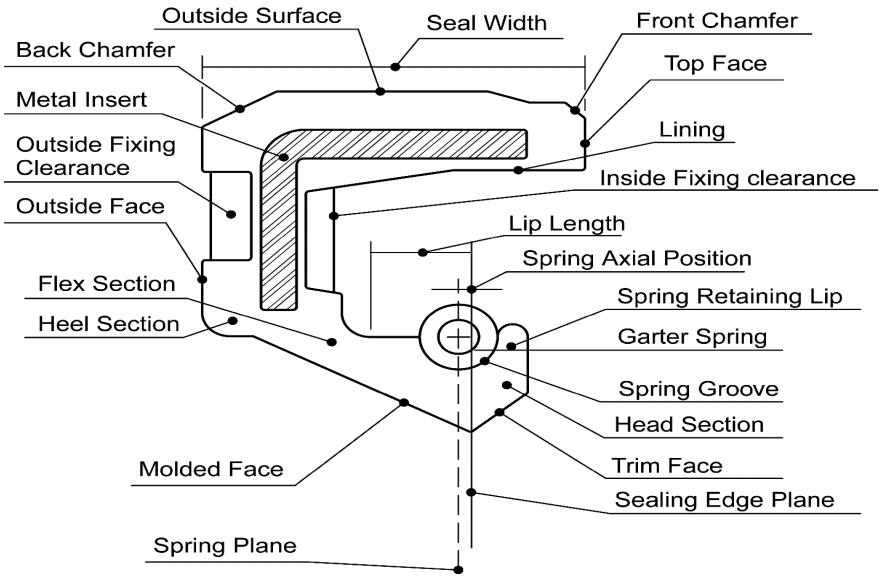
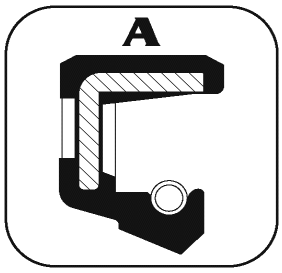
Rotary shaft seals are applied for sealing rotating shafts. Essentially, they consist of a rubber sealing lip, a stiffening metal core, and a garter spring. Depending on the application, there are three standard types: A, B, and C. Below is our A style.



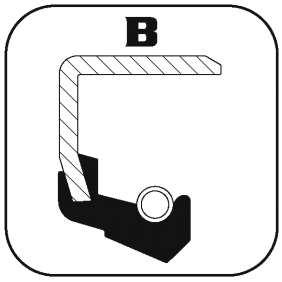
Type A

The rubber elastomer outer covering tolerates thermal expansion as well as roughness in the housing bore. There will be no fretting corrosion. Furthermore, damage of the housing bore will be prevented when frequently replacing the seal. This qualifies for sealing gaseous or liquid media.



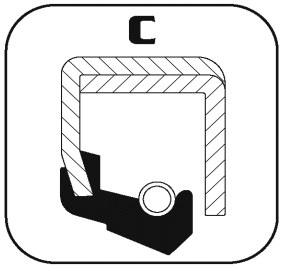
Type B

Metallic casing enables easier fitting. However, this type demands closer tolerances in the housing bore to ensure the sealing process.



Type C

Metallic casing with reinforcing cap. Sealing and mounting are identical as with type B. This type is applied in case of rougher operating conditions and where larger dimensions are utilized. Less delicate in case of incorrect mounting due to reinforcing cap.



Hardware Specifications

Shaft Specifications

Our seals perform the best on medium carbon steel or stainless steel shafts. Heat treatment or nitriding is especially recommended.

Shaft Hardness

In the area where the sealing lip contacts the shaft, we recommend that the minimum hardness is 45 HRc. Where lubrication is doubtful, abrasive matter is present, or the shaft speed is greater than 14m/s, 55 HRc is preferred.

Shaft Roughness

We recommend the shaft to be machined to a surface roughness of Ra = 9-17 (Ra = .23-.43um). In the area of the contact surface, rifling marks are not permitted.

Shaft Eccentricity

Two types of shaft eccentricity affect seal performance. They are dynamic run out (double dynamic eccentricity) and offset (shaft to bore misalignment or static eccentricity).

Shaft Tolerance

Shaft tolerances are shown on tables 1 & 2.

Housing Specifications

Steel and cast iron provide a good surface for both rubber and metal O.D. seals. For soft alloy, such as an aluminum housing, seals with a rubber O.D. are a better choice.

Housing Roughness

The housing inside diameter roughness is 100 micro inch Ra or 2.54 micrometers Ra for metal O.D. seals, and 150 micro inch or 3.81 micrometers for rubber covered O.D. seals.

Housing Tolerance

Housing tolerances are shown on tables 3 & 4.

Table 1. **Shaft Tolerance in INCH**

Nominal Shaft Diameter	Tolerance
up to 4,000	+/- 0.003
over 4,000 to 6,000	+/- 0.004
over 6,000 to 10,000	+/- 0.005
over 10,000	+/- 0.006

Table 2. **Shaft Tolerance in METRIC**

Shaft Diameter		Tolerance in mm
over	to	+ / -
0	3	0.0 / -.060
3	6	0.0 / -.075
6	10	0.0 / -.090
10	18	0.0 / -.110
18	30	0.0 / -.130
30	50	0.0 / -.160
50	80	0.0 / -.190
80	120	0.0 / -.220
120	180	0.0 / -.250
180	250	0.0 / -.290
250	315	0.0 / -.320
315	400	0.0 / -.360
400	500	0.0 / -.400

Table 3. **Housing Tolerance in INCH**

Bore Diameter	Bore Tolerance
up to 3.000	+/- 0.001
3.001 to 6.000	+/- 0.0015
6.001 to 10.000	+/- 0.002
10.001 to 20.000	+0.002 / -0.004
20.001 to 40.000	+0.002 / -0.006
40.001 to 60.000	+0.002 / -0.010

Table 4. **Housing Tolerance in METRIC**

Bore Diameter	Bore Tolerance
over 6 to 10	+0.022 / -0.000
over 10 to 18	+0.027 / -0.000
over 18 to 30	+0.033 / -0.000
over 30 to 50	+0.039 / -0.000
over 50 to 80	+0.046 / -0.000
over 80 to 120	+0.054 / -0.000
over 120 to 180	+0.063 / -0.000
over 180 to 250	+0.072 / -0.000
over 250 to 315	+0.081 / -0.000
over 315 to 400	+0.089 / -0.000

Width Tolerance of Seals

Unit	Width Range	Tolerance
Inch	ANY	+/-0.015
Metric	up to 10mm	+/-0.20
	over 10mm	+/-0.30

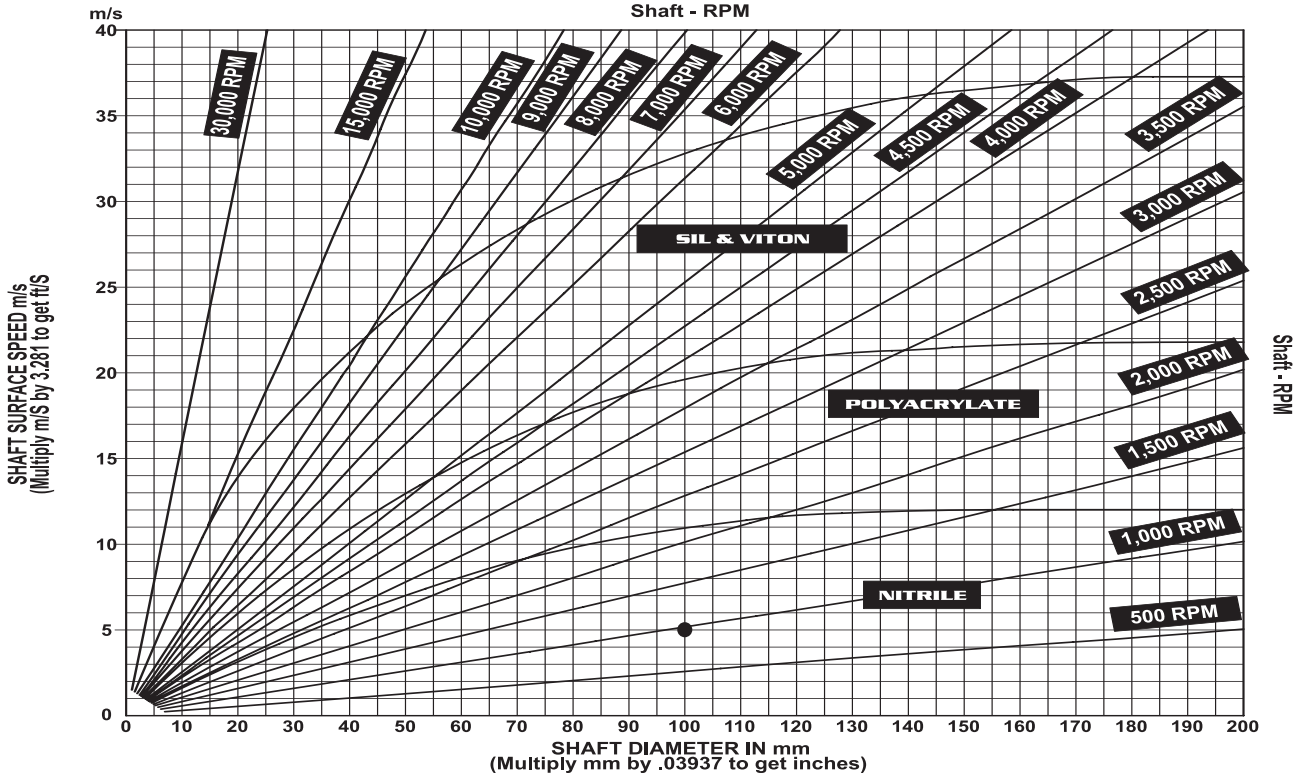
Seal Outside Diameter Tolerances - INCH

Bore Diameter	Press-fit Allowance		Tolerance	
	Metal Case	Rubber Covered Case	Metal Case	Rubber Covered Case
up to 1,000	+0.004	+0.006	+/- 0.002	+/- 0.003
1,001 to 2,000	+0.004	+0.007	+/- 0.002	+/- 0.003
2,001 to 3,000	+0.004	+0.008	+/- 0.002	+/- 0.003
3,001 to 4,000	+0.005	+0.010	+/- 0.002	+/- 0.004
4,001 to 6,000	+0.005	+0.010	+ 0.003 / - 0.002	+/- 0.004
6,001 to 8,000	+0.006	+0.010	+ 0.003 / - 0.002	+/- 0.004
8,001 to 10,000	+0.008	+0.010	+ 0.004 / - 0.002	+/- 0.004
10,001 to 20,000	+0.008	+0.010	+ 0.006 / - 0.002	+/- 0.004
20,001 to 40,000	+0.008	+0.010	+ 0.008 / - 0.002	+/- 0.004
40,001 to 60,000	+0.008	+0.010	+ 0.010 / - 0.002	+/- 0.004

Seal Outside Diameter Tolerances - METRIC

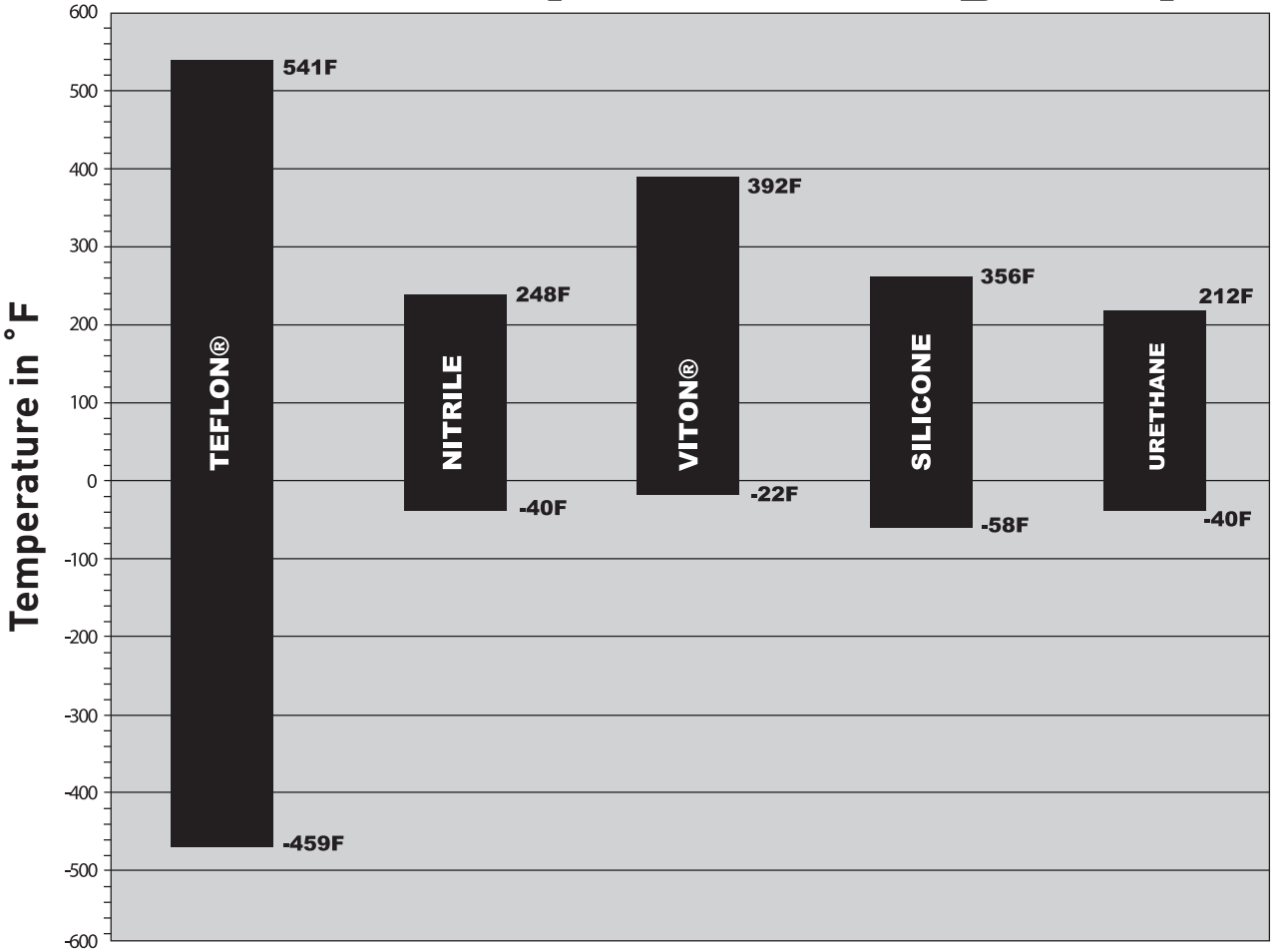
Bore Diameter	Press-fit Allowance		Permissible Eccentricity
	Metal Case	Rubber Covered Case	
up to 50	+ 0.20 / + 0.10	+ 0.30 / + 0.15	0.25
over 50 to 80	+ 0.23 / + 0.13	+ 0.35 / + 0.20	0.35
over 80 to 120	+ 0.25 / + 0.15	+ 0.35 / + 0.20	0.50
over 120 to 180	+ 0.28 / + 0.18	+ 0.45 / + 0.25	0.65
over 180 to 300	+ 0.30 / + 0.20	+ 0.45 / + 0.25	0.80
over 300 to 500	+ 0.35 / + 0.23	+ 0.55 / + 0.30	1.00

Shaft Speed Graph



● Example: A 100mm shaft rotating at 1000rpm would require a Nitrile lip.

Material Temperature Range Graph



Pressure

Our standard seal designs are generally used for sealing lower pressure applications. The chart below shows the maximum psi allowed for our standard seal types.

Seal Type	A, ADL, AO, B, C, DC	A-P, ADL-P	MS, MD (Teflon®)
Max allowable pressure	7psi	140psi	MS 60psi/MD 150psi

Shaft to Bore Misalignment

This is the degree of misalignment from the center of the shaft to the bore center. Misalignment concentrates wear on one side of the sealing lip. This becomes more severe as surface speeds increase. The chart below shows maximum misalignment.

Total Misalignment Allowed	.010 .005 (AO type only)	.010	.005

Shaft Run-Out

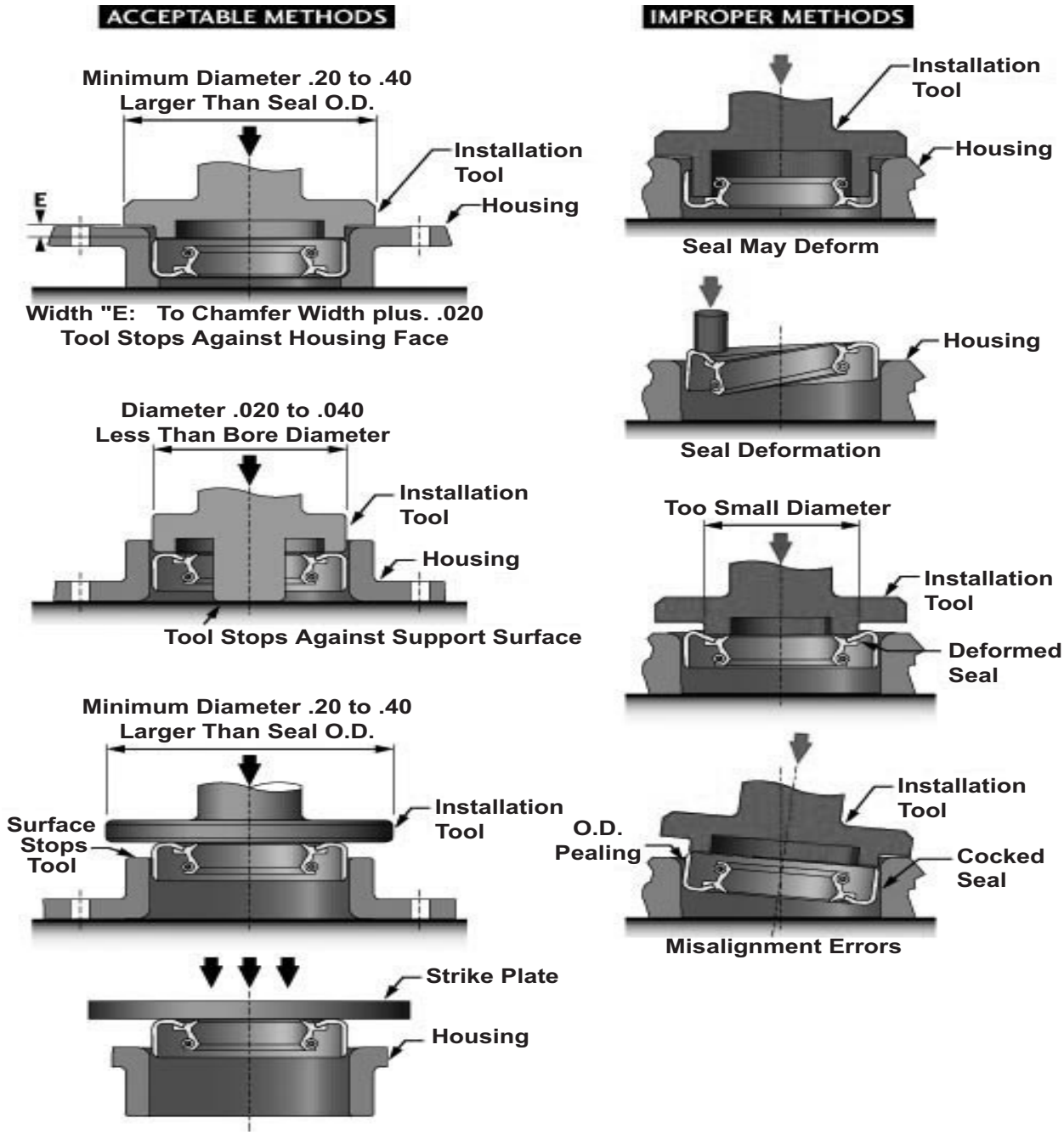
This is the misalignment of the sealing lip to the shaft with the center of shaft rotation, or movement of the center of the rotation through bearing looseness or shaft whip. This type of wear is more evenly distributed throughout the circumference of the sealing lip. Run-Out should be kept to a minumum. A combination of shaft run-out and bore misalignment create very difficult sealing conditions.

Total RPM Allowed	0-800	.025 (AO .005)	.025	.005
	800-2200	.020 (AO .005)	.020	.005
	2200-4200	.015 (AO .005)	.015	.005

Installation Methods

The subject of installation represents an area commonly overlooked when selecting an oil seal for an application. Studies have shown this area to be one of the major causes of premature seal failure. To assist the installation, the oil seal should be prelubricated with grease or oil to reduce sliding friction of contact surfaces. This will also help protect the seal lips during initial run-in. This section expands on recommended procedures for installation.

HOUSING INSTALLATION



An installation tool should always be used when installing an oil seal. The use of a tool can make installation easier and lower the possibility of seal cocking. A hydraulic or pneumatic press is advised to supply necessary force to install the seal. Figure 5 describes examples of both recommended and improper installation methods. In each preferredmethod, installation load is absorbed by either housing or bottom plate to prevent seal damage and to locate the seal properly within the bore.

Materials & Specifications

The most important component of an oil seal is the elastomer material. You must consider all environmental conditions and functions of the seal such as:

Chemical Resistance
Resistance to high and low temperatures
Resistance to ozone and weathering
Resistance to water
Low Compression Set
Elasticity
Cost

Harwal offers many compounds to satisfy almost any sealing application. The chart below shows the limitations and resistance qualities of our most common elastomers. Also included are the advantages and disadvantages of each elastomer.

Material	Advantages	Disadvantages	Ranges	Substitutes
Nitrile (NBR)	Highly cost efficient. Good low temp. capabilities. Excellent wear resistance. Little to no swell in hydrocarbon fluids.	Poor high heat resistance. Poor ozone resistance. Poor resistance to lubricants containing sulfur or EP additives, hydrocarbons or oxygenate blends (gasoline/methanol).	-40°F to +248°F -40°C to +120°C	FPM Polyacrylate PTFE
Viton® (FPM)	Excellent properties for sealing under high temperatures. Excellent fluid compatibilities. Very long usage life.	Poor resistance to basic fluids with a ph >7. Expensive compared to other materials.	-22°F to +392°F -30°C to +200°C	PTFE
Leather	Good dry running capabilities	Higher cost than Nitrile. Poor heat resistance.	-50°F to +200°F -46°C to +93°C	Nitrile FPM Polyacrylate PTFE
Polyacrylate (ACM)	Good resistance to EP lubricants. Low swell when sealing hydrocarbon fluids. Better heat resistance than Nitrile.	Higher cost than Nitrile. Poor low temperature capabilities. Should not be used when sealing aqueous media.	-20°F to +300°F -29°C to +149°C	FPM PTFE
Silicone	Good resistance to dry heat. Excellent sealing capabilities in low temperature applications.	Higher cost than Nitrile. High swell properties. Poor dry running capabilities. Poor resistance to some EP additives.	-58°F to +356°F -50°C to +180°C	FPM PTFE
Urethane	Good lubricant and ozone resistance. Good abrasion resistance. More durable than Silicone.	Substantial softening when used in applications above 250°F. Poor resistance to hot water or steam.	Please contact your Harwal representative with your specific application.	Urethane cannot be substituted.
Teflon® (PTFE)	Superior dry running capabilities. Extremely low coefficient of friction. Excellent chemical resistance. Resistant to hydrocarbon/ oxygenate blends.	Poor resistance to abrasion in dirty environments. Can be easily damaged during installation. High thermal expansion.	-459°F to +541°F -272°C to +282°C	PTFE cannot be substituted.

Material Characteristics

	Nitrile	Polvacrvlate	Silicone	Viton®
Temperature Range	+248F / -40F +120C / -40C	+302F / -22F +150C / -30C	+356F / -58F +180C / -50C	+392F / -22F +200C / -30C
Abrasion Resistance	B	C	D	B
Compression Set	B	C	B	B
Cracking Resistance	C	C	A	B
Cut Growth Resistance	B	B	D	D
Flex Cracking Resistance	C	C	B	B
Impact Strength	B	D	C	C
Low Temperature Resistance	B	D	A	B
Oxidation Resistance	B	A	A	A
Sunlight Resistance	C	A	A	A
Tear Resistance	B	D	D	C
Weathering Resistance	B	A	A	A

Legend: **A=Excellent** **B=Good** **C=Fair** **D=Poor**

Troubleshooting

	Symptom	Probable Cause / Solution
The Sealing Member	Lip Surface hardened	Lip hardening can be caused by excessive operating temperatures, inadequate lubrication, or if the media being sealed is incompatible with the lip material.
	Sealing lip brittle or cracked	Operating temperature of sealed media or lubricant may exceed the recommended limits for the type of sealing member material. Make sure the seal is the correct size for the application. If the seal is too tight on the shaft, this may cause overheating. Check that the seal was installed with and maintained adequate lubrication for the type of seal you are using.
	Sealing lip shows excessive wear (entire circumference)	Shaft finish may be too rough at point of lip contact. Seal may not have been properly or adequately lubricated prior to installation. Make sure the seal is the correct size. If the seal is too tight on the shaft, this may cause overheating and rapid wear. Shaft run-out or shaft whip may exceed the recommended limits. Make sure that the seal seats close to the bearing and check for excessive looseness in the bearing or splines.
	Sealing lip shows excessive wear (one side)	Check misalignment of shaft to bore. Shaft misalignment causes rapid wear at one point on the sealing lip.
	Sealing lip contact on shaft is too light	Make sure the seal is the correct size for the application. Check for excessive wear at point of lip contact. The shaft may be too soft, be sure to check the minimum shaft hardness specifications for your application. Check to make sure you used the proper installation tool. Your installation tool must not have an O.D. of more than 1/32" greater than the shaft or the sealing lip may be overstretched
	Sealing lip is nicked or scratched	This can be caused by careless storage, handling, or the use of improper assembly / installation tools. This can also be caused by failing to properly clean and prepare shaft prior to installation and/or failing to protect the sealing member when installing over splines or keyways etc.
Oil Seal Metal Parts	Seal case is distorted	The seal O.D. may be too large for the housing bore. The housing bore may be excessively out-of-round. If you find that the bore diameter and the out-of-round limits are correct, look for evidence of careless handling or the use of improper installation tools.
	Garter spring is damaged	This may be caused by careless handling or use of improper installation tools or methods. Excessive spreading of the primary sealing lip during the installation process can damage the spring.
	Inner components of the seal assembly are loose	This can be caused by the use of improper installation tools. Check the out-of-round limits of the housing bore and make sure the O.D. of the seal is not too large for the bore. Either of these conditions can cause the seal to become distorted. Seal distortion may not be apparent, but may be enough to loosen the inner components of the seal and cause it to leak.
	Seal cocked in housing	This can be because of the use of improper installation tools or methods. Check to make sure the seal O.D. is not too large for the bore. Also be sure to check for burrs, scale, or chips that may prevent the seal from seating properly.
Shaft	Excessive shaft wear	Check to be sure the seal is the proper size for the shaft. Too tight of a fit will cause excessive wear on both the lip and the contact point on the shaft. Check to be sure the seal was properly and adequately lubricated prior to installation. Check to be sure that the seal stays lubricated while in use. Check for the presence of abrasive dirt or other debris. Make sure shaft was cleaned properly prior to the installation of the seal. In applications where the seal has the possibility of getting dirt or other large debris on or near the sealing lip, a seal with a dust lip should be used.
	Shaft is scratched or gouged	Carefully inspect and clean the shaft prior to installation. If the shaft cannot be refinished, a shaft repair sleeve may be needed.
Bore	Leakage around the O.D. of the seal	The seal may be cocked in the housing. Check the O.D. surface of the seal for evidence of damage from installation, careless handling or improper storage prior to use. Check interior of housing for excessive roughness, foreign matter, scratches or burrs. Check housing to be sure it is not out-of-round. If the eccentricity is only slight, .001" or so, special cement on the O.D. can be used to offset this problem.
	Other	Your Harwal representative will be happy to assist you with any questions or concerns you may have with our sealing products.

Shaft Seal Interchange Table

HARWAL TYPES	A	AO	ADL	B	BO	BDL	C
Chicago Rawhide (SKF)	HMS4	HM4	HMSA7	CRW1	HM14	CRWA1	CRWH1
Clark Seals	SC	VC	TC	SB2	VB2	TB2	SA2
Dichtomatik	WA	WAO	WAS	WB	WBO	WBS	WC
Freudenberg	BA	BAOF	BASL	B1	B1OF	B1SL	B2
Gaco	A		FA	ABI			
Garlock	92	91	94	76	71	78	50
Goetze	827N		827S	822N		822S	824N
ISP	A	VC	AS	BE	VB	BES	CE
Kaco	DG	DGS	DF	DC	DFS	DFK	DFSK
NAK	SC		TC	SB		TB	SA
National	35	34	32	48	44	47	45
NOK	SC	VC	TC	SB	VB	TB	SA2
Paulstra	IE		IEL	EE		EEL	EEP
Pioneer Weston	R21		R23	R4/WR		R6	R1/WRL
Simmerwerke	A		ASL	B		BSL	C
Simrit	BAUX2	BAFUDX7	BAUSLX2	B1U	B1	B1SL	B2U
Stefa	CB		CC	BB		BC	DB
Timken	35	34	32	48		47	45
Transcom (TCM)	SC	VC	TC	SB	VB	TB	SA2
Wyko Seals	A1N#		ASN#	B1N#		BSN#	C1N#

HARWAL TYPES	CDL	DC	HLSRS	HP-1	HES	VA	VS
Chicago Rawhide (SKF)	CRWHA1					VR1	VR2
Clark Seals	TA2	DF					
Dichtomatik	WCS	WAD		WCP21		VA	VS
Freudenberg	B2SL	DB					
Gaco			SMK				
Garlock			64	PS			
Goetze	824S						
ISP	CES						
NAK		DB					
National	41	7S			8L	VR1	VR2
NOK	TA2	DC					
Simmerwerke	SCL						
Simrit	B2USL	BADUO		B2PT			
Stefa	DC						
Timken	41				8L	VRS1	VRS2
Transcom (TCM)	TA	DC		PA1		VA	VS
Wyko Seals		A/BDN#					

HARWAL TYPES	VL	VE	RB	9RB	U41	U43	U45
Chicago Rawhide (SKF)	VR3	VR4	MVR1	MVR2	UN	SI	
Dichtomatik	VL	VE	VRM		MA25	MA23	MA24
NAK			RE	RE1	UNP	UOP	UIP
National	VR3	VR4					
Timken	VRS3	VRS4					
Transcom (TCM)			AFS	AFX	UNP	UOP	UIP
Wyko Seals							

Media Compatibility Table

The recommendations shown in the table are based on data supplied by our polymer manufacturers and comparison made with similar materials. The table below is meant only as a guideline and users of the actual product must conduct their own functional test to determine the suitability of any compound for their particular application.

Media	Nitrile (NBR)	EPDM	Neoprene	Teflon® (PTFE)	Silicone	Viton® (FPM)	Nylon
Acetaldehyde	D	A	C	A	A	D	A
Acetamide	A	A	B	A	B	B	A
Acetate Solvent	C	A	D	A	C	D	A
Acetic Acid	C	A	C	A	C	B	D
Acetic Acid 20%	B	A	A	A	B	B	D
Acetic Acid 80%	C	A	C	A	B	B	D
Acetic Acid, Glacial	C	B	D	A	B	D	B
Acetic Anhydride	D	B	A	A	C	D	A
Acetone	D	A	C	A	D	D	A
Acetyl Bromide	*	*	*	A	*	*	D
Acetyl Chloride (dry)	D	D	D	A	C	A	B
Acetylene	B	A	B	A	B	A	A
Acrylonitrile	D	D	C	A	D	D	A
Adipic Acid	C	A	C	A	*	A	*
Alcohols:Amyl	B	A	A	A	D	A	A
Alcohols:Benzyl	D	B	C	A	*	A	B
Alcohols:Butyl	C	A	A	A	B	A	D
Alcohols:Diacetone	D	A	D	A	D	D	A
Alcohols:Ethyl	C	A	A	A	B	A	A
Alcohols:Hexyl	A	C	A	A	B	C	A
Alcohols:Isobutyl	B	A	A	A	A	A	A
Alcohols:Isopropyl	B	A	B	A	A	A	D
Alcohols:Methyl	A	A	A	A	A	C	B
Alcohols:Octyl	B	A	B	*	B	B	A
Alcohols:Propyl	A	A	A	A	A	A	D
Aluminum Chloride	A	A	A	A	B	A	B
Aluminum Chloride 20%	A	A	A	A	B	A	D
Aluminum Fluoride	A	A	A	A	B	A	A
Aluminum Hydroxide	A	A	A	A	*	A	A
Aluminum Nitrate	A	A	A	A	B	A	A
Aluminum Potassium Sulfate 10%	A	A	A	A	A	A	D
Aluminum Potassium Sulfate 100%	A	A	A	A	A	A	D
Aluminum Sulfate	A	A	A	A	A	A	A
Alums	A	A	B	A	A	A	A
Amines	D	B	B	A	B	D	D
Ammonia 10%	A	A	A	A	*	D	A
Ammonia Nitrate	C	A	C	A	*	D	D
Ammonia, anhydrous	B	A	A	A	C	D	A
Ammonia, liquid	C	A	A	A	*	D	B
Ammonium Acetate	B	A	A	A	*	A	A
Ammonium Bifluoride	B	A	D	A	*	A	*
Ammonium Carbonate	B	A	A	A	C	A	A
Ammonium Caseinate	*	*	A	*	*	*	*
Ammonium Chloride	B	A	B	A	C	A	B
Ammonium Hydroxide	D	A	A	A	A	B	A
Ammonium Nitrate	A	A	B	A	C	A	A
Ammonium Oxalate	D	A	A	*	*	*	*
Ammonium Persulfate	A	B	A	A	D	A	D
Ammonium Phosphate, Dibasic	A	A	A	A	A	A	C
Ammonium Phosphate, Monobasic	A	A	A	A	A	A	B
Ammonium Phosphate, Tribasic	A	A	A	A	A	A	B
Ammonium Sulfate	A	A	A	A	A	A	A
Ammonium Sulfite	A	A	A	A	*	D	A
Ammonium Thiosulfate	A	A	A	*	*	*	*
Amyl Acetate	D	A	D	A	D	D	B
Amyl Alcohol	B	A	A	A	D	A	A
Amyl Chloride	D	D	D	A	D	B	C
Aniline	D	B	D	A	B	A	A
Aniline Hydrochloride	D	B	D	A	D	A	D
Antifreeze	A	A	C	*	C	A	D
Antimony Trichloride	B	B	*	A	*	A	D
Aqua Regia (80% HCl, 20% HNO3)	D	C	D	A	D	B	D
Arochlor 1248	C	B	D	A	B	A	A

LEGEND: A - Excellent B - Good C - Fair D - Severe Effect * - Insufficient Data

Media	Nitrile (NBR)	EPDM	Neoprene	Teflon® (PTFE)	Silicone	Viton® (FPM)	Nylon
Aromatic Hydrocarbons	D	D	D	*	D	A	*
Arsenic Acid	A	A	A	A	A	A	C
Arsenic Salts	*	*	*	*	*	A	A
Asphalt	B	D	D	A	D	A	A
Barium Carbonate	A	A	*	A	*	A	A
Barium Chloride	A	A	A	A	A	A	A
Barium Cyanide	C	A	C	A	*	A	A
Barium Hydroxide	A	A	A	A	A	A	A
Barium Nitrate	A	A	A	A	B	A	A
Barium Sulfate	A	A	A	A	A	A	A
Barium Sulfide	A	A	A	A	A	A	A
Beer	A	A	A	A	A	A	A
Beet Sugar Liquids	A	A	A	A	A	A	A
Benzaldehyde	D	A	D	A	D	D	A
Benzene	D	D	D	A	D	A	A
Benzene Sulfonic Acid	D	D	A	A	D	A	D
Benzoic Acid	D	D	B	A	B	A	D
Benzol	D	D	D	A	D	A	D
Benzonitrile	*	*	*	A	A	*	*
Benzyl Chloride	D	D	D	*	D	A	A
Bleaching Liquors	D	A	D	A	B	A	C
Borax (Sodium Borate)	B	A	A	A	B	A	A
Boric Acid	A	A	D	A	A	A	B
Brewery Slop	A	*	A	*	*	A	*
Bromine	D	D	D	A	D	A	D
Butadiene	D	C	B	A	D	B	C
Butane	A	D	A	A	D	A	A
Butanol (Butyl Alcohol)	A	A	A	A	B	A	B
Butter	A	A	B	A	B	A	*
Buttermilk	A	A	D	A	A	A	B
Butyl Amine	*	*	D	A	B	D	A
Butyl Ether	B	D	D	A	D	D	A
Butyl Phthalate	D	B	D	A	A	C	A
Butylacetate	D	B	D	A	D	D	A
Butylene	A	D	D	A	D	A	B
Butyric Acid	D	B	D	A	D	B	C
Calcium Bisulfate	A	A	A	*	C	*	*
Calcium Bisulfide	A	C	A	A	C	A	A
Calcium Bisulfite	A	D	A	A	A	A	A
Calcium Carbonate	A	A	A	A	A	A	A
Calcium Chlorate	A	A	*	A	*	A	*
Calcium Chloride	A	A	A	A	A	A	A
Calcium Hydroxide	A	A	A	A	A	A	A
Calcium Hypochlorite	C	B	D	A	B	A	D
Calcium Nitrate	A	A	A	A	B	A	A
Calcium Oxide	A	A	A	A	A	B	B
Calcium Sulfate	A	A	B	A	*	A	D
Calgon	A	A	A	*	A	A	A
Cane Juice	A	A	A	A	A	A	A
Carbolic Acid (Phenol)	D	B	D	A	D	A	D
Carbon Bisulfide	C	D	D	*	*	A	A
Carbon Dioxide (dry)	A	B	B	A	B	B	A
Carbon Dioxide (wet)	A	B	B	A	B	B	A
Carbon Disulfide	D	D	D	A	*	A	B
Carbon Monoxide	A	A	B	A	A	A	A
Carbon Tetrachloride	D	D	D	A	D	A	D
Carbon Tetrachloride (dry)	C	B	D	A	D	A	*
Carbon Tetrachloride (wet)	D	D	D	A	D	*	*
Carbonated Water	A	*	A	*	*	A	A
Carbonic Acid	D	B	D	A	A	A	A
Catsup	A	A	A	*	*	A	A
Chloric Acid	*	*	*	A	*	*	D
Chlorinated Glue	B	B	D	*	*	A	*
Chlorine (dry)	B	A	C	A	D	A	D
Chlorine Water	D	C	D	A	D	A	C
Chlorine, Anhydrous Liquid	D	B	D	A	D	A	D
Chloroacetic Acid	D	B	D	A	D	D	D
Chlorobenzene (Mono)	D	D	D	B	D	A	D

LEGEND:
A - Excellent
B - Good
C - Fair
D - Severe Effect
* - Insufficient Data

Media	Nitrile (NBR)	EPDM	Neoprene	Teflon® (PTFE)	Silicone	Viton® (FPM)	Nylon
Chlorobromomethane	D	B	D	A	D	A	C
Chloroform	D	D	D	A	D	A	A
Chlorosulfonic Acid	D	D	D	A	D	D	D
Chocolate Syrup	A	A	A	A	*	A	A
Chromic Acid 10%	D	C	D	A	C	B	D
Chromic Acid 30%	D	B	D	A	C	A	D
Chromic Acid 5%	D	A	D	A	C	A	D
Chromic Acid 50%	D	B	D	A	C	A	D
Chromium Salts	*	*	*	*	*	*	B
Cider	A	A	A	*	B	A	A
Citric Acid	A	A	A	A	A	A	A
Citric Oils	A	B	D	*	*	A	*
Cloroxr (Bleach)	D	B	B	A	*	A	A
Coffee	A	A	A	*	A	A	A
Copper Chloride	A	A	A	A	A	A	D
Copper Cyanide	A	A	A	A	A	A	D
Copper Fluoborate	B	*	A	*	*	A	*
Copper Nitrate	A	*	A	A	*	A	D
Copper Sulfate >5%	A	A	A	A	A	A	D
Copper Sulfate 5%	A	A	A	A	A	A	D
Cream	A	*	D	A	*	A	A
Cresols	D	D	D	*	D	A	D
Cresylic Acid	D	D	D	A	D	A	D
Cupric Acid	B	A	A	A	A	A	D
Cyanic Acid	C	*	C	A	A	A	*
Cyclohexane	B	D	D	A	D	A	A
Cyclohexanone	D	B	D	A	D	D	A
Detergents	A	A	B	A	A	A	A
Diacetone Alcohol	D	A	D	A	D	D	A
Dichlorobenzene	D	D	D	A	D	C	D
Dichloroethane	D	*	D	A	*	C	A
Diesel Fuel	A	D	B	A	D	A	A
Diethyl Ether	D	D	D	A	D	D	A
Diethylamine	C	B	A	D	B	A	A
Diethylene Glycol	A	A	A	A	B	A	A
Dimethyl Aniline	D	B	D	A	D	D	A
Dimethyl Formamide	D	B	D	A	C	C	A
Diphenyl	D	D	B	A	D	A	*
Diphenyl Oxide	A	D	D	A	C	A	*
Dyes	*	*	C	*	*	A	A
Epsom Salts (Magnesium Sulfate)	A	A	A	A	A	A	A
Ethane	A	D	B	A	D	A	D
Ethanol	C	A	A	A	B	A	A
Ethanolamine	B	B	B	A	B	D	A
Ether	D	C	D	A	D	C	A
Ethyl Acetate	D	B	D	A	B	D	A
Ethyl Benzoate	D	*	D	A	D	A	*
Ethyl Chloride	A	A	C	A	D	A	A
Ethyl Ether	D	D	D	A	D	D	A
Ethyl Sulfate	A	*	*	A	*	A	*
Ethylene Bromide	D	C	C	A	D	A	*
Ethylene Chloride	D	D	D	A	D	B	A
Ethylene Chlorohydrin	D	B	A	A	C	A	D
Ethylene Diamine	A	A	B	A	A	B	D
Ethylene Dichloride	D	C	D	A	D	A	A
Ethylene Glycol	A	A	A	A	A	A	A
Ethylene Oxide	D	C	D	A	D	D	A
Fatty Acids	B	D	C	A	C	A	A
Ferric Chloride	A	A	B	A	B	A	A
Ferric Nitrate	A	A	A	A	C	A	A
Ferric Sulfate	A	A	A	A	B	A	A
Ferrous Chloride	A	*	A	A	*	A	D
Ferrous Sulfate	A	A	*	A	*	B	D
Fluoboric Acid	A	A	A	A	*	B	D
Fluorine	D	A	*	D	D	C	D
Fluosilicic Acid	A	A	A	A	*	B	D
Formaldehyde 100%	C	A	C	A	B	D	D
Formaldehyde 40%	B	A	B	A	*	A	A

LEGEND: A - Excellent B - Good C - Fair D - Severe Effect * - Insufficient Data

Media	Nitrile (NBR)	EPDM	Neoprene	Teflon® (PTFE)	Silicone	Viton® (FPM)	Nylon
Formic Acid	C	A	A	A	B	C	D
Freon 113	A	D	C	A	D	B	*
Freon 12	A	B	A	A	D	B	A
Freon 22	D	A	A	A	D	D	B
Freon TF	A	D	A	A	D	B	D
Freonr 11	B	D	D	A	D	B	D
Fruit Juice	A	*	A	A	*	A	A
Fuel Oils	A	D	B	B	D	A	A
Furan Resin	D	C	D	A	D	D	*
Furfural	D	D	D	A	D	D	B
Gallic Acid	B	B	B	B	D	A	A
Gasoline (high-aromatic)	A	D	A	B	D	A	A
Gasoline, leaded, ref.	A	D	B	A	D	A	A
Gasoline, unleaded	A	D	B	A	D	A	A
Gelatin	A	A	A	A	A	A	A
Glucose	A	A	A	A	A	A	A
Glue, P.V.A.	A	A	A	A	A	B	A
Glycerin	A	A	A	A	A	A	A
Glycolic Acid	A	A	A	A	A	A	*
Gold Monocyanide	A	*	A	D	*	A	*
Grape Juice	A	A	D	A	A	A	A
Grease	A	D	D	A	D	A	*
Heptane	A	D	B	A	D	A	A
Hexane	A	D	B	A	D	A	B
Honey	A	A	*	A	A	A	A
Hydraulic Oil (Petro)	A	D	A	A	B	A	A
Hydraulic Oil (Synthetic)	D	A	A	A	B	A	A
Hydrazine	B	A	B	A	B	A	*
Hydrobromic Acid 100%	D	A	D	A	D	A	D
Hydrobromic Acid 20%	D	A	D	*	D	A	D
Hydrochloric Acid 100%	D	D	D	A	D	A	D
Hydrochloric Acid 20%	*	A	C	A	D	A	D
Hydrochloric Acid 37%	B	C	B	A	B	A	D
Hydrochloric Acid, Dry Gas	*	*	*	A	*	*	A
Hydrocyanic Acid	B	B	B	A	C	A	B
Hydrocyanic Acid (Gas 10%)	B	A	A	A	D	A	*
Hydrofluoric Acid 100%	D	D	D	A	D	B	D
Hydrofluoric Acid 20%	D	D	B	A	D	A	C
Hydrofluoric Acid 50%	D	D	D	A	D	B	D
Hydrofluoric Acid 75%	D	C	D	A	D	B	D
Hydrofluosilicic Acid 100%	B	A	B	A	D	A	D
Hydrofluosilicic Acid 20%	A	A	B	A	D	A	D
Hydrogen Gas	A	A	A	A	C	A	A
Hydrogen Peroxide 10%	D	A	D	A	A	A	C
Hydrogen Peroxide 100%	D	D	D	A	B	A	D
Hydrogen Peroxide 30%	D	B	D	A	B	A	D
Hydrogen Peroxide 50%	D	B	D	A	B	A	D
Hydrogen Sulfide (aqua)	D	B	A	A	C	D	C
Hydrogen Sulfide (dry)	D	B	A	A	C	D	C
Hydroquinone	D	D	A	A	*	B	D
Hydroxyacetic Acid 70%	A	A	A	A	*	A	*
Ink	A	*	A	A	*	A	C
Iodine	B	B	D	A	*	A	A
Iodine (in alcohol)	*	A	*	*	*	*	C
Iodoform	D	A	A	C	*	*	*
Isooctane	A	D	B	A	D	A	A
Isopropyl Acetate	D	B	D	A	D	D	B
Isopropyl Ether	B	D	D	A	D	D	A
Isotane	A	*	D	*	*	A	D
Jet Fuel (JP3, JP4, JP5)	A	D	D	A	D	A	C
Kerosene	A	D	A	A	D	A	A
Ketones	D	A	D	A	*	D	A
Lacquer Thinners	D	D	D	A	D	D	A
Lacquers	D	D	D	A	D	D	A
Lactic Acid	A	A	A	A	A	A	B
Lard	A	D	D	A	B	A	A
Latex	A	A	*	A	A	A	A
Lead Acetate	B	A	A	A	A	D	A

LEGEND: A - Excellent B - Good C - Fair D - Severe Effect * - Insufficient Data

Media	Nitrile (NBR)	EPDM	Neoprene	Teflon® (PTFE)	Silicone	Viton® (FPM)	Nylon
Lead Nitrate	A	A	A	A	B	A	*
Lead Sulfamate	B	A	A	B	B	A	B
Ligroin	A	D	B	A	D	A	D
Lime	A	D	A	A	*	A	A
Linoleic Acid	B	D	*	A	B	B	*
Lithium Chloride	A	A	A	A	A	A	*
Lithium Hydroxide	C	*	*	A	*	*	*
Lubricants	A	D	D	A	D	A	A
Lye: Ca(OH)2 Calcium Hydroxide	A	A	A	A	A	B	A
Lye: KOH Potassium Hydroxide	B	A	B	A	C	B	C
Lye: NaOH Sodium Hydroxide	A	B	B	A	A	B	A
Magnesium Bisulfate	B	*	B	A	*	*	A
Magnesium Carbonate	A	A	A	A	*	A	*
Magnesium Chloride	A	A	A	A	A	A	A
Magnesium Hydroxide	A	A	A	A	A	A	B
Magnesium Nitrate	A	A	A	A	*	A	A
Magnesium Oxide	A	*	A	A	*	C	*
Magnesium Sulfate (Epsom Salts)	A	A	A	A	A	A	A
Maleic Acid	D	D	D	A	*	A	A
Maleic Anhydride	D	D	D	A	*	A	*
Malic Acid	A	D	D	A	B	A	A
Manganese Sulfate	A	A	A	A	A	A	A
Mash	A	A	A	*	*	A	A
Mayonnaise	C	*	A	A	*	A	A
Melamine	C	A	D	A	C	A	A
Mercuric Chloride (dilute)	A	A	A	A	*	A	D
Mercuric Cyanide	A	A	A	B	A	A	A
Mercurous Nitrate	B	A	B	A	*	A	*
Mercury	A	A	A	A	*	A	A
Methane	A	D	B	A	D	A	A
Methanol (Methyl Alcohol)	A	A	A	A	A	C	B
Methyl Acetate	D	B	B	A	D	D	A
Methyl Acetone	D	A	D	A	*	D	A
Methyl Acrylate	D	B	B	*	D	D	*
Methyl Alcohol 10%	A	A	A	A	A	C	B
Methyl Bromide	B	D	D	A	*	A	B
Methyl Butyl Ketone	D	A	D	*	D	D	D
Methyl Cellosolve	A	B	B	A	D	D	C
Methyl Chloride	D	D	D	A	D	A	B
Methyl Dichloride	D	D	*	*	*	A	C
Methyl Ethyl Ketone	D	A	D	A	D	D	A
Methyl Ethyl Ketone Peroxide	D	D	D	*	B	D	*
Methyl Isobutyl Ketone	D	B	D	A	D	D	B
Methyl Isopropyl Ketone	D	C	D	A	C	D	A
Methyl Methacrylate	D	D	D	*	C	D	*
Methylamine	B	A	*	A	*	D	*
Methylene Chloride	D	C	*	A	*	B	C
Milk	A	A	A	A	A	A	A
Mineral Spirits	A	D	C	A	D	A	A
Molasses	A	A	A	A	*	A	A
Monochloroacetic acid	D	C	A	A	*	C	D
Monoethanolamine	B	B	D	A	B	D	A
Morpholine	D	D	D	A	*	*	A
Motor oil	A	D	B	A	*	*	A
Mustard	B	A	A	A	*	D	A
Naphtha	A	D	D	B	D	A	A
Naphthalene	D	D	D	A	D	A	A
Natural Gas	A	D	A	A	A	A	*
Nickel Chloride	A	A	B	A	A	A	C
Nickel Nitrate	A	A	A	A	*	A	A
Nickel Sulfate	A	A	A	A	A	A	A
Nitrating Acid (<15% HNO3)	*	*	A	A	*	*	*
Nitrating Acid (>15% H2SO4)	D	A	A	A	*	*	*
Nitrating Acid (S1% Acid)	*	*	A	A	*	*	*
Nitrating Acid (S15% H2SO4)	*	*	A	A	*	*	*
Nitric Acid (20%)	D	A	D	A	D	A	D
Nitric Acid (50%)	D	D	D	A	D	A	D
Nitric Acid (5-10%)	D	A	B	A	C	A	D

LEGEND: A - Excellent B - Good C - Fair D - Severe Effect * - Insufficient Data

Media	Nitrile (NBR)	EPDM	Neoprene	Teflon® (PTFE)	Silicone	Viton® (FPM)	Nylon
Nitric Acid (Concentrated)	D	D	D	A	D	A	D
Nitrobenzene	D	B	D	A	D	B	B
Nitrogen Fertilizer	*	*	*	A	*	*	*
Nitromethane	D	B	D	A	D	D	B
Nitrous Acid	*	A	D	A	*	B	*
Nitrous Oxide	*	A	A	A	*	B	C
Oils:Aniline	D	B	D	A	D	C	A
Oils:Anise	*	*	D	*	*	*	*
Oils:Bay	*	*	D	*	*	A	*
Oils:Bone	A	*	D	A	*	A	*
Oils:Castor	B	B	A	A	A	A	A
Oils:Cinnamon	*	*	C	A	*	A	*
Oils:Citric	D	B	D	A	*	A	A
Oils:Clove	A	*	C	A	*	A	*
Oils:Coconut	A	D	C	A	A	A	*
Oils:Cod Liver	A	A	B	A	B	A	*
Oils:Corn	D	C	A	A	A	B	A
Oils:Cottonseed	A	D	C	A	A	A	B
Oils:Creosote	D	D	C	A	D	A	D
Oils:Diesel Fuel (20, 30, 40, 50)	A	D	B	A	D	A	A
Oils:Fuel (1, 2, 3, 5A, 5B, 6)	B	D	D	A	C	B	A
Oils:Ginger	A	A	A	A	*	A	*
Oils:Hydraulic Oil (Petro)	A	D	A	A	B	A	A
Oils:Hydraulic Oil (Synthetic)	D	A	A	A	B	A	A
Oils:Lemon	*	D	D	A	*	A	*
Oils:Linseed	A	D	D	A	A	A	A
Oils:Mineral	A	D	B	A	C	A	A
Oils:Olive	D	D	B	A	D	A	A
Oils:Orange	A	*	C	*	D	A	*
Oils:Palm	A	A	D	A	*	A	*
Oils:Peanut	A	D	B	A	A	A	*
Oils:Peppermint	D	*	D	A	*	A	*
Oils:Pine	D	D	D	A	D	A	A
Oils:Rapeseed	D	A	B	A	D	A	*
Oils:Rosin	A	*	*	A	*	A	A
Oils:Sesame Seed	A	*	D	A	*	A	*
Oils:Silicone	A	A	D	A	C	A	A
Oils:Soybean	A	C	C	A	A	A	A
Oils:Sperm (whale)	A	*	D	A	*	A	*
Oils:Tanning	A	*	D	*	*	A	*
Oils:Transformer	A	D	B	A	B	A	A
Oils:Turbine	B	A	D	A	D	A	A
Oleic Acid	B	B	C	A	D	B	A
Oleum 100%	D	D	D	A	D	A	D
Oleum 25%	D	D	D	A	D	A	D
Oxalic Acid (cold)	D	A	D	A	B	A	B
Ozone	D	A	C	A	A	A	D
Palmitic Acid	A	B	D	A	D	A	A
Paraffin	B	D	B	A	*	B	A
Pentane	A	D	B	A	D	A	A
Perchloric Acid	D	B	A	A	D	A	D
Perchloroethylene	C	D	D	A	D	A	C
Petrolatum	A	A	A	C	D	A	D
Petroleum	A	D	B	A	D	A	A
Phenol (10%)	D	B	D	A	D	A	D
Phenol (Carbolic Acid)	D	B	D	A	D	A	D
Phosphoric Acid (>40%)	D	B	B	A	D	A	B
Phosphoric Acid (crude)	D	B	D	A	D	A	B
Phosphoric Acid (molten)	*	*	A	*	*	*	*
Phosphoric Acid (S40%)	D	B	B	A	C	A	B
Phosphoric Acid Anhydride	D	*	A	*	*	*	*
Phosphorus	*	*	*	A	*	*	*
Phosphorus Trichloride	D	A	D	A	*	A	*
Photographic Developer	A	B	A	A	B	A	*
Photographic Solutions	B	A	B	A	A	B	A
Phthalic Acid	D	A	A	A	B	A	B
Phthalic Anhydride	D	A	A	A	*	A	*
Picric Acid	C	B	A	A	D	A	C

LEGEND: A - Excellent B - Good C - Fair D - Severe Effect * - Insufficient Data

Media		EPDM	Neoprene	Teflon® (PTFE)	Silicone	Viton® (FPM)	Nylon
Potash (Potassium Carbonate)	A	A	A	*	*	A	A
Potassium Bicarbonate	A	A	A	A	A	A	A
Potassium Bromide	A	A	A	A	A	A	A
Potassium Chlorate	A	A	A	A	B	A	C
Potassium Chloride	A	A	A	A	A	A	A
Potassium Chromate	A	A	A	A	*	A	B
Potassium Cyanide Solutions	A	A	B	A	A	A	A
Potassium Dichromate	A	A	A	A	A	A	B
Potassium Ferricyanide	D	A	A	A	*	A	B
Potassium Ferrocyanide	D	A	A	A	*	A	B
Potassium Hydroxide (Caustic Potash)	B	A	B	A	C	B	C
Potassium Hypochlorite	A	A	B	A	*	*	B
Potassium Iodide	A	A	A	A	*	A	A
Potassium Nitrate	A	A	A	A	A	A	B
Potassium Oxalate	*	*	*	A	*	*	*
Potassium Permanganate	C	A	A	A	*	A	D
Potassium Sulfate	A	A	A	A	A	A	A
Potassium Sulfide	A	A	A	A	A	A	A
Propane (liquefied)	A	D	C	A	D	A	A
Propylene	D	D	D	A	D	A	*
Propylene Glycol	A	A	C	A	A	A	A
Pyridine	D	B	D	A	D	D	C
Pyrogallic Acid	*	B	A	A	*	A	*
Resorcinal	*	B	D	A	*	A	D
Rosins	A	*	A	A	A	A	A
Rum	A	A	A	*	A	A	A
Rust Inhibitors	A	*	C	*	*	A	*
Salad Dressings	A	*	*	*	*	A	A
Salicylic Acid	B	A	*	A	*	A	A
Salt Brine (NaCl saturated)	A	A	A	A	A	A	A
Sea Water	A	A	B	A	A	A	A
Shellac (Bleached)	A	A	B	A	*	A	A
Shellac (Orange)	A	A	D	A	*	A	A
Silicone	A	A	A	A	C	A	A
Silver Bromide	*	*	*	A	*	*	*
Silver Nitrate	B	A	A	A	A	A	A
Soap Solutions	A	A	B	A	A	A	A
Soda Ash (see Sodium Carbonate)	A	A	A	A	A	A	B
Sodium Acetate	B	A	B	A	D	D	B
Sodium Aluminate	A	A	A	A	*	A	A
Sodium Benzoate	B	A	A	A	*	A	B
Sodium Bicarbonate	A	A	A	A	A	A	A
Sodium Bisulfate	B	A	A	A	A	A	A
Sodium Bisulfite	A	A	A	A	A	A	C
Sodium Borate (Borax)	A	A	A	A	A	A	A
Sodium Bromide	*	A	A	A	*	A	B
Sodium Carbonate	A	A	A	A	A	A	B
Sodium Chlorate	B	A	A	A	C	A	D
Sodium Chloride	A	A	A	A	A	A	A
Sodium Chromate	A	*	A	A	*	A	C
Sodium Cyanide	A	A	A	A	A	A	A
Sodium Ferrocyanide	A	A	A	A	*	A	*
Sodium Fluoride	A	A	A	A	*	A	B
Sodium Hydrosulfite	C	B	B	A	C	A	A
Sodium Hydroxide (20%)	A	B	B	A	A	C	A
Sodium Hydroxide (50%)	A	B	B	A	A	D	A
Sodium Hydroxide (80%)	D	B	B	A	A	D	C
Sodium Hypochlorite (<20%)	B	B	C	A	B	A	D
Sodium Hypochlorite (100%)	D	B	C	A	B	A	D
Sodium Hyposulfate	*	*	C	A	*	*	*
Sodium Metaphosphate	A	A	B	A	A	A	A
Sodium Metasilicate	A	A	A	A	*	A	*
Sodium Nitrate	A	A	B	A	D	A	A
Sodium Perborate	B	A	B	A	B	A	B
Sodium Peroxide	B	A	B	A	D	A	A
Sodium Polyphosphate	A	A	B	A	D	A	A
Sodium Silicate	A	A	A	A	A	A	A
Sodium Sulfate	A	A	A	A	A	A	A

LEGEND: A - Excellent B - Good C - Fair D - Severe Effect * - Insufficient Data

Media	Nitrile (NBR)	EPDM	Neoprene	Teflon® (PTFE)	Silicone	Viton® (FPM)	Nylon	
Sodium Sulfide	A	A	A	A	A	A	A	
Sodium Sulfite	A	A	A	A	A	A	D	
Sodium Tetraborate	A	A	B	A	A	A	A	
Sodium Thiosulfate (hypo)	B	A	A	A	A	A	B	
Sorghum	A	*	A	*	*	A	A	
Soy Sauce	A	*	A	*	*	A	A	
Stannic Chloride	A	A	C	A	B	A	B	
Stannic Fluoborate	A	*	A	*	*	A	*	
Stannous Chloride	A	C	A	A	B	A	C	
Starch	A	A	A	A	*	A	A	
Stearic Acid	B	B	B	A	B	A	A	
Stoddard Solvent	A	D	C	A	D	A	A	
Styrene	D	D	D	A	D	B	A	
Sugar (Liquids)	A	A	A	A	A	A	A	
Sulfate (Liquors)	A	A	B	A	B	A	B	
Sulfur Chloride	D	D	D	A	C	A	A	
Sulfur Dioxide	D	A	B	A	B	A	C	
Sulfur Dioxide (dry)	D	A	D	A	B	A	B	
Sulfur Hexafluoride	B	B	A	*	B	*	B	
Sulfur Trioxide	D	C	D	A	B	A	D	
Sulfur Trioxide (dry)	D	C	D	A	B	A	A	
Sulfuric Acid (<10%)	A	A	B	A	C	A	C	
Sulfuric Acid (10-75%)	B	B	B	A	D	A	D	
Sulfuric Acid (75-100%)	C	B	D	A	D	A	D	
Sulfuric Acid (cold concentrated)	D	C	D	A	D	B	D	
Sulfuric Acid (hot concentrated)	D	D	D	A	D	A	D	
Sulfurous Acid	B	B	C	A	D	A	D	
Sulfuryl Chloride	*	*	*	A	*	*	*	
Tallow	A	A	B	A	*	A	A	
Tannic Acid	A	A	A	A	B	A	C	
Tanning Liquors	B	B	A	A	B	A	A	
Tartaric Acid	A	B	A	A	A	A	B	
Tetrachloroethane	D	D	D	A	D	A	C	
Tetrachloroethylene	D	D	D	A	D	A	A	
Tetrahydrofuran	D	D	D	A	D	D	A	
Tin Salts	A	B	*	A	B	A	*	
Toluene (Toluol)	D	D	D	A	D	C	A	
Tomato Juice	A	A	A	A	*	A	A	
Trichloroacetic Acid	*	B	D	A	D	C	C	
Trichloroethane	D	D	D	A	D	A	C	
Trichloroethylene	D	D	D	A	D	A	C	
Trichloropropane	D	*	A	A	*	A	*	
Tricresylphosphate	D	A	C	A	C	A	A	
Triethylamine	C	A	A	A	*	D	A	
Trisodium Phosphate	A	A	A	A	A	A	A	
Turpentine	*	D	D	A	D	A	B	
Urea	B	A	B	A	B	A	A	
Uric Acid	*	*	A	A	*	*	A	
Urine	A	A	D	A	*	A	B	
Varnish	B	D	D	A	D	A	A	
Vegetable Juice	A	A	*	A	B	A	A	
Vinegar	B	A	B	A	A	A	A	
Vinyl Acetate	D	B	D	A	D	A	*	
Vinyl Chloride	D	C	D	A	*	A	A	
Water, Acid, Mine	A	A	C	A	B	A	A	
Water, Deionized	A	A	A	A	*	A	A	
Water, Distilled	A	A	A	A	C	A	A	
Water, Fresh	A	A	A	A	B	A	A	
Water, Salt	A	A	A	A	B	A	A	
Weed Killers	A	*	C	*	A	A	A	
Whey	A	*	*	A	*	A	*	
Whiskey & Wines	A	A	C	A	A	A	A	
White Liquor (Pulp Mill)	A	*	A	A	A	A	A	
White Water (Paper Mill)	*	*	A	*	*	A	A	
Xylene	D	D	D	A	D	B	A	
Zinc Chloride	A	A	A	A	B	A	A	
Zinc Hydrosulfite	A	A	A	A	*	*	A	
Zinc Sulfate	A	A	A	A	A	A	A	

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