs/ft ³)	Specific Weight, γ (lb/ft ³)	Dynamic Viscosity, μ (lb*s/ft ²)	Kinematic Viscosity, ν (ft ² /s)	Gas Constant, ^a R (ft*lb/slug*°R)	Specific Heat Ratio, ^b K
Air (standard)	59	2.38 E - 3	7.65 E - 2	3.74 E - 7	1.57 E - 4	1.716 E + 3	1.40
Carbon dioxide	68	3.55 E - 3	1.14 E - 1	3.07 E - 7	8.65 E - 5	1.130 E + 3	1.30
Helium	68	3.23 E - 4	1.04 E - 2	4.09 E - 7	1.27 E - 3	1.242 E + 4	1.66
Hydrogen	68	1.63 E - 4	5.25 E - 3	1.85 E - 7	1.13 E - 3	2.466 E + 4	1.41
Methane (natural gas)	68	1.29 E - 3	4.15 E - 2	2.29 E - 7	1.78 E - 4	3.099 E + 3	1.31
Nitrogen	68	2.26 E - 3	7.28 E - 2	3.68 E - 7	1.63 E - 4	1.775 E + 3	1.40
Oxygen	68	2.58 E - 3	8.31 E - 2	4.25 E - 7	1.65 E - 4	1.554 E + 3	1.40

^aValues of the gas constant are independent of temperature

^bValues of the specific heat ratio depend only slightly on temperature.

Approximate Physical Properties of Some Common Gases at Standard Atmospheric Pressure (SI Units)

Gas	Temperature (°C)	Density, ρ (kg/m ³)	Specific Weight, γ (N/m ³)	Dynamic Viscosity, μ (N*s/m ²)	Kinematic Viscosity, ν (m ² /s)	Gas Constant, ^a R (J/kg*K)	Specific Heat Ratio, ^b K
Air (standard)	15	1.23 E + 0	1.20 E + 1	1.79 E - 5	1.46 E - 5	2.869 E + 2	1.40
Carbon dioxide	20	1.83 E + 0	1.80 E + 1	1.47 E - 5	8.03 E - 6	1.889 E + 2	1.30
Helium	20	1.66 E - 1	1.63 E + 0	1.94 E - 5	1.15 E - 4	2.077 E + 3	1.66
Hydrogen	20	8.38 E - 2	8.22 E - 1	8.84 E - 6	1.05 E - 4	4.124 E + 3	1.41
Methane (natural gas)	20	6.67 E - 1	6.54 E + 0	1.10 E - 5	1.65 E - 5	5.183 E + 2	1.31
Nitrogen	20	1.16 E + 0	1.14 E + 1	1.76 E - 5	1.52 E - 5	2.968 E + 2	1.40
Oxygen	20	1.33 E + 0	1.30 E + 1	2.04 E - 5	1.53 E - 5	2.598 E + 2	1.40

^aValues of the gas constant are independent of temperature

^bValues of the specific heat ratio depend only slightly on temperature.

GLOSSARY

A

Air Side:	The side of a seal that normally faces away from the fluid being sealed.
Air Side Angle:	The angle between the air-side surface and the shaft. Also barrel angle.
Angle, Contact Approach:	See angle, outside lip.
Angle, Helix:	The angle between a helical rib and the lip line of contact.
Angle, Helix Contact:	The angle formed by the rib leading edge and the lip line of contact.
Angle, Helixseal Rib:	The angle formed by the leading edge of the rib and a line perpendicular to a plane tangent to the outside lip surface at the centerline of the rib base.
Angle, Inside Lip:	The angle between the inside lip surface and the axis of the seal case.
Angle, Molded Toe:	The angle between the toe face of a seal lip and the seal axis.
Angle, Outside Lip:	The angle between the outside lip surface and the axis of the seal case.
Angle, Trimming:	The angle between the trimmed face of a seal lip and the seal axis.
Assembly, Seal:	A group of parts that includes sealing surfaces, provisions for initial loading and a secondary sealing mechanism, which accommodates the radial and axial movement necessary for installation.
Axial Clearance:	See Clearance, Axial.

B

Base, Seal:	See Face, Outside Seal.
Bedding-In:	See Run-in.
Bell Mouth:	A condition where the contact between the sealing element and the shaft occurs on the air side of the seal and not on the seal tip.
Blister:	A raised cavity or sack that deforms a surface of the seal material.

REFERENCE

Bond:	The adhesion established by vulcanization between two cured elastomer surfaces, or between one cured elastomer surface and one nonelastomer surface.
Bore, Housing:	A cylindrical surface that mates with the outside diameter of the outer seal case.
Bore, Seal Case:	See Diameter, Outer-Case Inner.
Buna-N:	See Nitrile.

C

Cap:	The part of the seal head section that is removed during trimming.
Case, Bonded:	A design feature of a type of radial lip seal where in the heel of the sealing element is attached to the seal case by an adhesive during the molding operation.
Case, Clinched:	A design feature of a type of radial lip wherein the heel of the sealing element is attached to the seal case by clamping it between two convolutions, or folds, of the case.
Case, Inner:	A rigid, cup-shaped component of a seal assembly that is placed inside the outer seal case. It has one or more of the following functions: reinforcing member, shield, spring retainer or lip-clamping device.
Checking:	Short axial cracks on the lip contact surface.
Clearance, Axial:	The gap between the toe face of the head sections and the inside surface of the inner case.
Cocked Assembly:	An installation in which the plane of the outside seal face is not perpendicular to the shaft axis.
Coil:	One turn of the coiled wire garter spring.
Composite:	A seal element comprised of two or more compounds bonded together to enhance seal performance and/or reduce costs.
Contact Line:	The circular line formed where the air side and oil side surface of the elastomeric lip element intersect. The contact line is a point when the seal element is view in cross-section.

REFERENCE

Contact Line Height:	The axial distance from the outside seal face to the lip contact line.
Case, Molded:	A design feature of a type of radial lip seal wherein the lip and case are made integral in the molding process.
Case, Outer:	The outer thin-wall rigid structure of the lip seal assembly which contains the inner case, the primary-seal ring, the spring parts and the secondary seal.
Case, Seal:	A rigid member to which the seal lip is attached.
Cavity, Mold:	A single unit or assembly of contoured parts in which a material, such as an elastomer, is shaped into a particular configuration.
Cavity, Seal:	The annular area between a housing bore and a shaft, into which a seal is installed.
Contact Point:	The area where the seal lip contacts the shaft.
Contact Width:	The axial dimension of the contact area that results when the seal is installed on the shaft.
Contamination:	Foreign matter on the seal surface.
Crack:	A sharp break or fissure in the sealing element.
Creep:	The time –dependent part of a strain resulting from stress.
Cure Time:	The time required to produce vulcanization at a given temperature.
Curing Temperature:	The temperature at which the elastomeric product is vulcanized.
Cut:	A deep discontinuity in the seal material whereby no material is removed.
Cut, Trim:	Damage to the elastomeric portion of the seal during trimming.

D

Deformation:	A stress induced change of form or shape.
Diameter Assembled Spring Inside:	Assembled spring inside the inner diameter of the garter spring with the ends securely joined.
Diameter, Free-Lip:	See Diameter, Unsprung Lip

REFERENCE

Diameter, Functional Lip:	The apparent inner diameter of the seal lip when the seal case is concentric with the outer diameter of the sizing mandrel in an air gauge, light box or similar inspection equipment.
Diameter, Inside Face Inner:	The inner diameter of the inner case of a radial lip seal.
Diameter, Lip:	The inner diameter of the seal lip, measured with the spring installed.
Diameter, Lip-Inner:	The inside, or smallest, diameter of the outer case on a lip-seal assembly.
Diameter, Seal Outer:	The external diameter of a lip-seal assembly, which normally corresponds to the outer diameter of the outer seal case.
Diameter, Spring Mean Coil:	The spring coil diameter minus the spring wire diameter.
Diameter, Spring Outside Coil:	The outer diameter of an individual helical coil of a garter spring.
Diameter, Trimmed Lip:	The lip diameter in the free state (no spring) developed by knife trimming the molded portion of the sealing element to form the contact line.
Diameter, Unsprung Lip:	The inner diameter of the seal lip, measured without the spring installed.
Dimension, Radial Wall:	The distance between the seal lip contact line and the seal outside diameter measured in a radial direction on a finished seal in the free state.
Dry Running:	Operation of a seal without lubrication at the seal-shaft interface.
Durometer:	An instrument which measures the hardness of rubber by the penetration (without puncturing) of an indenter point into the surface of rubber.

E

Eccentricity, Lip ID to OD:	See Variation, Radial Wall.
Eccentricity, Shaft:	The radial distance which the geometric center of a shaft is displaced from the axis of shaft rotation.
Elasticity:	The property of a material which causes it to return to its original shape after deformation.

REFERENCE

Elastomer:	An elastic rubberlike substance, such as natural or synthetic rubber.
Element, Sealing:	See Lip, Seal.
Elongation:	The increase in length of a specimen due to a tensile force expressed as a percentage of the original specimen length
End Play:	A measure of axial movement encountered or allowed, usually in reference to the shaft on which the seal lip contacts.
Extrusion:	Permanent displacement of part of a seal into a gap, under the action of fluid pressure.

F

FPM:	Feet per minute, used as a measure of shaft speed instead of RPM. To convert RPM to FPM use the formula $0.262 \times \text{RPM} \times \text{diameter (inches)} = \text{FPM}$
Face, Inside:	The surface of the inner case which faces, and is usually in contact with, the fluid being sealed.
Face, Molded Toe:	See Face, Toe.
Face, Outside:	The surface of the seal case, perpendicular to the shaft axis, which is not in contact with the fluid being sealed.
Face, Rib Leading:	The face of the helix seal rib which is closest to the fluid side of the seal.
Face, Toe:	The annular surface of the spring retaining lip.
Face, Trim:	The seal inside lip surface when formed by a trimming operation.
Factor, pv:	An arbitrary term which is the product of face pressure and relative sliding velocity. The term is normally considered to provide some measure of severity of service or seal life.
Filler:	A solid compounding ingredient which may be added usually in finely divided form, in relatively large proportions, to a polymer.
Finish, Shaft Surface:	See Texture, Shaft Surface.
Flash:	Thin extrusions of the elastomer formed by extrusion at the parting lines in the mold cavity or vent points.

REFERENCE

Flashing:	A rapid change in fluid state, from liquid to gaseous. In a dynamic seal, this can occur when frictional energy is added to the fluid as the latter passes between the primary sealing faces, or when fluid pressure is reduced below the fluid's vapor pressure because of a pressure drop across the sealing faces.
Flex Point:	Region where the seal lip will flex when the seal element is stretched over the shaft.
Flex Thickness:	The thickness of the region that flexes when the seal element is stretched over the seal.
Flexibility, Cold:	Flexibility of a material during exposure to a predetermined low temperature for a specific length of time.
Fluid Side:	The side of the seal which in normal use faces toward the fluid being sealed.
Fluoroelastomer:	A saturated polymer in which hydrogen atoms have been replaced with fluorine. It is characterized by excellent chemical and heat resistance.
Followability:	The ability of a seal lip to maintain a dam when the shaft has vibrations or dynamic runout.
Force, Lip:	The radial force exerted by an extension spring and/or lip of a seal on the mating shaft. Lip force is expressed as force per unit of shaft circumference.

G

Groove, Spring:	A depression formed in the head section of the seal. It is generally semicircular in form and serves to accommodate and locate the garter spring.
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H

Hardness:	The resistance to indentation. Measured by the relative resistance of the material to an indenter point of any one of a number of standard hardness testing instruments.
Hardness, Durometer:	An arbitrary numerical value which indicates the resistance to penetration of the indenter point into the rubber surface. Value may be taken immediately or after a very short specified time.

REFERENCE

Hardness, Shore:	The relative hardness of an elastomer obtained by use of a Shore durometer instrument.
Height, Contact Line:	The axial distance from the outside seal face to the lip contact line.
Height, Helix Seal Rib:	The height of the helical ribs, measured perpendicular to the outside lip surface.
Height, Lip:	The axial distance from the outside seal face to the toe face.
Housing:	A rigid structure which supports and locates the seal assembly with respect to the shaft.
Hydroseal:	A sealing system having helically disposed elements formed on the shaft surface.

I

Inclusion:	Foreign matter included in the seal material.
Incomplete Trim:	A trimmed surface which does not have all designated material removed.
Index, Spring:	The ratio of the mean coil diameter to the wire diameter of a garter spring to exclude contaminants.
Insert, Lip:	A material such as PTFE bonded onto a lip of an elastomeric seal to provide improved experiences the closest approach and effects the primary seal.
Interface:	The region between the static and dynamic sealing surfaces in which there is contact, or which experiences the closest approach and effects the primary seal.
Interference, Lip:	See Interference, Seal.
Interference, Seal:	The difference between the seal and shaft diameters.
International Rubber Hardness Degrees (IRHD):	A standard unit used to indicate the relative hardness of elastomeric materials, where zero represents a material having a Young's modulus of zero, and 100 represents a material of infinite Young's modulus.

K

Knit Line:	A blemish of the sealing element created by premature curing during molding operation.
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REFERENCE

L

Lead, Shaft:	Spiral grooves on a shaft surface caused by relative axial movement of grinding wheel to shaft.
Leakage:	See Rate, Leakate.
Length, Deflected:	Refers to the working circumferential length (measured on spring centerline) of the garter spring with the seal lip assembled on a normal (designed) shaft diameter.
Length, Lip:	The axial distance between the thinnest part of the flex section and the contact line.
Length, Spring Free:	The total unconfined length of a spring. For a garter spring, it would not include the rib length.
Life, Flex:	The length of time to failure which indicates the relative ability of a material to withstand dynamic bending or flexing under specific test conditions.
Line, Contact:	The line of intersection between the outside and inside lip surface of a radial lip seal. In a cross-sectional view, this intersection is illustrated as a point.
Lip, Axial Dirt:	A nonsprung axial lip at the heel of the elastomeric lip that impinges upon a radial flange and is used.
Lip, Auxiliary:	See Lip, Secondary Seal.
Lip, Dirt:	See Lip, Secondary Seal.
Lip Dust:	See Lip, Secondary Seal.
Lip, Molded:	A type of seal lip which requires no trimming to form the contact line.
Lip, Primary:	The normally flexible elastomeric component of a lip seal assembly, which rides against the rotating surface and affects the seal.
Lip, Static:	The section of the helix seal lip incorporating the contact line.
Lip, Secondary:	A short, nonspring-loaded lip, located at the outside seal face of a radial lip seal to prevent ingress of atmospheric contaminants.
Lip, Spring Retaining:	The portion of the primary lip that restricts the axial movement of the extension spring from a predetermined position.

REFERENCE

Load, Radial:	The total force (load) acting on the seal lip which tends to maintain contact of the lip on the shaft. It is the sum of the forces developed from seal interference and the garter spring.
LOP:	See Pressure, Lip Opening.
Lubricant, Mold:	The substance used to coat the surfaces of a mold to prevent the elastomer from adhering to the mold cavity surface during vulcanization.
Lubricant Starvation:	Lack of proper lubrication at the seal interface which may cause premature wear and early failure.

M

Machine Lead:	Spiral grooves similar to a screw thread on a shaft surface that can result from improper finishing process, may result in early leakage.
Modulus, Rubber:	The tensile stress at a specified elongation. A measure of resistance to deformation.
Modulus, Young's:	The ratio of the stress to the resulting strain (the latter expressed as a fraction of the original height or thickness in the direction of the force).
Mold Impression:	A molded imperfection on the surface of the seal.
Monomer:	A single organic molecule usually containing carbon and capable of additional polymerization.

N

Nib, Spring:	A short end section of an extension spring formed by a reduction in the coil diameter used to join the two ends in forming a garter spring.
Nick:	A void created in the seal material after molding.
Nitrile:	A general term for the copolymers of butadiene and acrylonitrile.
Nonfill:	A void in the seal material.
O	
Offset:	The radial distance between the axis of the seal bore and the axis of shaft rotation.
Oil Resistance:	The measure of an elastomer's ability to withstand the deteriorating effect of oil on the mechanical properties.

REFERENCE

Oil Seal:	A seal designed primarily for the retention of oil.
Oil Swell:	The change in volume of a rubber material due to absorption of oil.
O-Ring:	A torodial shaped seal.
Out-of-round, Shaft:	The deviation of the shaft cross section from a true circle. Out-of-round is measured as the radial distance, on a polar chart recording, between concentric, circmscribed, and inscribed circles which just contain the trace and are so centered that the radial distance is minimized.

P

Packing, Mechanical:	A deformable material used to prevent or control the passage of matter between surfaces which move in relation to each other.
Pitch, Helix Seal Rib:	The circumferential displacement between adjacent helical ribs of a lip seal.
Plasticity:	The degree or rate at which unvulcanized elastomer and elastomeric compounds will flow when subjected to forces of compression, shear or extrusion.
Plasticizer:	A material that when incorporated in elastomer or polymer, will change its hardness, flexibility, processability, and/or plasticity.
Plunge Ground:	The surface texture of shaft or wear sleeve produced by presenting the grinding wheel perpendicular to the rotating shaft without axial motion.
Polyacrylate:	A type of elastomer characterized by an unsaturated chain and being a copolymer of alkyl acrylate and some other monomer such as chloroethyl vinyl ether or vinyl chloroacetate.
Polymer:	Generic term for an organic compound of high molecular weight and consisting of recurrent structural groups.
Polymerization:	The ability of certain organic compounds to react together to form a single molecule of higher atomic weight.

REFERENCE

Polytetrafluoroethylene (PTFE):	PTFE is a fluoropolymer with excellent thermal and chemical resistance and low coefficient of friction. PTFE is usually compounded with fillers such as molybdenum disulfide, graphite, pigments, and glass fibers to improve wear characteristics and other properties.
Porosity:	A multitude of minute cavities in the seal material.
Position, Spring:	The axial distance between the seal contact line and the centerline of the spring groove of a radial lip seal, commonly referred to as the "R" value.
Precure-Partial Cure:	The first cure of a material that is given more than one cure in its manufacture.
Pressure-Partial Cure:	The first cure of a material that is given more than one cure is its manufacture.
Pressure, Contact:	The average pressure necessary for flowing air at 10.000 cm ³ /m between the contact surface of a radial lip seal and a shaft-size mandrel under the following conditions: the seal case outer diameter clamped to be concentric with the mandrel and the pressurized air applied to the outside lip surface.
Pressure, Seal Cavity:	The pressure of a fluid being sealed.
Pressure, Spring:	The contact pressure which results from the spring load.
PTFE Seal, Lay Down Lip:	Term used to describe a PTFE sealing element with a wide contact pattern on shaft. Often used with hydrodynamic features.
PTFE Seal, Line Contact Lip:	A seal utilizing an insert of PTFE bonded to an elastomeric back-up material. Shaft contact is over a narrow area similar to most radial lip seals.

R

Ra:	The average of all peaks and valleys from the mean line within cut-off (.10" or .254mm). Ra does not describe the surface profile (texture) and two shafts with the same Ra value can have very different surface characteristics.
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REFERENCE

Rate, Leakage:	The quantity of fluid passing through a seal is given length of time.
Rate, Spring:	The force, independent of initial tension, which is required for extending the working length of a spring a unit distance.
Rate, Wear:	The amount of seal contact surface wear per unit of time.
Relaxation, Stress:	A characteristics of an elastomer wherein a gradual increase in deformation is experienced under constant load, after the initial deformation.
Resilience:	In elastomer or rubber like materials subjected to and relieved of stress, resilience is the ratio of energy given up on recovery from the deformation to the energy required to produce the deformation. Resilience for an elastomer is usually expressed in percent.
Resistance, Cold:	The ability of a seal or sealing material to withstand the effects of a low temperature.
Resistance, Heat:	The ability of a seal or sealing material to resist the deteriorating effects of elevated temperatures.
Resistance, Ozone:	The ability of a material to withstand the deteriorating effects of ozone (surface cracking).
Rib:	A long, narrow projection which is normally triangular in cross-section and which is molded into the outside lip surface of a helix seal. It is oriented at an angle to the shaft axis. One end of the rib forms part of the seal-lip contact surface.
Rough Trim:	A trimmed surface with irregularities on the outside and inside lip surfaces in the immediate vicinity of the contact line.
Roughness:	Irregularities in shaft surface texture which result from the production process.
Roughness, Axial Surface:	Surface roughness of a shaft measured in a direction (plane) normal to the centerline axis.
Run-In:	The period of initial operation during which the seal-lip wear rate is greatest and the contact surface is developed.

REFERENCE

Runout, Dynamic:	Twice the distance the center of the shaft is displaced from the center of rotation and expressed in TIR. That runout to which the seal lip is subjected due to the outside diameter of the shaft not rotating in a true circle.
RZ (din):	Average peak to valley height.

S

Scoop Trim:	A trimmed surface which is concave.
Scoring:	A type of wear in which the working surface is grooved.
Scratch:	A shallow discontinuity in the seal material whereby no material is removed.
Scuffing:	Metal surface degradation resulting from adhesive wear.
Seal, Bonded:	Design feature of a type of radial lip seal. The heel of the sealing element is attached (bonded) to the seal case by an adhesive during the molding operation.
Seal, Birotational:	A rotary shaft seal which seal will seal fluid regardless of direction of shaft rotation.
Seal, Dynamic:	A seal which has rotating, oscillation, or reciprocating motion between it and its mating surface, in contrast to stationary-type seals, such as a gasket.
Seal, Helix:	An elastomeric hydrodynamic lip seal having helical ribs on the outside lip surface.
Seal, Hydrodynamic:	A dynamic sealing device which utilizes the viscous shear and inertia forces of the fluid, imparted by a helically grooved O ribbed seal lip, to generate a pressure differential that opposes fluid flow.
Seal, Lip:	An elastomeric seal which prevents leakage in dynamic and static applications by reason of controlled interference between the seal lip and the mating surface.
Seal, Mechanical:	Any material or device that prevents or controls the passage of matter across the separable members of a mechanical assembly.

REFERENCE

Seal, Radial:	A seal which exerts radial sealing pressure in order to retain fluids and/or exclude foreign matter.
Seal, Radial Lip:	A type of seal which features a flexible sealing member referred to as a lip. The lip is usually of an elastomeric material. It exerts radial sealing pressure on a mating shaft in order to retain fluids and/or exclude foreign matter.
Seal, Shaft:	Generally considered to be a lip seal or an oil seal but a broad definition could include any sealing device mounted on a shaft or sealing a shaft.
Seal, Split:	A seal which has its primary sealing element split, approximately parallel with the shaft axial centerline. Typically used where conventional installation methods are impractical or impossible.
Seal, Unirotational:	A seal designed for applications having a single direction of shaft rotation.
Seal, Unitized:	A seal assembly in which all components necessary for accomplishing the complete sealing function are retained in a single package.
Sealer, Case OD:	A coating applied to the case OD to prevent leakage between the seal case and the housing bore.
Sealing Capacity:	The difference in leakage rates of a hydrodynamic seal and a nonhydrodynamic seal when tested on a shaft with a spiral groove that tends to pump oil out of the sump when the shaft is rotating.
Section, Flex:	The portion of a seal lip which is bounded by the head and heel section of a lip seal. Its primary function is to permit relative motion between the seal lip and the case.
Section, Head:	The portion of a lip seal which is generally defined by the inside and outside lip surface and the spring groove.
Section, Heel:	The portion of a lip seal which is attached to the seal case and bounded by the flex section and the outside face.

REFERENCE

Set, Compression:	The deformation which remains in rubber after it has been subject to and released from a specific percent compression for a definite period of time at a prescribed temperature. Compression set measurements are for the purpose of evaluating creep and stress relaxation properties of rubber.
Set, Permanent:	The residual unrecoverable deformation in an elastomeric part after the load causing the deformation has been removed.
Shaft Diameter:	The outside diameter of the shaft at the location where the seal is mounted.
Shaft Finish:	The relative roughness, usually expressed in micro inches, of the outside diameter of the shaft. The smaller the number, the smoother the finish.
Side, Air:	The side of a seal which in normal use faces away from the fluid being sealed.
Silicone:	A type of elastomer having a basic polymer of dimethyl polysiloxane, with various attached vinyl or phenyl groups.
Slant, Seal:	The difference between the maximum and minimum axial dimensions from the seal-lip contact line to the outside face of the case.
Sleeve, Wear:	A replaceable metal ring, generally used in assemblies to eliminate expensive shaft replacement caused by grooving that may occur at the seal-shaft interface.
Slinger:	A washer-like device used for imparting radial momentum to a liquid in order to keep the latter away from the sealing interface. Often incorporated into a wear sleeve.
Speed, Surface:	The linear velocity calculated from the shaft rotational speed using the nominal shaft diameter.
Spiral Trim:	A trimmed surface which has a spiral pattern.
Spring Axial Position:	The axial distance between the projected intersection of the inside and outside lip surface and centerline of the spring coil diameter (center plane of the spring) with the spring in position and the seal located on the shaft.

REFERENCE

Spring, Finger:	A spring consisting of a multiple number or cantilevered elements located circumferentially on a ring. It can be designed to produce either a radial or an axial force.
Spring, Garter:	A helically coiled wire with its ends connected to form a ring. It is used in tension for maintaining a radial sealing force between the sealing element of a radial lip seal and a shaft.
S.T.B.M:	Shaft to bore misalignment, the amount by which the shaft is off center, with respect to the bore's center.
Stability, Dimensional:	The ability to retain manufactured shape and size after having experienced the combination of operating stresses and temperatures.
Step Trim:	A trimmed surface having a discontinuity perpendicular to the contact line.
Stick, Slip:	A friction related phenomenon where the sealing element tends to adhere and rotate with the shaft surface momentarily until the elastic characteristics of the sealing element overcome the adhesive force, causing the seal lip to lose contact with the rotating shaft long enough to allow leakage. This cycle repeats itself continuously and is normally associated with non-lubricated/boundary lubricated conditions.
Sump Temperature:	The temperature of the fluid contained within the machinery sump.
Surface, Contact:	The portion of the seal lip which circumferentially contacts the shaft to form the seal-shaft interface.
Surface Contamination:	Foreign matter on the seal surface.
Surface, Inside Lip:	The inside truncated conical surface of the lip, the minor diameter of which terminates at the contact point.
Surface, Outside Lip:	The outside truncated conical surface of the lip, the minor diameter of which terminates at the contact point.
Surface Speed:	The linear velocity calculated from the shaft rotational speed, using the nominal shaft diameter.

REFERENCE

Surface, Trimmed Seal:	The lip surface formed by a knife cutting operation to develop the contact line.
Synthetic Rubber:	Synthetic elastomers made by polymerization of one or more monomers.

T

Tear:	The removal or separation of a portion of the sealing element.
Tear Resistance:	The property of an elastomeric material to resist tearing forces.
Tensile Strength, Ultimate:	The force per unit of original cross-sectional area at the moment of a specimen rupture.
Tension, Initial Spring:	The “preload” that has been wound into the coils of a spring during the coiling operation.
Test, Accelerated Life:	Any set of test conditions designed to reproduce in a short time the effects obtained under service conditions.
Test, Bench:	A laboratory test in which the functional operating conditions are approximated, but the equipment is conventional laboratory equipment and not necessarily identical with that in which the product will be used.
Test, Field:	A test performed in the actual environment in which the product will be used.
Test, Flex:	A laboratory method used to evaluate the resistance of a material to repeated bending.
Test, Life:	A laboratory procedure used to determine that period of operation which a component or assembly will operate until it no longer performs its intended function.
Texture, Shaft Surface:	A term used to describe the quality, appearance or characteristic of the shaft surface resulting from operations, such as grinding, polishing, burnishing and so on.
Thickness, Film:	In a dynamic seal, the distance separating the two surfaces which form the primary seal.
Trim:	The removal of the superfluous parts from a molded product, usually removal of parting line flash or feed sprues.

REFERENCE

Trim, Crooked:	See Slant, Seal.
Trim, Rough:	Irregularities on the outside and inside lip surfaces in the immediate vicinity of the contact line.

U

Unbonded Flash:	Flash which does not properly adhere to the mating material to which it is intended to be bonded.
Under Cure:	A degree of cure less than desired.
Underlip Temperature:	The temperature of the oil between the underlip and sump temperature.
Underlip Temperature Rise:	The difference between the underlip and sump temperature.
Unsprung Interference:	The difference between the shaft diameter and the unsprung lip diameter.

V

Value "R":	See position, Spring.
Variation, Contact Line Height:	The difference in the contact line height as measured at any two points on the contact line. Maximum contact line height variation is defined as seal slant.
Variation, Radial Wall:	The difference between the minimum and maximum radial wall dimensions when measured around 360 degrees of the lip seal.
Vibration, Torsional:	A vibration which has a circumferential angular direction. It is often generated by a stick-slip action between mating seal faces.
Volume Swell:	Increase in physical size caused by the swelling action of a liquid, generally expressed as a percent of the original volume.
Vulcanization:	An irreversible process during which a rubber compound, through a change in its chemical structure, becomes less plastic and more resistant to swelling by organic liquids and the elastic properties are confined, improved or extended over a greater range of temperature.

REFERENCE

W

Washer, Bonded:	A flat, metal, washer-type ring which has been molded in place in the elastomeric material forming one of the sealing elements.
Weepage:	A minute amount of liquid leakage by a seal.
Wetting:	A formation of a continuous film of a liquid on a surface.
Width, Case:	The total axial width of the seal case.
Width, Contact:	The width of the lip contact area of a radial lip seal, measured in the axial direction.
Width, Helix Contact:	The axial width of that portion of the contact surface of a helix seal which is formed by the helical ribs. It is equal to the total axial width of the contact surface minus the width of the static lip.
Width, Helix Seal Rib:	The maximum width of a helical rib measured perpendicular to the rib's longitudinal axis.
Width, Static Lip Contact:	The axial width of the contact surface developed by a static lip.
Wind-Up, Spring:	The tendency of a garter spring with ends assembled together to deform from a flat surface. Excessive spring wind-up results in the spring forming a figure "8" configuration.

FLUID COMPATIBILITY

Materials react in different ways depending on the fluid where they are immersed, the next table shows the compatibility of Nitrile, Polyacrylate, Silicon and Fluorocarbon with different fluids.

REFERENCE

CHEMICAL	SEALING MATERIAL			
	N	P	S	F
1-Butene, 2 Ethyl	1	--	4	1
1-Chloro-1-Nitro Ethane	4	4	4	4
51-F-23	1	1	3	1
Acetaldehyde	4	4	2	4
Acetamide	1	4	2	2
Acetic Acid, Glacial	3	4	2	3
Acetic Acid, 30%	2	4	1	2
Acetic Acid, 5%	2	--	1	1
Acetic Acid, hot high pressure	4	--	4	4
Acetic Anhydride	3	4	3	4
Acetone	4	4	3	4
Acetophenone	4	4	4	4
Acetyl Acetone	4	--	4	4
Acetyl Chloride	4	4	3	1
Acetylene	1	4	2	1
Acetylene Tetrabomide	4	--	--	1
Acrylonitrile	4	4	4	3
Adipic Acid	1	--	--	--
Aero Lubriplate	1	--	2	1
Aero Safe 2300	4	--	4	4
Aero Safe 2300W	4	--	4	4
Aero Shell 17 grease	1	--	2	1
Aero Shell 750	2	--	4	1
Aero Shell 7A grease	1	--	2	1
Aero Shell IAC	1	--	2	1
Aerozene 50 (50% Hydrazine, 50% UDMH)	4	--	4	4
Air above 300 F	4	--	1	1
Air below 300 F	2	--	1	1
Alkazene (Dibromoethylbenzene)	4	4	4	2
Alum-NH3-Cr_K (aq)	1	4	1	4
Aluminum Acetate (AQ)	2	4	4	4
Aluminum Bromide	1	--	1	1

REFERENCE

Lip Codes: N = Nitrile P = Polyacrylate S = Silicon F = Fluorocarbon

Ratings: 1 = Minor Affect 2 = Moderate Affect 3 = Static Only 4 = Not Recommended
 -- = Insufficient Data (AQ) = Aqueous

CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Aluminum Chloride (AG)	1	1	2	1
Aluminum Fluoride (AQ)	1	--	2	1
Aluminum Nitrate (AQ)	1	--	2	1
Aluminum Phosphate (AQ)	1	--	1	1
Aluminum salts	1	--	1	1
Aluminum Sulfate(AQ)	1	4	1	1
Ambrex 33 mobile	1	--	4	1
Ammonia and Lithium in solution	2	--	4	4
Ammonia, Anhydrous	2	4	3	4
Ammonia gas (cold)	1	4	1	4
Ammonia gas (hot)	4	4	1	4
Ammonium Carbonate (AQ)	4	4	--	--
Ammonium Chloride (AQ)	1	--	--	1
Ammonium Hydroxide (conc.)	4	4	1	2
Ammonium Nitrate (AQ)	1	2	--	--
Ammonium Nitrite (AQ)	1	--	2	--
Ammonium Persulfate (AQ)	4	4	--	--
Ammonium Persulfate 10%	4	--	--	--
Ammonium Phosphate Dibasic Am- monium Phosphate	1	--	1	--
Monobasic	1	--	1	--
Ammonium Phosphate Tribasic	1	--	1	--
Ammonium Phosphate (AQ)	1	--	1	--
Ammonium salts	1	--	1	4
Ammonium Sulfate (AQ)	1	4	--	4
Ammonium Sulfide	1	--	--	4
Amyl Acetate (banana oil)	4	4	4	4
Amyl Alcohol	2	4	4	2
Amyl Borate	1	--	--	1
Amyl Chloride	--	--	4	1
Amyl Chloronaphthalene	4	4	4	1

REFERENCE

Lip Codes: N = Nitrile P = Polyacrylate S = Silicon F = Fluorocarbon

Ratings: 1 = Minor Affect 2 = Moderate Affect 3 = Static Only 4 = Not Recommended
 -- = Insufficient Data (AQ) = Aqueous

CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Amyl Naphthalene	4	2	4	1
AN-O-3 Grade M	1	--	2	1
AN-O-366	1	--	4	1
AN-O-6	1	--	4	1
AN-W-O-366B Hydr. Fluid	1	--	4	1
Anderol L-774 (MIL-L-7808D)	2	4	1	1
Anderol L-826 (Diester)	2	--	4	1
Anderol L-829 (Diester)	2	--	4	1
ANG (Diester base) (TG749)	2	--	2	1
ANG (Glycerol Ester)	2	--	2	1
Anhydrous Ammonia	2	--	2	4
Anhydrous Hydrazine	4	--	--	4
Anhydrous Hydrogen Fluoride	4	--	--	4
Aniline	4	4	4	3
Aniline dyes	4	4	3	2
Aniline Hydrochloride	2	4	4	2
Aniline oils	4	--	4	4
Animal fats (butter)	1	1	2	1
Ansul Ether (Anesthetics)	3	4	4	4
API GL-5	2	1	4	1
Aqua Regia	4	4	4	2
Argon	4	--	2	1
Aroclor 1248	3	4	2	1
Aroclor 1254	4	4	3	1
Aroclor 1260	1	4	2	1
Aromatic fuel 50%	2	--	4	1
Arsenic Acid	1	3	1	1
Arsenic Trichloride (AQ)	1	--	--	--
Askrel	2	4	4	1
Asphalt	2	2	4	1
ASTM #1 Method D-471	1	1	3	1

REFERENCE

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
ASTM #2 Method D-471	1	1	3	1
ASTM #3 Method D-471	1	1	3	1
ASTM #4 Method D-471	2	--	4	1
ASTM Reference Fuel A (MIL-S-3136B Type 1)	1	2	4	1
ASTM Reference Fuel B (MIL-S-3136B Type 3)	1	--	4	1
ASTM Reference Fuel C	2	4	4	1
ATF Type (Mercon)	1	1	1	1
ATF Type A	1	1	2	1
ATF Type F	1	1	2	1
ATF Type I	1	1	2	1
ATF Type II	1	1	2	1
ATL-857	2	--	4	1
Atlantic Dominion	1	--	4	1
Aurex 903R Mobile	1	--	4	1
Automotive brake fluid	4	--	4	4
B.P. Aero Hydraulic Fluid #1 (DTD585)	--	--	--	1
Banana oil (Amyl Acetate)	4	4	4	4
Bardol	4	--	4	1
Barium Chloride (AQ)	1	1	1	1
Barium Hydroxide (AQ)	1	4	1	1
Barium Sulfate (AQ)	1	4	1	1
Barium Sulfide (AQ)	1	4	1	1
Beer	1	4	1	1
Beer sugar liquors	1	4	1	1
Bel Ray SE 140	1	--	--	1
Bel Ray SE 290	2	--	--	4
Benzaldehyde	4	4	2	4
Benzene	4	4	4	2
Benzene sulfonic acid	4	4	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Benzine (Ligroin) (Nitrobenzine)	1	1	4	1
Benzine (Pet Ether)	1	1	4	1
Benzoic acid	3	3	3	1
Benzophenone	--	--	--	1
Benzoyl Chloride	4	4	--	1
Benzyl Alcohol	4	4	2	1
Benzyl Benzoate	4	4	--	1
Benzyl Chloride	4	4	4	1
Biphenyl (Diphenyl) (Phenylbenzene)	4	4	4	1
Black Point 77	1	--	4	1
Black Sulphate liquors	2	--	2	1
Blast furnace gas	4	4	1	1
Bleach solutions	4	4	2	1
Borax	2	2	2	1
Bordeaux mixture	2	4	2	1
Boric Acid	1	4	1	1
Boron fluids (HEF)	2	--	4	1
Brake fluid (non-Petroleum)	4	--	4	4
Brake fluid (Wagner 21B)	3	--	3	4
Bray GG-130	2	--	4	1
Brayco 719-R (W-H-910)	4	--	2	4
Brayco 885 (MIL-L-6085A)	2	--	4	1
Brayco 910	2	--	4	4
Bret 710	2	--	4	4
Brine	1	4	1	1
BP, ISO 220 Mineral Oil, PM-220	1	1	2	1
Brom-113	4	--	4	--
Brom-114	2	--	4	2
Bromine	4	--	4	1
Bromine Trifluoride	4	4	4	4
Bromine Water	4	4	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Bromine-Anhydrous	4	4	4	1
Bromine-Pentafluoride	4	--	4	4
Bromobenzene	4	4	4	1
Bromochloro Trifluoroethane	4	--	4	1
Bunker oil	1	1	2	1
Butadiene	4	4	4	1
Butane	1	1	4	1
Butane 2, 2-Dimethyl	1	--	4	1
Butane 2, 3-Dimethyl	1	--	4	1
Butanol (Butyl Alcohol)	1	--	2	1
Butter (animal fat)	1	1	2	1
Butyl Acetate	4	4	4	4
Butyl Acetyl Ricinoleate	3	--	--	1
Butyl Acrylate	4	4	--	4
Butyl Alcohol	1	4	2	1
Butyl Amine	3	4	4	4
Butyl Benzoate	4	4	--	1
Butyl Butyrate	4	--	--	1
Butyl Carbitol	4	4	4	1
Butyl Cellosolve	3	4	--	4
Butyl Cellosolve Adipate	4	--	2	2
Butyl Ether	4	--	4	4
Butyl Oleate	4	--	--	1
Butyl Stearate	2	--	--	1
Butylene	2	4	4	1
Butylaldehyde	4	4	4	4
Butyric Acid	4	--	--	2
Calcine liquors	1	--	--	1
Calcium Acetate (AQ)	2	4	4	4
Calcium Bisulfate (AQ)	4	4	1	1
Calcium Carbonate	1	--	1	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Calcium Chloride (AQ)	1	1	1	1
Calcium Cyanide	1	--	1	--
Calcium Hydroxide (AQ)	1	4	1	1
Calcium Hypochloride	4	--	--	1
Calcium Hypochlorite (AQ)	2	4	2	1
Calcium Nitrate (AQ)	1	1	2	1
Calcium Phosphate	1	--	1	1
Calcium salts	1	--	--	1
Calcium Sulfide (AQ)	1	4	2	1
Calcium Sulfite	1	--	1	1
Calcium Thiosulphate	2	--	1	1
Caliche liquors	1	--	2	1
Cane sugar liquors	1	4	1	1
Caporic Aldehyde	--	--	2	4
Carbamate	3	4	--	1
Carbitol	2	4	2	2
Carbolic Acid (Phenol)	4	4	4	1
Carbon Bisulfide	3	3	4	1
Carbon Dioxide (wet or dry)	1	--	2	1
Carbon Disulfide	4	--	--	1
Carbon Monoxide	1	--	1	1
Carbon Tetrachloride	3	4	4	1
Carbonic Acid	2	--	1	1
Castor oil	1	1	1	1
Caustic soda	2	3	2	2
Cellosolve	4	4	4	3
Cellosolve Acetate	4	4	4	4
Cellosolve Butyl	4	--	4	4
Celluguard	1	--	1	1
Cellulube (Fryquel)	4	4	1	1
Cellulube 220 (see MIL-L-19457)	4	4	3	3

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Cellulube 90, 100, 150, 220, 300, 500	4	--	1	1
Cellutherm 2505A	2	--	4	1
Cetane (Hexadecane)	1	--	4	1
China wood oil (Tung oil)	1	--	4	1
Chloracetic Acid	4	--	--	4
Chlorextol	2	--	4	1
Chlorinated salt Brine	4	--	4	1
Chlorinated solvents (wet or dry)	4	--	4	1
Chlorine (dry)	4	4	4	1
Chlorine (wet)	4	4	4	1
Chlorine Dioxide	4	4	--	1
Chlorine Trifluoride	4	4	4	4
Chloroacetic Acid	4	4	--	4
Chloroacetone	4	4	4	4
Chlorobenzene	4	4	4	1
Chlorobenzene (Mono)	4	--	4	1
Chlorobromomethane	4	4	4	1
Chlorobutadiene	4	4	4	1
Chlorodane	2	--	4	1
Chlorododecane	4	4	4	1
Chloroform	4	4	4	1
Chlorosulfonic Acid	4	4	4	4
Chlorotoluene	4	4	4	1
Chlorox (Sodium Hypochlorite NAOC1)	2	4	2	1
Chrom Alum	1	--	1	1
Chrome plating solutions	4	4	2	1
Chromic Acid	4	4	3	1
Chromic Oxide .88 Wt. % Aqueous Sol	4	--	2	1
Circo light processing oil	1	--	4	1
Citric Acid	1	--	1	1
City Service #'s 65, 120, 250	1	--	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
City Service Kool Motor-AP gear oil	1	--	4	1
City Service Pacemaker #2	1	--	4	1
CM Coolant #5	1	--	--	--
Coal Tar (Creosote)	1	1	4	1
Cobalt Chloride (2N)	1	--	1	1
Cobalt Chloride (AQ)	1	4	2	1
Coconut oil	1	1	1	1
Cod liver oil	1	1	2	1
Coffee (basically water)	1	--	--	1
Coke oven gas	4	4	2	1
Coliche liquors	2	--	--	--
Convelex 10	4	--	4	--
Coolanol (Monsanto)	1	--	4	1
Coolanol 45 (Monsanto)	1	--	4	1
Copper Acetate (AQ)	2	4	4	4
Copper Chloride (AQ)	1	1	1	1
Copper Cyanide (AQ)	1	1	1	1
Copper salts	1	--	1	1
Copper Sulfate (AQ)	1	4	1	1
Copper Sulfate 10%	1	--	1	1
Copper Sulfate 50%	1	--	1	1
Corn oil	1	1	1	1
Cottonseed oil	1	1	1	1
Creosote (coal tar)	1	1	4	1
Creosote (wood)	1	--	4	1
Cresol	4	4	4	1
Cresylic Acid	4	4	4	1
Crude oil	2	--	4	1
Cumene	4	4	4	1
Cutting oil	1	--	4	1
Cyclohexane	1	1	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Cyclohexanol	3	--	4	1
Cyclohexanone	4	4	4	1
DC44M (Dow Corning)	3	3	3	1
DC44M hi temp Silicone grease	3	3	3	1
Decalin	4	--	4	1
Decane	1	1	2	1
Delco brake fluid	4	--	4	4
Denatured Alcohol	1	4	1	1
Detergent solutions	1	4	1	1
Developing fluids	1	--	1	1
Dextron	1	--	4	1
Di-Ester lubricant (MIL_L-7808)	2	--	4	1
Di-Ester synthetic lubricant	2	--	4	1
Diacetone	4	4	4	4
Diacetone Alcohol	4	4	2	4
Diazion	4	--	4	2
Dibenzyl Ether	4	--	--	4
Dibenzyl Sebecate	4	4	3	2
Dibromoethylbenzene (Alkazene)	4	4	4	2
Dibutyl Amine	4	4	3	4
Dibutyl Ether	4	3	4	3
Dibutyl Phthalate	4	4	2	3
Dibutyl Sebecate	4	4	2	2
Dichloro-Butane	2	--	4	1
Dichloro-Isopropyl Ether	4	3	4	3
Dicyclohexylamine	3	4	--	4
Diesel fuel	1	1	4	1
Diethyl Benzene	4	--	4	1
Diethyl ether	4	3	4	4
Diethyl Sebecate	2	4	2	2
Diethylamine	2	4	2	4

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Diethylene Glycol	1	2	2	1
Difluorodibromomethane	4	--	4	--
Diisobutylene	2	4	4	1
Diisooctyl Sebacate	4	--	4	2
Diisopropyl Benzene	4	--	--	1
Diisopropyl Ketone	4	4	4	4
Diisopropylidene Acetone (Phorone)	4	4	4	4
Dimethyl Aniline (Xylidine)	3	4	4	4
Dimethyl Disulfite (DMS)	4	4	4	4
Dimethyl Ether (Methyl Ether)	3	4	4	4
Dimethyl Ether (Monomethyl Ether)	1	4	1	1
Dimethyl Formamide	2	4	2	4
Dimethyl Phthalate	4	4	--	2
Dinitrotolene	4	4	4	4
Diethyl Phthalate	3	4	3	2
Diethyl Sebecate	4	4	3	2
Dioxane	4	4	4	4
Dioxolane	4	4	4	4
Dipentene	2	4	4	1
Diphenyl (Biphenyl) (Phenybenzene)	4	4	4	1
Diphenyl oxides	4	4	3	1
DMS (Dimethyl Disulfite)	4	4	4	4
Dow chemical 50-4	--	--	--	4
Dow chemical ET378	4	--	4	--
Dow chemical ET588	4	--	--	4
Dow Corning-11	1	--	4	1
Dow Corning-1208	1	--	4	1
Dow Corning-200	1	--	4	1
Dow Corning-220	1	--	4	1
Dow Corning-3	1	--	4	1
Dow Corning-33	1	--	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Dow Corning-4	1	--	4	1
Dow Corning-4050	1	--	4	1
Dow Corning-44	1	--	4	1
Dow Corning-5	1	--	4	1
Dow Corning-510	1	--	4	1
Dow Corning-55	1	--	4	1
Dow Corning-550	1	--	4	1
Dow Corning-6620	1	--	4	1
Dow Corning-704	2	--	4	1
Dow Corning-705	2	--	--	1
Dow Corning-710	1	--	4	1
Dow Corning-F60	1	--	4	1
Dow Corning-F61	1	--	2	1
Dow Corning-XF61	1	--	4	1
Dow Guard	1	--	1	1
Dowtherm 209, 50% solution	4	--	4	4
Dowtherm A or E	4	--	4	1
Dowtherm oil	4	4	3	1
Drinking water (see note re. water)	1	--	1	1
Dry cleaning fluids	3	4	4	1
Elco 28-EP lubricant	1	--	4	1
Engine oil (Diester motor oil)	2	1	1	1
Engine oil (Hydrocarbon motor oil)	1	1	1	1
EP lubes	2	1	4	1
Epichlorohydrin	4	4	4	4
Epoxy resins	--	--	--	4
ESAM-6 fluid	--	--	--	4
Esso fuel 208	1	--	4	1
Esso golden gasoline	2	--	4	1
Esso GX 80W90 (GL-5)	2	1	4	1
Esso motor oil	1	--	4	1

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	N	P	S	F
Esso transmission fluid (Type A)	1	--	4	1
Esso WS3812 (MIL-L-7808)	1	--	4	1
Esso XP90 EP lubricant	1	--	4	1
Esstic 42,43	1	--	4	1
Esters	4	--	4	4
Ethane	1	--	4	1
Ethanol (Ethyl Alcohol)	1	4	1	3
Ethanolamine	2	4	2	4
Ethyl Acetate	4	4	2	4
Ethyl Acetate-organic Ester	4	--	2	4
Ethyl Acetoacetate	4	4	2	4
Ethyl Acrylate	4	4	2	4
Ethyl Acrylic Acid	4	--	4	--
Ethyl Alcohol (Ethanol)	1	4	1	3
Ethyl Benzene	4	4	4	1
Ethyl Benzoate	4	4	4	1
Ethyl Bromide	2	--	4	1
Ethyl Cellosolve	4	4	4	4
Ethyl Cellulose	2	4	3	4
Ethyl Chloride	1	4	4	1
Ethyl Chlorocarbonate	4	4	4	1
Ethyl Chloroformate	4	4	4	4
Ethyl Cyclopentane	1	--	4	1
Ethyl Ether	3	4	4	4
Ethyl Formate	4	--	--	1
Ethyl Hexanol	1	--	2	1
Ethyl Mercapton	4	--	3	2
Ethyl Oxalate	4	4	4	1
Ethyl Pentachlorobenzene	4	4	4	1
Ethyl Silicate	1	--	--	1
Ethylene	1	--	--	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Ethylene Chloride	4	4	4	2
Ethylene Chlorohydrin	4	4	3	1
Ethylene Diamine	1	4	1	4
Ethylene Dibromide	4	--	4	1
Ethylene Dichloride	4	4	4	1
Ethylene Glycol	1	3	1	1
Ethylene Oxide	4	4	4	4
Ethylene Trichloride	4	4	4	1
Ethylmorpholene Stannus Octate 50/50	4	--	--	4
Fatty Acids	2	--	3	1
FC-43 Heptacosofluorotributylamine	1	--	1	1
FC75 Fluorocarbon	1	--	1	2
Ferric Chloride (AQ)	1	1	2	1
Ferric Nitrate (AQ)	1	1	3	1
Ferric Sulfate (AQ)	1	1	2	1
Fish oil	1	--	1	1
Fluorine (liquid)	4	4	4	2
Fluorobenzene	4	4	4	1
Fluoroboric Acid	1	--	--	--
Fluorolube	1	--	1	2
Formaldehyde (RT)	3	4	2	4
Formaldehyde, 37%	3	4	2	1
Formic Acid	2	--	--	3
Freon 11	2	--	--	1
Freon 112	3	--	4	1
Freon 113	1	--	4	2
Freon 114	1	--	4	2
Freon 114B2	2	--	4	2
Freon 115	1	--	--	2
Freon 12	1	1	4	2
Freon 12 and ASTM #2 oil (50/50)	1	--	4	1

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	N	P	S	F
Freon 12 and Suniso 4G (50/50)	1	--	4	1
Freon 13	1	--	4	1
Freon 134A	4	4	4	4
Freon 13B1	1	--	4	1
Freon 14	1	--	4	1
Freon 142B	1	--	--	4
Freon 152A	1	--	--	4
Freon 21	4	--	4	4
Freon 218	1	--	--	1
Freon 22	4	4	4	4
Freon 22 and ASTM #2 oil (50/50)	4	--	4	2
Freon 31	4	--	--	4
Freon 32	1	--	--	4
Freon 502	2	--	--	2
Freon BF	2	--	4	1
Freon C316	1	--	--	--
Freon C318	1	--	--	2
Freon MF	1	--	4	2
Freon PCA	1	--	4	2
Freon T-P35	1	--	1	1
Freon T-WD602	2	--	4	1
Freon TA	1	--	3	3
Freon TC	1	--	4	1
Freon TF	1	--	4	2
Freon TMC	2	--	3	1
Fuel oil	1	1	4	1
Fuel oil #6	2	--	4	1
Fuel oil, acidic	1	--	4	1
Fumaric Acid	1	4	2	1
Fuming Sulphuric Acid (20/25% Oleum)	4	--	4	1
Furan, Furfuran	4	4	--	--

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Furaryl Alcohol	4	--	4	--
Furfural	4	4	4	4
Furfuraldehyde	4	--	4	4
Fyrquel (Cellulube)	4	--	1	1
Fyrquel 90, 100, 150, 220, 300, 500	4	--	1	1
Fyrquel A60	4	--	4	4
Gallic Acid	2	4	--	1
Gasohol (10% Ethanol or Methanol)	2	4	4	3
Gasoline (lead and no-lead)	2	4	4	1
Gelatin	1	4	1	1
Girling brake fluid	4	--	4	4
Glacial Acetic Acid	2	--	2	4
Glauber's salt (AQ)	4	4	--	1
Glucose	1	--	1	1
Glue	1	--	1	1
Glycerin	1	3	1	1
Grease	1	2	1	1
Green Sulfate liquor	2	2	1	1
Gulf endurance oils	1	--	4	1
Gulf FR fluids (emulsion)	1	--	4	1
Gulf FRG fluids	1	--	1	1
Gulf FRP fluids	4	--	1	2
Gulf harmony oils	1	--	4	1
Gulf high temperature grease	1	--	4	1
Gulf legion oils	1	--	4	1
Gulf paramount oils	1	--	4	1
Gulf security oils	1	--	4	1
Gulfcrown grease	1	--	4	1
Halothane	4	--	4	1
Halowax oil	4	--	4	1
Hannifin Lube A	1	--	2	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Heavy water (Deuterium)	1	--	1	1
Hef (high energy fuel)	2	--	4	1
Helium	1	1	1	1
Hexane	1	1	4	1
Hexyl alcohol	1	4	2	1
High viscosity lubricant, H2	1	--	1	1
High viscosity lubricant, U4	1	--	1	1
Hilo MS #1	4	--	4	4
Houghto-Safe 1010, Phosphate Ester	4	--	4	1
Houghto-Safe 1055, Phosphate Ester	4	--	4	1
Houghto-Safe 1120, Phosphate Ester	4	--	4	1
Houghto-Safe 271 H2O and Glycol base	1	--	2	2
Houghto-Safe 5040, water/oil emulsion	1	--	4	1
Houghto-Safe 620 water/glycol	1	--	2	2
Hydraulic oil (Petroleum)	1	1	3	1
Hydrazine	2	--	3	4
Hydro-Driv, MIH-10 (Petroleum base)	1	--	2	1
Hydro-Driv, MIH-50 (Petroleum base)	1	--	2	1
Hydrobromic Acid	4	4	4	1
Hydrobromic Acid 40%	4	4	4	1
Hydrocarbons (saturated)	1	--	4	1
Hydrochloric Acid (cold) 37%	3	4	3	1
Hydrochloric Acid (hot) 37%	4	4	4	2
Hydrochloric Acid 3 molar	4	--	4	1
Hydrocyanic Acid	2	4	3	1
Hydrofluoric Acid (conc.) cold	4	4	4	1
Hydrofluoric Acid (conc.) hot	4	4	4	3
Hydrofluoric Acid, Anhydrous	4	4	4	4
Hydrofluorsilicic (Fluosilicic) Acid	1	--	4	1
Hydrogen gas	1	2	3	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Hydrogen Peroxide (90%)	4	4	2	2
Hydrogen Sulfide (wet) cold	4	4	3	4
Hydrogen Sulfide (wet) hot	4	4	3	4
Hydrolube-water/Ethylene Glycol	1	--	2	1
Hydroquinone	3	4	--	2
Hydyne	2	--	4	4
Hyjet	4	--	--	4
Hyjet III	4	--	--	4
Hyjet S	4	--	--	4
Hyjet W	4	--	--	4
Hypochlorous Acid	4	4	--	1
Isopropyl Acetate	4	4	4	4
Industron FF44	1	--	4	1
Industron FF48	1	--	4	1
Industron FF53	1	--	4	1
Industron FF80	1	--	4	1
Iodine	2	--	--	1
Iodine Pentafluoride	4	4	4	4
ISO-Butyl N-Butyrate	4	--	--	1
Isobutyl Alcohol	2	4	1	1
Isododecane	1	--	4	1
Isooctane	1	1	4	1
Isophorone	4	4	4	4
Isopropanol	2	--	1	1
Isopropyl Acetate	4	4	4	4
Isopropyl Alcohol	2	4	1	1
Isopropyl Chloride	4	4	4	1
Isopropyl Ether	2	3	4	4
JP3, JP4, JP5 (see MIL-J-5624G)	1	2	4	1
JP6 (see MIL-F-25656B)	1	--	4	1
JPX (see MIL-F-25604)	1	--	4	4

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
KEL-F liquids	1	--	1	2
Kerosene	1	1	4	1
Keystone #87 HX-grease	1	--	4	1
Keystone (KSL) Diester lube	2	--	--	1
Krytox, LVP (Dupont)	1	1	1	1
Lacquer solvents	4	4	4	4
Lacquers	4	4	4	4
Lactams-Amino Acids	4	--	--	4
Lacquer solvents	4	4	4	4
Lactic Acid (cold)	1	4	1	1
Lactic Acid (hot)	4	4	2	1
Lard	1	1	2	1
Lavender oil	2	2	4	1
Lead Acetate (AQ)	2	4	4	4
Lead Nitrate (AQ)	1	--	2	--
Lead Sulfamate (AQ)	2	4	2	1
Legroin (Benzine)	1	1	4	1
Legroin (Nitrobenzine)	1	1	4	1
Legroin (Pet Ether)	1	1	4	1
Lehigh X1169	1	--	4	1
Lehigh X1170	1	--	4	1
Light grease	1	--	4	1
Lime bleach	1	4	2	1
Lime Sulfur	4	4	4	1
Lime water (Calcium Hydroxide-AQ)	1	4	1	1
Lindol (Hydraulic fluid)	4	4	2	2
Linoleic Acid	2	--	1	2
Linseed oil	1	1	--	1
Liquefied Petroleum gas	1	3	1	1
Liquid Oxygen	4	--	4	4
Lubricating oils (Di-Ester)	1	--	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Lubricating oils (Petroleum)	1	1	4	1
Lye	2	3	2	2
Magnesium Chloride (AQ)	1	--	1	1
Magnesium Hydroxide (AQ)	2	4	--	1
Magnesium salts	1	--	1	1
Magnesium sulfate (AQ)	1	4	1	1
Magnesium Sulfite	1	--	1	1
Malathion	2	--	4	1
Maleic Acid	4	4	--	1
Maleic Anhydride	4	4	--	4
Malic Acid	1	4	2	1
MCS 312	4	--	1	1
MCS 352,463	4	--	4	1
MEK (Methyl Ethyl Ketone)	4	4	4	4
Mercury	1	--	--	1
Mercury Chloride (AQ)	1	--	--	1
Mercury vapors	1	--	--	1
Mesityl oxide	4	4	4	4
Methane	1	1	4	2
Methane, Sulfurated (odor detection)	1	1	4	2
Menthanol (Methyl Alcohol)	1	4	1	4
Methyl Acetate	4	4	4	4
Methyl Acetoacetate	4	--	2	4
Methyl Acetone	4	4	3	4
Methyl Acrylate	4	4	4	4
Methyl Alcohol (Ethanol)	1	4	1	4
Methyl Benzoate	4	--	4	1
Methyl Bromide	2	3	--	1
Methyl Butyl Ketone (Propyl Acetone)	4	4	3	4
Methyl Carbonate	4	--	4	1
Methyl Cellosolve	3	4	4	4

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Methyl Cellulose	2	--	2	4
Methyl Chloride	4	4	4	2
Methyl Chloroformate	4	--	4	1
Methyl Cyclopentane	4	4	4	2
Methyl D-Bromide	4	--	4	1
Methyl Ether (Dimethyl Ether)	1	4	1	1
Methyl Ether (Monomethyl Ether)	1	4	1	1
Methyl Ethyl Ketone (MEK)	4	4	4	4
Methyl Ethyl Ketone Peroxide	4	--	2	4
Methyl Formate	4	--	--	--
Methyl Isobutyl Ketone	4	4	4	4
Methyl Methacrylate	4	4	4	4
Methyl Oleate	4	--	--	2
Methyl Salicylate	4	--	--	--
Methylacrylic Acid	4	4	4	4
Methylene Chloride	4	4	4	2
Methylene Dichloride	4	--	4	2
MIL-1-8660 B	1	--	4	1
MIL-A-6091	2	--	1	1
MIL-A-8243 B	1	3	2	2
MIL-C-4339 C	1	1	3	1
MIL-C-5545 A	2	2	4	1
MIL-C-6529 C	2	2	4	1
Mil-C-8188 C	1	3	3	1
MIL-E-9500	1	--	1	1
MIL-F-16884	1	--	4	1
MIL-F-16929 A	1	3	3	1
MIL-F-17111	1	1	3	1
MIL-F-19605	1	--	4	1
MIL-F-25172	1	--	4	1
MIL-F-25524 A	1	--	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
MIL-F-25558 B (RJ-1)	1	1	3	1
MIL-F-25576 C (RP-1)	1	1	4	1
MIL-F-25656 B	1	--	4	1
MIL-F-5566	1	--	1	1
MIL-F-5602	1	1	3	1
MIL-F-7024 A	1	2	4	1
MIL-G-10924	1	1	4	1
MIL-G-10924 B	1	1	3	1
MIL-G-15793	1	3	3	1
MIL-G-18709 A	1	1	3	1
MIL-G-2108	1	1	3	1
MIL-G-23827 A	1	3	3	1
MIL-G-25013 D	1	2	4	1
MIL-G-25537 A	1	1	3	1
MIL-G-25760 A	1	3	4	1
MIL-G-27343	1	--	4	1
MIL-G-27617	4	--	4	1
MIL-G-3278	2	--	4	1
MIL-G-4343 B	2	1	4	1
MIL-G-7118 A	1	3	3	1
MIL-G-7187	1	1	3	1
MIL-G-7421 A	1	--	3	1
MIL-G-7711 A	1	1	3	1
MIL-G-81322	2	--	--	--
MIL-H-13862	1	1	3	1
MIL-H-13866 A	1	1	3	1
MIL-H-13910 B	2	2	4	1
MIL-H-13919 A	1	1	3	1
MIL-H-19457 B	4	4	3	3
MIL-H-22072	1	3	2	2
MIL-H-22251	2	--	4	--

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
MIL-H-25598	1	1	3	1
MIL-H-27601 A	2	2	4	1
MIL-H-46001 A	1	1	3	1
MIL-H-46004	1	1	3	1
MIL-H-5559 A	1	3	2	2
MIL-H-5606 B red oil	1	1	4	1
MIL-H-6083 C	1	1	3	1
MIL-H-7083 A	1	3	2	2
MIL-H-7644	2	2	4	1
MIL-H-81019 B	1	1	3	1
MIL-H-8446 B (MLO-8515)	2	3	4	1
MIL-I-27686 D	1	3	2	2
MIL-J-5161 F	1	--	4	1
MIL-J-5624 G JP-3, JP-4, JP-5	1	2	4	1
MIL-L-10295 A	1	1	3	1
MIL-L-10324 A	1	1	3	1
MIL-L-11734 B	1	3	3	1
MIL-L-14107 B	3	--	4	1
MIL-L-15016	1	--	4	1
MIL-L-15017	1	1	3	1
MIL-L-15018 B	1	1	3	1
MIL-L-15019 C	1	1	3	1
MIL-L-15719 A	2	2	4	1
MIL-L-16958 A	1	1	3	1
MIL-L-17331 D	1	1	3	1
MIL-L-17353 A	1	--	3	1
MIL-L-17672 B	1	1	3	1
MIL-L-18486 A	1	1	3	1
MIL-L-19457	4	4	3	3
MIL-L-19701	1	3	3	1
MIL-L-2104 B	1	1	3	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
MIL-L-2105 B	1	1	3	1
MIL-L-2105 C (API GL-5)	2	1	4	1
MIL-L-21260	1	1	3	1
MIL-L-22396	1	1	3	1
MIL-L-23699 A	1	3	3	1
MIL-L-25336 B	1	3	3	1
MIL-L-25681 C	1	2	4	1
MIL-L-25968	1	3	3	1
MIL-L-26087 A	1	1	3	1
MIL-L-27694 A	1	--	4	1
MIL-L-3150 A	1	1	3	1
MIL-L-3503	1	1	3	1
MIL-L-3545 B	2	2	4	1
MIL-L-46000 A	1	3	3	1
MIL-L-46002	1	--	3	1
MIL-L-5020 A	1	2	4	1
MIL-L-5606	1	1	4	1
MIL-L-6082 A	1	1	1	1
MIL-L-6082 C	1	1	3	1
MIL-L-6085 A	1	3	3	1
MIL-L-6086 B	1	1	3	1
MIL-L-6387 A	1	--	3	1
MIL-L-644 B	1	2	3	--
MIL-L-7645	2	2	4	1
MIL-L-7808 D	2	4	1	1
MIL-L-7808 E	2	4	1	2
MIL-L-7808 F	2	3	1	1
MIL-L-7870 A	1	1	3	1
MIL-L-8383 B	1	1	3	1
MIL-L-9000 F	1	2	4	1
MIL-L-9236 B	1	3	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
MIL-O-11773	1	3	3	1
MIL-O-6081 C	1	1	3	1
MIL-P-12098	2	2	4	1
MIL-P-46046 A	2	2	4	1
MIL-S-21568 A	1	1	4	1
MIL-S-3136 B Type I	1	2	4	1
MIL-S-3136 B Type II	1	--	4	1
MIL-S-3136 B Type III	1	--	4	1
MIL-S-3136 B Type IV	1	1	3	1
MIL-S-3136 Type V	1	1	3	1
MIL-S-3136 B Type VI	1	1	3	1
MIL-S-3136 B Type VII	1	--	4	1
MIL-S-81087	1	--	4	1
MIL-T-9188 B	4	4	4	4
Milk	1	4	1	1
Mineral oil	1	1	2	1
Mineral spirits	2	--	4	1
Mobil SHC 525	1	4	4	3
Mobil SHC 624	2	4	4	3
Mobil SHC 626	2	4	4	3
Mobil SHC 629	2	3	4	2
Mobil SHC 630	2	2	4	1
Mobil SHC 632	2	1	4	1
Mobil SHC 634	1	1	4	1
Mobil SHC 75W90	1	3	4	2
Mono Ethanolamine	4	--	2	4
Monobromobenzene	4	--	4	1
Monochlorobenzene	4	4	4	1
Monoethanol Amine	4	4	2	4
Monomethyl Aniline	4	4	--	2
Monomethyl Ether (Dimethyl Ether)	1	4	1	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Monomethyl Ether (Methyl Ether)	1	4	1	1
Monomethyl Hydrazine	2	--	4	--
Mononitrotoluene/Dinitrotoluene 40/60	4	--	4	4
Monovinyl Acetylene	1	--	2	1
Mopar brake fluid	4	--	4	4
Mustard gas	--	--	1	--
Myvacet 9-45	1	--	--	1
N-Heptane	1	--	4	1
N-Hexaldehyde	4	--	2	4
N-Hexene-1	2	1	4	1
N-Octane	2	4	4	1
N-Pentane	1	--	4	1
N-Propyl Acetate	4	4	4	4
Naptha	2	2	4	1
Naphthaienic Acid	2	--	4	1
Naphthalene	4	--	4	1
Natural gas	1	2	1	1
Neat's foot oil	1	1	2	1
Neon	1	--	1	1
Neville Acid	4	4	4	1
Nickel Acetate (AQ)	2	4	4	4
Nickel Chloride (AQ)	1	3	1	1
Nickel salts	1	--	1	1
Nickel Sulfate (AQ)	1	4	1	1
Niter cake	1	4	1	1
Nitric Acid (conc.)	4	4	4	3
Nitric Acid (dilute)	4	4	2	1
Nitric Acid, red fuming	4	4	4	4
Nitrobenzene	4	4	4	2
Nitrobenzene (Petroleum Ether)	1	1	4	1
Nitrobenzine	--	--	--	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Nitroethane	4	4	4	4
Nitrogen	1	1	1	1
Nitrogen Tetroxide	4	4	4	4
Nitromethane	4	4	4	4
Nitropropane	4	--	4	4
No. 5 cm coolant	1	--	--	--
O-A-548A	1	3	2	2
O-Chloronaphthalene	4	4	4	1
O-Chlorophenol	4	--	4	1
O-Dichlorobenzene	4	4	4	1
O-Dichorobenzene	4	4	4	1
O-T-634B	3	4	4	1
Octachlorotoluene	4	4	4	1
Octadecane	1	2	4	1
Octyl Alcohol	2	4	2	1
Oleic Acid	3	4	4	2
Oleum (Fuming Sulfuric Acid)	4	--	4	1
Oleum spirits	2	--	4	1
Olive oil	1	1	3	1
Oronite 8200 (see MIL-H-8446B)	2	3	4	1
Orthochloro Ethyl Benzene	4	--	4	1
OS 45 Type III (OS45)	2	--	4	1
OS 45 Type IV (OS45-1)	2	--	4	1
OS 70	2	--	4	1
Oxalic Acid	2	--	2	1
Oxygen-(200-400 degrees F.)	4	4	2	2
Oxygen, cold	2	2	1	1
Ozone	4	2	1	1
P-Cymene	4	4	4	1
P-D-680	1	--	4	1
P-D-680B	1	--	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
P-Dichlorobenzene	4	--	4	1
P-S-661B	1	--	4	1
Paint thinner, Duco	4	4	4	2
Palmitic Acid	1	--	4	1
Par-Al-Ketone	4	--	4	4
Para-Dichlorobenzene	4	--	4	1
Parker O-Lube	1	--	1	1
Peanut oil	1	1	1	1
Pentane, 2 Methyl	1	--	4	1
Pentane, 2-4 Dimethyl	1	--	4	1
Pentane, 3 Methyl	1	--	4	1
Perchloric Acid	4	4	4	1
Perchloroethylene	2	4	4	1
Petroleum, above 250 degrees F.	4	4	4	2
Petroleum, below 250 degrees F.	1	2	2	1
Phenol (Carbolic Acid)	4	4	4	1
Phenol, 70%/30% water	4	--	4	1
Phenol, 85%/15% water	4	--	4	1
Phenylbenzene	4	4	4	1
Phenyl Ethyl Ether	4	4	4	4
Phenyl Hydrazine	4	4	--	1
Phenylbenzene	4	4	4	1
Phorone (Disopropylidene Acetone)	4	4	4	4
Phosphate Ester	4	4	1	1
Phosphoric Acid, 20%	2	--	2	1
Phosphoric Acid-3 molar	4	--	2	1
Phosphoric Acid-45%	4	--	3	1
Phosphoric Acid, concentrated	4	--	2	1
Phosphorus Trichloride	4	--	--	1
Pickling solution	4	4	4	2
Picric Acid	2	--	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Pine oil	4	--	4	1
Pinene	2	4	4	1
Piperidine	4	4	4	4
Plating solution, chrome	--	--	4	1
Plating solution, others	1	--	4	1
Polyalkylene Glycol (Ucon-51 lube)	--	--	2	2
Potassium Acetate (AQ)	2	4	4	4
Potassium Chloride (AQ)	1	1	1	1
Potassium Cupro Cyanide (AQ)	1	1	1	1
Potassium Cyanide (AQ)	1	1	1	1
Potassium Dichromate (AQ)	1	1	1	1
Potassium Hydroxide (AQ)	2	4	3	4
Potassium Nitrate (AQ)	1	1	1	1
Potassium salts	1	--	1	1
Potassium Sulfate (AQ)	1	4	1	1
Potassium Sulfite	1	--	1	1
Prestone anti-freeze	1	--	1	1
PRL-high temp Hydr oil	2	--	2	1
Producer gas	1	2	2	1
Propane	1	1	4	1
Propane Propionitrile	1	--	4	1
Propyl Acetone (Methyl Butyl Ketone)	4	4	3	4
Propyl Alcohol	1	4	1	1
Propyl Nitrate	4	4	4	4
Propylene	4	4	4	1
Propylene Oxide	4	4	4	4
Pydraul, 10E, 29 ELT	4	4	4	1
Pydraul, 115E	4	4	4	1
Pydraul, 230E, 312C, 540C	4	4	4	1
Pydraul, 30E, 50E, 65E, 90E	4	4	1	1
Pyranol	1	--	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Pyranol, transformer oil	1	1	4	1
Pyridine	4	4	4	4
Pyrogard, 42, 43, 53, 55 (Phosphate Ester)	4	--	4	1
Pyrogard C, D	1	--	2	1
Pyroligenous Acid	4	4	--	4
Pyrolube	4	--	2	1
Pyrrole	4	4	2	4
Quaker 613-AS	2	3	2	2
Radiation	3	3	3	4
Rapeseed oil	2	2	4	1
Red Line 100 oil	1	--	4	1
Red oil (MIL-H-5606)	1	1	4	1
RJ-1 (MIL-F-25558B)	1	1	4	1
RP-1 (MIL-F-25576C)	1	1	4	1
SAE 30	1	1	1	1
SAE 90	1	1	4	1
SAE 90 EP (GL-5)	2	1	4	1
Sal Ammoniac	1	1	2	1
Salicylic Acid	2	--	--	1
Salt water	1	4	1	1
Santo Safe 300	4	--	1	1
Sewage	1	4	2	1
Shell Alvania grease #2	1	--	2	1
Shell Carnea 19 and 29	1	--	--	1
Shell Diala	1	--	--	1
Shell Iris 3XF mine fluid (fire rest)	1	--	--	1
Shell Iris 905	1	--	--	1
Shell Iris Tellus #27, pet base	1	--	4	1
Shell Iris Tellus #33	1	--	4	1
Shell Iris UMF (5% aromatic)	1	--	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Shell lo Hydrax 27 and 29	1	--	4	1
Shell macoma 72	1	--	4	1
Silicate Esters	2	--	4	1
Silicone greases	1	1	3	1
Silicone oils	1	1	3	1
Silver Nitrate	2	1	1	1
Sinclair Opaline CX-EP lube	1	--	4	1
Skelly solvent B, C, E	1	--	--	1
Skydrol 500	4	4	3	4
Skydrol 7000	4	4	3	2
Soap solutions	1	4	1	1
Socony Mobil Type A	1	--	4	1
Socony vacuum AMV AC781 (grease)	1	--	4	1
Socony vacuum PD959B	4	--	4	1
Soda ash	1	--	1	1
Sodium Acetate (AQ)	2	4	4	4
Sodium Bicarbonate (AQ) baking soda	1	--	1	1
Sodium Bisulfite (AQ)	1	4	1	1
Sodium Borate (AQ)	1	--	1	1
Sodium Carbonate (soda ash)	1	--	1	1
Sodium Chloride (AQ)	1	--	1	1
Sodium Cyanide (AQ)	1	--	1	1
Sodium Hydroxide (AQ)	2	3	2	2
Sodium Hypochlorite (AQ) (Chlorax)	2	4	2	1
Sodium Metaphosphate (AQ)	1	--	--	1
Sodium Nitrate (AQ)	2	--	4	--
Sodium Perborate (AQ)	2	--	2	1
Sodium Peroxide (AQ)	2	4	4	1
Sodium Phosphate (AQ)	1	1	4	1
Sodium salts	1	--	1	1
Sodium Silicate (AQ)	1	--	--	1

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REFERENCE

CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Sodium Sulfate (AQ)	1	4	1	1
Sodium Sulfit	1	--	1	1
Sodium Sulphide	1	--	1	1
Sodium Thiosulfate (AQ)	2	4	1	1
Sovasol #1, 2, 3	1	--	4	1
Sovasol #73, 74	2	--	4	1
Soybean oil	1	1	1	1
SPRY	1	--	1	1
SR-10 Fuel	1	--	4	1
SR-6 Fuel	2	--	4	1
Stannic Chloride (AQ)	1	--	2	1
Stannous Chloride (AQ)	1	--	2	1
Stauffer 7700	2	--	4	1
Steam over 300 degrees F. (water)	4	4	4	4
Steam under 300 degrees F. (water)	4	4	3	4
Stearic acid	2	--	2	--
Stoddard solvent	1	1	4	1
Styrene	4	4	4	2
Sucrose solution	1	4	1	1
Sulfite liquors	2	4	4	1
Sulfur	4	4	3	1
Sulfur Chloride (AQ)	3	4	3	1
Sulfur Dioxide (dry)	4	4	2	1
Sulfur Dioxide (wet)	4	4	2	1
Sulfur Dioxide liquid (under pressure)	4	4	2	1
Sulfur Hexafluoride	2	4	2	1
Sulfur liquors	2	--	4	1
Sulfur Trioxide	4	4	2	1
Sulfur-Molten	4	--	4	1
Sulfuric Acid (20% Oleum)	4	4	4	1
Sulfuric Acid (conc.)	4	4	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Sulfuric acid (dilute)	3	2	4	1
Sulfuric Acid 3 Molar	4	--	4	1
Sulfurous Acid	2	4	4	1
Sunoco #3661	1	--	4	1
Sunoco all purpose grease	1	--	4	1
Sunoco SAE 10	1	--	4	1
SunSAFE (fire resistant Hydr. fluid)	1	--	--	1
Super shell gas	1	--	4	1
Swan Finch EP lube	1	--	4	1
Swan Finch Hypoid	1	--	4	1
Tannic Acid	1	4	2	1
Tar, Bituminous	2	4	2	1
Tartaric acid	1	--	1	1
Terpineol	2	--	--	1
Tertiary-Butyl Alcohol Turbine oil #15 (MIL-L-7808A)	2	--	4	1
Turbo oil #35	1	--	4	1
Turpentine	1	2	4	1
Type I fuel (MIL-S-3136)	1	--	4	1
Type II fuel (MIL-L-3136)	2	--	4	1
Type III fuel (MIL-L-3136)	2	--	4	1
Ucon Hydrolube J-4	1	--	1	1
Ucon Lubricant 50-HB100	1	--	1	1
Ucon Lubricant 50-HB260	1	--	1	1
Ucon Lubricant 50-HB5100	1	--	1	1
Ucon Lubricant 50-HB55	1	--	1	1
Ucon Lubricant 50-HB660	1	--	1	1
Ucon Lubricant LB-1145	1	--	1	1
Ucon Lubricant LB-135	1	--	1	1
Ucon Lubricant LB-285	1	--	1	1
Ucon Lubricant LB-300	1	--	1	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Ucon Lubricant LB-625	1	--	1	1
Ucon Lubricant LB-65	1	--	1	1
Ucon oil LB-385	1	--	1	1
Ucon oil LB-400X	1	--	1	1
Ultra-violet light	4	2	1	1
Univis (Hydraulic fluid)	1	--	4	1
Univolt #35 (mineral oil)	1	--	4	1
Varnish	2	4	4	1
Vegtable oils	1	1	2	1
Versilube F-50	1	1	3	1
Vinegar	2	4	1	1
Vinyl Chloride	4	4	--	1
W-B-680	2	2	4	1
W-G-632	1	1	3	1
W-G-671C	1	1	3	1
W-H-910	2	2	4	1
W-I-530A	1	1	3	1
W-K-211D	1	--	4	1
W-K-220A	1	2	4	1
W-L-751B	2	2	4	1
W-L-800	1	1	3	1
W-L-820B	1	1	3	1
W-L-825A Type I	1	1	3	1
W-L-825A Type II	1	1	3	1
W-L-825A Type III	2	2	4	1
W-O-526	1	1	3	1
W-P-216A	1	1	3	1
W-P-236	2	2	4	1
Wagner 21B brake fluid	3	--	3	4
Water	1	4	1	1
Wemco	1	--	4	1

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CHEMICAL	SEALING MATERIAL			
	N	P	S	F
Whiskey, wines	1	4	1	1
White gas	2	4	4	1
White oil	1	1	4	1
White pine oil	2	--	4	1
Wolmar salt	1	--	1	1
Wood alcohol	1	--	1	1
Wood oil	1	1	4	1
Xenon	1	--	1	1
Xylene	4	4	4	1
Xylidine (Di-Methyl Aniline)	3	4	4	4
Xylol	4	--	4	1
Zeolites	1	--	--	1
Zinc Acetate (AQ)	2	4	4	4
Zinc Chloride (AQ)	1	4	1	1
Zinc salts	1	--	1	1

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PROFILE MATRIX

	1	2	3	4	5	6	7	8
A	SCJ 	SBJ 	SBH 	SBS 	SCL 	SCL6 	SB2T 	SB2L 
B	TCJ 	TBJ 	TBH 	TBS 	TCL 	TCL6 	TB2T 	TB2L 
C	VCJ 	VBJ 	VBH 	VBS 	VCL 	VCL6 	VB2T 	VB2L 
D	KCJ 	KBJ 	KBH 	KBS 	KCL 	KCL6 	KB2T 	KB2L 
E	DCJ 	DBJ 	SBM 	DBS 	DCL 	DCL6 	DB2T 	TBM 
F	SB2T 	SBT 	SCT 	UBS 	SCLT 	SAM 	TCLT 	TAM 
G	TB2T 	TBT 	TCT 	VCLT 	VAM 	VBM 	KBM 	DCLT 
H	VB2T 	VBT 	VCT 	KB2T 	KBT 	KCT 	KCLT 	KAM 
I	DB2T 	DBT 	DCT 	OSA2 	OSB2 	OSB 	OSBR 	OSC 
J	OTA2 	OTB2 	OTB 	OTBR 	OTC 	OVB 	OVBR 	OVC 

REFERENCE

PROFILE MATRIX

	1	2	3	4	5	6	7	8
A	OVA2 	OVB2 	OKA2 	OKB2 	OKB 	OKBR 	OKC 	SCN 
B	OUA2 	OUB2 	OUB 	OUBR 	OUC 	SCN1 	TCN1 	TDN 
C	SB4 	TB4 	SC4 	DC4 	TBR8 	TC8 	TC9 	TBC9 
D	RVS 	RO 	ROE 	SA2C 	SB2C 	SCC 	TA2C 	TB2C 
E	TCC 	EBC 	EBG 	ECS 	ECJ 	VA2 	VBR 	VC 
F	VBC 	VBJ 	VBH 	V13 	V16 	V10 	V15 	KA2 
G	KBR 	KC 	KBR 	KBJ 	KBH 	KBS 	KAM 	KBP 
H	KCL 	SA2 	SBR 	SC 	SBC 	SBJ 	SBH 	SBS 
I	SAM 	SBP 	SUA2 	TA2 	TBR 	TC 	TBC 	TBJ 
J	TBH 	TCL 	T11 	TC8 	TC9 	DB2 	DA2 	DBR 

REFERENCE

PROFILE MATRIX

	1	2	3	4	5	6	7	8
A	DBC 	DAP 	TSL8 	TSL9 	TSL10 	WPC 	WPR 	WPK 
B	WPB2 	OSB2 	OTB2 	OKB2 	OUA2 	OUBR 	OUC 	OUB10 
C	OUA20 	UA2 	UBR 	UC 	UB10 	UA20 	XB2 	XA2 
D	XBR 	XC 	XBC 	XBP 	LC 	LCO 	NBC 	VSB 
E	VSB5 	TGT1 	TCK 	XCJ 	XBJ 	XBH 	XBS 	XB2L 
F	TCN 	TC4 	RVA 	EC 	VB2 	KB2 	SB2 	DC 
G	UB2 	OUB2 	OVB2 	WPB 	FL 	EVO 		

REFERENCE