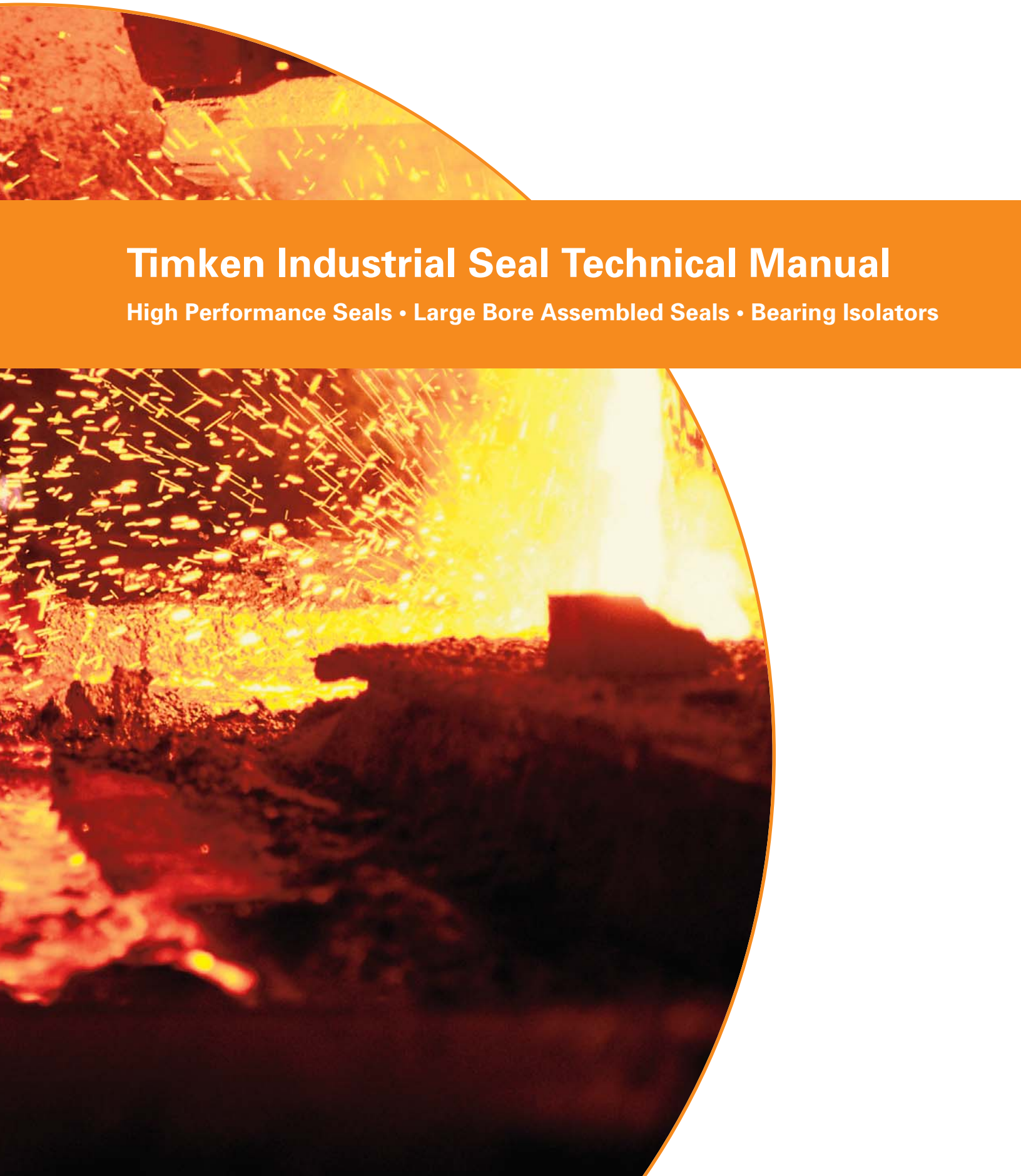
TIMKEN



Timken Industrial Seal Technical Manual

High Performance Seals • Large Bore Assembled Seals • Bearing Isolators

Introduction

At Timken, customers turn to us to for innovative solutions that solve their most critical issues. When they do, they benefit from more than a century of knowledge in managing friction and transmitting power for a variety of industries and applications. We've applied this technical know-how to offer OEMs, distributors and end users a complete line of products and services – from bearings, maintenance tools and condition monitoring products to engineered surfaces, training programs, bearing and chock repair, and more.

Now, from the people that brought you Timken industrial seals for small bore applications comes the latest addition to our seal family – a complete line of high-performance oil seals and bearing isolators for large bore applications. Like all of our products and services, our seals are backed by our leading technical support and a vast distribution network. Turn to Timken today for a full line of Timken industrial seals that help improve bearing, equipment and bottom-line performance.

WARNING:

- Proper maintenance and handling practices are critical. Failure to follow installation instructions and to maintain proper lubrication can result in equipment failure, creating a risk of serious bodily harm.
- Never spin a bearing with compressed air. The rolling elements may be forcefully expelled creating a risk of serious bodily harm.
- This catalog is not intended to substitute for the specific recommendations of your equipment suppliers.

Oil Seal Selection

Single Lip Seal: All-purpose seal available in a wide range of sizes. Suitable for most sealing applications.

Dual Lip Seal: Used for difficult sealing problems or applications involving the separation of two fluids or exclusion of foreign materials.

Single Lip Split Seal: Engineered for ease of installation on large shafts. Does not require costly teardown to replace seal.

Bonded Seal: Best choice for applications with lower-end performance requirements. Economically priced.

Special Purpose Seal: Designed for use in high-speed applications with spherical and tapered roller bearings.

Bearing Isolator: Keeps bearings protected from contaminants in applications where longer life and superior protection from debris are required.

Protector Seal: Used in highly contaminated operating environments to protect bearings on both rotating and stationary shafts. Uniquely designed using microcellular technology.

Using This Catalog

The following pages contain the information that will allow you to make appropriate decisions about the seals best suited for your standard applications. Our technical manual includes:

- Organization by seal type, with special sections for single lip, dual lip and special purpose seals. These three sections include critical information for easy and accurate seal selection.
- General engineering information, including nomenclature, technical specifications, tolerance charts and more.
- Installation instructions, with diagrams, and troubleshooting tips for common problems.

How to Order

Timken high-performance industrial seals and bearing isolators for large bore applications are available through our trusted network of authorized distributors. Timken works closely with distributors to deliver unparalleled value and innovation to end users in a variety of industrial markets.

When ordering oil seals for standard or special applications, please provide as much information about the end user as possible, including:

- Customer name and address
- Part name and numbers shown on customer's drawing
- Intended use/ application:
  - Quantity
  - Packaging requirements
  - Material requirements
- Functional test requirements
- Suggested design
- Fixed dimensions
- RPMs/FPMs
- Shaft type
- Housing type
- Eccentricity requirements
- Temperature requirements
- Medium to be sealed
- Type of bearing

Turn to Timken today for a full line of industrial seals that help improve bearing, equipment and bottom-line performance.

Index for Technical Manual

Technology Overview

Turn to Timken

No one knows bearings and how to protect them, better than Timken. Our complete line of high-performance oil seals and bearing isolators are specifically engineered for long life and high performance in the toughest applications. Turn to us for longer bearing life, increased productivity and reduced maintenance costs.

Oil Seals

Creating the most advanced seals for heavy industrial markets requires quality materials. Timken industrial seals are manufactured using special elastomers that are engineered for high-abrasion resistance, low wear and outstanding temperature and chemical resistance. In addition, we have materials and designs suited for a wide range of applications and our color-coded seals help you identify the seal to ensure you are using the right seal for the right application. Available in a variety of sizes, our seals include:

Timken N Black Peak Temp. = 250°F (121°C)

Timken ES Blue Peak Temp. = 350°F (177°C)

Timken V Green Peak Temp. = 450°F (232°C)

Technology

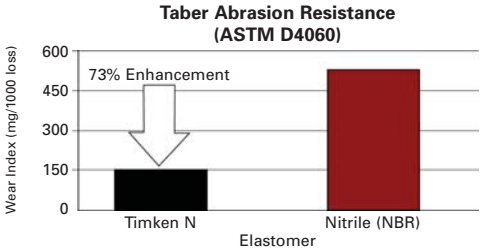
As a technology leader in friction management solutions, we invest in our own research and development and partner with trusted suppliers to develop the highest quality materials for all of our products. Our new line of seals is no exception.

Product quality – and resulting uptime and performance – depend heavily on material selection. Remember, all radial lip seals are contact seals. The elastomer of the seal contacts the rotating element of the equipment and, over time, all elastomers will wear away. The difference in how competing seals perform is in the materials. Our oil seals are made with elastomers that are designed to minimize wear, improve seal life and increase uptime.

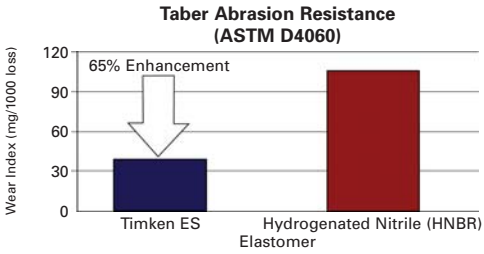
Taber Abrasion Resistance

The elastomers used to make Timken oils seals were developed with a special emphasis on abrasion resistance. In testing, our seals perform up to 90 percent better than seals made from traditional materials.

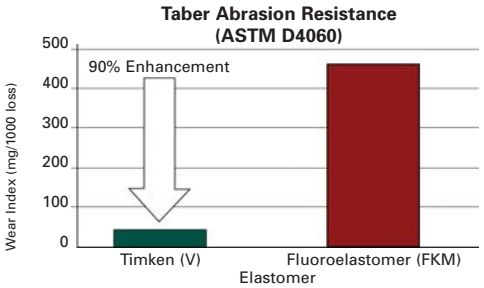
Timken Nitrile (N) Black Industrial Seals



Timken Hydrogenated Nitrile Butadiene Rubber (HNBR) Blue Industrial Seals



Timken Fluoroelastomer (V) Green Industrial Seals



Bearing Isolators

Timken bearing isolators are an optimum choice when you require an extra layer of protection from contaminants in tough applications, such as pumps, motors, gearboxes and other rotating heavy equipment. Our metallic bearing isolators feature a cam lock design and an engineered unitizing ring, providing enhanced protection in a broad range of environments. Made from PTFE material, our non-metallic bearing isolators also offer superior protection.

General Specifications

Timken industrial seals offer a leading combination of quality, technology and high performance. However, there are additional considerations – such as shaft finish, temperatures and other operating factors – that can impact the level of performance achieved. We recommend the following practices to ensure that you are maximizing the efficiency and the life of your bearings and machinery. For specific application assistance, contact your Timken sales representative.

Shaft Finish

The amount of contact between the shaft surface and the sealing element, and the condition of the shaft surface, has a significant impact on how well seals perform. Shafts containing "threads" or other texture are simply not able to be sealed effectively. Replacement oil seals always require new sealing surfaces.

Unless otherwise indicated, it is recommended that shaft finishes have a hardness of 30 to 40 Rockwell C. A minimum of 45 Rockwell C can provide extra protection from damage during handling or installation. *See Table 1.*

Table 1: Shaft Requirements

Seal Type	Required Shaft Hardness Rockwell C	Required Shaft Finish	
		µin (micro-inches) Ra	µm (micro-meters) Ra
Standard Oil Seals	30 - 40	10 - 20	0.25 - 0.50
PS-I Oil Seals	50 - 70	4 - 8	0.10 - 0.20
Bearing Isolators	Not Specified	64 maximum	1.63 maximum

For best results and finishes we recommend using the plunge grind method. We recommend 10-20 µ in. Ra (0.25-0.50 µm) with no machine lead, scratches, dents, corrosion, pits or other surface defects.

Shaft Lead

Spiral grooves, or lead, may be generated on a shaft surface by the relative axial movement of the finishing tool (lathe, belt, grinding wheel, etc.) during the finishing operation. Lead on a shaft can negatively affect a radial lip seal, allowing severe leakage and leading to sealing failure.

Detecting Lead

It is nearly impossible to manufacture lead-free surfaces, but the thread method allows lead to be detected and quantified. To do so, use the following procedure:

1. Mount shaft or sleeve in holding chuck.
2. Use 5 to 10 cps viscosity silicone oil to lightly coat the shaft or sleeve.
3. Because the most accurate results are achieved when the setup is level, check to ensure that the shaft or sleeve is level with the assembly.
4. Find a length of 100 percent extra strong quilting thread (dia. of 0.009 in. or 0.23 mm) or unwaxed dental floss for next step.
5. Use the thread to drape over the surface of the shaft and attach one ounce (28 g) weight at a distance below the shaft that will create a string-to-shaft contact arc of 220 degrees to 240 degrees.

Table 2: Determination of Lead (Source: RMA Handbook OS-1/1985)

Thread Movement During Clockwise (CW) Rotation	Thread Movement During Counter-Clockwise (CCW) Rotation	Lead Definition
From Fixed End Towards Free End	From Free End Towards Fixed End	Clockwise Lead (Right-Hand) See Figure 1 and Figure 2
From Free End Towards Fixed End	From Fixed End Towards Free End	Counter-Clockwise Lead (Left-Hand) See Figure 3 and Figure 4
No Movement	No Movement	No Measurable Lead
From Fixed End Towards Free End	From Fixed End Towards Free End	Shaft may be tapered. Remount shaft end-for-end. If direction reverses, shaft is tapered.
From Free End Towards Fixed End	From Free End Towards Fixed End	Shaft may be tapered. Remount shaft end-for-end. If direction reverses, shaft is tapered.
From Fixed End Towards Free End	From Fixed End Towards Free End	Shaft may not be level. Remount shaft end-for-end. If direction does not reverse, shaft is not level.
From Free End Towards Fixed End	From Free End Towards Fixed End	Shaft may not be level. Remount shaft end-for-end. If direction does not reverse, shaft is not level.
Away From Center	Away From Center	Crowned Shaft
Toward Center	Toward Center	Cusped Shaft

6. Adjust machine's rotational speed to 60 RPM.
7. Measure the axial movement of the thread while the shaft or sleeve rotates for a period of 30 seconds.
8. Look for movement at both edges of the shaft by placing the thread there as well.
9. Reverse the direction of the shaft or sleeve rotation and repeat the test.
10. Refer to Table 2 to determine results.

Comparing Shaft Lead – Lead Angle

The lead of a shaft is compared with other shafts of differing diameters by calculating the lead angle. This is found by dividing the string advance by the product of the shaft circumference (both in inches), and the number of revolutions required to advance the string the measured amount.

$$\text{LEAD ANGLE} = \frac{\text{String Advance}}{(\text{Shaft circumference}) \times (\text{number of turns})}$$

For example, a string will advance 0.300 in. in 30 seconds on a 4.000 in. shaft rotating at 60 RPM. The lead angle equals 0.0456 degrees = 0 degrees 2 minutes 44 seconds. A 2 in. shaft with the same advance (0.300 in. in 30 seconds at 60 RPM) has a lead angle of 0.0912 degrees = 0 degrees 5 minutes 28.3 seconds.

For best seal performance, industry standards recommend that the lead angle of a shaft be 0 degrees +/- 0.05 degrees (+/- 0 degrees +/- 3 minutes).

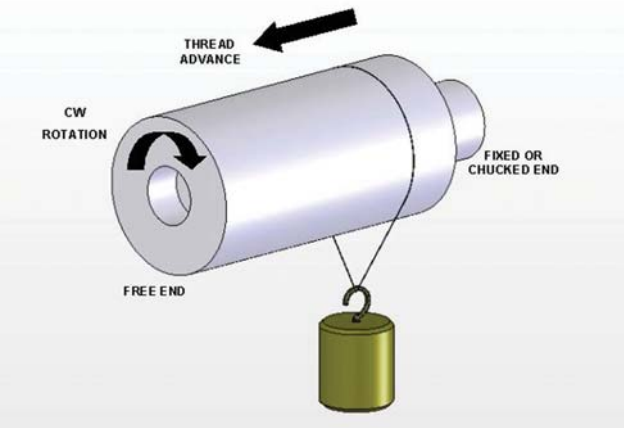


Figure 1: Clockwise Lead

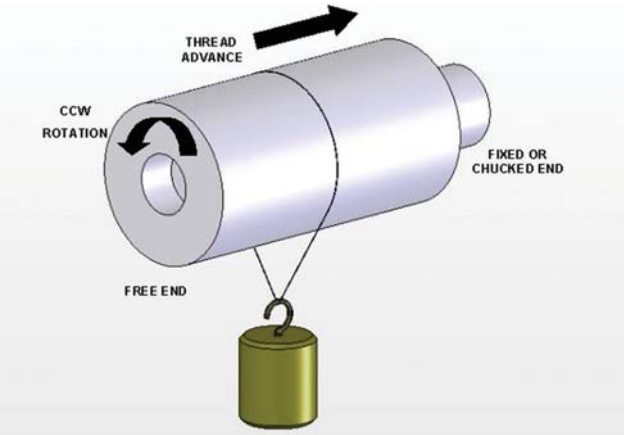


Figure 2: Clockwise Lead

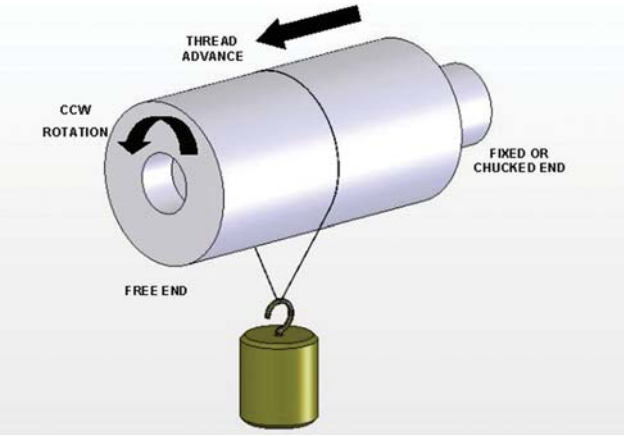


Figure 3: Counter-Clockwise Lead

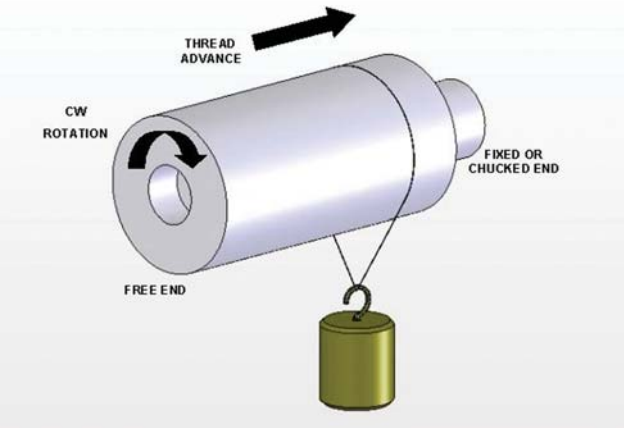


Figure 4: Counter-Clockwise Lead

Shaft-to-Bore Misalignment

Shaft-to-bore misalignment is the distance by which a shaft is off center relative to its bore. To measure this, calculate the distance between the shaft center line and the bore centerline, as shown in *Figure 5.*

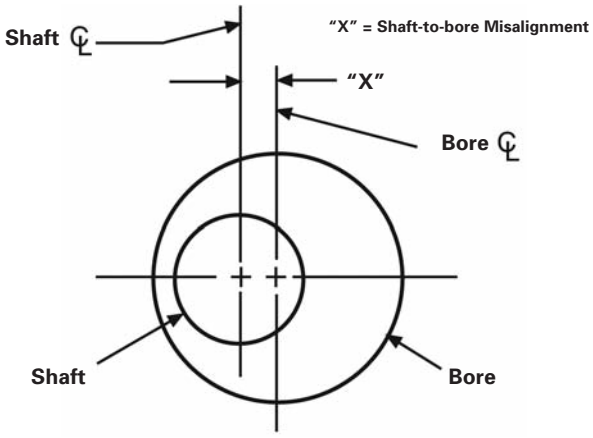


Figure 5: Shaft-to-bore Misalignment

Dynamic Runout

Dynamic runout is the amount by which a shaft, at the sealing surface, does not rotate around the true center. You can measure dynamic runout by holding a dial indicator against the shaft surface while it is slowly rotated. The resulting measurement is called a total indicator reading, or TIR. *See Figure 6.*

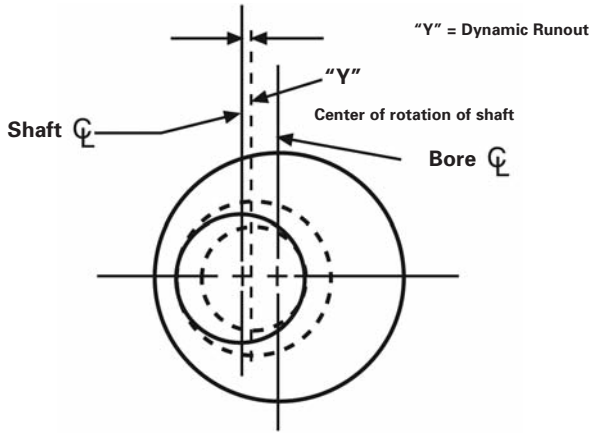


Figure 6 — Dynamic Runout

Pressure Data

Table 3 shows the maximum operating pressure suitable for standard oil seals and *Table 4* shows maximum pressure limits for a variety of sealing options. If an application generates higher surge pressures than what are listed, full details should be submitted for design consideration and engineering recommendations. Custom and high-pressure seals can be developed, although features such as ability to take greater eccentricities may be sacrificed to gain pressure capabilities. If possible, machine designs should include vents to allow the seal to operate more efficiently.

Table 3: Operating Pressure Limits For Standard Oil Seals

Shaft Speed		Maximum* Pressure*		
f/m (feet per minute)	m/s (meters per second)	psi (pounds per sq.in)	kPa (kilopascals)	bar
0-1000	0 0-5.1	7	48	0.48
1001-2000	5.2-10.2	5	35	0.35
2001 & up	10.3 & up	3	21	0.21

* Split oil seals are not recommended for applications involving fluid pressure.

Table 4: Maximum Pressure Limits

Seal Type	Maximum Operating Pressure*		
	psi (pounds per sq.in)	kPa (kilopascals)	bar
Standard Oil Seals	7	48	0.48
PS-I Oil Seals	150†	1,034	10.34
Bearing Isolators	Ambient	Ambient	Ambient

* Maximum operating pressure decreases as surface speed increases. Please consult your Timken sales representative for specific application operating pressures.
† Retaining plate required at pressures greater than 75psi.

Shaft and Bore Tolerances

Seal performance depends on close tolerances in the finished dimensions of the shaft, housing bore and oil seal. *Tables 5, 6 and 7* give more information on proper tolerance allocation.

Table 5: Shaft Diameter Tolerances for Oil Seals

Shaft Diameter		Recommended Tolerance	
inch	mm	inch	mm
Up thru 4.000	Up thru 101.60	±0.003	±0.08
4.001 - 6.000	101.61-152.40	±0.004	±0.10
6.001-10.000	152.41-254.00	±0.005	±0.13
10.001 & Up	254.01 & Up	±0.006	±0.15

The recommended bore diameter tolerances shown in *Table 6* apply only to housings made from ferrous materials. For recommendations on seals made from non-ferrous materials, submit full details to your Timken sales representative.

Bore depth standard tolerance is +/- 0.016 in. (0.4 mm).

Table 6: Housing Bore Tolerances for Oil Seals

Housing Bore Diameter (Nominal)		Recommended Bore Diameter Tolerance	
inch	mm	inch	mm
Thru 1.000	Thru 25.40	±0.001	±0.03
1.001 - 3.000	25.41 - 76.20	±0.001	±0.03
3.001 - 4.000	76.21 - 101.60	±0.0015	±0.04
4.001 - 4.375	101.61 - 111.13	±0.0015	±0.04
4.376 - 6.000	111.14 - 152.40	±0.0015	±0.04
6.001 - 7.000	152.41 - 177.80	±0.002	±0.05
7.001 - 8.000	177.81 - 203.20	±0.002	±0.05
8.001 - 9.000	203.21 - 228.60	±0.002	±0.05
9.001 - 10.000	228.61 - 254.00	±0.002	±0.05
10.001 - 20.000	254.01 - 508.00	+0.002 -0.004	+0.05 -0.10
20.001 - 30.000	508.01 - 762.00	+0.002 -0.006	+0.05 -0.15
30.001 - 40.000	762.01 - 1016.00	+0.002 -0.006	+0.05 -0.15
40.001 - 60.000	1016.01 - 1524.00	+0.002 -0.010	+0.05 -0.25

Recommended Bore Finish = 100 microinches Ra (2.54 micrometers) or smoother.

Table 7: Shaft and Bore Tolerances for Bearing Isolators

Shaft Diameter		Recommended Tolerance	
inch	mm	inch	mm
Thru 6.000	Thru 152.40	±0.002	±0.05
6.001 & Up	152.41 & Up	±0.003	±0.08

Bore Diameter		Recommended Tolerance	
inch	mm	inch	mm
Thru 6.000	Thru 152.40	±0.001	±0.03
6.001 - 10.000	152.41 - 254.00	±0.002	±0.05
10.001 & Up	254.01 & Up	±0.003	±0.08

Surface Speed

Shaft finish, misalignment and runout, lubrication, pressure and seal design are all factors in determining safe operating speeds and become more important the more the shaft speed increases. To determine the appropriate surface speed for your application(s), use the formulas below or see Appendix F for the surface speed chart. Because surface speed limits vary with seal design, also refer to the product listings for limits on specific Timken industrial seals.

Surface Speed (f/m) = Shaft Dia. (in.) x RPM x 0.262
Surface Speed (f/m) = Shaft Dia. (mm) x RPM x 0.0103
Surface Speed (m/s) = Shaft Dia. (in.) x RPM x 0.0013299
Surface Speed (m/s) = Shaft Dia. (m/m) x RPM x 0.0000524

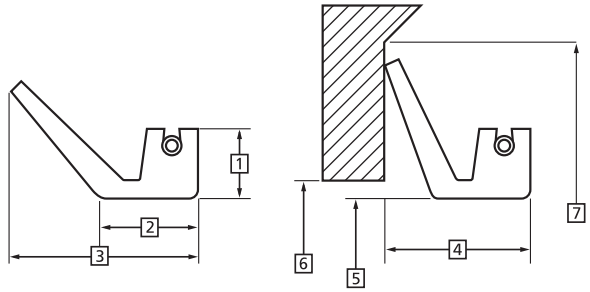
Conversion Formulas

Conversion Formulas		
Multiply	By	To Obtain
Inch (in.)	25.4	millimeter (mm)
millimeter (mm)	0.0394	Inch (in.)
bar	100	kilopascal (kPa)
bar	14.504	psi (lb/sq. in.)
kilopascal (kPa)	0.010	bar
kilopascal (kPa)	0.145	psi (lb/sq. in.)
psi (lb/sq. in.)	0.0689	bar
psi (lb/sq. in.)	6.895	kilopascal (kPa)

Temperature Conversion Formulas
°F = 1.8 (°C) + 32
°C = (°F - 32)/1.8

Model 145 Face Seal Dimensional Data

Cross-Section Dimensions **Assembled Dimensions**



DIM #	Description	Model 145A1	Model 145A2
1	Height of cross-section	1.000 in. (25.4 mm)	0.500 in. (12.7 mm)
2	Shaft contact width	1.344 in. (34.1 mm)	0.563 in. (14.3 mm)
3	Overall free width	2.594 in. (65.9 mm)	0.969 in. (24.6 mm)
4	Assembled width	2.000 ± 0.500 in. (50.8 ± 12.77 mm)	0.781 ± 0.156 in. (19.8 ± 4.0mm)
5	Shaft Diameter	Application Dependent	Application Dependent
6	Maximum face bore	Shaft + 1.000 in. (Shaft + 25.4 mm)	Shaft 0.391 in. (Shaft + 9.9 mm)
7	Minimum face diameter	Shaft + 1.000 in. (Shaft + 114.3 mm)	Shaft 1.750 in. (Shaft + 44.5 mm)

IMPORTANT NOTE

Recommendations printed in this catalog pertaining to shaft finishes, misalignment, runout, speeds, temperatures and tolerances are generally applicable. The combination of a selected seal with a certain application, and the operating circumstances involved, could modify the performance of the seal and/or the equipment. To get the most out of your Timken seals, submit full information to ensure that the seal(s) you receive are suitable for your application.

Equipment Inspection and Preparation
Before installing any lip seal, equipment should be thoroughly inspected. Follow the specifications below for best results:

Shaft Surface Finish [Roughness Average or AA (Arithmetic Average)]

- With the exception of PS-1 (Model 61), all shafts should have a surface finish within 10-20 µin. (0.25-0.50 µm).
- For PS-1 (Model 61), the surface finish should be within 4-8 µ in (0.10-0.20 µm).
- The surface finish direction of all seals must be perpendicular to the shaft axis of rotation.

Bore Surface Finish, Ra ([Roughness Average or AA (Arithmetic Average)]

- The surface finish of all bores must be 100 µin. (2.54 µm).
- The surface finish direction of all bores must be perpendicular to the shaft axis of rotation.

Shaft Surface Hardness, Rockwell C-Scale

- With the exception of PS-1 (Model 61), all shafts should have a surface hardness between 30-40 Rockwell C.
- For PS-1 (Model 61), the surface hardness must be within 50-70 Rockwell C.

Additional Specifications

- Both the shaft and bore should include an edge relief (preferably an edge chamfer), as shown in *Figures 7 and 8. See Tables 8 and 9* for specific values.
- Both the shaft and bore should be clear of any defects, such as spiral-machining marks, burrs, sharp edges, nicks, scratches and corrosion.

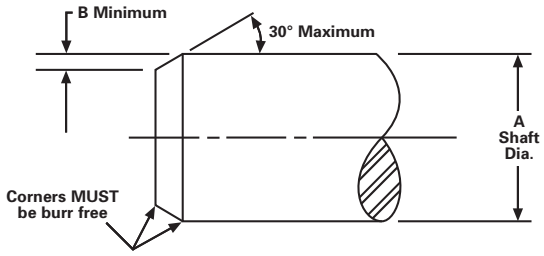


Figure 7: Shaft Geometry

Table 8: Edge Relief for Shafts

A - Shaft Diameter		B - Minimum*	
inch	mm	inch	mm
Thru 0.394	Thru 10.00	0.030	0.75
0.395 - 0.787	10.01 - 20.00	0.040	1.00
0.788 - 1.181	20.01 - 30.00	0.050	1.25
1.182 - 1.575	30.01 - 40.00	0.060	1.50
1.576 - 1.969	40.01 - 50.00	0.070	1.75
1.970 - 2.756	50.01 - 70.00	0.080	2.00
2.757 - 3.740	70.01 - 95.00	0.090	2.25
3.576 - 5.118	95.01 - 130.00	0.110	2.75
5.970 - 9.449	130.01 - 240.00	0.140	3.50
9.450 & Up	240.01 & Up	0.220	5.50

* If a shaft lead-in radius is used, maintain the diametral difference to no less than indicated value

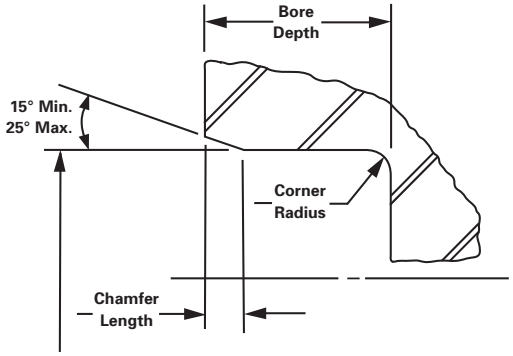


Figure 8: Housing Bore Dimensions

Table 9: Edge Relief for Housing Bores

Nominal Seal Width		Chamfer Length		Max. Housing Corner Radius	
inch	mm	inch	mm	inch	mm
Thru 0.394	Thru 10.00	0.03-0.04	0.7-1.0	0.020	0.50
Over 0.394	Over 10.00	0.05-0.06	1.2-1.5	0.030	0.75

- Typically, the shaft has a wear groove created from previous seals. Make sure the new sealing lip does not seal in the same location.
- When drive features such as keyways or splines are present, they must be covered using an installation tool similar to the one shown in *Figure 10* below, and using "Installation Method D" shown in *Figure 10* on the next page. If the use of a tool is prohibited by the size of the shaft, use one of the following options:
  - Polyethylene tape
  - Brass shim stock with smooth edges
  - Wooden plug with smooth edges

Seal Inspection

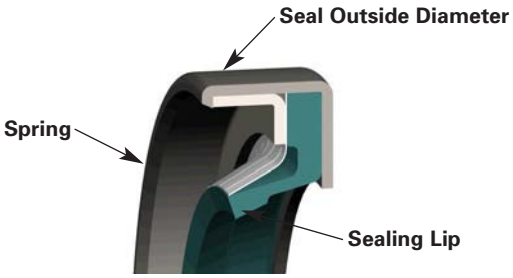
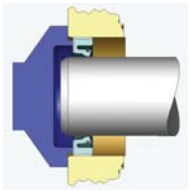


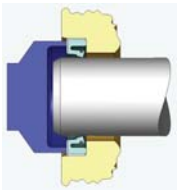
Figure 9: Seal Cross Section

- Inspect the sealing lip for any signs of damage, such as cuts, indentations and nicks.
- Make sure that the spring (finger or garter type) is retained within the seal (bonded or assembled).
- Inspect the seal OD, looking for any signs of damage, such as cuts (in rubber seals), indentations and nicks.

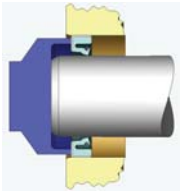
Installation Methods



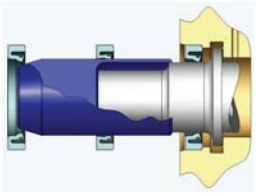
Installation Method A
Thru Bore:
Installation tool bottoms on machined face



Installation Method B
Thru Bore:
Seal bottoms on machined bore shoulder



Installation Method C
Thru Bore:
Installation tool bottoms on shaft



Installation Method D
Thru Bore:
Mounting thimble assists in compressing seal lip for easier installation

Figure 10: Installation Methods

Solid Seal Installation

Install the seal(s) using one of the proper installation methods shown in *Figure 10*. When using installation tooling, the diameter, or contact area, should not be more than 0.010 in. (0.254 mm) smaller than the bore diameter. If the use of an installation tool is prohibited by the size of the seal, then:

- Rest a block of wood (piece of 2 in. x 4 in. or similar) on the seal and use a mallet to drive the seal into position. Do not hit the seal directly with the mallet, as it may cause damage.
- When using this method, follow a star pattern *(as shown in Figure 11)* to avoid "cocking" of the seal.
- Place the ends of the wooden block at positions 1 and 2 *(as shown in Figure 11)*.

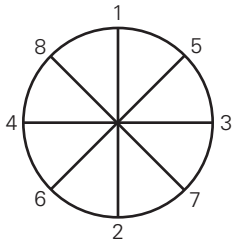


Figure 11: Star Pattern

- Hit the center of the board with the mallet.

- Continue by rotating the wooden block to the appropriate positions (3 and 4, 5 and 6, 7 and 8), hitting the center of the block with the mallet each time.
- Repeat the pattern until the seal is properly seated in the housing bore. The seal is fully seated when the difference between the seal surface and the housing surface is equal to or less than 0.010 in. (0.254 mm).

Split Seal Installation

Ambient pressure/non-flooded applications only

- Apply a thin coat of lubricant to the seal lip and shaft.
- Split the seal along the axis of rotation *(shown in Figure 12)* and place the seal around the shaft.

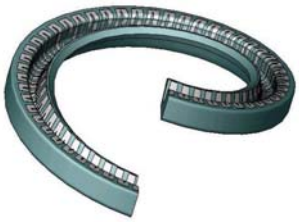


Figure 12: Split Seal Separation

- Beginning with the split ends, insert the seal into the top of the housing bore. Make sure the split ends of the seal are touching.
- Working downwards on both sides, continue inserting the seal into the housing bore, finishing at the bottom.
- Once the seal is properly seated in the housing bore, it should protrude from the housing surface by 0.015 in. (0.381 mm), as *shown in Figure 13.* The 0.015 in. protrusion is built into the width of the seal. The depth of the bore housing should be machined to the seal width specified on the packaging.

IMPORTANT NOTE
The 0.015 in. protrusion will be built into the width of the seal. The depth of the bore housing should be machined to the seal width specified on the package.

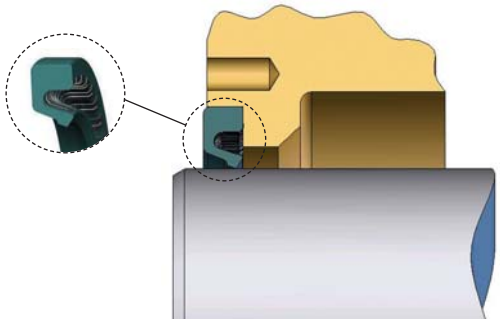
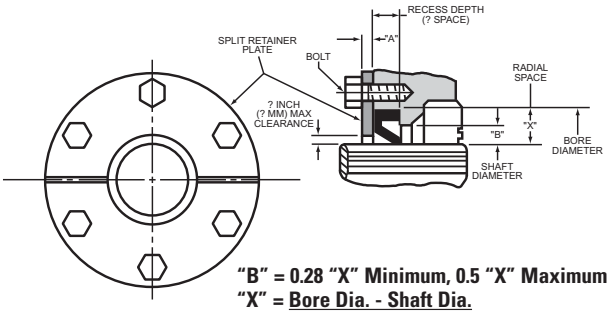


Figure 13: Split Seal Installed

Inspection

After installation, inspect the sealing areas for leaks, paying special attention to the area around the sealing lip and the OD. Make sure that the sealing lip is not in the groove worn into the shaft from the previous seal.

Shaft Diameter	No. of Bolts	"A" Minimum Plate Thickness
3 in. - 8 in. (76.2 - 203.2 mm)	6	1/8 in. (3.18 mm)
Over 8 in.	Bolts on a max. of 6 in. (152.4 mm) chord, spacing centered about split in end plate	1/4 in. (6.35 mm)



"B" = 0.28 "X" Minimum, 0.5 "X" Maximum

"X" = Bore Dia. - Shaft Dia. / 2

***Figures shown are for a guide only. Good machine design practices should be followed.**

Figure 14: Standard Oil Seal Installation

Equipment Preparation

Before installing an isolator, all equipment should be inspected. First, disconnect all power to the machinery and follow standard safety procedures to avoid personal injury or equipment damage during installation.

Second, inspect the shaft and bore surfaces. The shaft finish should be better than 64 µin (1.63 µm) with minimal lead, but a polished surface is not required. The bore surface should be 64 µin (1.63 µm). Both the shaft and bore should have a chamfer or other edge relief to prevent the o-ring from shearing.

Third, check the shaft and bore for damage or imperfections. They should both be clear of burrs, nicks, indentations and any other defects. Clean all foreign debris from the area. Note that, in many cases, the previous seal may have worn a groove into the shaft. Make sure that the rotor o-ring of the new seal does not ride in this area.

Finally, if drive features such as keyways or splines are present on the shaft, they must be covered during installation. To do so, use an installation tool, polyethylene tape, brass shim stock with smooth edges or a wooden plug with smooth edges.

Seal Preparation

IMPORTANT NOTE
Timken metallic and non-metallic bearing isolators are unitized, and any attempts to take them apart will not only cause seal damage, but will void the warranty on the product.

Before installation, inspect the o-ring's OD and ID, making sure they are free of any defects. Use the lubricant included with your isolator to lightly grease all the o-rings.

Installation

Using your hands only (no installation tool required) push the isolator evenly onto the shaft *as shown in Figure 14*.

Figure 14: Seal Installation on Shaft

If your isolator has a drain port, rotate it to the 6 o'clock position. For isolators with a mark on the OD of the stator, rotate it to the 12 o'clock position to ensure appropriate positioning of the drain port. Some non-metallic bearing isolators may be installed in any direction, and there is no need to position the seal. *See Figure 15* for clarification, or contact your Timken sales representative if you require additional information.

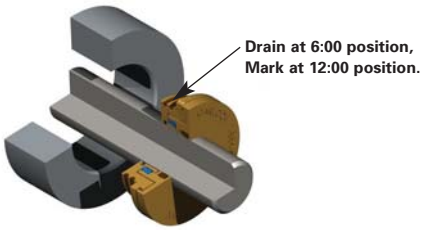


Figure 15: Drain Port Positioning

Using your hands only (no installation tool required), push the isolator gently into the bore. If required, gently tap the isolator using a soft-faced mallet. While flanged isolators are fully seated when the flange is flush against the housing, flangeless isolators can be installed at the bottom of the housing and are fully seated when they are flush with the bore face. *See Figure 16* for clarification.

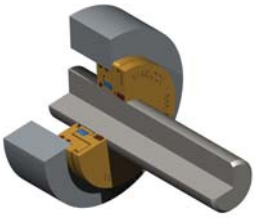


Figure 16: Flanged Seal Flush with Housing Face

Post-Installation

Inspection

After installation, inspect the sealing area for damage. Gently spin the shaft to make sure the rotor is working properly.

IMPORTANT NOTE
Do not flood the isolator or block the expulsion ports, as these actions can cause seal damage and failure.

Removal

To remove an old isolator from your equipment, start from the back side of the seal and perform installation instructions in reverse. If access to the back side of the isolator is difficult, pry it from the housing a little at a time. Be careful not to damage the shaft or housing bore during seal removal.

Seal & Material Selection

Seal Selection Guide*

Seal Type	0-3 inches	3-6 inches	6-12 inches	Over 12 inches	Rotary	Reciprocating	0-1000	1000-2000	2000-3000	3000-5000	5000-7000	7000-12000	0.010	0.015	0.020	0.093	0.100	0.125	Ambient	7 psi	150 psi	25%	50%	100%	Timken N	Timken ES	Timken V	Sillicone	GYLON	Bronze	Stainless Steel	PTFE
Model 57	X	X	X		X		X						X						X	X		X	X	X	X	X	X	X				
Model 58	X	X	X		X		X						X						X	X		X										
Model 63	X				X		X	X	X				X	X					X	X		X	X	X	X	X	X	X				
Model 53		X	X	X	X		X	X	X				X	X					X	X		X	X	X	X	X	X	X				
Model 23		X	X	X	X		X	X					X						X			X	X		X	X	X	X				
Model 26 (solid)	X	X	X	X	X	X	X	X	X	X			X	X					X	X		X	X	X	X	X	X					
Model 26 (split)	X	X	X	X	X		X	X	X	X			X	X					X			X	X		X	X	X					
Model 59			X	X	X	X	X	X	X	X			X	X	X	X			X	X		X	X	X	X	X	X					
Model 87			X	X	X	X	X	X	X	X			X	X	X	X	X		X	X		X	X	X	X	X	X					
Model 64			X	X	X		X	X	X	X	X		X	X	X	X	X	X	X	X		X	X	X	X	X	X					
Model 145#			X	X	X		X	X	X	X			N/A	N/A	N/A	N/A	N/A	N/A	X			N/A	N/A	N/A	X	X	X					
Model 143#			X	X	X		X	X	X	X			N/A	N/A	N/A	N/A	N/A	N/A	X			N/A	N/A	N/A	X	X	X					
P/S® (Model 61)	X	X	X		X	X	X	X					Under 0.005						X	X	X	X	X	X					X			
Timken Metallic Bearing Isolator	X	X	X	X	X		X	X	X	X	X	X	X	X	X				X											X	X	
Timken Metallic Bearing Isolator (Microcellular Filter included)	X	X	X	X	X		X	X	X	X			X	X	X				X											X	X	
Timken Non-Metallic Isolator (Graphite Filled)	X	X	X	X	X		X	X	X	X			X	X	X				X													X
Timken Non-Metallic Isolator (Glass Filled)	X	X	X	X	X		X	X	X	X			X	X	X				X													X
Parameter	**Shaft Size**				**Type of Motion**		**Speed (FPM)**						**Max Radial Misalignment (inches)**						**Max Pressure**			**Media Level**			**Seal Material****							

* Values shown are generally applicable limits. For specific application help, contact your Timken sales representative.

** Seal materials shown are typical for oil seals. Other materials are available upon request. Contact your Timken sales representative for more information.

Material Selection Guide*

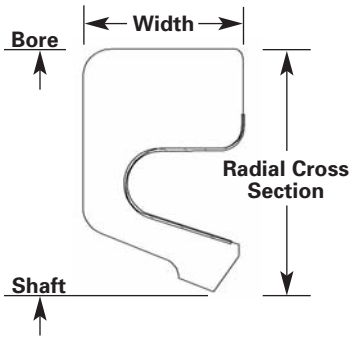
Material Type#	Color	Durometer	Coefficient of Friction	Operating Temperature	Max Spike Temperature	Abrasion Resistance	Chemical Resistance	Comparative Cost
Timken N	Black	80	1.788	-40°F to 200°F (-40°C to 93°C)	250°F (123°C)	Moderate	Moderate	Low
Timken ES	Dark Blue	88	1.053	-40°F to 300°F (-40°C to 150°C)	350°F (177°C)	High	Improved	Moderate
Timken V	Green	76	1.158	-22°F to 400°F (-30°C to 204°C)	450°F (232°C)	High	Very Good	High
Silicone	Light Blue (FDA - Red)	82	Over 2.000	-75°F to 350°F (-59°C to 176°C)	400°F (232°C)	Low	Excellent	High
Gylon®	Black (FDA - White)	N/A	0.100	-120°F to 400°F (-84°C to 204°C)	450°F (232°C)	High	Excellent	High

* Values shown are generally applicable limits. For specific application help, contact your Timken sales representative.

** Seal materials shown are typical for oil seals. Other materials are available upon request. Contact your Timken sales representative for more information.

Models 145 and 143 face seals are not available in Timken N, but are supplied with standard nitrile material.

Reference Dimensions



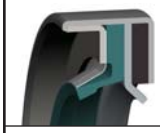
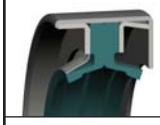
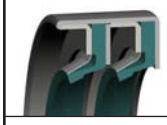
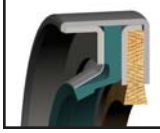
Model 3	Model 21	Model 23	Model 24	Model 25	Model 26	Model 26-E	Model 26-R1
Model 53	Model 53-F1	Model 53-G1	Model 53-R1	Model 53-R2	Model 53-T2	Model 53-TB	Model 53-TF
Model 54	Model 57	Model 58	Model 59	Model 59-G1	PS®-1	PS®-1 Dbl Opposed	PS®-1 Dbl Tandem
PS®-1 Reverse Lip	Model 62	Model 63	Model 63-F1	Model 63-G1	Model 63-R1	Model 63-R2	Model 63-T2
Model 63-TB	Model 63-TF	Model 64	Model 64-G1	Model 71	Model 76	Model 87	Model 88
Model 91	Model 92	Model 94	Model 111	Model 113	Model 123	Model 143	Model 145
Model 151	Model 154	Model 154-DL	Model 154-M	Model 154-P	Model 154-PG	Model 161-O	

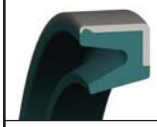
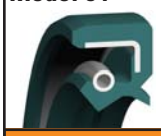
Large Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
Model 26 	• General purpose seal • Solid or split design • Reverse bevel-lip design prevents lip rollover • Reinforced rubber OD • Single- and dual-lip configurations available	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.750 to 60.000 (19.0 to 1524.0)	5,000 f/m (25.4 m/s)	Molded-in stainless steel finger	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.008 @ 5,000 (0.20 @ 25.4)	To 7 psi (0.4 bar) (N/A if split)
Model 26R1 	• General purpose dual-lip seal • Low-speed service • Reverse bevel-lip design prevents lip rollover • Dust lip prevents ingress of light contaminants	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.750 to 60.000 (19.0 to 1524.0)	5,000 f/m (25.4 m/s)	Molded-in stainless steel finger	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.008 @ 5,000 (0.20 @ 25.4)	To 7 psi (0.4 bar) (N/A if split)
Model 59 	• Severe service assembled seal • Heavy-duty outer case • Reverse bevel-lip design prevents lip rollover • Aggressive shaft-to-bore misalignment capability	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	6.000 to 90.000 (152.4 to 2286.0)	5,000 f/m (25.4 m/s)	Molded-in stainless steel finger	0.093 (2.4)	To 7 psi (0.4 bar)
Model 59G1 	• Severe service dual-lip assembled seal • GYLON® excluder lip for non-lubricated external conditions or corrosive external conditions	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	6.000 to 40.000 (152.4 to 1016.0)	2,500 f/m (12.8 m/s)	Molded-in stainless steel finger	0.010 @ 2,500 (0.25 @ 12.7)	To 7 psi (0.4 bar)
Model 64® 	• Severe service assembled seal • Heavy-duty metal outer case • Unique carrier/garter spring combination • Industry's highest shaft-to-bore misalignment capability	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	8.000 to 90.000 (203.2 to 2286.0)	7,000 f/m (35.6 m/s)	Combination of stainless steel garter & stainless steel finger	0.125 @ 5,000 (3.18 @ 24.5) 0.093 @ 7,000 (2.36 @ 35.6)	To 7 psi (0.4 bar)
Model 64G1 	• Severe service dual-lip assembled seal • GYLON® excluder lip for non-lubricated external conditions or corrosive external conditions	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	8.000 to 55.000 (203.2 to 1397.0)	3,500 f/m (17.9 m/s)	Combination of stainless steel garter & stainless steel finger	0.010 @ 3,500 (0.25 @ 17.9)	To 7 psi (0.4 bar)
Model 87 	• Severe service seal • Metal reinforced rubber OD • Reverse bevel-lip design prevents lip rollover • Aggressive shaft-to-bore misalignment capability	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	6.000 to 48.000 (152.4 to 1219.2)	5,000 f/m (25.4 m/s)	Molded-in carbon steel garter	0.100 @ 2,500 (2.54 @ 12.7) 0.050 @ 5,000 (1.27 @ 25.4)	To 7 psi (0.4 bar)
Model 88 	• Severe service seal • Aggressive shaft-to-bore misalignment capability • Metal reinforced rubber OD for positive bore retention	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	6.000 to 48.000 (152.4 to 1219.2)	5,000 f/m (25.4 m/s)	Molded-in carbon steel garter	0.050 @ 2,500 (1.27 @ 12.7) 0.025 @ 5,000 (0.64 @ 25.4)	To 7 psi (0.4 bar)

** Most designs available without spring.*
** Most designs available in silicone and other materials.*

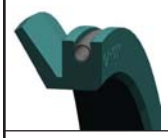
Small Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
Model 53 	• General purpose assembled seal • Heavy-duty metal outer case	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 60.000 (76.2 to 1524 .0)	3,000 f/m (15.2 m/s)	Stainless steel finger	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.005 @ 3,000 (0.13 @ 15.2)	To 7 psi (0.4 bar)
Model 53G1 	• General purpose dual-lip seal • Gylon® excluder lip for non-lubricated external conditions or corrosive external conditions	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 40.000 (76.2 to 1016.0)	1,500 f/m (7.6 m/s)	Stainless steel finger	0.010 @ 1,500 (0.25 @ 7.6)	To 7 psi (0.4 bar)
Model 53R1 	• General purpose dual-lip seal • Dual lips oppose for exclusion and retention • Spring in one element only	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 15.000 (76.2 to 381.0)	2,000 f/m (10.2 m/s)	Stainless steel finger	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2)	To 7 psi (0.4 bar)
Model 53R2 	• General purpose dual-lip seal • Dual lips oppose for exclusion and retention • Spring in two elements	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 15.000 (76.2 to 381.0)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 53TB 	• General purpose dual-lip seal • Lips set in tandem configuration • Spring in one element	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 15.000 (76.2 to 381.0)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 53TF 	• General purpose dual-lip seal • Lips set in tandem configuration • Spring in one element	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 15.000 (76.2 to 381.0)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 53T2 	• General purpose dual-lip seal • Lips set in tandem configuration • Spring in both elements	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 15.000 (76.2 to 381.0)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 53F1 	• General purpose dual-lip seal • Heavy-duty metal outer case • Felt excluder	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 15.000 (76.2 to 381.1)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 1,000 (0.25 @ 5.1)	To 7 psi (0.4 bar)
Model 63 	• General purpose assembled seal • Heavy-duty metal outer case • Single and dual-lip configurations available	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.250 to 3.000 (6.4 to 76.2)	3,000 f/m (15.2 m/s)	Stainless steel finger	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.005 @ 3,000 (0.13 @ 15.2)	To 7 psi (0.4 bar)

** Most designs available without spring.*
** Most designs available in silicone and other materials.*

Large Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
Model 63G1 	• General purpose dual-lip seal • Gylon® excluder lip for non-lubricated external conditions or corrosive external conditions	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.250 to 3.000 (6.4 to 76.2)	1,500 f/m (7.6 m/s)	Stainless steel finger	0.010 @ 1,500 (0.25 @ 7.6)	To 7 psi (0.4 bar)
Model 63R1 	• General purpose dual-lip seal • Dual lips oppose for exclusion and retention • Spring in one element only	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.250 to 3.000 (6.4 to 76.2)	2,000 f/m (10.2 m/s)	Stainless steel finger	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2)	To 7 psi (0.4 bar)
Model 63R2 	• General purpose dual-lip seal • Dual lips oppose for exclusion and retention • Spring in both elements	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.250 to 3.000 (6.4 to 76.2)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 63TB 	• General purpose dual-lip seal • Non-sprung front lips serves as a baffle • Lips set in tandem configuration	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.250 to 3.000 (6.4 to 76.2)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 63TF 	• General purpose dual-lip seal Non-sprung back lip serves as a baffle • Lips set in tandem configuration	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.250 to 3.000 (6.4 to 76.2)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 63T2 	• General purpose dual-lip seal • Lips set in tandem configuration • Spring in both elements	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.250 to 3.000 (6.4 to 76.2)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 63F1 	• General purpose dual-lip seal • Felt excluder	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.250 to 3.000 (6.4 to 76.2)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 500 (0.25 @ 2.5)	To 7 psi (0.4 bar)

Small Seals Bonded Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
Model 71 	• General purpose bonded seal • No spring • Ideal for grease retention or contamination exclusion	• Nitrile • Fluoroelastomer	-40°F (-40°C) to 200°F (93°C) -22°F (-30°C) to 400°F (204°C)	0.250 to 7.250 (6.3 to 184.1)	1,000 f/m (5.1 m/s)	N/A	0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 76 	• General purpose bonded seal • Metal outer case • Garter spring construction	• Nitrile • Fluoroelastomer	-40°F (-40°C) to 200°F (93°C) -22°F (-30°C) to 400°F (204°C)	0.250 to 8.000 (6.3 to 203.2)	3,000 f/m (15.2 m/s)	Carbon steel garter	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.005 @ 3,000 (0.13 @ 15.2)	To 7 psi (0.4 bar)
Model 91 	• General purpose bonded seal • No spring • Ideal for grease retention or contamination exclusion	• Nitrile • Fluoroelastomer	-40°F (-40°C) to 200°F (93°C) -22°F (-30°C) to 400°F (204°C)	0.281 to 5.000 (7.1 to 127.0)	1,000 f/m (5.1 m/s)	N/A	0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 92 	• General purpose bonded seal • Garter spring construction	• Nitrile • Fluoroelastomer	-40°F (-40°C) to 200°F (93°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 12.500 (76.2 to 317.5)	3,000 f/m (15.2 m/s)	Carbon steel garter	0.015 @ 1,000 ((0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.005 @ 3,000 (0.13 @ 15.2)	To 7 psi (0.4 bar)
Model 94 	• General purpose bonded seal • Dual-lip design • Garter spring construction	• Nitrile • Fluoroelastomer	-40°F (-40°C) to 200°F (93°C) -22°F (-30°C) to 400°F (204°C)	0.438 to 7.375 (11.1 to 187.3)	3,000 f/m (15.2 m/s)	Carbon steel garter	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.005 @ 3,000 (0.13 @ 15.2)	To 7 psi (0.4 bar)
Split Seals	**Features**	**Materials**	**Temperature**	**Shaft Diameter in. (mm)**	**Surface Speed**	**Spring Type**	**Misalign. in. @ f/m (mm@m/s)**	**Pressure**
Model 21 	• General purpose split seal • Low-speed service • Cover plate required	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 42.000 (76.2 to 1066.8)	1,000 f/m (5.1 m/s)	Mold-in stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	N/A
Model 23 	• General service split seal • Cover plate required • Over 300,000 sizes readily available	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 (76.2) and up	2,000 f/m (10.2 m/s)	Mold-in stainless steel finger	0.010 @ 1,000 (0.25 @ 5.1) 0.005 @ 2,000 (0.13 @ 10.2)	N/A
Model 24 	• Special purpose split seal for tapered housing grooves • Low-speed service • Tapered OD	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 21.500 (76.2 to 546.1)	1,000 f/m (5.1 m/s)	Mold-in stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	N/A
Model 25 	• PTFE split seal • Low-speed service • Excellent chemical resistance • Cover plate required	• PTFE	-120°F (-85°C) to 400°F (205°C)	3.000 to 20.000 (76.2 to 508.0)	1,000 f/m (5.1 m/s)	Carbon steel garter	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	N/A

** Most designs available without spring.*
** Most designs available in silicone and other materials.*

Split Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
Model 26 	• General purpose seal • Solid or split design • Reverse bevel-lip design prevents lip rollover • Reinforced rubber OD • Single- and dual-lip configurations available	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.750 to 60.000 (19.0 to 1524.0)	5,000 f/m (25.4 m/s)	Mold-in stainless steel finger	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.008 @ 5,000 (0.20 @ 25.4)	To 7 psi (0.4 bar) (N/A if split)
Model 26R1 	• General purpose dual-lip seal • Reverse bevel-lip design prevents lip rollover • Dust lip prevent ingress of light contaminants	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	0.750 to 60.000 (19.05 to 1524.0)	5,000 f/m (25.4 m/s)	Mold-in stainless steel finger	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.008 @ 5,000 (0.20 @ 25.4)	To 7 psi (0.4 bar) (N/A if split)
Excluder Seals	**Features**	**Materials**	**Temperature**	**Shaft Diameter in. (mm)**	**Surface Speed**	**Spring Type**	**Misalign. in. @ f/m (mm@m/s)**	**Pressure**
Model 143 	• Face-type excluder seal† • Split design • High-speed service • Stainless steel clamp	• Nitrile • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	6.000 to 80.000 (152.4 to 2032.0)	5,000 f/m (25.4 m/s)	N/A	N/A	N/A
Model 145A 	• Face-type excluder seal • Flexible sealing lip provides continuous contact with perpendicular surfaces	• Nitrile • Fluoroelastomer	-40°F (-40°C) to 200°F (93°C) -22°F (-30°C) to 400°F (204°C)	0.110 to 8.272 (2.8 to 210.1)	2,500 f/m (12.8 m/s)	N/A	N/A	N/A
Model 145A1 	• Face-type excluder seal • Solid design • High-speed service • Designed for 2.000 ±0.500 in. (50.8 ±12.7 mm) assembled width	• Nitrile • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	17.000 to 80.000 (431.8 to 2032.0)	5,000 f/m (25.4 m/s)	Stainless steel garter	N/A	N/A
Model 145A2 	• Face-type excluder seal • Solid design • High-speed service • Designed for 0.781 ±0.156 in. (19.8 ±3.9 mm) assembled width	• Nitrile • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	7.000 to 80.000 (177.8 to 2032.0)	5,000 f/m (25.4 m/s)	Stainless steel garter	N/A	N/A
Model 145L 	• Face-type excluder seal • Flexible sealing lip provides continuous contact with perpendicular surfaces	• Nitrile • Fluoroelastomer	-40°F (-40°C) to 200°F (93°C) -22°F (-30°C) to 400°F (204°C)	5.320 to 18.700 (135.1 to 474.9)	2,500 f/m (12.8 m/s)	N/A	N/A	N/A
Model 145S 	• Face-type excluder seal • Flexible sealing lip provides continuous contact with perpendicular surfaces	• Nitrile • Fluoroelastomer	-40°F (-40°C) to 200°F (93°C) -22°F (-30°C) to 400°F (204°C)	0.181 to 8.272 (4.6 to 210.1)	2,500 f/m (12.8 m/s)	N/A	N/A	N/A

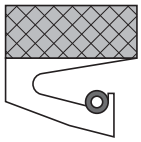
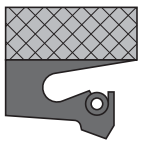
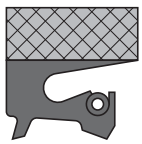
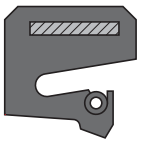
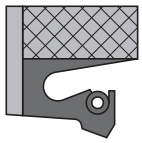
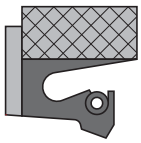
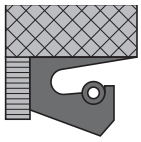
** Most designs available without spring.*
** Most designs available in silicone and other materials.*
† Not recommended for rotating applications (Seal should not rotate)

External Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
Model 26E 	• General purpose external seal • Solid design • Reverse bevel lip design prevents lip rollover • Reinforced rubber ID	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	1.000 to 60.000 (25.4 to 1524.0)	5,000 f/m (25.4 m/s)	Stainless steel finger	0.015 @ 1,000 (0.38 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.008 @ 5,000 (0.20 @ 25.4)	To 7 psi (0.4 bar)
Model 111 	• Heavy-duty metal case • Low speed service • Assembled design	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 50.000 (76.2 to 1270)	1,000 f/m (5.1 m/s)	Stainless steel finger	0.010 @ 500 (0.25 @ 2.5) 0.005 @ 1,000 (0.13 @ 5.1)	To 7 psi (0.4 bar)
Model 113 	• Heavy-duty metal case • Assembled design	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	3.000 to 50.000 (76.2 to 1270)*	3,000 f/m (15.2 m/s)	Stainless steel finger	0.020 @ 1,000 (0.50 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.005 @ 3,000 (0.13 @ 15.2)	To 7 psi (0.4 bar)
Model 123 	• Heavy-duty metal case • Assembled design	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	1.156 to 50.000 (29.4 to 1270)	3,000 f/m (15.2 m/s)	Stainless steel finger	0.020 @ 1,000 (0.50 @ 5.1) 0.010 @ 2,000 (0.25 @ 10.2) 0.005 @ 3,000 (0.13 @ 15.2)	To 7 psi (0.4 bar)
Specialty Seals	**Features**	**Materials**	**Temperature**	**Shaft Diameter in. (mm)**	**Surface Speed**	**Spring Type**	**Misalign. in. @ f/m (mm@m/s)**	**Pressure**
P/S® Single Lip 	• Assembled seal for high pressure applications • Gylon® element offers excellent chemical resistance • Dry running up to 700 fpm (3.5 m/s)	• Gylon® • FDA Gylon®	-40°F (-40°C) to 400°F (204°C)	0.438 to 20.000 (11.1 to 508.0) max seal OD	2,000 f/m (10.2 m/s)	N/A	0.005 @ 2,000 (0.13 @ 10.2)	150 psi (10 bar)
P/S® Single Lip Reverse 	• Assembled seal for high pressure applications • Gylon® element offers excellent chemical resistance • Dry running up to 700 fpm (3.5 m/s)	• Gylon® • FDA Gylon®	-40°F (-40°C) to 400°F (204°C)	0.438 to 20.000 (11.1 to 508.0) max seal OD	2,000 f/m (10.2 m/s)	N/A	0.005 @ 2,000 (0.13 @ 10.2)	150 psi (10 bar)
P/S® Dual Opposed 	• Assembled seal for high pressure applications • Gylon® element offers excellent chemical resistance • Dry running up to 700 fpm (3.5 m/s)	• Gylon® • FDA Gylon®	-40°F (-40°C) to 400°F (204°C)	0.438 to 20.000 (11.1 to 508.0) max seal OD	2,000 f/m (10.2 m/s)	N/A	0.005 @ 2,000 (0.13 @ 10.2)	150 psi (10 bar)
P/S® Dual Tandem 	• Assembled seal for high pressure applications • Gylon® element offers excellent chemical resistance • Dry running up to 700 fpm (3.5 m/s)	• Gylon® • FDA Gylon®	-40°F (-40°C) to 400°F (204°C)	0.438 to 20.000 (11.1 to 508.0) max seal OD	2,000 f/m (10.2 m/s)	N/A	0.005 @ 2,000 (0.13 @ 10.2)	150 psi (10 bar)

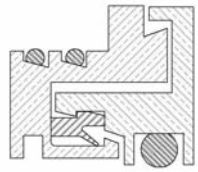
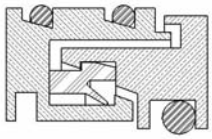
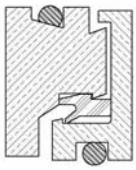
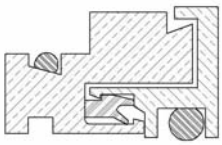
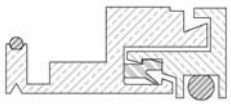
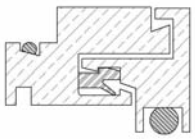
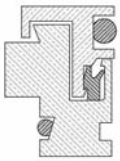
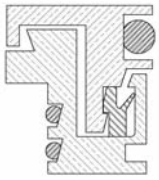
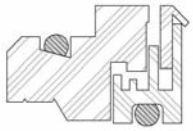
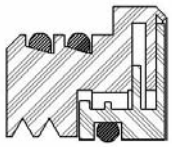
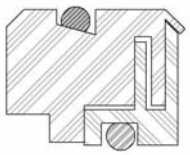
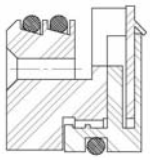
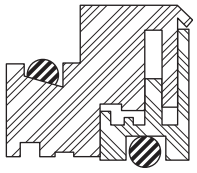
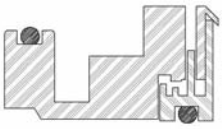
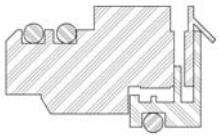
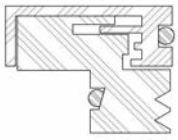
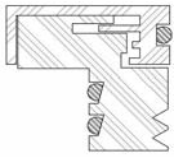
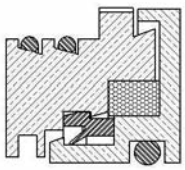
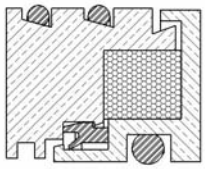
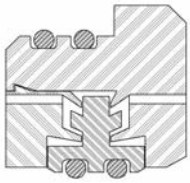
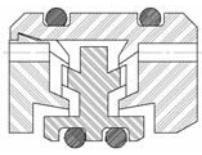
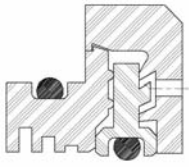
** Most designs available without spring.*
** Most designs available in silicone and other materials.*

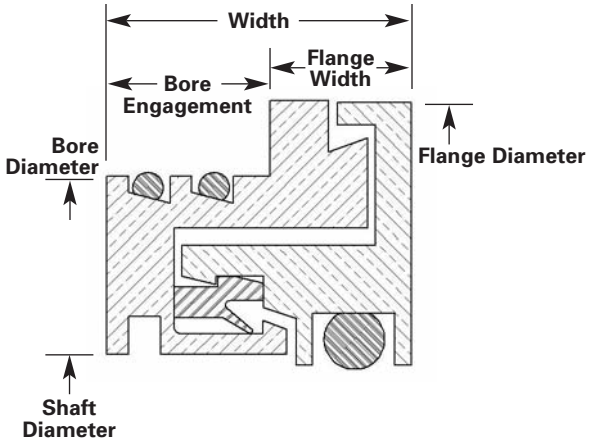
Specialty Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
Model 26HR 	• Special purpose seal for high misalignment applications • Low-speed service • Increased misalignment capability over standard 26	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	1.000 to 2.400 (25.4 to 508.0)	1,000 f/m (5.1 m/s)	Molded-in carbon steel garter	Application dependent	To 7 psi (0.4 bar)
Model 50 	• Low-speed service • Moderate pressure	• Timken N	-40°F (-40°C) to 200°F (93°C)	5.000 to 12.000 (127.0 to 304.8)	1,000 f/m (5.1 m/s)	Molded-in carbon steel garter	0.010 (0.25)	To 35 psi (2.4 bar)
Model 54 	• Special purpose assembled seal • Excluder seal • Designed for spherical bearing applications	• Timken N	-40°F (-40°C) to 200°F (93°C)	For spherical radii from 2.375 to 8.000 (60.33 to 203.2)	1,000 f/m (5.1 m/s)	Stainless steel finger	N/A	To 50 psi (3.4 bar)
Model 57 	• Metal reinforced rubber OD • Reverse bevel lip design prevents lip rollover • Available in single and dual lip • Ideal for slow-speed service applications (continuous casters)	• Timken N • Timken ES • Timken V	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 300°F (150°C) -22°F (-30°C) to 400°F (204°C)	2.000 to 12.000 (50.8 to 304.8)	500 f/m (2.5 m/s)	Stainless steel finger	0.015 @ 500 (0.38 @ 2.5)	To 7 psi (0.4 bar)
Model 58 	• High-temp, assembled seal • THERMO-CERAM™ sealing element • Ideal for abrasive environments • Grease lubricated apps only	• THERMO-CERAM™	To 1600°F (871°C)	2.000 to 12.000 (50.8 to 304.8)	500 f/m (2.5 m/s)	N/A	0.015 @ 500 (0.38 @ 2.5)	Ambient
Model 62 	• Assembled seal • Solid design • Low-speed service • Excellent chemical resistance	• PTFE	-120°F (-85°C) to 400°F (205°C)	0.437 to 20.000 (11.1 to 508.0) in max seal OD	2,000 f/m (10.2 m/s)	Carbon steel garter	0.005 @ 2,000 (0.13 @ 10.2)	To 7 psi (0.4 bar)

** Most designs available without spring.*
** Most designs available in silicone and other materials.*

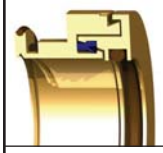
Universal Oil Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed f/m (m/s)	Spring Type	Misalign. in. @ f/m (mm @ m/s)	Pressure
Model 151 	• Available in two versions, split (151-1) or endless (151-2) • Tested and established sealing lip design • Cover plate required	• NBR • Mill-Right ES • Fluoroelastomer • Silicone	-40°F (-40°C) to 248°F (120°C) -40°F (-40°C) to 347°F (175°C) -22°F (-30°C) to 401°F (205°C) -76°F (-60°C) to 329°F (165°C)	up to 94.4 (2400)	4,921 (25)	Stainless steel garter spring	0.059 @ 4921 (1.5 @ 25)	7.25 psi (0,5 bar; N/A if split)
Model 154 	• Available in two versions, split (154-1) or endless (154-2) • New sealing lip design • Cover plate required	• NBR • Fluoroelastomer • Silicone	-40°F (-40°C) to 248°F (120°C) -22°F (-30°C) to 401°F (205°C) -76°F (-60°C) to 329°F (165°C)	up to 94.4 (2400)	4,921 (25)	Stainless steel garter spring	0.059 @ 4921 (1.5 @ 25)	7.25 psi (0,5 bar; N/A if split)
Model 154-DL 	• Incorporates a dust lip • New sealing lip design • Cover plate required	• NBR • Fluoroelastomer • Silicone	-40°F (-40°C) to 248°F (120°C) -22°F (-30°C) to 401°F (205°C) -76°F (-60°C) to 329°F (165°C)	up to 94.4 (2400)	4,921 (25)	Stainless steel garter spring	0.059 @ 4921 (1.5 @ 25)	7.25 psi (0,5 bar; N/A if split)
Model 154-M 	• Incorporates a metallic reinforcement ring • No cover plate required	• NBR • Fluoroelastomer • Silicone	-40°F (-40°C) to 248°F (120°C) -22°F (-30°C) to 401°F (205°C) -76°F (-60°C) to 329°F (165°C)	up to 94.4 (2400)	4,921 (25)	Stainless steel garter spring	0.059 @ 4921 (1.5 @ 25)	7.25 psi (0,5 bar; N/A if split)
Model 154-P 	• Incorporates radial lubrication grooves • Cover plate required	• NBR • Fluoroelastomer • Silicone	-40°F (-40°C) to 248°F (120°C) -22°F (-30°C) to 401°F (205°C) -76°F (-60°C) to 329°F (165°C)	up to 94.4 (2400)	4,921 (25)	Stainless steel garter spring	0.059 @ 4921 (1.5 @ 25)	7.25 psi (0,5 bar; N/A if split)
Model 154-PG 	• Incorporates radial lubrication grooves and peripheral lubrication grooves • Cover plate required	• NBR • Fluoroelastomer • Silicone	-40°F (-40°C) to 248°F (120°C) -22°F (-30°C) to 401°F (205°C) -76°F (-60°C) to 329°F (165°C)	up to 94.4 (2400)	4,921 (25)	Stainless steel garter spring	0.059 @ 4921 (1.5 @ 25)	7.25 psi (0,5 bar; N/A if split)
Model 161-O 	• Available only in an endless version • PTFE back-up ring • Pressure-resistant • Cover plate required	• NBR • Fluoroelastomer • Silicone	-40°F (-40°C) to 248°F (120°C) -22°F (-30°C) to 401°F (205°C) -76°F (-60°C) to 329°F (165°C)	up to 94.4 (2400)	4,921 (25)	Stainless steel garter spring	0.010 @ 4921 (0.25 @ 25)	Can withstand pressure depending on shaft speed max 50 bar

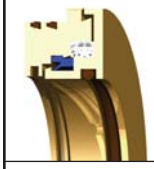
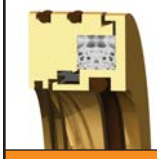
** Most designs available without spring.*
** Most designs available in silicone and other materials.*

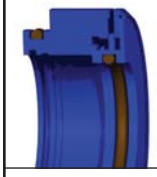
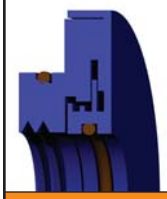
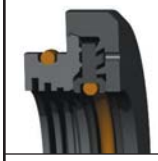
Metallic Isolator – Flanged 	**Metallic Isolator – Flangeless** 	**Metallic Isolator – Narrow Width** 	**Metallic Isolator – Small C-S** 	**Metallic Isolator – SPB** 
Metallic Isolator – Step Shaft 	**Metallic Isolator – Vertical** 	**Metallic Isolator – Vertical** 	**Non-Metallic Isolator (Glass-Filled PTFE) – Flanged** 	**Non-Metallic Isolator (Glass-Filled PTFE) – Flanged** 
Non-Metallic Isolator (Glass-Filled PTFE) – Flangeless 	**Non-Metallic Isolator (Glass-Filled PTFE) – Grease Purge** 	**Non-Metallic Isolator (Glass-Filled PTFE) – Small C-S** 	**Non-Metallic Isolator (Glass-Filled PTFE) – SPB** 	**Non-Metallic Isolator (Glass-Filled PTFE) – Step Shaft** 
Non-Metallic Isolator (Glass-Filled PTFE) – Vertical 	**Non-Metallic Isolator (Glass-Filled PTFE) – Vertical** 	**Metallic Isolator (Microcellular Filter)** 	**Metallic Isolator (Microcellular Filter) Flangeless** 	**Non-Metallic Isolator (Graphite-Filled PTFE)** 
Non-Metallic Isolator (Graphite-Filled PTFE) – Flangeless 	**Non-Metallic Isolator (Graphite-Filled PTFE) – Small C-S** 			



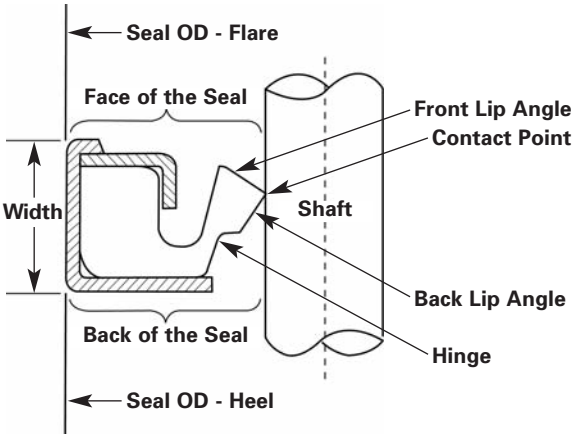
Metallic Isolator Seal Sizes Code Prefix	Description	Material	Width	Flange Width	Bore Engagement
29602	Standard	Bronze	0.700	0.325	0.375
29604	Standard	316 Stainless Steel	0.700	0.325	0.375
29606	Small Cross Section	316 Stainless Steel	0.625	0.375	0.250
29607	Small Cross Section	Bronze	0.625	0.375	0.250
29608	Small Cross Section, Short Flange	Bronze	0.625	0.250	0.375
29609	Narrow Width Flangeless	Bronze	0.375	N/A	0.375
29610	Small Flanged	Bronze	0.700	0.325	0.375
29611	Narrow Width Flangeless	316 Stainless Steel	0.375	N/A	0.375
29612	Flangeless	316 Stainless Steel	0.625	N/A	0.625
29616	Split Pillow Block	Bronze	1.000	0.500	0.500
29619	Flangeless	Bronze	0.625	N/A	0.625
29620	Vertical	Bronze	0.700	0.325	0.375
29621	Vertical - Small Cross Section	Bronze	0.625	0.375	0.250
Metallic Isolator (Microcellular Filter) Seal Sizes Code Prefix	**Description**	**Material**	**Width**	**Flange Width**	**Bore Engagement**
29102	Standard	Bronze	0.700	0.325	0.375
29106	Standard	316 Stainless Steel	0.700	0.325	0.375
29119	Flangeless	Bronze	0.625	N/A	0.625
Non-Metallic Isolator (Glass-Filled PTFE) Seal Sizes Code Prefix	**Description**	**Material**	**Width**	**Flange Width**	**Bore Engagement**
29500	Standard Style 2 OD o-rings	Glass-Filled PTFE	0.750	0.300	0.450
29502	Standard	Glass-Filled PTFE	0.750	0.375	0.375
29507	Small Cross Section	Glass-Filled PTFE	0.625	0.375	0.250
29516	Split Pillow Block	Glass-Filled PTFE	1.000	0.500	0.500
29518	Grease Purgeable	Glass-Filled PTFE	0.820	0.320	0.500
29519	Flangeless	Glass-Filled PTFE	0.640	N/A	0.640
29520	Vertical	Glass-Filled PTFE	0.760	0.385	0.375
29521	Vertical - Two OD o-rings	Glass-Filled PTFE	0.885	0.385	0.500
Non-Metallic Isolator (Graphite-Filled PTFE) Seal Sizes Code Prefix	**Description**	**Material**	**Width**	**Flange Width**	**Bore Engagement**
24801	Flangeless	Graphite-Filled PTFE	0.625	N/A	0.625
24802	Standard	Graphite-Filled PTFE	0.625	0.250	0.375
24807	Small Cross Section	Graphite-Filled PTFE	0.690	0.375	0.315

Metallic Isolator Model Number	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Axial Motion in. (mm)	Misalign. & Runout in. @ f/m (mm@m/s)	Pressure
Standard, Small Flanged 	• Meets NEMA MG 1-2003 • Surpasses IEEE 841-2001 test standards • Conforms to API 610 • No arbor press required for installation • No internal metal-to-metal contact • Small OD of flange does not interfere with equipment	• Bronze or 316 stainless steel construction • Filled PTFE unitizing ring • Fluoroelastomer	-30°F (-34°C) to 400°F (204°C)	0.875 to 10.500 (22.2 to 266.7)	12,000 f/m (60.9 m/s)	±0.025 (0.64)	±0.020 (0.51)	Ambient
Small Cross Section, Short Flange 	• Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • Conforms to API 610 • No arbor press required for installation • No internal metal-to-metal contact • Fits in c/s as small as 0.188 in. (4.76mm) • Short flange width does not interfere with equipment	• Bronze or 316 stainless steel construction • Filled PTFE unitizing ring • Fluoroelastomer o-rings standard	-30°F (-34°C) to 400°F (204°C)	0.875 to 5.500 (22.2 to 139.7)	12,000 f/m (60.9 m/s)	±0.015 (0.38)	±0.010 (0.25)	Ambient
Flangeless Narrow Width 	• Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • No arbor press required for installation • No internal metal-to-metal contact • Flangeless design fits in spaces as narrow as 0.375 in. (9.53mm)	• Bronze or 316 stainless steel construction • Filled PTFE unitizing ring • Fluoroelastomer o-rings standard	-30°F (-34°C) to 400°F (204°C)	0.875 to 5.500 (22.2 to 139.7)	12,000 f/m (60.9 m/s)	±0.015 (0.38)	±0.010 (0.25)	Ambient
Flangeless 	• Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • Conforms to API 610 • No arbor press required for installation • No internal metal-to-metal contact • Does not extend past face of housing	• Bronze or 316 stainless steel construction • Filled PTFE unitizing ring • Fluoroelastomer o-rings standard	-30°F (-34°C) to 400°F (204°C)	0.875 to 10.500 (22.2 to 266.7)	12,000 f/m (60.9 m/s)	±0.025 (0.64)	±0.020 (0.51)	Ambient
Split Pillow Block 	• Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • Conforms to API 610 • No arbor press required for installation • No internal metal-to-metal contact • Standard and custom design for split pillow blocks	• Bronze or 316 stainless steel construction • Filled PTFE unitizing ring • Fluoroelastomer o-rings standard	-30°F (-34°C) to 400°F (204°C)	0.875 to 10.500 (22.2 to 266.7)	12,000 f/m (60.9 m/s)	±0.025 (0.64)	±0.020 (0.51)	Ambient
Step Shaft 	• Meets NEMA MG 1-2003 • Surpasses IEEE 841-2001 test standards • Conforms to API 610 • No arbor press required for installation • No internal metal-to-metal contact • Custom designed for individual step-shaft applications	• Bronze or 316 stainless steel construction • Filled PTFE unitizing ring • Fluoroelastomer o-rings standard	-30°F (-34°C) to 400°F (204°C)	0.875 to 10.500 (22.2 to 266.7)	12,000 f/m (60.9 m/s)	Std: ±0.025 (0.64) Small C/S: ±0.015 (0.38)	Std: ±0.020 (0.51) Small C/S: ±0.015 (0.38)	Ambient
Vertical, Small Cross Section 	• Meets NEMA MG 1-2003 • Surpasses IEEE 841-2001 test standards • Conforms to API 610 • No arbor press required for installation • No internal metal-to-metal contact • Fits in c/s as small as 0.188 in. (4.76mm) • Vertical design for top applications only	• Bronze or 316 stainless steel construction • Filled PTFE unitizing ring • Fluoroelastomer o-rings standard	-30°F (-34°C) to 400°F (204°C)	0.875 to 10.500 (22.2 to 266.7)	12,000 f/m (60.9 m/s)	Std: ±0.025 (0.64) Small C/S: ±0.015 (0.38)	Std: ±0.020 (0.51) Small C/S: ±0.015 (0.38)	Ambient

Metallic Isolator (Microcellular Filter)	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Axial Motion in. (mm)	Misalign. & Runout in. @ f/m (mm@m/s)	Pressure
Standard 	• Unique microcellular technology • Protects against severely dusty environments • Meets NEMA MG 1-2003 • Surpasses IEEE 841-2001 test standards • Conforms to API 610 • No arbor press required for installation • No internal metal-to-metal contact	• Bronze or 316 stainless steel construction • Silicone foam • Filled PTFE unitizing ring • Fluoroelastomer o-ring standard	-30°F (-34°C) to 400°F (204°C)	0.875 to 10.500 (22.2 to 266.7)	4,500 f/m (22.9 m/s)	±0.025 (0.64)	±0.020 (0.51)	Ambient
Flangeless 	• Unique microcellular technology • Protects against severely dusty environments • Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • Conforms to API 610 • No arbor press required for installation • No internal metal-to-metal contact • Does not extend past face housing	• Bronze construction • Silicone foam • Filled PTFE unitizing ring • Fluoroelastomer o-rings standard	-30°F (-34°C) to 400°F (204°C)	0.875 to 10.500 (22.2 to 266.7)	4,500 f/m (22.9 m/s)	±0.025 (0.64)	±0.020 (0.51)	Ambient
Non-Metallic Isolator (Glass-Filled PTFE)	**Features**	**Materials**	**Temperature**	**Shaft Diameter in. (mm)**	**Surface Speed**	**Axial Motion in. (mm)**	**Misalign. & Runout in. @ f/m (mm@m/s)**	**Pressure**
Standard 	• Filled PTFE construction • Excellent chemical resistance • Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • No arbor press required for installation	• FDA compliant blue glass filled PTFE • Fluoroelastomer o-rings standard	-40°F (-40°C) to 400°F (204°C)	0.875 to 11.000 (22.2 to 279.4)	4,500 f/m (22.9 m/s)	±0.015 (0.38)	±0.020 (0.51)	Ambient
Small C/S 	• Filled PTFE construction • Excellent chemical resistance • Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • No arbor press required for installation • Fits in c/s as small as 0.188 in. (4.76mm)	• FDA compliant blue glass filled PTFE • Fluoroelastomer o-rings standard	-40°F (-40°C) to 400°F (204°C)	0.875 to 11.000 (22.2 to 279.4)	4,500 f/m (22.9 m/s)	±0.015 (0.38)	±0.020 (0.51)	Ambient
Flangeless 	• Filled PTFE construction • Excellent chemical resistance • Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • No arbor press required for installation • Does not extend past face of housing	• FDA compliant blue glass filled PTFE • Fluoroelastomer o-rings standard	-40°F (-40°C) to 400°F (204°C)	0.875 to 11.000 (22.2 to 279.4)	4,500 f/m (22.9 m/s)	±0.015 (0.38)	±0.020 (0.51)	Ambient
Grease Purgeable 	• Filled PTFE construction • Excellent chemical resistance • Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • No arbor press required for installation • Relief in seal allows regreasing with no disassembly of equipment	• FDA compliant blue glass filled PTFE • Fluoroelastomer o-rings standard	-40°F (-40°C) to 400°F (204°C)	0.875 to 10.875 (22.2 to 276.2)	4,500 f/m (22.9 m/s)	±0.015 (0.38)	±0.020 (0.51)	5 psi
Split Pillow Block 	• Filled PTFE construction • Excellent chemical resistance • Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • No arbor press required for installation • Standard and custom design for split pillow blocks	• FDA compliant blue glass filled PTFE • Fluoroelastomer o-rings standard	-40°F (-34°C) to 400°F (204°C)	0.875 to 11.000 (22.2 to 279.4)	4,500 f/m (22.9 m/s)	±0.015 (0.38)	±0.020 (0.51)	Ambient

Non-Metallic Isolator (Glass-Filled PTFE)	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Axial Motion in. (mm)	Misalign. & Runout in. @ f/m (mm@m/s)	Pressure
Step Shaft 	• Filled PTFE construction • Excellent chemical resistance • Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • No arbor press required for installation • Custom designed for individual stepshaft applications	• FDA compliant blue glass filled PTFE • Fluoroelastomer o-rings standard	-40°F (-40°C) to 400°F (204°C)	0.875 to 11.000 (22.2 to 279.4)	4,500 f/m (22.9 m/s)	±0.015 (0.38)	±0.020 (0.51)	Ambient
Vertical 	• Filled PTFE construction • Excellent chemical resistance • Meets NEMA MG 1-2003 • Meets IEEE 841-2001 test standards • No arbor press required for installation • Two OD o-Rings for increased retention in the bore • Vertical design for top applications only	• FDA compliant blue glass filled PTFE • Fluoroelastomer o-rings standard	-40°F (-40°C) to 400°F (204°C)	0.875 to 11.000 (22.2 to 279.4)	4,500 f/m (22.9 m/s)	±0.015 (0.38)	±0.020 (0.51)	Ambient
Non-Metallic Isolator (Graphite-Filled PTFE)	**Features**	**Materials**	**Temperature**	**Shaft Diameter in. (mm)**	**Surface Speed**	**Axial Motion in. (mm)**	**Misalign. & Runout in. @ f/m (mm@m/s)**	**Pressure**
Standard 	• Excellent chemical resistance • Multi-position capability • No arbor press required for installation • Unique pumping/fanning action	• Graphite-filled PTFE • Fluoroelastomer o-rings standard	-40°F (-40°C) to 400°F (204°C)	0.875 to 6.000 (22.2 to 152.4)	4,500 f/m (22.9 m/s)	±0.015 (0.38)	±0.015 (0.38)	Ambient
Standard C/S 	• Excellent chemical resistance • Multi-position capability • No arbor press required for installation • Unique pumping/fanning action • Designed to fit small c/s with no equipment modification	• Graphite-filled PTFE • Fluoroelastomer o-rings standard	-40°F (-40°C) to 400°F (204°C)	0.875 to 10.500 (22.2 to 266.7)	4,500 f/m (22.9 m/s)	±0.015 (0.38)	±0.015 (0.38)	Ambient
Flangeless 	• Excellent chemical resistance • Multi-position capability • No arbor press required for installation • Unique pumping/fanning action • Does not extend past face of housing	• Graphite-filled PTFE • Fluoroelastomer o-rings standard	-40°F (-40°C) to 400°F (204°C)	0.875 to 6.000 (22.2 to 152.4)	4,500 f/m (22.9 m/s)	±0.015 (0.38)	±0.015 (0.38)	Ambient

For larger shaft diameters, please contact your Timken sales representative.



Assembled Seal: Seal made up of a group of parts, including sealing surface(s), provisions for initial loading and a secondary sealing mechanism to accommodate radial movement required for installation and operation.

Axial Clearance: Gap between element heel and seal lip.

Back Lip Angle: Angle seen from the back of the seal coinciding with the seal interface.

Bearing Isolator: Product using labyrinth sealing methods and other techniques to provide high-performance sealing technology for demanding applications in operating environments with high levels of contamination.

Bonded Seal: Assembly in which the insert and/or spring is bonded to the elastomer sealing element.

Contact Point: Interface where sealing element reacts with the shaft or bore housing.

Contact Line Height: Axial distance from seal face to contact point.

Contact Width: Amount of area reacting dynamically in the axial direction.

Dynamic Runout: Amount by which a shaft, at the sealing surface, does not rotate around the true center. Measured by holding a dial indicator against the shaft surface while it is slowly rotated. The resulting measurement is called a total indicator reading, or TIR.

Elastomer: Synthetic and natural materials that are able to be vulcanized and can be elongated at least twice their original length at room temperature, but are able to return to their approximate "normal" length when released. Common material used in the manufacture of seals.

End Play: Measurement of axial movement allowed, in reference to the shaft on which the seal lip comes into contact.

Face Lip Angle: Angle seen from the face of the seal coinciding with the seal interface.

Fluid Side: 1.) Refers to face of the seal when goal is to retain lubricant. 2.) Refers to the back of the seal when goal is to exclude contamination.

Garter Spring: Helically coiled wire in the form of a ring that helps maintain a radial sealing force between the radial seal lip element and a shaft or bore. A close wound spring is used for tension and an open wound is used for compression.

Heel: Part of lip seal case located tangent to the back of the seal.

Hinge: Point at which the seal lip pivots around the seal assembly.

Housing Bore: Cylindrical surface that mates with the OD of a standard lip seal's outer case or an external lip seal's contact lip.

Inclusion: Retaining lubricant by facing the seal in toward the lubricant.

Glossary

Inner Case: Rigid, cup-shaped component within a seal assembly that is used as a reinforcing member, shield, spring retainer and/or lip clamping device.

Labyrinth Seal: Sealing product that uses an intricate pathway to exclude debris and retain lubrication.

Lip Diameter: Innermost diameter of the seal lip, measured with the spring installed.

Lip Load: Radial force exerted by the seal lip geometry and spring loading. Expressed as force-per-unit of shaft circumference.

Lip Seal: Elastomeric element that prevents leakage in dynamic and static applications through means of geometry and loading.

Lubricant Starvation: Inadequate lubrication at the seal interface which causes premature wear of seals.

Offset: Radial distance between the centerlines of the seal bore and the shaft rotation.

Outer Case: Rigid structure of lip-seal assembly that houses all components of the seal assembly.

Plunge Ground Finish: Surface texture of a shaft or wear sleeve produced by using a grinding wheel perpendicular to the rotating shaft, without axial motion.

Primary Lip: Elastomeric sealing element that rides against the rotating surface facing 1.) inward toward the lubricant for grease inclusion or 2.) outward from the lubricant for contaminant exclusion.

Radial Lip Seal: Assembly containing an elastomeric element that prevents leakage in dynamic and static applications through means of geometry and loading.

Radial Load: Radial force exerted by the seal lip geometry and spring loading. Expressed as a force-per-unit of shaft circumference.

Roughness: Anomalies in the surface texture of the shaft which result from the manufacturing process. [See SAE J448a (June 1963)]

Seal Case: Rigid member to which the elastomeric element is attached.

Seal Outer Diameter (OD): External diameter of the lip seal assembly that interfaces with the housing bore diameter.

Shaft Eccentricity: Radial distance describing how much the geometric centerline of the shaft is displaced from the axis of the shaft rotation.

Shaft Lead: Helical grooves in a shaft surface that are caused by relative axial movement of the grinding wheel to shaft.

"Slip-Stick": Friction challenge caused by a sealing element that adheres to and rotates with the shaft surface until the elastic characteristics of the sealing element overcome the adhesive force, causing the seal lip to loose contact with the rotating surface long enough to cause leakage. Normally associated with non-lubricated and boundary-lubricated conditions, this cycle repeats itself again and again.

Spring Groove: A semicircular depression in the head section of a seal that accommodates the garter spring.

Spring Retaining Lip: Section of the primary lip that restricts axial movement of the extension spring from its proper position.

Surface Finish: Quality, appearance and characteristics of a shaft surface due to processing such as grinding, burnishing, etc. [See SAE J488a (June 1963)]

Unidirectional/ Unirotational Seal: Type of seal designed for applications in which the shaft rotates in only one direction.

Unitized Seal: Seal assembly in which all the parts are retained in a single package.

Volume Swell: Increase in seal size due to the absorbtion of fluid by the elastomer.

Wear Sleeve: Replaceable metal sleeve used in assemblies to prevent grooving from contamination at the seal-shaft interface.

Weepage: Small amount of liquid leakage from a seal.

Model	Prefix	Seal Material	Description
21	25001	Timken N	SPLIT
	25001	Timken N	SPLIT
	25008	Timken V	SPLIT
	25018	Timken ES	SPLIT
23	25003	Timken N	SPLIT
	25004	SILICONE (SIL)	SPLIT
	25006	Timken V	SPLIT
	25010	Timken ES	SPLIT
24	25005	Timken N	SPLIT
	25029	Timken ES	SPLIT
	25030	Timken V	SPLIT
25	25056	PTFE	SOLID
	25058	PTFE	SPLIT
26	24600	Timken N	SOLID
	24602	Timken V	SOLID
	24610	Timken N	SPLIT
	24612	Timken V	SPLIT
	24626	Timken ES	SOLID
	24627	Timken ES	SPLIT
26E	24640	Timken N	SOLID
	24675	Timken ES	SOLID
	24642	Timken V	SOLID
26HR	24656	Timken ES	HIGH RUNOUT, SPLIT
	24660	Timken N	HIGH RUNOUT
	24662	Timken V	HIGH RUNOUT
	24663	Timken N	HIGH RUNOUT, SPLIT
	24664	Timken ES	HIGH RUNOUT, SOLID
26NS	24650	Timken N	NO SPRING
	24652	Timken V	NO SPRING
26R1	24606	Timken V	SPLIT , DUAL LIP
	24608	Timken N	SPLIT, DUAL LIP
	24620	Timken N	DUAL LIP
	24622	Timken V	DUAL LIP
	24629	Timken ES	DUAL LIP
	24648	Timken ES	SPLIT, DUAL LIP
50	21020	Timken N	GARTER SPRING
51	21022	Timken N	METAL BUTTONS/STEEL CASE
	21486	Timken N	BRASS BUTTONS/BRASS CASE
	21619	Timken N	BRASS CASE/NO BUTTONS
53	21086	Timken N	STD
	21095	SILICONE (SIL)	STD
	21096	Timken ES	STD
	21699	Timken V	STD
53F1	22543	Timken V	STD
	22544	Timken ES	STD
	22987	Timken N	STD
53R1	22537	Timken V	STD
	22544	Timken ES	STD
	22543	Timken N	STD

Model	Prefix	Seal Material	Description
53R2	22627	Timken N	STD
	22634	Timken ES	STD
	23708	Timken V	STD
53T2	22897	Timken N	STD
	22903	Timken V	STD
54	21140	Timken N	STD
57	26056	Timken N	STD
	26057	Timken V	STD
	26058	Timken ES	STD
58	21003	CERAMIC	STD
	21005	CERAMIC	316SS CASE
59	24700	Timken N	STD
	24702	Timken V	STD
	24715	Timken ES	STD
59G1	24750	Timken N	GYLON EXCLUDER LIP
	24751	Timken ES	GYLON EXCLUDER LIP
	24752	Timken V	GYLON EXCLUDER LIP
P/S®I	24060	GYLON	GYLON LIP , FLUORO GSKT
	24062	GYLON	DBL TANDEM, GYLON LIP, FLUORO GSKT
	24063	GYLON	DBL OPPOSED , GYLON LIP, FLUORO GSKT
	24076	FDA GYLON	DBL OPPSED, FDA GYLON LIP, FLUORO GSKT
	24125	FDA GYLON	FDA GYLON LIP, FLUORO GSKT
	24128	FDA GYLON	DBL TANDEM, FDA GYLON LIP, FLUORO GSKT
61	73306	Gylon	Universal Oil Seal, Solid
	75506	FDA GYLON	Universal Oil Seal, Solid
62	21702	PTFE	STD
63	21158	Timken N	STD
	21168	SILICONE (SIL)	STD
	21290	Timken ES	STD
	21695	Timken V	STD
63F1	23078	Timken N	FELT
63G1	23501	Timken ES	GYLON EXCLUDER LIP
	23502	Timken V	GYLON EXCLUDER LIP
	23500	Timken N	GYLON EXCLUDER LIP
63R1	23052	Timken ES	DUAL OPPOSED LIP - SINGLE SPRING
	23547	Timken N	DUAL OPPOSED LIP - SINGLE SPRING
	23711	Timken V	DUAL OPPOSED LIP - SINGLE SPRING
63R2	23627	Timken V	DUAL OPPOSED LIP - DUAL SPRING
	23769	Timken ES	DUAL OPPOSED LIP - DUAL SPRING

Model	Prefix	Seal Material	Description
63T2	23548	Timken N	DUAL TANDEM LIP - DUAL SPRING
	23550	Timken N	DUAL TANDEM LIP - DUAL SPRING
	23552	Timken V	DUAL TANDEM LIP - DUAL SPRING
63TB	23549	Timken N	DUAL TANDEM LIP - SINGLE SPRING
64	21238	Timken N	STD
	21243	SILICONE (SIL)	STD
	21247	Timken ES	STD
	21852	Timken V	STD
64G1	22503	Timken N	GYLON EXCLUDER LIP
	22504	Timken ES	GYLON EXCLUDER LIP
	22505	Timken V	GYLON EXCLUDER LIP
71	26001	NITRILE (NIT)	BONDED
76	26193	NITRILE (NIT)	BONDED
87	26080	Timken N	STD
	26081	Timken ES	STD
	26097	Timken V	STD
88	26088	Timken N	STD
	26086	Timken ES	STD
	26588	Timken V	STD
88NS	26186	Timken ES	NO SPRING
	26188	Timken N	NO SPRING
91	27023	NITRILE (NIT)	BONDED
92	27063	NITRILE (NIT)	BONDED
94	27223	#REF!	BONDED
	27685	FLUOROELASTOMER	BONDED
111	21011	Timken N	EXTERNAL
113	21012	Timken N	EXTERNAL
123	21016	Timken N	EXTERNAL
143	21332	NITRILE (NIT)	MODEL 142 ELEMENT, FACE SEAL WITH HOSE CLAMP
	21333	NITRILE (NIT)	MODEL 145A2 ELEMENT, FACE SEAL WITH HOSE CLAMP
	21334	Timken	MODEL 145A2 ELEMENT, FACE SEAL WITH HOSE CLAMP
	21335	FLUOROELASTOMER	MODEL 145A2 ELEMENT, FACE SEAL WITH HOSE CLAMP
	21339	Timken	MODEL 145A1 ELEMENT, FACE SEAL WITH HOSE CLAMP
	21340	NITRILE (NIT)	MODEL 145A1 ELEMENT, FACE SEAL WITH HOSE CLAMP

Model	Prefix	Seal Material	Description
145A	21758	NITRILE (NIT)	STD
	21761	FLUOROELASTOMER	STD
145A1	21700	NITRILE (NIT)	STD
	21712	Timken	STD
	21722	FLUOROELASTOMER	STD
145A2	21750	NITRILE (NIT)	STD
	21751	FLUOROELASTOMER	STD
	21754	Timken	STD
145L	21738	FLUOROELASTOMER	STD
	21748	NITRILE (NIT)	STD
145S	21749	NITRILE (NIT)	STD
151	25410	FKM	Universal Oil Seal, Split
	25810	NBR	Universal Oil Seal, Split
	25811	NBR	Universal Oil Seal, Split
	25600	NBR	Universal Oil Seal, Solid
	25601	HNBR	Universal Oil Seal, Solid
	25602	FKM	Universal Oil Seal, Solid
154	25816	FKM	Universal Oil Seal, Split
	25813	NBR	Universal Oil Seal, Split
	25827	HNBR	Universal Oil Seal, Split
	25828	FKM	Universal Oil Seal, Split
	25830	NBR	Universal Oil Seal, Split
	25856	NBR	Universal Oil Seal, Solid
	25812	NBR	Universal Oil Seal, Solid
	25814	FKM	Universal Oil Seal, Solid
	25829	HNBR	Universal Oil Seal, Solid
	25833	NBR	Universal Oil Seal, Solid
	25835	FKM	Universal Oil Seal, Solid
	25842	NBR	Universal Oil Seal, Solid
	25843	HNBR	Universal Oil Seal, Solid
	25844	FKM	Universal Oil Seal, Solid
157	25832	FKM	Universal Oil Seal, Split
	25854	NBR	Universal Oil Seal, Solid
	25851	NBR	Universal Oil Seal, Solid
	25852	HNBR	Universal Oil Seal, Solid
161	25820	FKM	Universal Oil Seal, Solid with PTFE BACK_UP RING
	25821	NBR	Universal Oil Seal, Solid with PTFE BACK_UP RING
	25822	HNBR	Universal Oil Seal, Solid with PTFE BACK_UP RING

Model	Prefix	Seal Material	Description
Metallic Isolator	29602	BRONZE	STANDARD CONFIGURATION - .325 in. FLANGE
	29604	316SS	STANDARD CONFIGURATION - .325 in. FLANGE
	29606	316SS	NARROW CROSS SECTION - .375 in. FLANGE
	29607	BRONZE	NARROW CROSS SECTION - .375 in. FLANGE
	29608	BRONZE	NARROW CROSS SECTION - .250 in. FLANGE
	29609	BRONZE	NO FLANGE - .375 in. WIDTH
	29610	BRONZE	SMALL FLANGE OD
	29611	316SS	NO FLANGE - .375 in. WIDTH
	29612	316SS	NO FLANGE
	29616	BRONZE	SPLIT PILLOW BLOCK
	29619	BRONZE	NO FLANGE
	29620	BRONZE	VERTICAL 2 O-RINGS ON OD
	29621	BRONZE	VERTICAL 1 O-RING ON OD
Metallic Isolator (Microcellular Filter)	29102	BRONZE	STANDARD CONFIGURATION - .325 in. FLANGE
	29106	316SS	STANDARD CONFIGURATION - .325 in. FLANGE
	29119	BRONZE	NO FLANGE

Model	Prefix	Seal Material	Description
Non-Metallic Isolator Glass Filled PTFE)	29500	PTFE	STANDARD CONFIGURATION - 2 O-RINGS ON OD
	29502	PTFE	STANDARD CONFIGURATION
	29507	PTFE	NARROW CROSS-SECTION DESIGN, 3/8 in. FLANGE
	29516	PTFE	SPLIT PILLOW BLOCK DESIGN
	29518	PTFE	STANDARD GREASE PURGE DESIGN
	29519	PTFE	STANDARD NO FLANGE DESIGN
	29520	PTFE	STANDARD VERTICAL DESIGN- 1 O-RING ON OD
	29521	PTFE	STANDARD VERTICAL DESIGN- 2 O-RINGS ON OD
Non-Metallic Isolator (Graphite Filled PTFE)	24801	PTFE	STANDARD DESIGN, NO FLANGE
	24802	PTFE	STANDARD DESIGN, 1/4 in. FLANGE
	24807	PTFE	NARROW CROSS-SECTION DESIGN, 3/8 in. FLANGE

Prefix	Model	Seal Material	Description
21003	58	THERMO-CERAMIC	STD
21005	58	THERMO-CERAMIC	316SS CASE
21008	58	THERMO-CERAMIC	OBSOLETE
21009	58	CARBON FLMNT	OBSOLETE
21011	111	Timken N	EXTERNAL
21012	113	Timken N	EXTERNAL
21016	8	Timken N	EXTERNAL
21020	50	Timken N	GARTER SPRING
21021	51	Timken N	OBSOLETE: NO SPRING
21022	51	Timken N	METAL BUTTONS
21060	53	Timken N	OBSOLETE: ISO TOLERANCE STD
21082	53	Timken ES	OBSOLETE: NO OD SEALANT, STAMP MILL-RIGHT ES
21083	53	Timken ES	OBSOLETE: METAL BUTTONS, ISO STD
21084	53	Timken ES	OBSOLETE: ISO TOLERANCE STD
21086	53	Timken N	STD
21092	53	Timken N	OBSOLETE
21094	53	Timken ES	OBSOLETE
21095	53	SILICONE (SIL)	STD
21096	53	Timken ES	STD
21097	53	Timken ES	OBSOLETE
21099	53	Timken ES	OBSOLETE: GREEN OD SEALANT
21100	53	SILICONE (SIL)	OBSOLETE: 0
21101	53	FDA SILICONE (SIL)	OBSOLETE: FDA SILICONE
21140	54	Timken N	STD
21154	62	PTFE	OBSOLETE: WHITE PTFE, STAINLESS STEEL SPRING
21155	62	PTFE	OBSOLETE: WHITE PTFE
21158	63	Timken N	STD
21162	63	Timken N	OBSOLETE
21168	63	SILICONE (SIL)	STD
21172	63	FDA SILICONE (SIL)	OBSOLETE: FDA APPROVED SILICONE
21175	63	FDA SILICONE (SIL)	OBSOLETE: FDA APPROVED SILICONE
21186	63	SILICONE (SIL)	OBSOLETE
21223	64	Timken N	OBSOLETE: 5/16 in. METAL BUTTONS
21238	64	Timken N	STD
21241	64	Timken ES	OBSOLETE: BLUE COATING ON INNER RING
21243	64	SILICONE (SIL)	STD
21246	64	Timken N	OBSOLETE: STAINLESS STEEL SPRING
21247	64	Timken ES	STD
21254	64	Timken N	OBSOLETE: METAL BUTTONS
21255	64	Timken ES	OBSOLETE: STAMP “MILL-RIGHT ES” ON CASE
21256	64	Timken N	OBSOLETE: NO SPRINGS
21261	64	Timken N	OBSOLETE: STAINLESS STEEL GARTER SPRING
21290	63	Timken ES	STD
21295	63	Timken ES	OBSOLETE
21296	63	Timken ES	OBSOLETE
21332	143	NITRILE (NIT)	MODEL 142 ELEMENT, FACE SEAL WITH HOSE CLAMP
21333	143	NITRILE (NIT)	MODEL 145A2 ELEMENT, FACE SEAL WITH HOSE CLAMP
21334	143	Timken	MODEL 145A2 ELEMENT, FACE SEAL WITH HOSE CLAMP
21335	143	FLUOROELASTOMER	MODEL 145A2 ELEMENT, FACE SEAL WITH HOSE CLAMP
21339	143	Timken	MODEL 145A1 ELEMENT, FACE SEAL WITH HOSE CLAMP
21340	143	NITRILE (NIT)	MODEL 145A1 ELEMENT, FACE SEAL WITH HOSE CLAMP
21366	53	Timken N	OBSOLETE: LOW TEMP NTRILE
21374	63	BUTYL	OBSOLETE
21381	53	BUTYL	OBSOLETE
21385	64	SILICONE (SIL)	OBSOLETE: NO SPRING
21392	53	BUTYL	OBSOLETE
21398	64	Timken V	OBSOLETE: ZINC PLATED FILLER RING
21446	53	SILICONE (SIL)	OBSOLETE
21466	63	Timken N	OBSOLETE: SPECIAL
21474	63	SILICONE (SIL)	OBSOLETE: NO SPRING
21480	63	SILICONE (SIL)	OBSOLETE
21485	142	Timken	OBSOLETE: MOLDED LIP ONLY, BUTT JOINT
21486	51	Timken N	BRASS BUTTONS
21503	113	Timken N	OBSOLETE

Prefix	Model	Seal Material	Description
21519	66	Timken V	OBSOLETE: STAINLESS STEEL SPRING
21619	51	Timken N	0
21632	67	Timken N	OBSOLETE: STAINLESS STEEL SPRING
21653	62	PTFE	OBSOLETE: WHITE PTFE, STAINLESS STEEL SPRING
21657	53	Timken N	OBSOLETE: OD SEALANT
21664	67	Timken N	OBSOLETE: OD SEALANT
21682	53	Timken V	OBSOLETE: GREEN MILL-RIGHT V
21688	63	Timken N	OBSOLETE: DRAW HOLES
21690	63	Timken V	OBSOLETE: GREEN MILL-RIGHT V
21692	53	Timken V	OBSOLETE: OD SEALANT
21694	67	Timken N	OBSOLETE: NO SPRING
21695	63	Timken V	STD
21699	53	Timken V	STD
21700	145A1	NITRILE (NIT)	STD
21702	62	PTFE	STD
21706	53	Timken N	OBSOLETE: DRAW HOLES
21707	63	Timken N	OBSOLETE: DRAW HOLES
21712	145A1	Timken	STD
21722	145A1	FLUOROELASTOMER	STD
21733	53	Timken V	OBSOLETE: NO SPRING
21738	145L	FLUOROELASTOMER	SPECIAL
21748	145L	NITRILE (NIT)	SPECIAL
21749	145S	NITRILE (NIT)	SPECIAL
21750	145A2	NITRILE (NIT)	STD
21751	145A2	FLUOROELASTOMER	STD
21754	145A2	Timken	STD
21757	145A	BUTYL	OBSOLETE
21758	145A	NITRILE (NIT)	SPECIAL
21760	63	Timken N	OBSOLETE: DRAW HOLES, OD SEALANT
21761	145A	FLUOROELASTOMER	SPECIAL
21763	67	SILICONE (SIL)	OBSOLETE: STAINLESS STEEL SPRING
21777	62	PTFE	OBSOLETE: STAINLESS STEEL SPRING
21800	67	Timken N	OBSOLETE: STAINLESS STEEL SPRING
21801	67	Timken N	OBSOLETE: NO SPRING
21814	123	Timken ES	OBSOLETE

Prefix	Model	Seal Material	Description
21818	67	Timken ES	OBSOLETE
21819	67	Timken ES	OBSOLETE: STAINLESS STEEL SPRING
21827	67	Timken ES	OBSOLETE
21836	53	Timken N	OBSOLETE: LOW TEMP
21844	62	PTFE	OBSOLETE: STAINLESS STEEL SPRING
21852	64	Timken V	STD
21855	64	Timken V	OBSOLETE: METAL BUTTONS
21859	64	Timken V	OBSOLETE
21867	62	PTFE	OBSOLETE: NO SPRING
21882	53	Timken V	OBSOLETE
21883	54	Timken N	OBSOLETE
21886	64	SILICONE (SIL)	OBSOLETE: METAL BUTTONS
21890	63	Timken N	OBSOLETE
21910	68	Timken N	OBSOLETE: STAINLESS STEEL SPRING
21913	66	Timken N	OBSOLETE: STAINLESS STEEL SPRING
21927	113	Timken N	OBSOLETE
21930	66	Timken N	OBSOLETE: STAINLESS STEEL SPRING
21933	63	SILICONE (SIL)	OBSOLETE: OD SEALANT
21944	67	Timken N	OBSOLETE
21954	62	PTFE	OBSOLETE: NO SPRING
21997	64	SILICONE (SIL)	OBSOLETE
22503	64G1	Timken N	GYLON EXCLUDER LIP
22504	64G1	Timken ES	GYLON EXCLUDER LIP
22505	64G1	Timken V	GYLON EXCLUDER LIP
22537	53R1	Timken N	STD
22543	53R1	Timken V	STD
22544	53R1	Timken ES	STD
22627	53R2	Timken N	STD
22628	53R2	Timken N	OBSOLETE
22629	53R2	FDA SILICONE (SIL)	OBSOLETE
22634	53R2	Timken ES	STD
22807	53TB	Timken N	OBSOLETE
22897	53T2	Timken N	STD
22898	53T2	Timken N	OBSOLETE
22899	53T2	FDA SILICONE (SIL)	OBSOLETE
22903	53T2	Timken V	STD
22905	53T2	Timken ES	OBSOLETE
22987	53F1	Timken N	STD

Prefix	Model	Seal Material	Description
22992	53F1	Timken N	OBSOLETE
22995	53F1	Timken ES	OBSOLETE
22996	53F1	Timken V	OBSOLETE
22998	53F1	SILICONE (SIL)	OBSOLETE
23046	63R2	Timken N	OBSOLETE
23048	67R1	Timken N	OBSOLETE
23051	53T2	SILICONE (SIL)	OBSOLETE
23052	63R1	Timken ES	DUAL OPPOSED LIP - SINGLE SPRING
23078	63F1	Timken N	FELT
23169	63R	Timken V	OBSOLETE: NO SPRING
23500	63G1	Timken N	GYLON EXCLUDER LIP
23501	63G1	Timken ES	GYLON EXCLUDER LIP
23502	63G1	Timken V	GYLON EXCLUDER LIP
23503	63G1	Timken V	GYLON EXCLUDER LIP - 316SS CASE
23547	63R1	Timken N	DUAL OPPOSED LIP - SINGLE SPRING
23547	63R1	Timken N	DUAL OPPOSED LIP - DUAL SPRING
23549	63TB	Timken N	DUAL TANDEM LIP - SINGLE SPRING
23550	63T2	Timken N	DUAL TANDEM LIP - DUAL SPRING
23552	63T2	Timken V	DUAL TANDEM LIP - DUAL SPRING
23605	63R1	Timken N	OBSOLETE
23621	67T2	Timken N	OBSOLETE
23627	63R2	Timken V	DUAL OPPOSED LIP - DUAL SPRING
23631	63R2	Timken V	OBSOLETE
23670	63F1	Timken N	OBSOLETE
23689	63R2	Timken N	OBSOLETE
23690	63TB	Timken N	OBSOLETE
23703	53R2	SILICONE (SIL)	OBSOLETE
23708	53R2	Timken V	STD
23713	63T2	FDA SILICONE (SIL)	OBSOLETE: FDA SILICONE
23724	68R2	Timken N	OBSOLETE: STAINLESS STEEL SPRING
23727	68R2	Timken N	OBSOLETE
23736	68R2	Timken N	OBSOLETE: STAINLESS STEEL SPRING; 9010 FILLER RING
23747	63R2	Timken N	OBSOLETE: SPECIAL
23748	63T2	Timken V	OBSOLETE

Prefix	Model	Seal Material	Description
23769	63R2	Timken ES	DUAL OPPOSED LIP - DUAL SPRING
24056	P/S®I	FDA GYLON	REVERSE UP
24057	61 P/S®I	PTFE	OBSOLETE: PTFE LIP, MILL-RIGHT N GSKT
24059	61 P/S®I	FDA GYLON	OBSOLETE: DBL TANDEM, FDA WHITE GYLON LIP, FDA WHITE GYLON GSKT
24060	P/S®I	GYLON	GYLON LIP, FLUORO GSKT
24061	61 P/S®I	FDA GYLON	OBSOLETE: FDA WHITE GYLON LIP, FLUORO GSKT
24062	P/S®I	GYLON	DBL TANDEM, GYLON LIP, FLUORO GSKT
24063	P/S®I	GYLON	DBL OPPOSED: GYLON LIP, FLUORO GSKT
24070	61 P/S®I	GYLON	OBSOLETE: REDUCED LOAD, BLACK GYLON LIP, FLUORO GSKT
24072	61 P/S®I	FDA GYLON	OBSOLETE: DBL OPPOSED, FDA WHITE GYLON LIP, FDA FLUORO GSKT
24073	62 P/S®I	FDA GYLON	OBSOLETE: FDA WHITE GYLON LIP ONLY
24076	P/S®I	FDA GYLON	DBL OPPOSED, FDA GYLON LIP, FLUORO GSKT
24105	63 P/S®I	GYLON	OBSOLETE: FLUORO LIP ONLY
24108	64 P/S®I	PTFE	OBSOLETE: PTFE LIP, FLUORO GSKT, 304SS INNER CASE
24125	P/S®I	FDA GYLON	FDA GYLON LIP, FLUORO GSKT
24128	P/S®I	FDA GYLON	DBL TANDEM, FDA GYLON LIP, FLUORO GSKT
24130	65 P/S®I	FDA GYLON	OBSOLETE: REVERSED LIP, FDA WHITE GYLON LIP, FDA FLUORO GSKT
24600	26	Timken N	SOLID
24602	26	Timken V	SOLID
24606	26R1	Timken V	SPLIT , DUAL LIP
24608	26R1	Timken N	SPLIT, DUAL LIP
24610	26	Timken N	SPLIT
24612	26	Timken V	SPLIT
24615	26	Timken N	OBSOLETE: LOW TEMP. MILL-RIGHT N
24617	26	Timken V	OBSOLETE: SPLIT, NO SPRING
24620	26R1	Timken N	DUAL LIP

Prefix	Model	Seal Material	Description
24622	26R1	Timken V	DUAL LIP
24623	26	Timken V	OBSOLETE: SOLID, NO FABRIC
24624	26	Timken N	OBSOLETE: SPLIT, NO FABRIC
24626	26	Timken ES	SOLID
24627	26	Timken ES	SPLIT
24629	26R1	Timken ES	DUAL LIP
24640	26E	Timken N	OBSOLETE: EXTERNAL
24646	26	Timken V	OBSOLETE: SPLIT, NO FABRIC
24648	26R1	Timken ES	SPLIT, DUAL LIP
24650	26NS	Timken N	NO SPRING
24652	26NS	Timken V	NO SPRING
24653	26	Timken N	OBSOLETE: NO FABRIC IN HEEL
24656	26HR	Timken ES	HIGH RUNOUT, SPLIT
24660	26HR	Timken N	HIGH RUNOUT
24662	26HR	Timken V	HIGH RUNOUT
24663	26HR	Timken N	HIGH RUNOUT, SPLIT
24664	26HR	Timken ES	HIGH RUNOUT, SOLID
24677	26	Timken ES	OBSOLETE: SOLID, NO FABRIC
24680	26HP	Timken N	OBSOLETE: HIGH PRESSURE
24682	26	Timken V	OBSOLETE: HIGH PRESSURE
24698	26	Timken N	OBSOLETE: SPLIT TO ISO TOLERENCE STD
24700	59	Timken N	STD
24702	59	Timken V	STD
24705	59	Timken V	OBSOLETE
24710	59	Timken N	OBSOLETE: SPECIAL
24711	59	Timken N	OBSOLETE
24715	59	Timken ES	STD
24718	59	Timken ES	OBSOLETE: STAMP "MILL-RIGHT ES" ON CASE
24719	59	Timken N METAL BUTTONS	OBSOLETE: NO SPRING
24720	59R1	Timken N	OBSOLETE
24726	59R1	Timken N	OBSOLETE
24734	59G1	Timken V	OBSOLETE: GYLON EXCLUDER LIP
24735	59	Timken ES	OBSOLETE: SPECIAL EXCLUDER LIP
24737	59	Timken ES	OBSOLETE: NO SPRING
24738	59	Timken ES	OBSOLETE: BLUE COATING ON INNER SHELL
24740	59	Timken V	OBSOLETE: ELEMENT ONLY-SPLIT
24741	59	Timken V	OBSOLETE: ELEMENT ONLY-SPLIT-NO SPRING
24744	59	Timken N	OBSOLETE: 5/16 in. METAL BUTTONS
24750	59G1	Timken N	GYLON EXCLUDER LIP
24751	59G1	Timken ES	GYLON EXCLUDER LIP
24752	59G1	Timken V	GYLON EXCLUDER LIP
24753	59G1	Timken ES	OBSOLETE: GYLON ENHANCED, METAL BUTTONS
24755	59	Timken N	OBSOLETE: SPECIAL WIDTH TOLERANCE TO BE +/-.008 in.
24757	59	Timken V	OBSOLETE
24772	59	Timken ES	OBSOLETE: .197 in. (5mm) METAL BUTTONS
24773	59	Timken N	OBSOLETE
24801	Non-Metallic Isolator	Graphite-Filled PTFE	STANDARD DESIGN, NO FLANGE
24802	Non-Metallic Isolator	Graphite-Filled PTFE	STANDARD DESIGN, 1/4 in. FLANGE
24807	Non-Metallic Isolator	Graphite-Filled PTFE	NARROW CROSS-SECTION DESIGN, 3/8 in. FLANGE
25001	21	Timken N	SPLIT
25001	21	Timken N	SPLIT
25003	23	Timken N	SPLIT
25004	23	SILICONE (SIL)	SPLIT
25005	24	Timken N	SPLIT
25006	23	Timken V	SPLIT
25008	21	Timken V	SPLIT
25010	23	Timken ES	SPLIT
25018	21	Timken ES	SPLIT
25019	23	Timken ES	OBSOLETE: GREEN OD SEALANT
25020	23	Timken ES	OBSOLETE: SOLID, GREEN OD SEALANT
25025	23	Timken N	OBSOLETE: 316 STAINLESS STEEL SPRING-SPLIT
25029	24	Timken ES	SPLIT

Prefix	Model	Seal Material	Description
25030	24	Timken V	SPLIT
25036	23	Timken N	OBSOLETE: ISO TOLERENCE STANDARDS
25044	23	Timken V	OBSOLETE: LEFT HAND BEVEL CUT
25051	21	Timken N	OBSOLETE: 2 BUTT CUTS @ 180 DEG APART
25056	25	PTFE	SOLID
25058	25	PTFE	SPLIT
25068	21	SILICONE (SIL)	OBSOLETE: 2 BUTT CUTS @ 180 DEG APART
25074	25	PTFE	OBSOLETE: 302 STAINLESS STEEL SPRING SOLID
25075	23	Timken N	OBSOLETE: 2 BUTT CUTS, 1/3 & 2/3 SECTIONS
25077	23	Timken N	OBSOLETE: SOLID, SPECIAL
25080	23	SILICONE (SIL)	OBSOLETE: 2 BUTT CUTS @ 180 DEG APART
25084	23	SILICONE (SIL)	OBSOLETE: SOLID
25086	23	Timken N	OBSOLETE: NOTCHES
25089	21	Timken N	OBSOLETE: RIGHT HAND BEVEL CUT
25090	23	SILICONE (SIL)	OBSOLETE: RIGHT HAND CUT
25109	23	Timken N	OBSOLETE: EXTERNAL CONSTRUCTION
25114	23	BUTYL	OBSOLETE: SPLIT
25131	23	Timken N	OBSOLETE: 2 BUTT CUTS, 3/16 in. GASKET
25152	23	Timken N	OBSOLETE: SPECIAL
25153	23	SILICONE (SIL)	OBSOLETE: SOLID, W/ GARTER SPRING
25156	23	Timken N	OBSOLETE: SOLID, SPECIAL
25157	23	SILICONE (SIL)	OBSOLETE: SEMI-FINISHED, UNCUT
25168	23	Timken ES	OBSOLETE: NOTCHES
25204	23	Timken N	OBSOLETE: 1/8 in. THK GASKETS
25205	23	Timken N	OBSOLETE: 3/16 in. THK GASKETS
25206	23	Timken N	OBSOLETE: 1/4 in. THK GASKETS
25229	23	SILICONE (SIL)	OBSOLETE: ENCAP SPRING
25230	23	SILICONE (SIL)	OBSOLETE: 1/8 in. THK GASKETS
25254	21	Timken N	OBSOLETE: 1/8 in. THK GASKETS
25255	21	Timken N	OBSOLETE: 3/16 in. THK GASKETS
25270	23	Timken V	OBSOLETE: ENCAP SPRING
25278	23	Timken N	OBSOLETE: ENCAP SPRING, SPECIAL
25279	23	Timken N	OBSOLETE: 2 LEFT HAND BEVEL CUTS, CUT 1/3 & 2/3 SECT
25280	23	Timken N	OBSOLETE: RIGHT HAND BEVEL CUTS,CUT 1/3 & 2/3 SECT.
25281	23	Timken N	OBSOLETE: SOLID, SPECIAL
25284	23	FDA SILICONE (SIL)	OBSOLETE: ENCAP SPRING, FDA
25285	23	FDA SILICONE (SIL)	OBSOLETE: ENCAP SPRING, FDA - SOLID
25305	23	Timken V	OBSOLETE: NO SPRING
25410	151-1	FKM	Universal Oil Seal, Split
25600	151-2	NBR	Universal Oil Seal, Solid
25601	151-2	HNBR	Universal Oil Seal, Solid
25602	151-2	FKM	Universal Oil Seal, Solid
25810	151-1	NBR	Universal Oil Seal, Split
25811	151-1	NBR	Universal Oil Seal, Split
25812	154-2	NBR	Universal Oil Seal, Solid
25813	154-1	NBR	Universal Oil Seal, Split
25814	154-2	FKM	Universal Oil Seal, Solid
25816	151-1	FKM	Universal Oil Seal, Split
25820	161-0	FKM	Universal Oil Seal, Solid with PTFE BACK_UP RING
25821	161-0	NBR	Universal Oil Seal, Solid with PTFE BACK_UP RING
25822	161-0	HNBR	Universal Oil Seal, Solid with PTFE BACK_UP RING
25827	154-1	HNBR	Universal Oil Seal, Split
25828	154-1	FKM	Universal Oil Seal, Split
25829	154-2	HNBR	Universal Oil Seal, Solid
25830	154-1	NBR	Universal Oil Seal, Split
25832	154-1	FKM	Universal Oil Seal, Split
25833	154-2	NBR	Universal Oil Seal, Solid
25835	154-2	FKM	Universal Oil Seal, Solid
25842	154-M	NBR	Universal Oil Seal, Solid
25843	154-M	HNBR	Universal Oil Seal, Solid
25844	154-M	FKM	Universal Oil Seal, Solid
25851	157-M	NBR	Universal Oil Seal, Solid

Prefix	Model	Seal Material	Description
25852	157-M	HNBR	Universal Oil Seal, Solid
25854	151-2	NBR	Universal Oil Seal, Solid
25856	151-2	FKM	Universal Oil Seal, Solid
26001	71	NITRILE (NIT)	BONDED
26056	57	Timken N	STD
26057	57	Timken V	STD
26058	57	Timken ES	STD
26059	57	SILICONE (SIL)	OBSOLETE
26061	57	SILICONE (SIL)	OBSOLETE: MODIFIED DUST LIP
26078	87	Timken ES	OBSOLETE: NO BUTTONS, .093 in. THK METAL INSERT
26079	88	Timken N	OBSOLETE: STAINLESS STEEL SPRING
26080	87	Timken N	STD
26081	87	Timken ES	STD
26088	88	Timken N	STD
26097	87	Timken V	STD
26185	88	Timken ES	OBSOLETE: NO BUTTONS
26186	88NS	Timken ES	NO SPRING
26188	88NS	Timken N	NO SPRING
26193	76	NITRILE (NIT)	BONDED
26588	88	Timken V	STD
26589	88NS	Timken V	OBSOLETE: NO SPRING
27023	91	NITRILE (NIT)	BONDED
27063	92	NITRILE (NIT)	BONDED
27223	94	NITRILE (NIT)	BONDED
27685	94	FLUOROELASTOMER	BONDED
29102	Metallic Isolator (Microcellular)	Bronze	MICRO-TEC II -STD CONFIGURATION - .325 in. FLANGE
29106	Metallic Isolator (Microcellular)	316 Stainless Steel	FLANGE STANDARD - 316SS
29119	Metallic Isolator (Microcellular)	Bronze	NO FLANGE
29500	Non-Metallic Isolator	Glass-Filled PTFE	1/4 in. FLANGE-3/4 in. WIDE FOR CROSS SECTION 1/2 in. OR MORE
29502	Non-Metallic Isolator	Glass-Filled PTFE	3/8 in. FLANGE- ONE O-RING ON OD-3/4 in. WIDE
29507	Non-Metallic Isolator	Glass-Filled PTFE	3/8 in. FLANGE-ONE O-RING ON OD-5/8 in. WIDE
29516	Non-Metallic Isolator	Glass-Filled PTFE	SPLIT PILLOW BLOCK DESIGN
29518	Non-Metallic Isolator	Glass-Filled PTFE	STD GREASE PURGE DESIGN
29519	Non-Metallic Isolator	Glass-Filled PTFE	STD NO FLANGE DESIGN
29520	Non-Metallic Isolator	Glass-Filled PTFE	STD VERTICAL DESIGN - ONE O-RING ON OD
29521	Non-Metallic Isolator	Glass-Filled PTFE	STD VERTICAL DESIGN - TWO O-RINGS ON OD
29602	Metallic Isolator	Bronze	STD CONFIGURATION - .325 in. FLANGE
29604	Metallic Isolator	316 Stainless Steel	STD CONFIGURATION - .325 in. FLANGE - 316SS
29606	Metallic Isolator	316 Stainless Steel	NARROW CROSS SECTION - .375 in. FLANGE - 316SS
29607	Metallic Isolator	Bronze	NARROW CROSS SECTION - .375 in. FLANGE
29608	Metallic Isolator	Bronze	NARROW CROSS SECTION - .250 in. FLANGE
29609	Metallic Isolator	Bronze	NO FLANGE - SPECIAL .375 in. WIDTH
29610	Metallic Isolator	Bronze	29602 VERSION -FLANGE DIAMETER 0.020 in. OVER BORE DIAMETER
29611	Metallic Isolator	316 Stainless Steel	NO FLANGE - SPECIAL .375 in. WIDTH - 316SS
29612	Metallic Isolator	316 Stainless Steel	NO FLANGE - 316SS
29616	Metallic Isolator	Bronze	SPLIT PILLOW BLOCK
29619	Metallic Isolator	Bronze	NO FLANGE VERTICAL 2 O-RINGS ON OD VERTICAL 1 O-RING ON OD
29620	Metallic Isolator	Bronze	VERTICAL 2 O-RINGS ON OD
29621	Metallic Isolator	Bronze	VERTICAL 1 O-RING ON OD
73306	61	Gylon	Universal Oil Seal, Solid
75506	61	Gylon (White)	Universal Oil Seal, Solid

Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMQ			Gylon® PTFE		
	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C
Acetamide (Acryimide)	1	70	21	1	70	21	2	140	60	3	70	21	1	300	149
Acetone	4	70	21	4	70	21	4	70	21	3	70	21	1	200	93
Acetyl Chloride	4	70	21	4	70	21	2	70	21	3	70	21	1	200	93
Acetylene Gas	1	200	93	1	ND	ND	1	200	93	2	70	21	1	200	93
Aluminum Chloride	1	160	71	1	70	21	1	212	100	2	70	21	1	boiling	boiling
Aluminum Phosphate	1	70	21	1	70	21	1	70	21	1	70	21	1	70	21
Aluminum Sulphate	1	160	71	1	ND	ND	1	140	60	1	70	21	1	200	93
Ammonium Chloride	2	200	93	1	70	21	1	212	100	3	70	21	1	250	121
Ammonium Hydroxide	4	140	60	4	ND	ND	2	70	21	1	70	21	1	300	149
Ammonium Nitrate	1	200	93	1	70	21	1	176	80	3	70	21	1	200	93
Ammonium Nitrite	1	70	21	1	70	21	1	70	21	2	70	21	1	70	21
Ammonium Phosphate	1	200	93	1	ND	ND	1	176	80	1	70	21	1	70	21
Ammonium Sulfate	1	200	93	1	ND	ND	1	176	80	1	70	21	1	200	93
Amyl Borate	2	100	38	1	70	21	1	70	21	4	70	21	1	70	21
Amyl Chloronapthalene	4	80	27	4	70	21	1	140	60	4	70	21	1	70	21
Amyl Naphthalene	4	70	21	4	70	21	1	70	21	4	70	21	1	70	21
Arsenic Acid	1	140	60	1	70	21	1	140	60	1	70	21	1	200	93
Asphalt Emulsion	2	70	21	ND	ND	ND	1	400	204	4	70	21	1	180	82
Asphalt Topping	2	150	66	2	ND	ND	1	212	100	4	70	21	1	180	82
ATF-TYPE A	1	70	21	1	70	21	1	70	21	1	70	21	1	450	232
Automotive Brake Fluid	3	70	21	ND	ND	ND	4	70	21	1	70	21	1	70	21
Automotive Gasoline	1	250	121	ND	ND	ND	1	70	21	4	70	21	ND	ND	ND
Benzine (Gasoline)	1	250	121	1	ND	ND	1	100	38	4	70	21	1	300	149
Benzoic Acid	4	70	21	3	ND	ND	1	176	80	4	70	21	1	300	149
Benzoyle Chloride	4	70	21	4	ND	ND	4	70	21	4	70	21	1	70	21
Benzyl Alcohol	4	70	21	4	ND	ND	1	140	60	2	ND	ND	1	400	204
Benzyl Benzoate	4	70	21	4	ND	ND	1	70	21	1	ND	ND	1	70	21
Benzyl Chloride	4	70	21	4	ND	ND	1	200	93	4	70	21	1	387	197
Biphenyl	4	70	21	4	70	21	1	300	149	4	70	21	1	300	149
Black Liquor	1	140	60	ND	ND	ND	1	212	100	1	70	21	1	70	21
Black Liquor Waste	1	70	21	ND	ND	ND	1	70	21	ND	ND	ND	1	70	21
Black Sulfate Liquor	2	200	93	ND	ND	ND	1	176	80	2	70	21	1	70	21
Blast Furnace Gas	4	70	21	4	70	21	1	70	21	1	250	121	1	70	21
Boric Acid	1	140	60	1	70	21	1	176	80	1	70	21	1	300	149
Bromine Anhydrous Gas	4	70	21	4	ND	ND	1	70	21	3	70	21	1	300	149
Bromobenzene	4	70	21	4	70	21	1	70	21	4	70	21	1	122	50
Butadien (Monomer)	4	140	60	4	ND	ND	2	250	121	4	70	21	1	300	149
Butane	1	200	93	1	70	21	1	176	80	4	70	21	1	300	149
Butyl Acetate	4	70	21	4	70	21	4	70	21	4	70	21	1	300	149
N-Butyl Benzoate	4	70	21	4	70	21	1	70	21	1	ND	ND	1	122	50
Butyl Carbitol	4	70	21	4	70	21	3	70	21	4	70	21	1	70	21
Butyl Oleate	4	70	21	4	70	21	3	70	21	2	70	21	1	70	21
Butyl Stearate	2	104	40	2	70	21	1	104	40	ND	ND	ND	1	70	21
Butylene	1	250	121	4	70	21	1	140	60	4	70	21	1	200	93
Calcium Bisulfate	1	70	21	ND	ND	ND	1	70	21	3	70	21	1	70	21
Calcium Bisulfide	1	70	21	ND	ND	ND	1	140	60	3	70	21	1	70	21

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Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMQ			Gylon® PTFE		
	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C
Calcium Bisulfite	1	104	40	1	70	21	1	176	80	1	70	21	1	200	93
Calcium Hydroxide	1	140	60	1	70	21	1	212	100	1	70	21	1	122	50
Calcium Hypochlorite	3	70	21	2	70	21	1	70	21	2	70	21	1	300	149
Calcium Nitrate	1	176	80	1	70	21	1	212	100	2	70	21	1	200	93
Calcium Sulfide	1	140	60	1	70	21	1	212	100	2	70	21	1	300	149
Carbamate	3	70	21	3	ND	ND	1	70	21	1	ND	ND	1	70	21
Carbolic Acid	4	70	21	4	70	21	1	140	60	4	70	21	1	70	21
Carbon Dioxide	1	160	71	1	70	21	2	212	100	2	70	21	1	300	149
Carbon Monoxide	1	140	60	1	70	21	1	212	100	1	140	60	1	300	149
Carbon Tetrachloride	4	70	21	2	70	21	1	75	24	4	70	21	1	200	93
Chlorine Dioxide	4	70	21	4	70	21	1	70	21	3	70	21	1	70	21
Chlorobenzene	4	70	21	4	70	21	1	200	93	4	70	21	1	300	149
Chlorotoluene	4	70	21	4	70	21	1	200	93	4	70	21	1	387	197
Chrome Plating Solutions	4	70	21	4	70	21	1	70	21	2	70	21	1	70	21
Chromic Acid	4	70	21	4	70	21	1	70	21	2	70	21	2	248	120
Cobalt Chloride	1	70	21	1	70	21	1	70	21	2	70	21	ND	ND	ND
Copper Chloride	1	176	80	1	70	21	1	212	100	1	70	21	11	50	66
Copper Cyanide	1	boiling	boiling	1	70	21	1	boiling	boiling	1	70	21	1	300	149
Copper Plating Solution	1	140	60	ND	ND	ND	1	140	60	4	70	21	1	70	21
Copper Sulfate	1	176	80	1	70	21	1	140	60	1	70	21	1	200	93
Creosote	2	70	21	2	ND	ND	1	212	100	4	70	21	1	70	21
Cresylic Acid	4	70	21	1	70	21	1	158	70	4	70	21	1	200	93
Cumene	4	70	21	4	70	21	1	200	93	4	70	21	3	122	50
Cyclohexane	1	250	121	1	70	21	1	200	93	4	70	21	1	300	149
Cyclohexanol	1	70	21	1	70	21	1	104	40	4	70	21	1	200	93
Degreasing Fluid	4	70	21	ND	ND	ND	1	70	21	ND	ND	ND	1	70	21
Denatured Alcohol	1	70	21	1	70	21	1	70	21	1	212	100	1	70	21
Detergent Solutions	1	200	93	1	70	21	1	212	100	1	ND	ND	1	300	149
Developing Fluids	1	70	21	1	70	21	1	70	21	1	70	21	1	300	149
Dibromoethyl Benzene	4	70	21	4	70	21	1	70	21	4	70	21	ND	ND	ND
0-Dichlorobenzene	4	70	21	4	70	21	1	158	70	4	70	21	1	125	52
Diesel Oil	1	250	121		170	21	1	200	93	4	70	21	1	300	149
Diethylamine	3	140	60	3	70	21	4	140	60	2	70	21	1	300	149
Diethylbenzene	4	70	21	4	70	21	1	200	93	4	70	21	1	122	50
Diethylene Glycol	1	200	93	1	ND	ND	1	140	60	2	70	21	1	125	52
Diisooctyl Sebacate	3	70	21	4	70	21	2	70	21	3	70	21	ND	ND	ND
Diisopropyl Benzene	4	70	21	4	70	21	1	200	93	4	70	21	1	70	21
Dimethylether	1	70	21	1	70	21	1	70	21	1	70	21	1	70	21
Dimethylphthalate	4	70	21	4	70	21	1	70	21	2	70	21	1	392	200
Dipentene	2	200	93	2	70	21	1	70	21	4	70	21	1	70	21
Diphenyl	4	70	21	4	70	21	1	300	149	4	70	21	1	300	149
Diphenyl Oxides	4	70	21	4	70	21	1	140	60	3	70	21	1	70	21
Dry Cleaning Fluids	3	70	21	3	70	21	1	70	21	4	70	21	1	70	21
Ethane	1	140	60	1	70	21	1	140	60	4	70	21	1	70	21
Ethanol	1	140	60	1	70	21	4	104	40	1	70	21	1	392	200
Ethyl Alcohol	1	140	60	1	70	21	1	70	21	2	70	21	1	392	200

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Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMQ			Gylon® PTFE		
	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C
Ethyl Chloride	1	140	60	1	70	21	1	140	60	4	70	21	1	125	52
Ethyl Formate	4	70	21	4	70	21	1	70	21	ND	ND	ND	1	70	21
Ethyl Oxalate	4	70	21	4	70	21	1	70	21	4	70	21	1	70	21
Ethyl Silicate	1	70	21	1	70	21	1	70	21	ND	ND	ND	1	70	21
Ethylene	1	200	93	1	70	21	1	70	21	4	70	21	1	70	21
Ethylene Chlorohydrin	4	70	21	4	70	21	1	70	21	3	70	21	1	300	149
Ethylene Diamine	1	80	27	1	70	21	4	70	21	1	70	21	1	242	117
Ethylene Dichloride	4	70	21	4	70	21	1	200	93	4	70	21	1	300	149
Ethylene Glycol	1	212	100	1	70	21	1	250	121	1	70	21	1	300	149
Ethylene Trichloride	4	70	21	4	70	21	1	70	21	4	70	21	1	70	21
Ferric Chloride	1	150	66	1	70	21	1	176	80	2	70	21	1	300	149
Ferric Nitrate	1	140	60	1	70	21	1	212	100	3	70	21	1	300	149
Ferric Sulfate	1	140	60	1	70	21	1	176	80	2	70	21	1	300	149
Formic Acid	4	70	21	2	140	60	3	140	60	3	70	21	1	boiling	boiling
Freon 12	1	250	121	1	70	21	2	75	24	4	70	21	1	70	21
Freon 22	4	70	21	4	70	21	4	70	21	4	70	21	1	300	149
Fuel Oil	1	250	121	1	70	21	1	200	93	4	70	21	1	300	149
Fumaric Acid	1	70	21	1	70	21	1	70	21	2	70	21	1	70	21
Fyrquel	4	70	21	4	70	21	1	212	100	1	70	21	1	70	21
Gear Oil Super	1	212	100	1	70	21	1	350	177	1	70	21	ND	ND	ND
Grease	1	100	38	1	70	21	1	140	60	4	70	21	1	70	21
Hydraulic Oil	1	250	121	1	70	21	1	70	21	3	70	21	1	70	21
Hydrobromic Acid	4	140	60	4	70	21	1	140	60	4	70	21	1	212	100
Hydrocyanic Acid	2	140	60	2	70	21	1	140	60	3	70	21	1	300	149
Hydrofluosilicic Acid	1	70	21	1	70	21	1	70	21	4	70	21	1	2009	3
Hydrogen Gas	1	200	93	1	70	21	1	176	80	3	140	60	1	300	149
Hypoid Lubes	2	70	21	2	70	21	1	300	149	4	70	21	ND	ND	ND
Isobutyl Alcohol	2	80	27	2	70	21	1	75	24	1	70	21	1	200	93
Isooctane	1	250	121	1	70	21	1	70	21	4	70	21	1	300	149
Isopropyl Alcohol	1	70	21	2	70	21	1	170	77	1	70	21	1	300	149
Kerosene	1	250	121	1	70	21	1	158	70	4	70	21	1	300	149
Ketones	4	70	21	4	70	21	4	70	21	4	70	21	1	300	149
Lacquers	4	70	21	4	70	21	4	70	21	4	70	21	1	70	21
Lacquer Solvents	4	70	21	4	70	21	4	70	21	4	70	21	1	70	21
Lead Nitrate	1	120	49	1	70	21	1	212	100	2	70	21	1	125	52
Lead Sulfamate	2	140	60	2	70	21	1	140	60	2	70	21	1	125	52
Linseed Oil	1	200	93	1	70	21	1	250	121	1	70	21	1	300	149
Liquefied Petroleum-Gas	1	250	121	1	70	21	1	176	80	4	70	21	1	200	93
Lubricating Oils	1	70	21	1	70	21	1	158	70	4	70	21	1	300	149
Magnesium Chloride	1	176	80	1	70	21	1	176	80	1	70	21	1	300	149
Magnesium Hydroxide	1	140	60	2	70	21	1	212	100	1	70	21	1	300	149
Magnesium Sulfate	1	176	80	1	70	21	1	boiling	boiling	1	70	21	1	300	149
Maleic Acid	4	176	80	4	70	21	1	140	60	4	70	21	1	300	149
Malic Acid	1	70	21	1	70	21	1	70	21	2	70	21	1	300	149
Methane	1	250	121	1	70	21	2	176	80	4	70	21	1	300	149
Methanol	1	70	21	1	70	21	4	75	24	1	70	21	1	300	149

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Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMQ			Gylon® PTFE		
	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C
Methyl Alcohol	1	70	21	1	70	21	4	75	24	1	70	21	1	300	149
Methyl Bromide	2	70	21	2	70	21	1	160	71	1	ND	ND	1	300	149
Methyl Ether	1	70	21	1	70	21	1	70	21	1	70	21	1	70	21
Methyl Oleate	4	70	21	4	70	21	1	70	21	ND	ND	ND	1	70	21
Mineral Oil	1	250	121	1	70	21	1	70	21	2	70	21	1	356	180
Naphtha	1	250	121	2	70	21	1	158	70	4	70	21	1	300	149
Naphthalene	4	70	21	4	70	21	1	176	80	4	70	21	1	424	218
Naphthalenic	2	70	21	2	70	21	1	160	71	4	70	21	1	70	21
Natural Gas	1	250	121	1	70	21	1	176	80	4	70	21	1	70	21
Nickel Chloride	1	176	80	1	70	21	1	212	100	1	70	21	1	300	149
Nitric Acid (Dilute)	4	70	21	4	70	21	1	158	70	2	70	21	1	248	120
Octachlortoluene	4	70	21	4	70	21	1	70	21	4	70	21	1	70	21
Octadecane	1	70	21	4	70	21	1	70	21	4	70	21	1	70	21
N-Octane	2	70	21	2	70	21	1	70	21	4	70	21	1	300	149
Octyl Alcohol	2	100	38	2	70	21	2	70	21	2	70	21	1	70	21
Oleum Spirits	2	70	21	2	70	21	1	160	71	4	70	21	1	70	21
Oxalic Acid	2	140	60	2	70	21	1	140	60	2	70	21	1	200	93
Oxygen-Cold	2	100	38	4	70	21	1	70	21	1	70	21	1	70	21
Oxygen-Hot	4	250	121	4	70	21	2	400	204	2	70	21	1	400	204
Ozone	4	70	21	1	70	21	1	70	21	1	400	204	1	125	52
Paint Thinner, Duco	4	70	21	4	70	21	2	200	93	4	70	21	1	70	21
Palmitic Acid	1	160	71	1	70	21	1	70	21	4	70	21	1	300	149
Perchloric Acid	4	70	21	4	70	21	3	200	93	4	ND	ND	1	200	93
Perchloroethylene	2	70	21	2	70	21	1	212	100	4	70	21	1	250	121
Petroleum	1	250	121	1	70	21	1	250	121	4	70	21	1	250	121
Phenol	4	70	21	4	70	21	1	140	60	4	ND	ND	1	300	149
Phenyl Benzene	4	70	21	4	70	21	1	300	149	4	70	21	1	300	149
Phenyl Ethyl Ether	4	70	21	4	70	21	4	70	21	4	70	21	1	70	21
Phenyl Hydrazine	4	70	21	4	70	21	1	70	21	1	ND	ND	1	70	21
Phorone	4	70	21	4	70	21	4	70	21	4	70	21	1	70	21
Phosphate Ester	4	70	21	4	70	21	4	70	21	1	70	21	1	70	21
Phosphorus Trichloride	4	70	21	4	70	21	1	70	21		ND	ND	1	300	149
Pickling Solution	4	70	21	4	70	21	2	70	21	4	70	21	1	70	21
Picric Acid (10%)	2	160	71	2	70	21	1	140	60	2	70	21	1	300	149
Pinene	2	70	21	2	70	21	1	158	70	4	70	21	1	boiling	boiling
Piperidine	4	70	21	4	70	21	4	70	21	4	70	21	1	boiling	boiling
Plating Solution - Chrome	4	70	21	4	70	21	1	140	60	4	70	21	1	300	149
Plating Solution - Others	1	70	21	1	70	21	1	70	21	4	70	21	1	70	21
Potassium Acetate	2	120	49	2	70	21	4	70	21	4	70	21	1	390	199
Potassium Chloride	1	176	80	1	70	21	1	212	100	1	70	21	1	70	21
Potassium Cupro-Cyanide	1	140	60	1	70	21	1	212	100	1	70	21	1	70	21
Potassium Cyanide	1	140	60	1	70	21	1	70	21	1	70	21	1	200	93
Potassium Dichromate	1	140	60	1	70	21	1	212	100	1	70	21	1	200	93
Potassium Hydroxide	2	150	66	2	ND	ND	2	70	21	3	70	21	1	300	149
Potassium Nitrate	1	140	60	1	70	21	1	212	100	1	70	21	1	300	149
Potassium Sulfate	1	160	71	1	70	21	1	212	100	1	70	21	1	300	149

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Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMQ			Gylon® PTFE		
	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C
Producer Gas	1	250	121	1	70	21	1	70	21	2	70	21	1	70	21
Propane	1	250	121	1	70	21	1	176	80	4	70	21	1	300	149
Propyl Acetate	4	70	21	4	70	21	4	70	21	4	70	21	1	70	21
N-Propyl Acetate	4	70	21	4	70	21	4	70	21	4	70	21	1	70	21
Propyl Acetone	4	70	21	4	70	21	4	70	21	3	ND	ND	1	70	21
Propyl Alcohol	2	200	93	1	70	21	1	212	100	1	70	21	1	300	149
Propyl Nitrate	4	70	21	4	70	21	4	70	21	4	70	21	1	70	21
Propylene	4	70	21	4	70	21	1	70	21	4	70	21	1	70	21
Propylene Oxide	4	70	21	4	70	21	4	70	21	4	70	21	1	300	149
Pydraul, 10E	4	70	21	4	70	21	1	70	21	4	70	21	1	70	21
Pydraul, 29ELT, 30E, 50E, 65E, 90E	4	70	21	4	70	21	1	158	70	1	70	21	1	70	21
Pydraul, 115E	4	70	21	4	70	21	1	70	21	4	70	21	2	400	204
Pyranol, Transformer Oil	1	70	21	1	70	21	1	70	21	4	70	21	ND	ND	ND
Rapeseed Oil	2	250	121	2	70	21	1	70	21	4	70	21	1	70	21
RJ-1 (MIL-F-25558)	1	70	21	1	70	21	1	70	21	4	70	21	ND	ND	ND
RP-1 (MIL-R-25576)	1	70	21	1	70	21	1	70	21	4	70	21	ND	ND	ND
SAE-10	1	250	121	1	70	21	1	70	21	4	70	21	1	70	21
SAE-30	1	70	21	1	70	21	1	70	21	1	ND	ND	ND	ND	ND
Sal Ammoniac	1	160	71	1	70	21	1	212	100	3	70	21	1	boiling	boiling
Salicylic Acid	2	70	21	2	70	21	1	70	21	1	ND	ND	1	300	149
Salt Water	1	140	60	1	70	21	1	176	80	1	70	21	1	250	121
Sea Water	1	140	60	1	70	21	1	212	100	1	70	21	1	250	121
Sewage	1	200	93	1	70	21	1	176	80	2	70	21	1	70	21
Silicate Esters	2	180	82	2	70	21	ND	400	204	4	70	21	1	70	21
Silicone Greases	1	140	60	1	70	21	1	140	60	3	70	21	1	300	149
Silicone Oils	1	140	60	1	70	21	1	400	204	4	70	21	1	300	149
Silver Nitrate	2	180	82	2	70	21	1	176	80	1	70	21	1	300	149
Soap Solutions	1	200	93	1	70	21	1	212	100	1	70	21	1	300	149
Soda Ash	1	160	71	1	70	21	1	212	100	1	70	21	1	300	149
Sodium Acetate	2	176	80	2	70	21	4	70	21	4	70	21	1	300	149
Sodium Bicarbonate	1	140	60	1	70	21	1	212	100	1	70	21	1	300	149
Sodium Bisulfite	2	212	100	1	70	21	1	212	100	1	70	21	1	200	93
Sodium Borate	1	70	21	1	70	21	1	176	80	1	70	21	1	300	149
Sodium Chloride	1	160	71	1	70	21	1	212	100	1	212	100	1	300	149
Sodium Cyanide	1	140	60	1	ND	ND	1	176	80	1	70	21	1	300	149
Sodium Hydroxide	2	70	21	2	70	21	2	70	21	1	70	21	1	300	149
Sodium Hypochlorite	4	130	54	2	70	21	1	158	70	2	70	21	1	300	149
Sodium Metaphosphate	1	140	60	1	70	21	1	140	60	1	70	21	1	300	149
Sodium Nitrate	2	176	80	2	ND	ND	1	212	100	4	70	21	1	300	149
Sodium Perborate	2	200	93	2	70	21	1	140	60	2	70	21	1	300	149
Sodium Peroxide	2	200	93	2	70	21	1	boiling	boiling	4	70	21	1	300	149
Sodium Phosphates	1	200	93	1	70	21	1	176	80	4	70	21	1	300	149
Sodium Silicate	1	140	60	1	70	21	1	212	100	1	70	21	1	300	149
Sodium Sulfates	1	140	60	1	ND	ND	1	176	80	1	70	21	1	300	149

Rating Key: 1 = Excellent compatibility up to given temperature
2 = Good compatibility up to given temperature
3 = Limited compatibility up to given temperature
4 = Poor compatibility up to given temperature
ND = No Data

Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMQ			Gylon® PTFE		
	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C	Rating	°F	°C
Sodium Thiosulfates	2	200	93	2	ND	ND	1	212	100	1	70	21	1	300	149
Soybean Oil	1	250	121	1	70	21	1	250	121	1	70	21	1	200	93
Stannic Chloride	1	140	60	1	70	21	1	140	60	2	70	21	1	300	149
Steam	4	212	100	4	212	100	1	212	100	4	225	107	1	450	232
Stearic Acid	1	70	21	2	70	21	1	140	60	2	70	21	1	300	149
Stoddards Solvent	12	50	121	1	70	21	1	158	70	4	70	21	1	300	149
Styrene Polymer	4	70	21	4	70	21	1	120	49	4	70	21	1	70	21
Sucrose Solution	1	140	60	2	70	21	1	140	60	1	70	21	1	200	93
Sulfur Chloride	4	70	21	4	70	21	1	140	60	3	70	21	1	300	149
Sulfur Hexafluroride	2	70	21	2	70	21	4	70	21	2	70	21	1	70	21
Sulfur Trioxide	4	70	21	4	70	21	1	140	60	2	70	21	1	300	149
Sulfuric Acid	4	70	21	4	70	21	1	158	70	4	70	21	1	400	204
Sulfur Acid (20% Oleum)	4	70	21	2	70	21	1	75	24	4	70	21	1	400	204
Sulfurous Acid	4	70	21	2	70	21	1	140	60	4	70	21	1	300	149
Tannic Acid	1	200	93	1	70	21	1	140	60	2	70	21	1	300	149
Terpineol	2	70	21	2	70	21	1	70	21	ND	ND	ND	1	70	21
Tertiary Butyl Alcohol	2	70	21	2	70	21	1	70	21	2	70	21	1	70	21
Tertiary Butyl Catechol	4	70	21	4	70	21	1	70	21	1	ND	ND	1	70	21
Tertiary Butyl Mercaptan	4	70	21	4	70	21	1	70	21	4	70	21	1	70	21
Tetrabromoethane	4	70	21	4	70	21	1	70	21	4	70	21	1	boiling	boiling
Tetrabromomethane	4	70	21	4	70	21	1	70	21	4	70	21	1	70	21
Tetrabutyl Titanate	2	70	21	2	70	21	1	70	21	ND	ND	ND	1	70	21
Tetrochloroethylene	4	70	21	4	70	21	1	212	100	4	70	21	1	250	121
Tetraethyl Lead	2	120	49	2	70	21	1	120	49	ND	ND	ND	1	300	149
Tetralin	4	70	21	4	70	21	1	70	21	4	70	21	1	70	21
Titanium Tetrachloride	4	70	21	2	70	21	1	ND	ND	4	70	21	1	300	149
Transformer Oil	1	150	66	1	70	21	1	300	149	2	70	21	1	300	149
Transmission Fluid Type A	1	70	21	1	70	21	1	212	100	2	70	21	1	70	21
Triaryl Phosphate	4	70	21	4	70	21	1	70	21	3	70	21	1	70	21
Tricresyl Phosphate	4	70	21	4	70	21	1	140	60	3	70	21	1	boiling	boiling
Turbine Oil	2	70	21	1	70	21	1	140	60	4	70	21	1	70	21
Turpentine	1	200	93	1	70	21	1	158	70	4	70	21	1	300	149
Varnish	2	70	21	2	70	21	1	70	21	4	70	21	1	70	21
Versilube F-50	1	70	21	1	70	21	1	350	177	3	70	21	1	70	21
Vinyl Chloride	4	70	21	4	70	21	1	70	21	1	ND	ND	1	300	149
Wagner 21B Brake Fluid	3	70	21	3	70	21	4	70	21	3	70	21	1	70	21
Water	1	180	82	1	70	21	2	275	135	2	180	82	1	boiling	boiling
White Oil	1	70	21	1	70	21	1	70	21	4	70	21	1	70	21
White Pine Tar	2	70	21	2	70	21	1	70	21	4	70	21	1	70	21
Xylene	4	70	21	4	70	21	1	140	60	4	70	21	1	300	149
Xylidines	4	70	21	ND	ND	ND	4	70	21	4	70	21	1	70	21
Zeolites	1	70	21	1	70	21	1	70	21	ND	ND	ND	ND	ND	ND
Zinc Acetate	2	176	80	2	70	21	4	176	80	4	70	21	1	70	21
Zinc Chloride	1	140	60	1	70	21	1	212	100	2	70	21	1	300	149
Zinc Sulfate	1	140	60	1	70	21	1	boiling	boiling	1	70	21	1	300	149

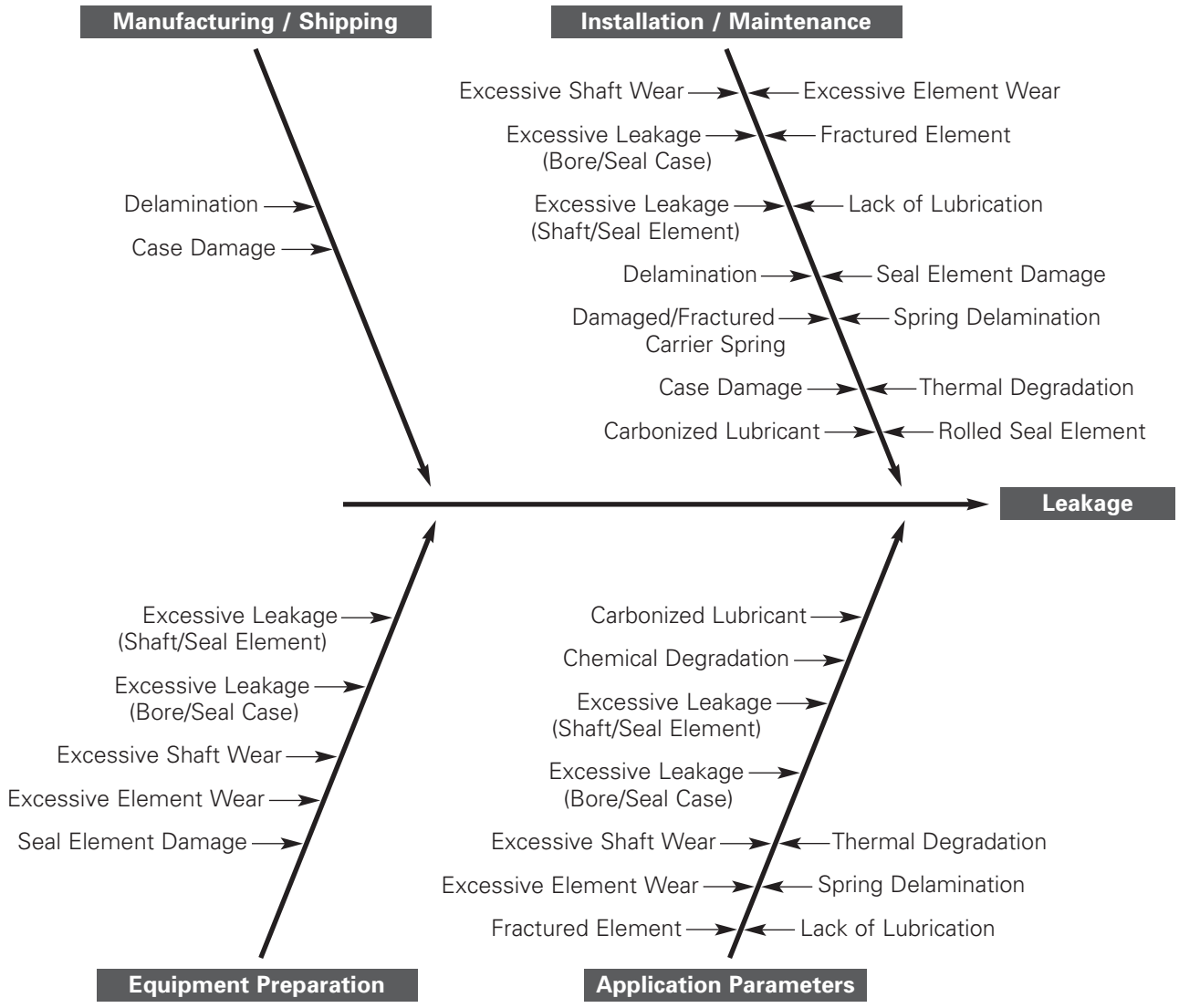
Rating Key: 1 = Excellent compatibility up to given temperature
2 = Good compatibility up to given temperature
3 = Limited compatibility up to given temperature
4 = Poor compatibility up to given temperature
ND = No Data

Identifying the Cause

If just one seal in a heavy industrial application becomes damaged or fails to operate properly, it can result in extensive product and equipment damage, lengthy downtime and unexpected maintenance costs. Familiarizing yourself with damage analysis techniques can help you prevent further damage to equipment while identifying how to stop future seal and machine damage before it occurs.

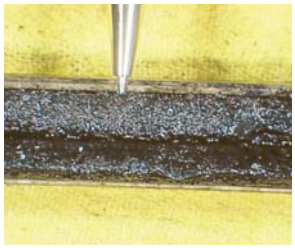
The diagram below organizes common symptoms with common root causes of seal failure and is designed to help you:

- Sort possible causes of failure in a logical manner
- Identify areas for data gathering
- Identify, explore and display all possible causes related to the failure to determine the root cause
- Keep any collaboration on defining the root cause focused and on track



The following information pertains to standard installations. If you have a special installation or need advice, contact your Timken sales representative. For more information on both seal and bearing damage analysis, go to www.timken.com/industrialseals.

Carbonized Lubricant



Problem
Lubricant breaks down, deposits around the main sealing interface and interferes with sealing capabilities

Potential Cause	*Potential Solution*
• Bearing lubricant becomes overheated	• Use a lubricant that can withstand greater temperatures or decrease the temperature for current lubricant

Case Damage

Problem
Seal case is damaged

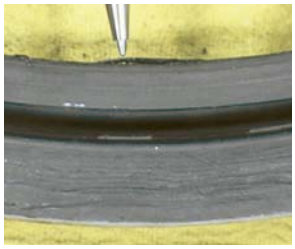
Potential Cause	*Potential Solution*
• Improper installation	• Change installation technique to prevent damage
• Improper shipping	• Contact your Timken sales representative to discuss shipping alternatives and replacement

Chemical Degradation

Problem
Abnormal swelling or distortion of the sealing element

Potential Cause	*Potential Solution*
• Sealing element material and the material being sealed (i.e. lubricant, coolant) are chemically incompatible	• Upgrade to sealing element that is compatible with the material being sealed

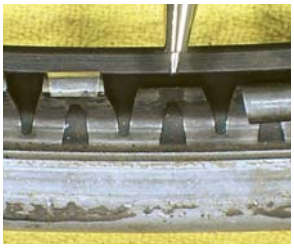
Delamination



Problem
Seal material separates, interfering with sealing capabilities

Potential Cause	*Potential Solution*
Trapped air due to:	
• Improper installation	• Change installation technique to prevent damage
• Improper shipping	• Contact your Timken sales representative to discuss shipping alternatives and replacement
• Manufacturing defect	• Contact your Timken sales representative to report manufacturing defect and arrange for replacement

Fractured Carrier Spring



Problem
Ineffective sealing due to distortion or cracking of the carrier spring

Potential Cause	*Potential Solution*
• Improper installation	• Change installation technique to prevent damage
• Excessive load	• Do not allow seal to carry the weight of the shaft

Excessive Leakage (Shaft/Seal Element)

Problem
Leakage occurs between shaft and seal lip

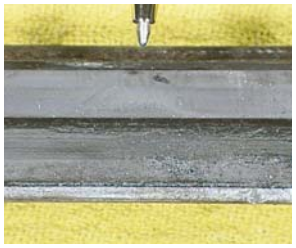
Potential Cause	*Potential Solution*
• Incorrect seal/shaft size	• Use correct seal size
• Rough surface finish on shaft	• Refinish shaft surface to seal specifications
• Too much lubricant used during installation	• Reduce amount of installation lubricant
• Shaft machined lead (spiral grooves)	• Refinish shaft surface to seal specifications
• Cocked seal installation	• Install seal squarely into housing bore
• Excessive shaft movement (TIR)	• Move seal closer to bearing
• Previously mentioned failure modes	• Reference previously mentioned sources/ solutions

Excessive Leakage (Bore/Seal Case)

Problem
Leakage occurs between bore and seal case

Potential Cause	*Potential Solution*
• Incorrect seal/bore size	• Use correct seal size
• Rough surface finish on bore	• Refinish bore surface to seal specifications
• Use of lubricant during installation	• Do not use lubricant during installation (not recommended for the bore and seal case)
• Cocked seal installation	• Install seal squarely into housing bore

Excessive Seal Element Wear



Problem
Wider than normal wear pattern on the surface of seal element

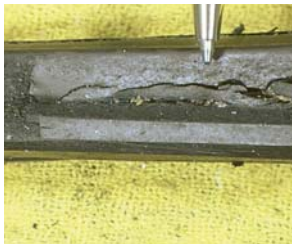
Potential Cause	*Potential Solution*
• Excessive internal pressure	• Clean drain ports and chamber vents or upgrade to seal with higher pressure capabilities
• High misalignment/ runout	• Upgrade to seal with higher misalignment/ runout capabilities
• Rough surface finish on shaft	• Refinish surface of shaft to seal specifications
• Insufficient lubrication	• Properly lubricate the seal
• Extended seal service	• Upgrade to extended service element material or change maintenance schedule to accommodate new seal life requirements
• Oversized shaft	• Use proper seal size

Rolled Seal Element

Problem
Seal was lip has been rolled over such that itdoes not properly engage shaft

Potential Cause	*Potential Solution*
• Damage during installation	• Change installation technique or use proper tools to prevent seal damage

Fractured Element



Problem
Seal fractures or splits

Potential Cause	*Potential Solution*
• Damage during installation	• Change installation technique to prevent seal damage
• Excessive load	• Do not allow seal to carry the weight of the shaft
• Thermal degradation	• Reduce operating temperature or upgrade to a compatible seal element
• Insufficient lubrication	• Apply proper amount of lubrication at sealing interface during installation

Low Lubrication Levels

Problem
Cracks or wear patterns develop, hindering sealing capabilities

Potential Cause	*Potential Solution*
• Insufficient lubrication	• Increase lubrication during installation
• High internal pressure	• Decrease internal pressure

Excessive Shaft Wear

Problem
Excess wear groove in shaft

Potential Cause	*Potential Solution*
• Abrasive damage during installation	• Clean shaft and seal prior to installation
• Abrasive damage during operation	• Prevent abrasive materials from collecting at sealing interface during operation
• Soft shaft material	• Make sure shaft hardness is sufficient for seal specifications

Seal Element Damage

Problem
Seal element has nicks, cuts or tears

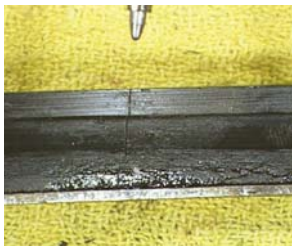
Potential Cause	*Potential Solution*
• Rough surface finish on shaft	• Refinish shaft to seal specifications
• Damage during installation	• Change installation technique to prevent damage

Spring Delamination

Problem
Sealing element and spring separate, causing leakage

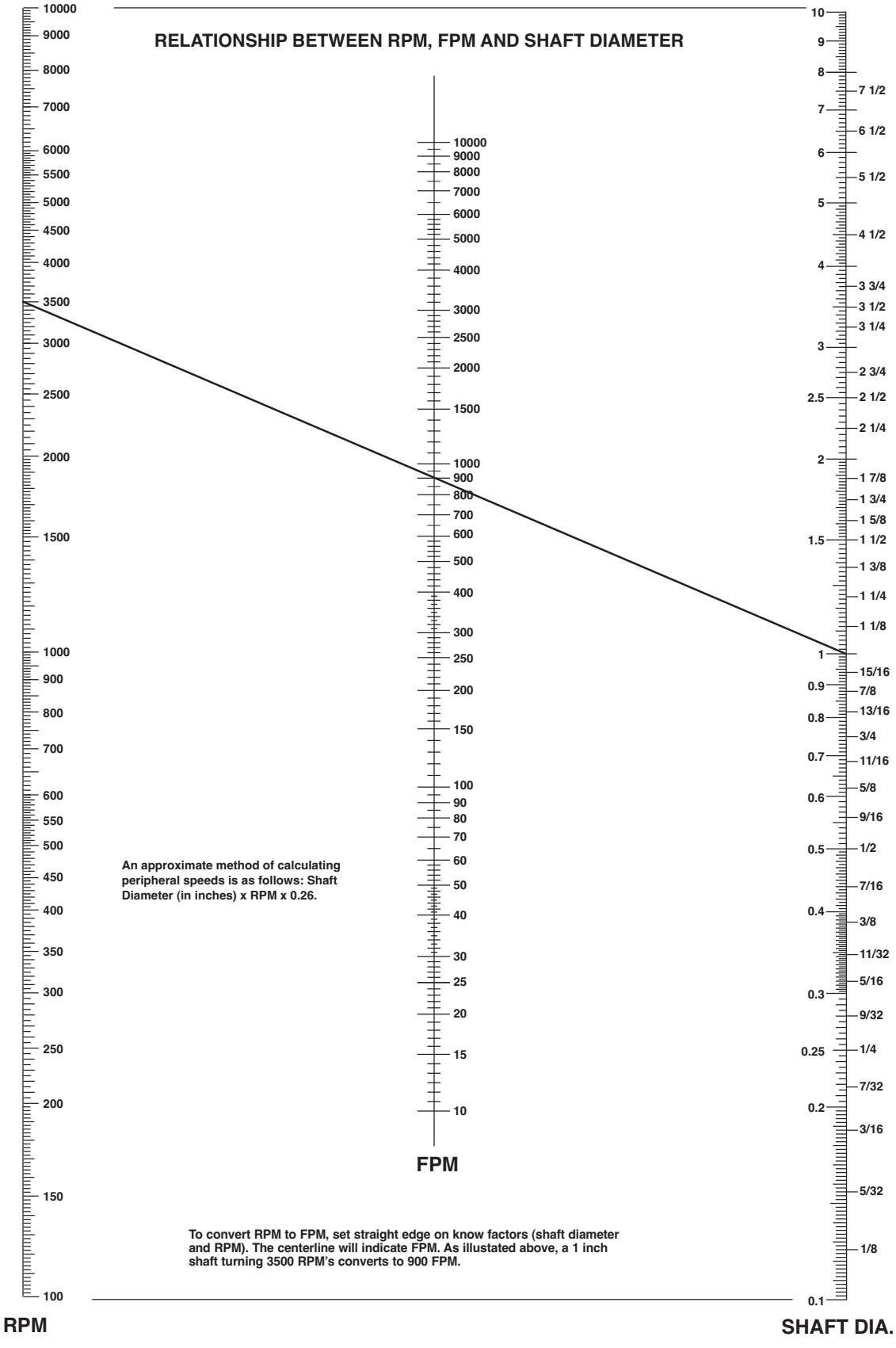
Potential Cause	*Potential Solution*
• Excessive load	• Upgrade to seal material with higher misalignment capabilities
• Excessive operating temperature	• Upgrade to seal material with higher temperature capabilities

Thermal Delamination



Problem
Cracks occur on sealing lip, causing leakage and contamination

Potential Cause	*Potential Solution*
• High temperature at sealing interface	• Upgrade to seal material that is compatible with application's temperature requirements, or reduce application's operating temperature


RELATIONSHIP BETWEEN RPM, FPM AND SHAFT DIAMETER
10000
9000
8000
7000
6000
5500
5000
4500
4000
3500
3000
2500
2000
1500
1000
900
800
700
600
550
500
450
400
350
300
250
200
150
100
RPM
10000
9000
8000
7000
6000
5000
4000
3000
2500
2000
1500
1000
900
800
700
600
500
400
300
250
200
150
100
90
80
70
60
50
40
30
25
20
15
10
FPM
10
9
8
7
6
5
4
3
2.5
2
1.5
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.25
0.2
0.1
7 1/2
6 1/2
5 1/2
4 1/2
3 3/4
3 1/2
3 1/4
2 3/4
2 1/2
2 1/4
1 7/8
1 3/4
1 5/8
1 1/2
1 3/8
1 1/4
1 1/8
15/16
7/8
13/16
3/4
11/16
5/8
9/16
1/2
7/16
3/8
11/32
5/16
9/32
1/4
7/32
3/16
5/32
1/8
SHAFT DIA.
An approximate method of calculating peripheral speeds is as follows: Shaft Diameter (in inches) x RPM x 0.26.
To convert RPM to FPM, set straight edge on know factors (shaft diameter and RPM). The centerline will indicate FPM. As illustated above, a 1 inch shaft turning 3500 RPM's converts to 900 FPM.

TIMKEN APPLICATION INQUIRY FORM

TIMKEN
Where You Turn

Date: _____

CS Rep: _____

CONTACT INFORMATION

Company: _____ ○ Distributor ○ End User

Contact Name _____ Location: _____

Phone: _____ Fax: _____

Email Address: _____

Current Seal Information

Seal Manufacturer: _____

Seal Part Number: _____

Seal Type: _____

Seal Element Material: _____

Seal Case Material: _____

Application Information

Shaft Diameter: _____ ○ in ○ mm

Bore Diameter: _____ ○ in ○ mm

Bore Depth: _____ ○ in ○ mm

Motion (Rotary or Reciprcating) : _____

Speed: _____ ○ RPM ○ fpm ○ mps

Shaft-to-Bore Misalignment (TIR) _____ ○ in ○ mm

Pressure: _____ ○ psi ○ bar ○ kp

Media Type: _____

Media Level: _____

Temperature _____ ○ F ○ C

Special Notes: _____

_____

_____

_____

TIMKEN
Where You Turn

Split Pillow Block Application Sheet - SNL & SNH Type Blocks

The Timken Company, 1835 Dueber Avenue, S.W., P.O. Box 6927, Canton, OH 44706-0927 U.S.A.
Telephone: 330-471-6399 Fax: 330-471-4041

Customer Contact Info.

Company: _____ Name: _____ Timkenk Area Manager: _____
Mailing Address: _____ Title: _____ Voice Mail Number: _____
City: _____ Phone # : _____
State: _____ Fax # : _____
Zip: _____ Email Address: _____

Current Seal

Current Seal (mfg.): _____
Size/Type: _____

Materials of Construction: ☐ Metallic ☐ Non-Metallic
Approximate Cost: _____
Approximate Life: _____

Application Data

☐ OEM ☐ Aftermarket

Date Required: _____
Annual Usage: _____
Peak Month Usage: _____

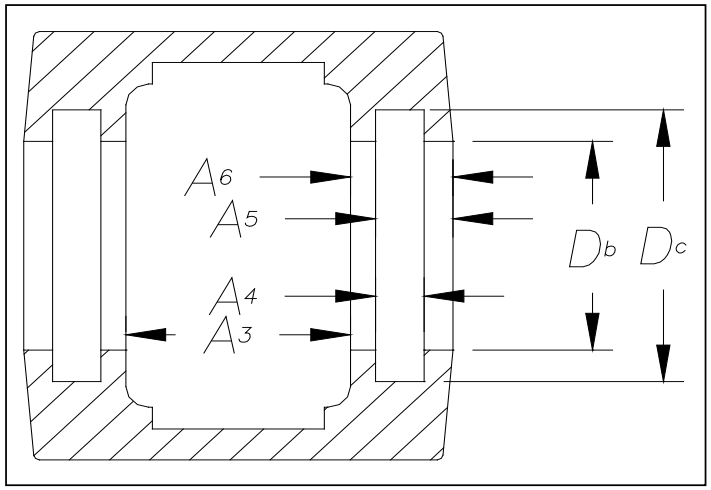
Application Data

Housing: _____

_____

Shaft Diameter: _____

A_3: _____
A_4: _____
A_5: _____
A_6: _____
D_b: _____
D_c: _____



Special Operating Conditions:

TIMKEN
Where You Turn

Oil Seals and Bearing Isolators Application Data Sheet

The Timken Company, 1835 Dueber Avenue, S.W., P.O. Box 6927, Canton, OH 44706-0927 U.S.A.
Telephone: 330-471-6399 Fax: 330-471-4041

Timken Area Manager: _____
Voice Mail Number: _____

Customer Contact Info:

Company: _____ Name: _____
Mailing Address: _____ Title: _____
City: _____ Phone # : _____
State: _____ Fax # : _____
Zip: _____ Email Address: _____

Current Seal

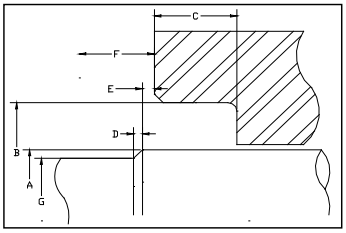
Equipment: ☐ Pump ☐ Electric Motor ☐ Gear Box ☐ Other: _____

Current Seal (mfg.): _____
Size/Type: _____

Materials of Construction: ☐ Metallic ☐ Non-Metallic

Approximate Cost: _____
Approximate Life: _____

Size:
(A) Shaft Diameter: _____
(B) Bore Diameter _____
(C) Bore Depth _____
(D) Step Width _____
(E) Distance to Step _____
(F) Distance to First Obstruction _____
(G) Small Shaft Diameter _____



Application Data

☐ OEM ☐ Aftermarket

Date Required: _____
Annual Usage: _____
Peak Month Usage: _____

Bearing: ☐ Ball or Roller Bearing ☐ Bushing ☐ Other _____

Shaft: ☐ Horizontal ☐ Vertical
Material: _____
Finish: _____
Hardness: _____

Bore:
Material: _____
Finish: _____
Hardness: _____

Motion: ☐ Rotating

RPM
Normal: _____
Maximum: _____
Shaft Run Out: _____

Frequency of Rotation:
☐ Continuous ☐ Intermittent
Misalignment: _____
Axial Motion: _____

☐ Reciprocating
Stroke Length: _____
Cycles / Min: _____

☐ Oscillating
Degress of Arc: _____
Cycles / Min: _____

Fluid:
Internal: _____ ☐ Dry ☐ Mist ☐ Flooded
Type: _____

External: _____
Type: _____

Temperature: ☐ °C ☐ °F
Minimum: _____
Normal: _____
Maximum: _____

Pressure: ☐ psi ☐ bars
Minimum: _____
Normal: _____
Maximum: _____

Special Operating Conditions:

G-6277

Timken Application Data Sheet

The Timken Company, 1835 Dueber Avenue, S.W., P.O. Box 6927, Canton, OH 44706-0927 U.S.A.
Telephone: 330-471-6399 Fax: 330-471-4041

TIMKEN
Where You Turn

Contact Information

Timken Representative: _____ KLOZURE Area Manager: _____
Phone: _____ Phone: _____
Email Address: _____ Email Address: _____

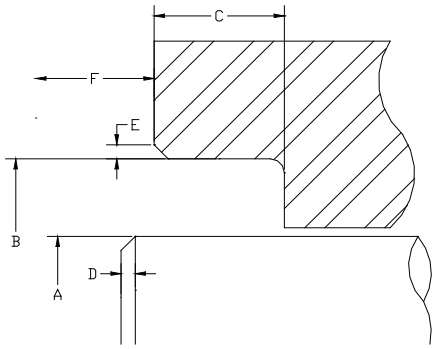
Customer Information

Company: _____ Contact: _____
Customer Type: _____ Title: _____
Mailing Address: _____ Phone: _____
City: _____ Fax: _____
State: _____ Email Address: _____
Zip: _____

Current Seal Information

Seal Manufacturer: _____ Purity: _____
Seal Part Number: _____ Approximate Cost: _____
Seal Type: _____ Approximate Monthly Usage: _____
Seal Element Material: _____ Approximate Annual Usage: _____
Seal Case Material: _____

Application Information



General

Equipment Type: _____
Bearing Type: _____
Shaft Attitude: _____

Size/Finish

(A) Shaft Diameter: _____ ◉ in ○ mm
Shaft Surface Finish: _____ micro-inch Ra
Shaft Surface Hardness: _____ Rockwell-C
(B) Bore Diameter: _____ ◉ in ○ mm
Bore Surface Finish: _____ micro-inch Ra
Bore Surface Hardness: _____ Rockwell-C
(C) Bore Depth: _____ ◉ in ○ mm
(D) Shaft Chamfer: _____ ◉ in ○ mm
(E) Bore Chamfer: _____ ◉ in ○ mm
(F) Distance to Obstruction: _____ ◉ in ○ mm

Motion

Type of Motion: _____
Speed (rotation): _____ ◉ RPM ○ fpm ○ mps
Stroke (reciprocating): _____ ◉ in ○ mm
Speed (reciprocating): _____ ◉ cps ○ cpm
Degrees of Arc: _____
Speed (oscillation): _____ ◉ cps ○ cpm

Alignment/Movement

Radial Misalignment (STBM): _____ ◉ in ○ mm
Radial Movement: _____ ◉ in ○ mm
Axial Movement: _____ ◉ in ○ mm

Pressure

Location: _____
Pressure Value: _____ ◉ psi ○ bar ○ kp

Media

Media Type: _____
Description: _____
Manufacturer: _____
Level: _____
Location: _____

Temperature

Nominal: _____ ◉ F ○ C
Minimum: _____ ◉ F ○ C
Exposure Time at Minimum: _____ ◉ sec ○ min ○ hrs ○ day
Maximum: _____ ◉ F ○ C
Exposure Time at Maximum: _____ ◉ sec ○ min ○ hrs ○ day

Notes

G-6277

TIMKEN

The Timken team applies their know-how to improve the reliability and performance of machinery in diverse markets worldwide. The company designs, makes and markets high-performance mechanical components, including bearings, gears, belts, chain and related mechanical power transmission products and services.

Stronger. **Commitment.** Stronger. **Value.** Stronger. **Worldwide.** Stronger. **Together.** | **Stronger.** By Design.

www.timken.com