



**TIMKEN**

**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**

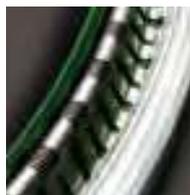
Creating the most advanced seals for heavy industrial markets requires quality materials. Timken industrial seals are manufactured using special elastomers that are engineered for high abrasion resistance, low wear and outstanding temperature and chemical resistance. In addition, we have materials and 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



**Timken ES Blue**  
Peak Temp. = 350°F



**Timken V Green**  
Peak Temp. = 450°F

**Technology**

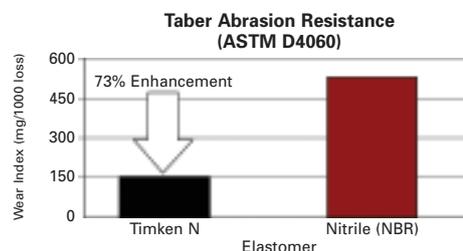
As a technology leader in friction management solutions, we invest in our own research and development and partner with trusted suppliers to develop the highest quality materials for all of our products. Our new line of seals is no exception.

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.

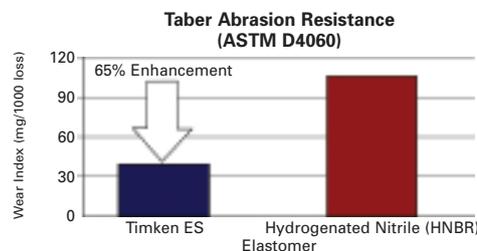
**Taber Abrasion Resistance**

The elastomers used to make Timken oil 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.

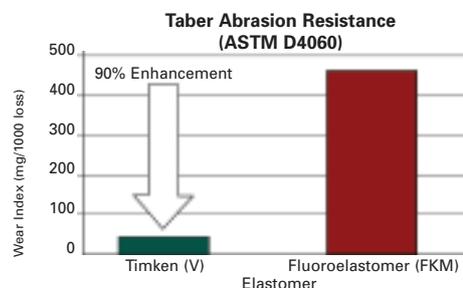
**Timken Nitrile (N) Black Industrial Seals**



**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 engineered unitizing ring, providing heightened protection in a broad range of environments. Made from PTFE material, our non-metallic bearing isolators also offer superior protection.



## Engineering Data

**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 help our seals achieve even higher levels of performance. 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.

The most satisfactory method for shafts and sleeves is a plunge ground finish. We recommend 10-20  $\mu$  in. Ra (0.25-0.50  $\mu$ m) with no machine lead, scratches, dents, corrosion, pits or other surface defects.

**Table 1: Shaft Requirements**

Seal Type	Required Shaft Hardness Rockwell C	Required Shaft Finish	
		$\mu$ in (micro-inches) Ra	$\mu$ m (micrometers) 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

**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

**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, causing severe leakage and seal 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. This will create a string-to-shaft contact arc of 220° to 240°.
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.

Engineering Data

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 (in inches) by the product of the shaft circumference (in inches), and the number of revolutions required to advance the string the measured amount.

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

For example, a string will advance 0.300" in 30 seconds on a 4.000" shaft rotating at 60 RPM. The lead angle equals  $0.0456^\circ = 2' 44.1''$ . A 2" shaft with the same advance (0.300" in 30 seconds at 60 RPM) has a lead angle of  $0.0912^\circ = 5' 28.3''$ .

For best seal performance, industry standards recommend that the lead angle of a shaft be  $0^\circ \pm 0.05^\circ (\pm 3')$ .



Figure 1: Clockwise Lead



Figure 2: Clockwise Lead

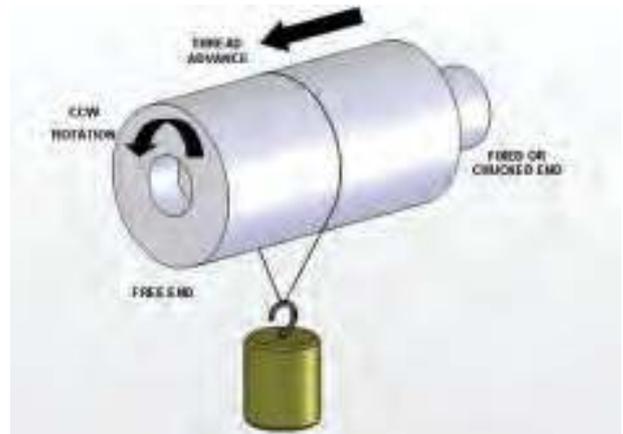


Figure 3: Counter-Clockwise Lead

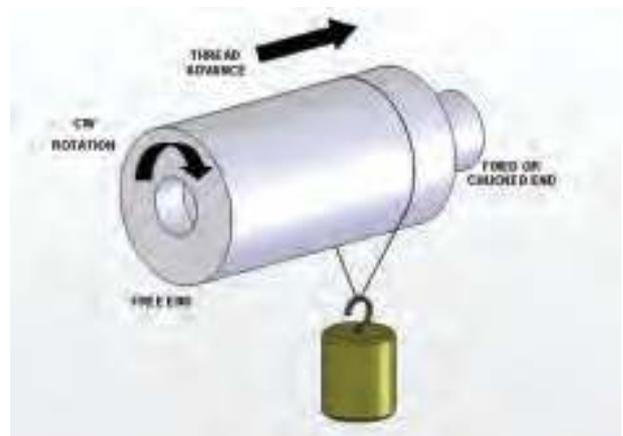


Figure 4: Counter-Clockwise Lead

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.

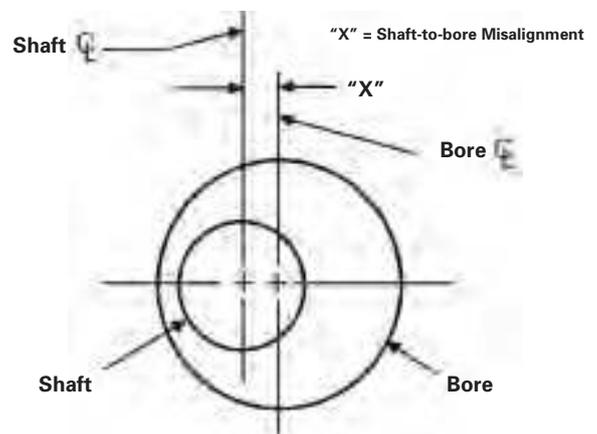


Figure 5: Shaft-to-bore Misalignment

Engineering Data

**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.

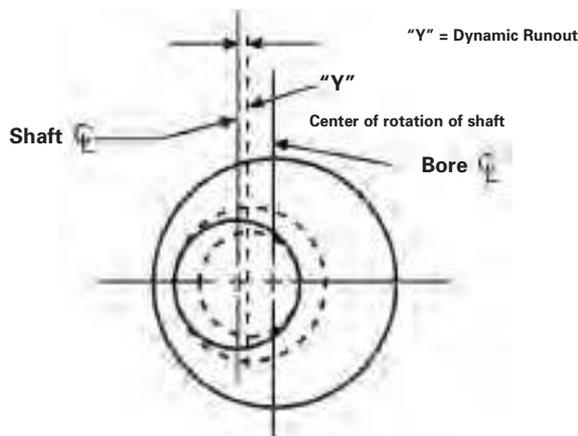


Figure 6 — Dynamic Runout

**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 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
0-100	0 0-5.1	7	48	0.50
1001-2000	5.2-10.2	5	35	0.35
2001 & up	10.3 & up	3	21	0.20

\* 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	0.50
PS-I Oil Seals	150†	1,034	10
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 tolerances.

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	±0.004	±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" (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	-0.15 +0.05
30.001 - 40.000	762.01 - 1016.00	+0.002 -0.006	-0.15 +0.05
40.001 - 60.000	1016.01 - 1524.00	+0.002 -0.010	-0.25 +0.05

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

## Engineering Data

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

Shaft 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.

$$\text{Surface Speed (f/m)} = \text{Shaft Dia. (in)} \times \text{RPM} \times 0.262$$

$$\text{Surface Speed (f/m)} = \text{Shaft Dia. (mm)} \times \text{RPM} \times 0.0103$$

$$\text{Surface Speed (f/m)} = \text{Shaft Dia. (in)} \times \text{RPM} \times 0.013299$$

$$\text{Surface Speed (m/s)} = \text{Shaft Dia. (m/s)} \times \text{RPM} \times 0.0000524$$

**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	
	$^{\circ}\text{F} = 1.8 (^{\circ}\text{C}) + 32$
	$^{\circ}\text{C} = (^{\circ}\text{F} - 32)/1.8$

**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 seals should have a surface finish within 10-20  $\mu$  in. (0.25-0.50  $\mu$ m).
- For PS-1 (Model 61), the surface finish should be within 4-8  $\mu$  in (0.10-0.20  $\mu$ m).
- 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 seals must be 100  $\mu$  in. (2.54  $\mu$ m).
- The surface finish direction of all seals must be perpendicular to the shaft axis of rotation.

**Shaft Surface Hardness, Rockwell C-Scale**

- With the exception of PS-1 (Model 61), all seals 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.
- 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 9* 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



**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.

Seals Installation Instructions

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



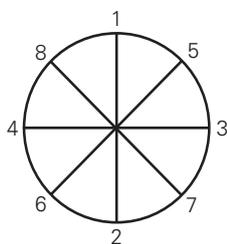
**Installation Method D Thru Bore:**  
Mounting thimble assists in compressing seal lip for easier installation

**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" (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" x 4" 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 0.010" (0.254 mm).

Split Seal Installation

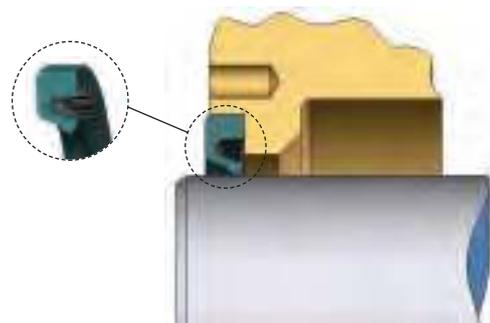
Ambient pressure/ non-flooded applications only

- 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 housing bore. Make sure the splits 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" (0.381 mm), as shown in *Figure 13*. The 0.015" 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.



**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.

Installation Instructions **Isolators****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  $64 \mu\text{in}$  ( $1.63 \mu\text{m}$ ) with minimal lead, but a polished surface is not required. The bore surface should be  $64 \mu\text{in}$  ( $2.54 \mu\text{m}$ ). 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**

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 an orientation slot 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 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.

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	Silicone	GYLON	Bronze	Stainless Steel	PTFE	
Model 57	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	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										
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						
Model 87			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						
Model 145 <sup>#</sup>			X	X	X		X	X	X				X	X	X	X	X	X	X				N/A	N/A	N/A		X	X					
Model 143 <sup>#</sup>			X	X	X		X	X	X				X	X	X	X	X	X	X				N/A	N/A	N/A		X	X					
P/S <sup>°</sup> (Model 61)	X	X	X		X	X	X	X					Under 0.005						X	X	X	X	X	X					X				
GUARDIAN™†	X	X	X	X	X		X	X	X	X			X	X					X			X											X
MICRO-TEC <sup>††</sup>	X	X	X	X	X		X	X	X	X			X	X	X				X			X											X
ISO-GARD <sup>°°</sup>	X	X	X	X	X		X	X	X	X	X		X	X	X				X			X								X	X		
EQUALIZER <sup>°°</sup>	X	X	X	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.

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

† All Timken metallic bearing isolators are supplied with fluoroelastomer o-rings.

° All Timken non-metallic bearing isolators are supplied with fluoroelastomer o-rings.

Material Selection Guide\*

Material Type <sup>†</sup>	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 148°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)	N/A	Over 2.000	-75°F to 350°F (-59°C to 176°C)	400°F (232°C)	High	Excellent	High
Gylon <sup>°</sup>	Black	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.

Configuration Oil Seals

<b>Model 3</b> 	<b>Model 21</b> 	<b>Model 23</b> 	<b>Model 24</b> 	<b>Model 25</b> 	<b>Model 26</b> 	<b>Model 26-E</b> 	<b>Model 26-R1</b> 
<b>Model 53</b> 	<b>Model 53-F1</b> 	<b>Model 53-G1</b> 	<b>Model 53-R1</b> 	<b>Model 53-R2</b> 	<b>Model 53-T2</b> 	<b>Model 53-TB</b> 	<b>Model 53-TF</b> 
<b>Model 54</b> 	<b>Model 57</b> 	<b>Model 58</b> 	<b>Model 59</b> 	<b>Model 59-G1</b> 	<b>PS°-1</b> 	<b>PS°-1 Dbl Opposed</b> 	<b>PS°-1 Dbl Tandem</b> 
<b>PS°-1 Reverse Lip</b> 	<b>Model 62</b> 	<b>Model 63</b> 	<b>Model 63-F1</b> 	<b>Model 63-G1</b> 	<b>Model 63-R1</b> 	<b>Model 63-R2</b> 	<b>Model 63-T2</b> 
<b>Model 63-TB</b> 	<b>Model 63-TF</b> 	<b>Model 64</b> 	<b>Model 64-G1</b> 	<b>Model 71</b> 	<b>Model 76</b> 	<b>Model 87</b> 	<b>Model 88</b> 
<b>Model 91</b> 	<b>Model 92</b> 	<b>Model 94</b> 	<b>Model 111</b> 	<b>Model 113</b> 	<b>Model 123</b> 	<b>Model 143</b> 	<b>Model 145</b> 

Oil Seals Product Information

Large Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
<b>Model 26</b> 	<ul style="list-style-type: none"> <li>General purpose seal</li> <li>Solid or split design</li> <li>Reverse bevel lip design prevents lip rollover</li> <li>Reinforced rubber O.D.</li> <li>Single and dual lip configurations available</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	<ul style="list-style-type: none"> <li>0.750 to 60.000</li> <li>(19.0 to 1524.0)</li> </ul>	5,000 f/m (25.4 m/s)	Molded-in stainless steel finger	<ul style="list-style-type: none"> <li>0.015 @ 1,000 (0.38 @ 5.10)</li> <li>0.010 @ 2,000 (0.25 @ 10.20)</li> <li>0.008 @ 5,000 (0.20 @ 25.40)</li> </ul>	To 7 psi (0.4 bar) (N/A if split)
<b>Model 26R1</b> 	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Low-speed service</li> <li>Reverse bevel lip design prevents lip rollover</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	<ul style="list-style-type: none"> <li>0.750 to 60.000</li> <li>(19.0 to 1524.0)</li> </ul>	5,000 f/m (25.4 m/s)	Molded-in stainless steel finger	<ul style="list-style-type: none"> <li>0.015 @ 1,000 (0.38 @ 5.10)</li> <li>0.010 @ 2,000 (0.25 @ 10.20)</li> <li>0.008 @ 5,000 (0.20 @ 25.40)</li> </ul>	To 7 psi (0.4 bar) (N/A if split)
<b>Model 59</b> 	<ul style="list-style-type: none"> <li>Severe service assembled seal</li> <li>Heavy duty outer case</li> <li>Reverse bevel lip design prevents lip rollover</li> <li>Aggressive shaft-to-bore misalignment capability</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	<ul style="list-style-type: none"> <li>6.000 to 90.000</li> <li>(152.4 to 2286.0)</li> </ul>	5,000 f/m (25.4 m/s)	Molded-in stainless steel finger	<ul style="list-style-type: none"> <li>0.015 @ 1,000 (0.38 @ 5.10)</li> <li>0.010 @ 2,000 (0.25 @ 10.20)</li> <li>0.008 @ 5,000 (0.20 @ 25.40)</li> </ul>	To 7 psi (0.4 bar) (N/A if split)
<b>Model 59G1</b> 	<ul style="list-style-type: none"> <li>Severe service dual lip assembled seal</li> <li>GYLON® excluder lip for non-lubricated external conditions or corrosive external conditions</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	<ul style="list-style-type: none"> <li>6.000 to 40.000</li> <li>(152.4 to 1016.0)</li> </ul>	2,500 f/m (12.8 m/s)	Molded-in stainless steel finger	<ul style="list-style-type: none"> <li>0.015 @ 1,000 (0.38 @ 5.10)</li> <li>0.010 @ 2,000 (0.25 @ 10.20)</li> <li>0.008 @ 5,000 (0.20 @ 25.40)</li> </ul>	To 7 psi (0.4 bar) (N/A if split)
<b>Model 64®</b> 	<ul style="list-style-type: none"> <li>Severe service assembled seal</li> <li>Heavy duty metal outer case</li> <li>Unique carrier/garter spring combination</li> <li>Industry's highest shaft-to-bore misalignment capability</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	<ul style="list-style-type: none"> <li>8.000 to 90.000</li> <li>(203.2 to 2286.0)</li> </ul>	7,000 f/m (35.8 m/s)	Combination of stainless steel garter & stainless steel finger	<ul style="list-style-type: none"> <li>0.015 @ 1,000 (0.38 @ 5.10)</li> <li>0.010 @ 2,000 (0.25 @ 10.20)</li> <li>0.008 @ 5,000 (0.20 @ 25.40)</li> </ul>	To 7 psi (0.4 bar) (N/A if split)
<b>Model 64G1</b> 	<ul style="list-style-type: none"> <li>Severe service dual lip assembled seal</li> <li>GYLON® excluder lip for non-lubricated external conditions or corrosive external conditions</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	<ul style="list-style-type: none"> <li>8.000 to 55.000</li> <li>(203.2 to 1397.0)</li> </ul>	3,500 f/m (17.9 m/s)	Carrier/garter combination	<ul style="list-style-type: none"> <li>0.015 @ 1,000 (0.38 @ 5.10)</li> <li>0.010 @ 2,000 (0.25 @ 10.20)</li> <li>0.008 @ 5,000 (0.20 @ 25.40)</li> </ul>	To 7 psi (0.4 bar) (N/A if split)
<b>Model 87</b> 	<ul style="list-style-type: none"> <li>Severe service seal</li> <li>Metal reinforced rubber O.D.</li> <li>Reverse bevel lip design prevents lip rollover</li> <li>Aggressive shaft-to-bore misalignment capability</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	<ul style="list-style-type: none"> <li>6.000 to 48.000</li> <li>(152.4 to 1219.2)</li> </ul>	5,000 f/m (25.4 m/s)	Molded-in carbon steel garter	<ul style="list-style-type: none"> <li>0.015 @ 1,000 (0.38 @ 5.10)</li> <li>0.010 @ 2,000 (0.25 @ 10.20)</li> <li>0.008 @ 5,000 (0.20 @ 25.40)</li> </ul>	To 7 psi (0.4 bar) (N/A if split)
<b>Model 88</b> 	<ul style="list-style-type: none"> <li>Severe service seal</li> <li>Aggressive shaft-to-bore misalignment capability</li> <li>Metal reinforced rubber OD for positive bore retention</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	<ul style="list-style-type: none"> <li>6.000 to 48.000</li> <li>(152.4 to 1219.2)</li> </ul>	3,000 f/m (15.2 m/s)	Molded-in carbon steel garter	<ul style="list-style-type: none"> <li>0.015 @ 1,000 (0.38 @ 5.10)</li> <li>0.010 @ 2,000 (0.25 @ 10.20)</li> <li>0.008 @ 5,000 (0.20 @ 25.40)</li> </ul>	To 7 psi (0.4 bar) (N/A if split)

\* Most designs available without spring.

\* Most designs available in silicone and other materials.

Product Information Oil Seals

Small Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
 <b>Model 53</b>	<ul style="list-style-type: none"> <li>General purpose assembled seal</li> <li>Heavy-duty metal outer case</li> <li>Single and dual lip configurations available</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 90.000 (76.2 to 2286.0)	3,000 f/m (15.2 m/s)	Stainless steel finger	0.015 @ 1,000 (0.38 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20) 0.008 @ 5,000 (0.20 @ 25.40)	To 7 psi (0.4 bar)
 <b>Model 53G1</b>	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Gylon® excluder lip for non-lubricated external conditions or corrosive external conditons</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 7.60)	To 7 psi (0.4 bar)
 <b>Model 53R1</b>	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Dual lips oppose for exclusion and retention</li> <li>Spring in one element only</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20)	To 7 psi (0.4 bar)
 <b>Model 53R2</b>	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Dual lips oppose for exclusion and retention</li> <li>Spring in one element only</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	To 7 psi (0.4 bar)
 <b>Model 53TB</b>	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Lips set in tandem configuration</li> <li>Used for retention and exclusion</li> <li>Spring in both elements</li> <li>Carbon steel clamp</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	To 7 psi (0.4 bar)
 <b>Model 53TF</b>	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Lips set in tandem configuration</li> <li>Used for retention and exclusion</li> <li>Spring in both elements</li> <li>Carbon steel clamp</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	To 7 psi (0.4 bar)
 <b>Model 53T2</b>	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Lips set in tandem configuration</li> <li>Used for retention and exclusion</li> <li>Spring in both elements</li> <li>Carbon steel clamp</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	To 7 psi (0.4 bar)
 <b>Model 53F1</b>	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Heavy-duty metal outer case</li> <li>Felt excluder</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 5.10)	To 7 psi (0.4 bar)
 <b>Model 63</b>	<ul style="list-style-type: none"> <li>General purpose assembled seal</li> <li>Heavy-duty metal outer case</li> <li>Stainless steel finger spring</li> <li>Single and dual lip configurations available</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20) 0.005 @ 3,000 (0.13 @ 15.20)	To 7 psi (0.4 bar)

\* Most designs available without spring.

\* Most designs available in silicone and other materials.

## Oil Seals Product Information

Large Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
<b>Model 63G1</b> 	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Gylon® excluder lip for non-lubricated external conditions or corrosive external conditions</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	0.250 to 3.000 (6.4 to 76.2)	1,500 f/m (7.6 m/s)	Stainless steel finger	0.010 (0.25)	To 7 psi (0.4 bar)
<b>Model 63R1</b> 	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Dual lips oppose for exclusion and retention</li> <li>Spring in one element only</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	0.250 to 3.000 (6.4 to 76.2)	1,000 f/m (10.2 m/s)	Stainless steel finger	0.015 @ 1,000 (0.38 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20)	To 7 psi (0.4 bar)
<b>Model 63R2</b> 	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Dual lips oppose for exclusion and retention</li> <li>Spring in one element only</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	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 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	To 7 psi (0.4 bar)
<b>Model 63TB</b> 	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Non-sprung front lips serves as a baffle</li> <li>Lips set in tandem configuration</li> <li>Used for retention and exclusion</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	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 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	To 7 psi (0.4 bar)
<b>Model 63TF</b> 	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Non-sprung front lips serves as a baffle</li> <li>Lips set in tandem configuration</li> <li>Used for retention and exclusion</li> <li>Spring in both elements</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	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 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	To 7 psi (0.4 bar)
<b>Model 63T2</b> 	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Lips set in tandem configuration</li> <li>Used for retention and exclusion</li> <li>Spring in both elements</li> <li>Carbon steel clamp</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	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 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	To 7 psi (0.4 bar)
<b>Model 63F1</b> 	<ul style="list-style-type: none"> <li>General purpose dual lip seal</li> <li>Felt excluder</li> </ul>	<ul style="list-style-type: none"> <li>Tim ken N</li> <li>Tim ken ES</li> <li>Tim ken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	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 @ 2.50)	To 7 psi (0.4 bar)

Product Information Oil Seals

Small Seals Bonded Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
 <b>Model 71</b>	<ul style="list-style-type: none"> <li>General purpose bonded seal</li> <li>No spring</li> <li>Ideal for grease retention or contamination exclusion</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Fluoroelastomer</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 400°F (204°C)</li> </ul>	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 @ 5.10)	To 7 psi (0.4 bar)
 <b>Model 76</b>	<ul style="list-style-type: none"> <li>Special purpose bonded seal</li> <li>Metal outer case</li> <li>Garter spring construction</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Fluoroelastomer</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 400°F (204°C)</li> </ul>	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 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20) 0.005 @ 3,000 (0.13 @ 15.20)	To 7 psi (0.4 bar)
 <b>Model 91</b>	<ul style="list-style-type: none"> <li>General purpose bonded seal</li> <li>No spring</li> <li>Ideal for grease retention or contamination exclusion</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Fluoroelastomer</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 400°F (204°C)</li> </ul>	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 @ 5.10)	To 7 psi (0.4 bar)
 <b>Model 92</b>	<ul style="list-style-type: none"> <li>General purpose bonded seal</li> <li>Metal outer case</li> <li>Garter spring construction</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Fluoroelastomer</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 400°F (204°C)</li> </ul>	3.000 to 15.000 (76.2 to 381.0)	1,000 f/m (5.1 m/s)	Carbon steel garter	0.010 @ 500 (0.25 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10) -22°F (-30°C) to 400°F (204°C)	To 7 psi (0.4 bar)
 <b>Model 94</b>	<ul style="list-style-type: none"> <li>General purpose bonded seal</li> <li>Metal outer case</li> <li>Dual lip design</li> <li>Garter spring construction</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Fluoroelastomer</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 400°F (204°C)</li> </ul>	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 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20) 0.005 @ 3,000 (0.13 @ 15.20)	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
 <b>Model 21</b>	<ul style="list-style-type: none"> <li>General purpose split seal</li> <li>Low-speed service</li> <li>Cover plate required</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	3.000 to 15.000 (76.2 to 381.0)	1,000 f/m (5.1 m/s)	Mold-in stainless steel finger	0.010 @ 500 (0.25 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	N/A
 <b>Model 23</b>	<ul style="list-style-type: none"> <li>General service split seal</li> <li>Cover plate required</li> <li>Over 300,000 sizes readily available</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	3.000 to 15.000 (76.2 to 381.0)	1,000 f/m (5.1 m/s)	Mold-in stainless steel finger	0.010 @ 1,000 (0.25 @ 5.10) 0.005 @ 2,000 (0.13 @ 10.20)	N/A
 <b>Model 24</b>	<ul style="list-style-type: none"> <li>Special purpose split seal for tapered housing grooves</li> <li>Low-speed service</li> <li>Tapered O.D.</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	3.000 to 15.000 (76.2 to 381.1)	1,000 f/m (5.1 m/s)	Mold-in stainless steel finger	0.010 @ 500 (0.25 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	N/A
 <b>Model 25</b>	<ul style="list-style-type: none"> <li>PTFE split seal</li> <li>Low-speed service</li> <li>Excellent chemical resistance</li> <li>Cover plate required</li> </ul>	<ul style="list-style-type: none"> <li>PTFE</li> </ul>	<ul style="list-style-type: none"> <li>-120°F (-85°C) to 400°F (205°C)</li> </ul>	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 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	N/A

\* Most designs available without spring.

\* Most designs available in silicone and other materials.

## Oil Seals Product Information

Split Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
 <b>Model 26</b>	<ul style="list-style-type: none"> <li>General purpose bonded seal</li> <li>No spring</li> <li>Ideal for grease retention or contamination exclusion</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20) 0.008 @ 5,000 (0.20 @ 25.40)	To 7 psi (0.4 bar)
 <b>Model 26R1</b>	<ul style="list-style-type: none"> <li>Special purpose bonded seal</li> <li>Metal outer case</li> <li>Garter spring construction</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20) 0.008 @ 5,000 (0.20 @ 25.40)	To 7 psi (0.4 bar)
Excluder Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
 <b>Model 143</b>	<ul style="list-style-type: none"> <li>General purpose bonded seal</li> <li>No spring</li> <li>Ideal for grease retention or contamination exclusion</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Timken ES</li> <li>Timken V</li> </ul>	200°F (93°C) -40°F (-40°C) to 400°F (204°C)	5.000 (7.1 to 127.0)	(5.1 m/s)			
 <b>Model 145A</b>	<ul style="list-style-type: none"> <li>General purpose bonded seal</li> <li>Metal outer case</li> <li>Garter spring construction</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Fluoroelastomer</li> </ul>	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 400°F (204°C)	3.000 to 15.000 (76.2 to 381.0)	1,000 f/m (5.1 m/s)	N/A	N/A	N/A
 <b>Model 145A1</b>	<ul style="list-style-type: none"> <li>General purpose bonded seal</li> <li>Metal outer case</li> <li>Dual lip design</li> <li>Garter spring construction</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-40°F (-40°C) to 200°F (93°C) -40°F (-40°C) to 400°F (204°C)	0.438 to 7.375 (11.1 to 187.3)	3,000 f/m (15.2 m/s)	Stainless steel garter	N/A	N/A
 <b>Model 145A2</b>	<ul style="list-style-type: none"> <li>General purpose split seal</li> <li>Low-speed service</li> <li>Cover plate required</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 garter	N/A	N/A
 <b>Model 145L</b>	<ul style="list-style-type: none"> <li>General service split seal</li> <li>Cover plate required</li> <li>Over 300,000 sizes readily available</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Fluoroelastomer</li> </ul>	-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)	N/A	N/A	N/A
 <b>Model 145S</b>	<ul style="list-style-type: none"> <li>Special purpose split seal for tapered housing grooves</li> <li>Low-speed service</li> <li>Tapered O.D.</li> </ul>	<ul style="list-style-type: none"> <li>Nitrile</li> <li>Fluoroelastomer</li> </ul>	-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)	N/A	N/A	N/A

\* Most designs available without spring.

\* Most designs available in silicone and other materials.

Product Information Oil Seals

Excluder Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
 <b>Model 26E</b>	<ul style="list-style-type: none"> <li>General purpose external seal</li> <li>Solid design</li> <li>Reverse bevel lip design prevents lip rollover</li> <li>Reinforced rubber OD</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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	0.015 @ 1,000 (0.38 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20) 0.008 @ 5,000 (0.20 @ 25.40)	To 7 psi (0.4 bar)
 <b>Model 111</b>	<ul style="list-style-type: none"> <li>Heavy-duty metal outer case</li> <li>Low speed service</li> <li>Assembled design</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 2.50) 0.005 @ 1,000 (0.13 @ 5.10)	To 7 psi (0.4 bar)
 <b>Model 113</b>	<ul style="list-style-type: none"> <li>Heavy-duty metal outer case</li> <li>Assembled design</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20) 0.005 @ 3,000 (0.13 @ 15.20)	To 7 psi (0.4 bar)
 <b>Model 123</b>	<ul style="list-style-type: none"> <li>Heavy-duty metal outer case</li> <li>Assembled design</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	-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 @ 5.10) 0.010 @ 2,000 (0.25 @ 10.20) 0.005 @ 3,000 (0.13 @ 15.20)	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
 <b>P/S® Single Lip</b>	<ul style="list-style-type: none"> <li>General purpose assembled seal for high pressure applications</li> <li>Gylon® element offers excellent chemical resistance</li> <li>Dry running up to 700 fpm (3.5 m/s)</li> </ul>	<ul style="list-style-type: none"> <li>Gylon®</li> <li>FDA Gylon®</li> </ul>	-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)	0.438 to 20.000 (11.1 to 508.0) max seal O.D.	2,000 f/m (10.2 m/s)	N/A	0.005 @ 2,000 (0.13 @ 10.20)	150 psi (10 bar)
 <b>P/S® Single Lip Reverse</b>	<ul style="list-style-type: none"> <li>General purpose assembled seal for high pressure applications</li> <li>Gylon® element offers excellent chemical resistance</li> <li>Dry running up to 700 fpm (3.5 m/s)</li> </ul>	<ul style="list-style-type: none"> <li>Gylon®</li> <li>FDA Gylon®</li> </ul>	-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)	0.438 to 20.000 (11.1 to 508.0) max seal O.D.	2,000 f/m (10.2 m/s)	N/A	0.005 @ 2,000 (0.13 @ 10.20)	150 psi (10 bar)
 <b>P/S® Dual Opposed</b>	<ul style="list-style-type: none"> <li>General purpose assembled seal for high pressure applications</li> <li>Gylon® element offers excellent chemical resistance</li> <li>Dry running up to 700 fpm (3.5 m/s)</li> </ul>	<ul style="list-style-type: none"> <li>Gylon®</li> <li>FDA Gylon®</li> </ul>	-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)	0.438 to 20.000 (11.1 to 508.0) max seal O.D.	2,000 f/m (10.2 m/s)	N/A	0.005 @ 2,000 (0.13 @ 10.20)	150 psi (10 bar)
 <b>P/S® Dual Tandem</b>	<ul style="list-style-type: none"> <li>General purpose assembled seal for high pressure applications</li> <li>Gylon® element offers excellent chemical resistance</li> <li>Dry running up to 700 fpm (3.5 m/s)</li> </ul>	<ul style="list-style-type: none"> <li>Gylon®</li> <li>FDA Gylon®</li> </ul>	-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)	0.438 to 20.000 (11.1 to 508.0) max seal O.D.	2,000 f/m (10.2 m/s)	N/A	0.005 @ 2,000 (0.13 @ 10.20)	150 psi (10 bar)

\* Most designs available without spring.

\* Most designs available in silicone and other materials.

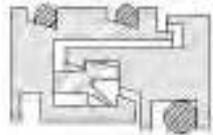
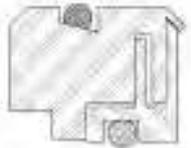
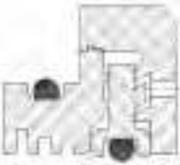
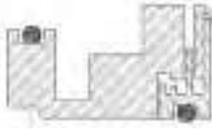
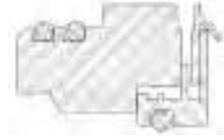
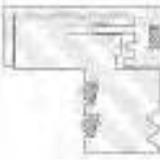
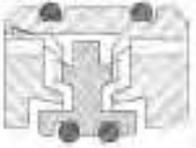
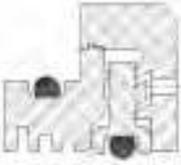
Oil Seals Product Information

Specialty Seals	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Spring Type	Misalign. in. @ f/m (mm@m/s)	Pressure
 <p><b>Model 26HR</b></p>	<ul style="list-style-type: none"> <li>General purpose seal for high misalignment applications</li> <li>Low-speed service</li> <li>Increased misalignment capability over standard 26</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	1.000 to 5.000 (25.4 to 127.0)	1,000 f/m (5.1 m/s)	Molded-in carbon steel garter	Application dependent	To 7 psi (0.4 bar)
 <p><b>Model 50</b></p>	<ul style="list-style-type: none"> <li>General purpose seal</li> <li>Low-speed service</li> <li>Moderate pressure</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> </ul>	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)
 <p><b>Model 54</b></p>	<ul style="list-style-type: none"> <li>Special purpose assembled seal</li> <li>Excluder seal</li> <li>Designed for spherical bearing applications</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> </ul>	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)
 <p><b>Model 57</b></p>	<ul style="list-style-type: none"> <li>General purpose seal</li> <li>Metal reinforced rubber O.D.</li> <li>Reverse bevel lip design prevents lip rollover</li> <li>Available in single &amp; dual lip</li> <li>Ideal for slow-speed service applications (continuous casters)</li> </ul>	<ul style="list-style-type: none"> <li>Timken N</li> <li>Timken ES</li> <li>Timken V</li> </ul>	<ul style="list-style-type: none"> <li>-40°F (-40°C) to 200°F (93°C)</li> <li>-40°F (-40°C) to 300°F (150°C)</li> <li>-22°F (-30°C) to 400°F (204°C)</li> </ul>	2.000 to 12.000 (50.8 to 304.8)	500 f/m (2.5 m/s)	Molded-in carbon steel garter	0.015 @ 500 (0.38 @ 2.50)	To 7 psi (0.4 bar)
 <p><b>Model 58</b></p>	<ul style="list-style-type: none"> <li>High-temp, general purpose assembled seal</li> <li>Stainless steel outer case</li> <li>THERMO-CERAM™ sealing element</li> <li>Ideal for abrasive environments</li> <li>Grease lubricated apps only</li> </ul>	<ul style="list-style-type: none"> <li>THERMO-CERAM™</li> </ul>	<ul style="list-style-type: none"> <li>To 1600°F (871°C)</li> </ul>	2.000 to 12.000 (50.8 to 304.8)	500 f/m (2.5 m/s)	N/A	0.015 @ 500 (0.38 @ 2.50)	Ambient
 <p><b>Model 62</b></p>	<ul style="list-style-type: none"> <li>Assembled seal</li> <li>Solid design</li> <li>Low-speed service</li> <li>Excellent chemical resistance</li> </ul>	<ul style="list-style-type: none"> <li>PTFE</li> </ul>	<ul style="list-style-type: none"> <li>-120°F (-85°C) to 400°F (205°C)</li> </ul>	0.437 to 20.000 (11.1 to 508.0) in max seal O.D.	2,000 f/m (10.2 m/s)	Carbon steel garter	0.005 @ 2,000 (0.13 @ 10.20)	To 7 psi (0.4 bar)

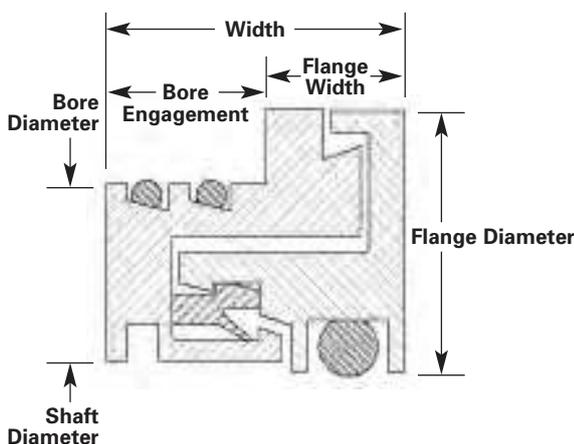
\* Most designs available without spring.

\* Most designs available in silicone and other materials.

Configurations Bearing Isolators

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

**Bearing Isolators Configurations**



<b>Metallic Isolator Seal Sizes Code Prefix</b>	<b>Description</b>	<b>Material</b>	<b>Width</b>	<b>Flange Width</b>	<b>Bore Engagement</b>
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
<b>Metallic Isolator (Microcellular Filter) Seal Sizes Code Prefix</b>	<b>Description</b>	<b>Material</b>	<b>Width</b>	<b>Flange Width</b>	<b>Bore Engagement</b>
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
<b>Non-Metallic Isolator (Glass-Filled PTFE) Seal Sizes Code Prefix</b>	<b>Description</b>	<b>Material</b>	<b>Width</b>	<b>Flange Width</b>	<b>Bore Engagement</b>
29500	Standard Style 2 O.D. 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	0.625
29520	Vertical	Glass-Filled PTFE	0.760	0.385	0.375
29521	Vertical - Two O.D. O-Rings	Glass-Filled PTFE	0.885	0.385	0.500
<b>Non-Metallic Isolator (Graphite-Filled PTFE) Seal Sizes Code Prefix</b>	<b>Description</b>	<b>Material</b>	<b>Width</b>	<b>Flange Width</b>	<b>Bore Engagement</b>
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	0.625	0.250	0.375

Product Information **Bearing Isolators**

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
<b>Standard, Small Flanged</b> 	<ul style="list-style-type: none"> <li>Meets NEMA MG 1-2003</li> <li>Meets IEEE 841-2001 test standards</li> <li>Conforms to API 610</li> <li>No arbor press required for installation</li> <li>No internal metal-to-metal contact</li> <li>Small O.D. of flange does not interfere with equipment</li> </ul>	<ul style="list-style-type: none"> <li>Bronze or 316 stainless steel construction</li> <li>Filled PTFE unitizing ring</li> <li>Fluoroelastomer</li> </ul>	-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
<b>Small Cross Section, Short Flange</b> 	<ul style="list-style-type: none"> <li>Meets NEMA MG 1-2003</li> <li>Meets IEEE 841-2001 test standards</li> <li>Conforms to API 610</li> <li>No arbor press required for installation</li> <li>No internal metal-to-metal contact</li> <li>Fits in c/s as small as 0.188" (4.76mm)</li> <li>Short flange width does not interfere with equipment</li> </ul>	<ul style="list-style-type: none"> <li>Bronze or 316 stainless steel construction</li> <li>Filled PTFE unitizing ring</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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
<b>Flangeless Narrow Width</b> 	<ul style="list-style-type: none"> <li>Meets NEMA MG 1-2003</li> <li>Meets IEEE 841-2001 test standards</li> <li>No arbor press required for installation</li> <li>No internal metal-to-metal contact</li> <li>Flangeless design fits in spaces as narrow as 0.375" (9.53mm)</li> </ul>	<ul style="list-style-type: none"> <li>Bronze or 316 stainless steel construction</li> <li>Filled PTFE unitizing ring</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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
<b>Flangeless</b> 	<ul style="list-style-type: none"> <li>Meets NEMA MG 1-2003</li> <li>Meets IEEE 841-2001 test standards</li> <li>Conforms to API 610</li> <li>No arbor press required for installation</li> <li>No internal metal-to-metal contact</li> <li>Does not extend past face of housing</li> </ul>	<ul style="list-style-type: none"> <li>Bronze or 316 stainless steel construction</li> <li>Filled PTFE unitizing ring</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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
<b>Split Pillow Block</b> 	<ul style="list-style-type: none"> <li>Meets NEMA MG 1-2003</li> <li>Meets IEEE 841-2001 test standards</li> <li>Conforms to API 610</li> <li>No arbor press required for installation</li> <li>No internal metal-to-metal contact</li> <li>Standard and custom design for split pillow blocks</li> </ul>	<ul style="list-style-type: none"> <li>Bronze or 316 stainless steel construction</li> <li>Filled PTFE unitizing ring</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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
<b>Step Shaft</b> 	<ul style="list-style-type: none"> <li>Meets NEMA MG 1-2003</li> <li>Surpasses IEEE 841-2001 test standards</li> <li>Conforms to API 610</li> <li>No arbor press required for installation</li> <li>No internal metal-to-metal contact</li> <li>Custom designed for individual step shaft applications</li> </ul>	<ul style="list-style-type: none"> <li>Bronze or 316 stainless steel construction</li> <li>Filled PTFE unitizing ring</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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
<b>Vertical, Small Cross Section</b> 	<ul style="list-style-type: none"> <li>Meets NEMA MG 1-2003</li> <li>Surpasses IEEE 841-2001 test standards</li> <li>Conforms to API 610</li> <li>No arbor press required for installation</li> <li>No internal metal-to-metal contact</li> <li>Fits in c/s as small as 0.188 in. (4.76mm)</li> <li>Vertical design for top applications only</li> </ul>	<ul style="list-style-type: none"> <li>Bronze or 316 stainless steel construction</li> <li>Filled PTFE unitizing ring</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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

**Bearing Isolators** Product Information

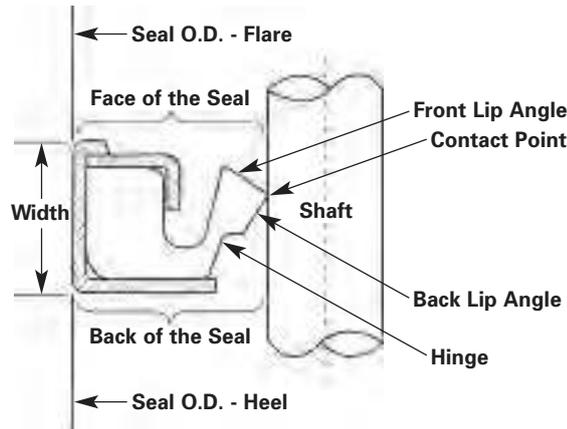
Metallic Isolator (Microcellular Filter)	Features	Materials	Temperature	Shaft Diameter in. (mm)	Surface Speed	Axial Motion in. (mm)	Misalign. & Runout in. @ f/m (mm@m/s)	Pressure
 <p><b>Standard</b></p> <ul style="list-style-type: none"> <li>• Unique microcellular technology</li> <li>• Protects against severely dusty environments</li> <li>• Meets NEMA MG 1-2003</li> <li>• Surpasses IEEE 841-2001 test standards</li> <li>• Conforms to API 610</li> <li>• No arbor press required for installation</li> <li>• No internal metal-to-metal contact</li> </ul>	<ul style="list-style-type: none"> <li>• Bronze or 316 stainless steel construction</li> <li>• Silicone foam</li> <li>• Filled PTFE unitizing ring</li> <li>• Fluoroelastomer O-ring standard</li> </ul>	-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	
 <p><b>Flangeless</b></p> <ul style="list-style-type: none"> <li>• Unique microcellular technology</li> <li>• Protects against severely dusty environments</li> <li>• Meets NEMA MG 1-2003</li> <li>• Meets IEEE 841-2001 test standards</li> <li>• Conforms to API 610</li> <li>• No arbor press required for installation</li> <li>• No internal metal-to-metal contact</li> <li>• Does not extend past face housing</li> </ul>	<ul style="list-style-type: none"> <li>• Bronze construction</li> <li>• Silicone foam</li> <li>• Filled PTFE unitizing ring</li> <li>• Fluoroelastomer O-rings standard</li> </ul>	-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 (0.38)	±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
 <p><b>Standard</b></p> <ul style="list-style-type: none"> <li>• Filled PTFE construction</li> <li>• Excellent chemical resistance</li> <li>• Meets NEMA MG 1-2003</li> <li>• Meets IEEE 841-2001 test standards</li> <li>• No arbor press required for installation</li> </ul>	<ul style="list-style-type: none"> <li>• FDA compliant blue glass filled PTFE</li> <li>• Fluoroelastomer O-rings standard</li> </ul>	-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	
 <p><b>Small C/S</b></p> <ul style="list-style-type: none"> <li>• Filled PTFE construction</li> <li>• Excellent chemical resistance</li> <li>• Meets NEMA MG 1-2003</li> <li>• Meets IEEE 841-2001 test standards</li> <li>• No arbor press required for installation</li> <li>• Fits in c/s as small as 0.188" (4.76mm)</li> </ul>	<ul style="list-style-type: none"> <li>• FDA compliant blue glass filled PTFE</li> <li>• Fluoroelastomer O-rings standard</li> </ul>	-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	
 <p><b>Flangeless</b></p> <ul style="list-style-type: none"> <li>• Filled PTFE construction</li> <li>• Excellent chemical resistance</li> <li>• Meets NEMA MG 1-2003</li> <li>• Meets IEEE 841-2001 test standards</li> <li>• No arbor press required for installation</li> <li>• Does not extend past face of housing</li> </ul>	<ul style="list-style-type: none"> <li>• FDA compliant blue glass filled PTFE</li> <li>• Fluoroelastomer O-rings standard</li> </ul>	-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	
 <p><b>Grease Purgeable</b></p> <ul style="list-style-type: none"> <li>• Filled PTFE construction</li> <li>• Excellent chemical resistance</li> <li>• Meets NEMA MG 1-2003</li> <li>• Meets IEEE 841-2001 test standards</li> <li>• No arbor press required for installation</li> <li>• Relief in seal allows regreasing with no disassembly of equipment</li> </ul>	<ul style="list-style-type: none"> <li>• FDA compliant blue glass filled PTFE</li> <li>• Fluoroelastomer O-rings standard</li> </ul>	-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	
 <p><b>Split Pillow Block</b></p> <ul style="list-style-type: none"> <li>• Filled PTFE construction</li> <li>• Excellent chemical resistance</li> <li>• Meets NEMA MG 1-2003</li> <li>• Meets IEEE 841-2001 test standards</li> <li>• No arbor press required for installation</li> <li>• Standard and custom design for split pillow blocks</li> </ul>	<ul style="list-style-type: none"> <li>• FDA compliant blue glass filled PTFE</li> <li>• Fluoroelastomer O-rings standard</li> </ul>	-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	

Product Information **Bearing Isolators**

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
<b>Step Shaft</b> 	<ul style="list-style-type: none"> <li>Filled PTFE construction</li> <li>Excellent chemical resistance</li> <li>Meets NEMA MG 1-2003</li> <li>Meets IEEE 841-2001 test standards</li> <li>No arbor press required for installation</li> <li>Custom designed for individual stepshaft applications</li> </ul>	<ul style="list-style-type: none"> <li>FDA compliant blue glass filled PTFE</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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
<b>Vertical</b> 	<ul style="list-style-type: none"> <li>Filled PTFE construction</li> <li>Excellent chemical resistance</li> <li>Meets NEMA MG 1-2003</li> <li>Meets IEEE 841-2001 test standards</li> <li>No arbor press required for installation</li> <li>Two O.D. O-Rings for increased retention in the bore</li> <li>Vertical design for top applications only</li> </ul>	<ul style="list-style-type: none"> <li>FDA compliant blue glass filled PTFE</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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
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
<b>Standard</b> 	<ul style="list-style-type: none"> <li>Excellent chemical resistance</li> <li>Multi-position capability</li> <li>No arbor press required for installation</li> <li>Unique pumping/fanning action</li> </ul>	<ul style="list-style-type: none"> <li>Graphite-filled PTFE</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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
<b>Standard C/S</b> 	<ul style="list-style-type: none"> <li>Excellent chemical resistance</li> <li>Multi-position capability</li> <li>No arbor press required for installation</li> <li>Unique pumping/fanning action</li> <li>Designed to fit small c/s with no equipment modification</li> </ul>	<ul style="list-style-type: none"> <li>Graphite-filled PTFE</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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
<b>Flangeless</b> 	<ul style="list-style-type: none"> <li>Excellent chemical resistance</li> <li>Multi-position capability</li> <li>No arbor press required for installation</li> <li>Unique pumping/fanning action</li> <li>Does not extend past face of housing</li> </ul>	<ul style="list-style-type: none"> <li>Graphite-filled PTFE</li> <li>Fluoroelastomer O-rings standard</li> </ul>	-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.

## Glossary



<b>Assembled Seal:</b>	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.	<b>Elastomer:</b>	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.
<b>Axial Clearance:</b>	Gap between element heel and seal lip.	<b>End Play:</b>	Measurement of axial movement allowed, in reference to the shaft on which the seal lip comes into contact.
<b>Back Lip Angle:</b>	Angle seen from the back of the seal coinciding with the seal interface.	<b>Face Lip Angle:</b>	Angle seen from the face of the seal coinciding with the seal interface.
<b>Bearing Isolator:</b>	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.	<b>Fluid Side:</b>	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.
<b>Bonded Seal:</b>	Assembly in which the insert and/or spring is bonded to the elastomer sealing element.	<b>Garter Spring:</b>	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.
<b>Contact Point:</b>	Interface where sealing element reacts with the shaft or bore housing.	<b>Heel:</b>	Part of lip seal case located tangent to the back of the seal.
<b>Contact Line Height:</b>	Axial distance from seal face to contact point.	<b>Hinge:</b>	Point at which the seal lip pivots around the seal assembly.
<b>Contact Width:</b>	Amount of area reacting dynamically in the axial direction.	<b>Housing Bore:</b>	Cylindrical surface that mates with the OD of a standard lip seal's outer case or an external lip seal's contact lip.
<b>Dynamic Runout:</b>	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.	<b>Inclusion:</b>	Retaining lubricant by facing the seal in toward the lubricant.

## Glossary

<b>Inner Case:</b>	Rigid, cup-shaped component within a seal assembly that is used as a reinforcing member, shield, spring retainer and/or lip clamping device.	<b>Seal Outer Diameter (O.D.):</b>	External diameter of the lip seal assembly that interfaces with the housing bore diameter.
<b>Labyrinth Seal:</b>	Sealing product that uses an intricate pathway to exclude debris and retain lubrication.	<b>Shaft Eccentricity:</b>	Radial distance describing how much the geometric centerline of the shaft is displaced from the axis of the shaft rotation.
<b>Lip Diameter:</b>	Inner-most diameter of the seal lip, measured with the spring installed.	<b>Shaft Lead:</b>	Helical grooves in a shaft surface that are caused by relative axial movement of the grinding wheel to shaft.
<b>Lip Load:</b>	Radial force exerted by the seal lip geometry and spring loading. Expressed as force per unit of shaft circumference.	<b>"Slip-Stick":</b>	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.
<b>Lip Seal:</b>	Elastomeric element that prevents leakage in dynamic and static applications through means of geometry and loading.	<b>Spring Groove:</b>	A semicircular depression in the head section of a seal that accommodates the garter spring.
<b>Lubricant Starvation:</b>	Inadequate lubrication at the seal interface which causes premature wear of seals.	<b>Spring Retaining Lip:</b>	Section of the primary lip that restricts axial movement of the extension spring from its proper position.
<b>Offset:</b>	Radial distance between the centerlines of the seal bore and the shaft rotation.	<b>Surface Finish:</b>	Quality, appearance and characteristics of a shaft surface due to processing such as grinding, burnishing, etc. [See SAE J488a (June 1963)]
<b>Outer Case:</b>	Rigid structure of lip-seal assembly that houses all components of the seal assembly.	<b>Unidirectional/Unirotational Seal:</b>	Type of seal designed for applications in which the shaft rotates in only one direction.
<b>Plunge Ground:</b>	Surface texture of a shaft or wear sleeve produced by using a grinding wheel perpendicular to the rotating shaft, without axial motion.	<b>Unitized Seal:</b>	Seal assembly in which all the parts are retained in a single package.
<b>Primary Lip:</b>	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.	<b>Volume Swell:</b>	Increase in seal size due to the absorption of fluid by the elastomer. Usually leads to signs of incompatibility.
<b>Radial Lip Seal:</b>	Assembly containing an elastomeric element that prevents leakage in dynamic and static applications through means of geometry and loading.	<b>Wear Sleeve:</b>	Replaceable metal sleeve used in assemblies to prevent grooving from contamination at the seal-shaft interface.
<b>Radial Load:</b>	Radial force exerted by the seal lip geometry and spring loading. Expressed as a force per unit of shaft circumference.	<b>Weepage:</b>	Small amount of liquid leakage from a seal.
<b>Roughness:</b>	Anomalies in the surface texture of the shaft which result from the manufacturing process. [See SAE J448a (June 1963)]		
<b>Seal Case:</b>	Rigid member to which the elastomeric element is attached.		

## Oil Seals Appendix A – Product Identification by Model Number

Model	Prefix	Seal Material	Description
21	25001	Timken N	SPLIT
	25002	SILICONE (SIL)	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	24678	Timken N	EXTERNAL SPLIT
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
	21486	Timken N	BRASS BUTTONS
	21619	Timken N	
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
53R2	22627	Timken N	STD
	22634	Timken ES	STD
	23708	Timken V	STD

Model	Prefix	Seal Material	Description
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
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 <sup>®</sup> I	24060	GYLON	GYLON LIP, FLUORO GSKT
	24062	GYLON	DBL TANDEM, GYLON LIP, FLUORO GSKT
	24063	GYLON	DBL OPPOSED, GYLON LIP, FLUORO GSKT
	24076 DT	FDA GYLON	DBL TANDEM, FDA GYLON LIP, FLUORO GSKT
	24125 Std	FDA GYLON	FDA GYLON LIP, FLUORO GSKT
	24128 DO	FDA GYLON	DBL OPPOSED, FDA GYLON LIP, FLUORO GSKT
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
	23503	Timken V	GYLON EXCLUDER LIP
63R1	23052	Timken ES	DUAL OPPOSED LIP - SINGLE SPRING
	23547	Timken N	DUAL OPPOSED LIP - SINGLE SPRING
	23548	Timken N	DUAL OPPOSED LIP - DUAL SPRING
63R2	23627	Timken V	DUAL OPPOSED LIP - DUAL SPRING
	23769	Timken ES	DUAL OPPOSED LIP - DUAL SPRING
63T2	23550	Timken N	DUAL TANDEM LIP - DUAL SPRING
	23552	Timken V	DUAL TANDEM LIP - DUAL SPRING

• Note: Please see Appendix B on page 30 for obsolete seal model to part number conversions.

Appendix A – Product Identification by Model Number **Oil Seals**

Model	Prefix	Seal Material	Description
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
	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	NITRILE (NIT)	BONDED
	27685	FLUROELASTOMER	BONDED
111	21011	Timken N	EXTERNAL
113	21012	Timken N	EXTERNAL
123	21016	Timken N	EXTERNAL

Model	Prefix	Seal Material	Description
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	FLUROELASTOMER	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
145A	21758	NITRILE (NIT)	SPECIAL
	21761	FLUROELASTOMER	SPECIAL
145A1	21700	NITRILE (NIT)	STD
	21712	Timken	STD
	21722	FLUROELASTOMER	STD
145A2	21750	NITRILE (NIT)	STD
	21751	FLUROELASTOMER	STD
	21754	Timken	STD
145L	21738	FLUROELASTOMER	SPECIAL
	21748	NITRILE (NIT)	SPECIAL
145S	21749	NITRILE (NIT)	SPECIAL

• Note: Please see Appendix B on page 30 for obsolete seal model to part number conversions.

**Oil Seals** Appendix A – Product Identification by Model Number

Model	Prefix	Description
<b>Non-Metallic Isolator (Graphite Filled PTFE)</b>	24801	STANDARD DESIGN, NO FLANGE
	24802	STANDARD DESIGN, 1/4" FLANGE
	24807	NARROW CROSS-SECTION DESIGN, 3/8" FLANGE
<b>Metallic Isolator</b>	29602	STANDARD CONFIGURATION - .325" FLANGE
	29604	STANDARD CONFIGURATION - .325" FLANGE - 316SS
	29606	NARROW CROSS SECTION - .375" FLANGE - 316SS
	29607	NARROW CROSS SECTION - .375" FLANGE
	29608	NARROW CROSS SECTION - .250" FLANGE
	29609	NO FLANGE - SPECIAL .375" WIDTH
	29610	29602 VERSION - FLANGE DIAMETER 0.020" OVER BORE DIAMETER
	29611	NO FLANGE - SPECIAL .375" WIDTH - 316SS
	29612	NO FLANGE - 316SS
	29616	SPLIT PILLOW BLOCK
	29619	NO FLANGE
	29620	VERTICAL 2 O-RINGS ON O.D.
	29621	VERTICAL 1 O-RING ON O.D.

Model	Prefix	Description
<b>Metallic Isolator (Microcellular)</b>	29102	STANDARD CONFIGURATION - .325" FLANGE
	29106	STANDARD - 316SS
	29119	NO FLANGE
<b>Non-Metallic Isolator (Glass Filled PTFE)</b>	29500	1/4" FLANGE - 3/4" WIDE FOR CROSS SECTION 1/2" OR MORE
	29502	3/8" FLANGE - ONE O-RING ON O.D. - 3/4" WIDE
	29507	3/8" FLANGE - ONE O-RING ON O.D. - 5/8" WIDE
	29516	SPLIT PILLOW BLOCK DESIGN
	29518	GREASE PURGE DESIGN
	29519	STANDARD NO FLANGE DESIGN
	29520	STD VERTICAL DESIGN - ONE O-RING ON O.D.
	29521	STANDARD VERTICAL DESIGN - TWO O-RINGS ON O.D.

• Note: Please see Appendix B on page 30 for obsolete seal model to part number conversions.

Appendix A – Product Identification by Model Number **Oil Seals**

Prefix	Model	Seal Material	Description
21003	58	THERMO-CERAM	STANDARD CONFIGURATION
21011	111	Timken N	EXTERNAL
21012	113	Timken N	EXTERNAL
21016	123	Timken NE	EXTERNAL
21020	50	Timken N	GARTER SPRING
21022	51	Timken N	METAL BUTTONS
21086	53	Timken N	STANDARD CONFIGURATION
21095	53	SILICONE (VMQ)	STANDARD CONFIGURATION
21096	53	Timken ES	STANDARD CONFIGURATION
21140	54	Timken N	STANDARD CONFIGURATION
21158	63	Timken N	STANDARD CONFIGURATION
21168	63	SILICONE (VMQ)	STANDARD CONFIGURATION
21238	64	Timken N	STANDARD CONFIGURATION
21243	64	SILICONE (VMQ)	STANDARD CONFIGURATION
21247	64	Timken ES	STANDARD CONFIGURATION
21290	63	Timken ES	STANDARD CONFIGURATION
21332	143	Timken N	MODEL 142 ELEMENT, FACE SEAL WITH HOSE CLAMP
21333	143	Timken N	MODEL 145A2 ELEMENT, FACE SEAL WITH HOSE CLAMP
21334	143	Timken ES	MODEL 145A2 ELEMENT, FACE SEAL WITH HOSE CLAMP
21335	143	Timken VM	MODEL 145A2 ELEMENT, FACE SEAL WITH HOSE CLAMP
21339	143	Timken ES	MODEL 145A1 ELEMENT, FACE SEAL WITH HOSE CLAMP
21340	143	Timken N	MODEL 145A1 ELEMENT, FACE SEAL WITH HOSE CLAMP
21486	51	Timken N	BRASS BUTTONS
21619	51	Timken N	STANDARD CONFIGURATION
21695	63	Timken V	STANDARD CONFIGURATION
21699	53	Timken V	STANDARD CONFIGURATION
21700	145A1	Timken N	STANDARD CONFIGURATION
21702	62	PTFE	STANDARD CONFIGURATION

Prefix	Model	Seal Material	Description
21712	145A1	Timken ES	STANDARD CONFIGURATION
21722	145A1	Timken V	STANDARD CONFIGURATION
21738	145L	FLUOROELASTOMER	SPECIAL
21748	145L	NITRILE (NBR)	SPECIAL
21749	145S	NITRILE (NBR)	SPECIAL
21750	145A2	Timken N	STANDARD CONFIGURATION
21751	145A2	Timken V	STANDARD CONFIGURATION
21754	145A2	Timken ES	STANDARD CONFIGURATION
21758	145A	Timken N	SPECIAL
21761	145A	FLUOROELASTOMER	SPECIAL
21852	64	Timken V	STANDARD CONFIGURATION
22503	64G1	Timken N	GYLON EXCLUDER LIP
22504	64G1	Timken ES	GYLON EXCLUDER LIP
22505	64G1	Timken V	GYLON EXCLUDER LIP
22543	53F1	Timken V	STANDARD CONFIGURATION
22544	53F1	Timken ES	STANDARD CONFIGURATION
22627	53R2	Timken N	STANDARD CONFIGURATION
22634	53R2	Timken ES	STANDARD CONFIGURATION
22897	53T2	Timken N	STANDARD CONFIGURATION
22903	53T2	Timken V	STANDARD CONFIGURATION
22987	53F1	Timken N	STANDARD CONFIGURATION
23052	63R1	Timken ES	DUAL OPPOSED LIP - SINGLE SPRING
23078	63F1	Timken N	FELT
23501	63G1	Timken ES	GYLON EXCLUDER LIP
23502	63G1	Timken V	GYLON EXCLUDER LIP
23503	63G1	Timken V	GYLON EXCLUDER LIP
23547	63R1	Timken N	DUAL OPPOSED LIP - SINGLE SPRING
23548	63R2	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
23627	63R2	Timken V	DUAL OPPOSED LIP - DUAL SPRING

• Note: Please see Appendix B on page 30 for obsolete seal model to part number conversions.

## Oil Seals Appendix A – Product Identification by Model Number

Model	Prefix	Seal Material	Description
23708	53R2	Timken V	STANDARD CONFIGURATION
23769	63R2	Timken E	SDUAL OPPOSED LIP - DUAL SPRING
24060	PS I (61)	GYLON	GYLON LIP , FLUORO GASKET
24062	PS I (61)	GYLON	DOUBLE TANDEM, GYLON LIP, FLUORO GASKET
24063	PS I (61)	GYLON	DOUBLE OPPOSED, GYLON LIP, FLUORO GASKET
24064	PS I (61)	GYLON	GYLON LIP, REVERSE LIP, FLUORO GASKET
24125	PS I (61)	GYLON	GYLON LIP - FDA , GYLON GASKET
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
24620	26R1	Timken N	DUAL LIP
24622	26R1	Timken V	DUAL LIP
24626	26	Timken ES	SOLID
24627	26	Timken ES	SPLIT
24629	26R1	Timken ES	DUAL LIP
24648	26R1	Timken ES	SPLIT, DUAL LIP
24650	26NS	Timken N	NO SPRING
24652	26NS	Timken V	NO SPRING
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
24678	26E	Timken N	EXTERNAL SPLIT
24700	59	Timken N	STANDARD CONFIGURATION
24702	59	Timken V	STANDARD CONFIGURATION
24715	59	Timken ES	STANDARD CONFIGURATION
24750	59G1	Timken N	GYLON EXCLUDER LIP
24751	59G1	Timken ES	GYLON EXCLUDER LIP

Model	Prefix	Seal Material	Description
24752	59G1	Timken V	GYLON EXCLUDER LIP
25001	21	Timken N	SPLIT
25002	21	SILICONE (VMQ)	SPLIT
25003	23	Timken N	SPLIT
25004	23	SILICONE (VMQ)	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
25029	24	Timken ES	SPLIT
25030	24	Timken V	SPLIT
25056	25	PTFE	SOLID
25058	25	PTFE	SPLIT
26001	71	NITRILE (NBR)	BONDED
26056	57	Timken N	STANDARD CONFIGURATION
26057	57	Timken V	STANDARD CONFIGURATION
26058	57	Timken ES	STANDARD CONFIGURATION
26080	87	Timken N	STANDARD CONFIGURATION
26081	87	Timken ES	STANDARD CONFIGURATION
26088	88	Timken N	STANDARD CONFIGURATION
26097	87	Timken V	STANDARD CONFIGURATION
26186	88NS	Timken ES	NO SPRING
26188	88NS	Timken N	NO SPRING
26193	76	NITRILE (NBR)	BONDED
26588	88	Timken V	STANDARD CONFIGURATION
27023	91	NITRILE (NBR)	BONDED
27063	92	NITRILE (NBR)	BONDED
27223	94	NITRILE (NBR)	BONDED
27685	94	FLUOROELASTOMER	BONDED

• Note: Please see Appendix B on page 30 for obsolete seal model to part number conversions.

## Appendix B – Obsolete Oil Seals (Model Number to Part Number Conversions) Oil Seals

Model	Prefix	Seal Material	Description
21	25051	Timken N	2 BUTT CUTS @ 180 DEG APART
	25068	SILICONE (SIL)	2 BUTT CUTS @ 180 DEG APART
	25089	Timken N	RIGHT HAND BEVEL CUT
	25254	Timken N	1/8" THK GASKETS
	25255	Timken N	3/16" THK GASKETS
23	25019	Timken ES	GREEN O.D. SEALANT
	25020	Timken ES	SOLID, GREEN O.D. SEALANT
	25025	Timken N	316 STAINLESS STEEL SPRING-SPLIT
	25036	Timken N	ISO TOLERANCE STANDARDS
	25044	Timken V	LEFT HAND BEVEL CUT
	25075	Timken N	2 BUTT CUTS, 1/3 & 2/3 SECTIONS
	25077	Timken N	SOLID, SPECIAL
	25080	SILICONE (SIL)	2 BUTT CUTS @ 180 DEG APART
	25084	SILICONE (SIL)	SOLID
	25086	Timken N	NOTCHES
	25090	SILICONE (SIL)	RIGHT HAND CUT
	25109	Timken N	EXTERNAL CONSTRUCTION
	25114	BUTYLSPPLIT	
	25131	Timken N	2 BUTT CUTS, 3/16" GASKET
	25152	Timken N	SPECIAL
	25153	SILICONE (SIL)	SOLID, W/ GARTER SPRING
	25156	Timken N	SOLID, SPECIAL
	25157	SILICONE (SIL)	SEMI-FINISHED, UNCUT
	25168	Timken ES	NOTCHES
	25204	Timken N	1/8" THK GASKETS
	25205	Timken N	3/16" THK GASKETS
	25206	Timken N	1/4" THK GASKETS
	25229	SILICONE (SIL)	ENCAP SPRING
	25230	SILICONE (SIL)	1/8" THK GASKETS
	25270	Timken V	ENCAP SPRING
	25278	Timken N	ENCAP SPRING, SPECIAL
	25279	Timken N	2 LEFT HAND BEVEL CUTS, CUT 1/3 & 2/3 SECT
	25280	Timken N	RIGHT HAND BEVEL CUTS, CUT 1/3 & 2/3 SECT
	25281	Timken N	SOLID, SPECIAL
	25284	FDA SILICONE (SIL)	ENCAP SPRING, FDA
25285	FDA SILICONE (SIL)	ENCAP SPRING, FDA - SOLID	
25305	Timken V	NO SPRING	
25	25074	PTFE	302 STAINLESS STEEL SPRING SOLID

Model	Prefix	Seal Material	Description
26	24615	Timken N	LOW TEMP. Timken N
	24617	Timken V	SPLIT, NO SPRING
	24623	Timken V	SOLID, NO FABRIC
	24624	Timken N	SPLIT, NO FABRIC
	24646	Timken V	SPLIT, NO FABRIC
	24653	Timken N	NO FABRIC IN HEEL
	24677	Timken ES	SOLID, NO FABRIC
	24682	Timken V	HIGH PRESSURE
	24698	Timken N	SPLIT TO ISO TOLERANCE STD
	26E	24640	Timken N
26HP	24680	Timken N	HIGH PRESSURE
51	21021	Timken N	NO SPRING
53	21060	Timken N	ISO TOLERANCE STD
	21082	Timken ES	NO OD SEALANT, STAMP Timken ES
	21083	Timken ES	METAL BUTTONS, ISO STD
	21084	Timken ES	ISO TOLERANCE STD
	21092	Timken N	
	21094	Timken ES	
	21097	Timken ES	
	21099	Timken ES	GREEN O.D. SEALANT
	21100	SILICONE (SIL)	
	21101	FDA SILICONE (SIL)	FDA SILICONE
	21366	Timken N	LOW TEMP NTRILE
	21381	BUTYL	
	21392	BUTYL	
	21446	SILICONE (SIL)	
21657	Timken N	O.D. SEALANT	
21682	Timken V	GREEN Timken V	
21692	Timken V	O.D. SEALANT	
21706	Timken N	DRAW HOLES	
21733	Timken V	NO SPRING	
21836	Timken N	LOW TEMP	
21882	Timken V		
53F1	22992	Timken N	
	22995	Timken ES	
	22996	Timken V	
	22998	SILICONE (SIL)	
53R2	22628	Timken N	
	22629	FDA SILICONE (SIL)	
	23703	SILICONE (SIL)	

## Oil Seals Appendix B – Obsolete Oil Seals (Model Number to Part Number Conversions)

Model	Prefix	Seal Material	Description	
53T2	22898	Timken N		
	22899	FDA SILICONE (SIL)		
	22905	Timken ES		
	23051	SILICONE (SIL)		
53TB	22807	Timken N		
54	21883	Timken N		
57	26059	SILICONE (SIL)		
	26061	SILICONE (SIL)	MODIFIED DUST LIP	
58	21008	CERAMIC		
	21009	CARBON FLMNT		
59	24705	Timken V		
	24710	Timken N	SPECIAL	
	24711	Timken N		
	24718	Timken ES	STAMP "Timken ES" ON CASE	
	24719	Timken N	NO SPRING METAL BUTTONS	
	24735	Timken ES	SPECIAL EXCLUDER LIP	
	24737	Timken ES	NO SPRING	
	24738	Timken ES	BLUE COATING ON INNER SHELL	
	24740	Timken V	ELEMENT ONLY-SPLIT	
	24741	Timken V	ELEMENT ONLY-SPLIT- NO SPRING	
	24744	Timken N	5/16" METAL BUTTONS	
	24755	Timken N	SPECIAL WIDTH TOLERANCE TO BE +/- .008"	
	24757	Timken V	24769Timken ES.156" METAL BUTTONS	
	24772	Timken ES	.197"(5mm) METAL BUTTONS	
	24773	Timken N		
59G1	24734	Timken V	GYLON EXCLUDER LIP	
	24753	Timken ES	GYLON ENHANCED, METAL BUTTONS	
59R1	24720	Timken N		
	24726	Timken N		
61 P/S®	124057	PTFE	PTFE LIP , Timken N GSKT	
	24059	FDA GYLON	DBL TANDEM, FDA WHITE GYLON LIP, FDA WHITE GYLON GSKT	
	24061	FDA GYLON	FDA WHITE GYLON LIP, FLUORO GSKT	
	24070	GYLON	REDUCED LOAD , BLACK GYLON LIP , FLUORO GSKT	
	24072	FDA GYLON	DBL OPPOSED, FDA	
62	24073	FDA GYLON	WHITE GYLON LIP , FDA FLUORO GSKT	
	24105	GYLON	FDA WHITE GYLON LIP ONLY	
	24108	PTFE	FLUORO LIP ONLY	
	24130	FDA GYLON	PTFE LIP, FLUORO GSKT, 304SS INNER CASE	
			REVERSED LIP, FDA WHITE GYLON LIP, FDA FLUORO GSKT	
	21154	PTFE	WHITE PTFE, STAINLESS STEEL SPRING	
		21155	PTFE	WHITE PTFE
		21653	PTFE	WHITE PTFE, STAINLESS STEEL SPRING
		21777	PTFE	STAINLESS STEEL SPRING
		21844	PTFE	STAINLESS STEEL SPRING
		21867	PTFE	NO SPRING
21954		PTFE	NO SPRING	
63	21162	Timken N		
	21172	FDA SILICONE (SIL)	FDA APPROVED SILICONE	
	21175	FDA SILICONE (SIL)	FDA APPROVED SILICONE	
	21186	SILICONE (SIL)		
	21295	Timken ES		
	21296	Timken ES		
	21374	BUTYL		
	21466	Timken N	SPECIAL	
	21474	SILICONE (SIL)	NO SPRING	
	21480	SILICONE (SIL)		
	21688	Timken N	DRAW HOLES	
	21690	Timken V	GREEN Timken V	
	21707	Timken N	DRAW HOLES	
21760	Timken N	DRAW HOLES, O.D. SEALANT		
21890	Timken N			
21933	SILICONE (SIL)	O.D. SEALANT		
63F1	23670	Timken N		
63G1	23501	Timken ES	GYLON EXCLUDER LIP	
	23502	Timken V	GYLON EXCLUDER LIP	
	23503	Timken V	GYLON EXCLUDER LIP	
63R	23169	Timken V	NO SPRING	
63R1	23605	Timken N		
63R2	23046	Timken N		
	23631	Timken V		
	23689	Timken N		
	23747	Timken N	SPECIAL	

Appendix B – Obsolete Oil Seals (Model Number to Part Number Conversions) Oil Seals

Model	Prefix	Seal Material	Description
63T2	23713	FDA SILICONE (SIL)	FDA SILICONE
	23748	Timken V	
63TB	23690	Timken N	
64	21223	Timken N	5/16" METAL BUTTONS
	21241	Timken ES	BLUE COATING ON INNER RING
	21246	Timken N	STAINLESS STEEL SPRING
	21254	Timken N	METAL BUTTONS
	21255	Timken ES	STAMP "Timken ES" ON CASE
	21256	Timken N	NO SPRINGS
	21261	Timken N	STAINLESS STEEL GARTER SPRING
	21385	SILICONE (SIL)	NO SPRING
	21398	Timken V	ZINC PLATED FILLER RING
	21855	Timken V	METAL BUTTONS
	21859	Timken V	
	21886	SILICONE (SIL)	METAL BUTTONS
	21997	SILICONE (SIL)	
	66	21519	Timken V
21913		Timken N	STAINLESS STEEL SPRING
21930		Timken N	STAINLESS STEEL SPRING
67	21632	Timken N	STAINLESS STEEL SPRING
	21664	Timken N	O.D. SEALANT
	21694	Timken N	NO SPRING
	21763	SILICONE (SIL)	STAINLESS STEEL SPRING
	21800	Timken N	STAINLESS STEEL SPRING
	21801	Timken N	NO SPRING
	21818	Timken ES	
	21819	Timken ES	STAINLESS STEEL SPRING
	21827	Timken ES	
	21944	Timken N	

Model	Prefix	Seal Material	Description
67R1	23048	Timken N	
67T2	23621	Timken N	
68	21910	Timken N	STAINLESS STEEL SPRING
68R2	23724	Timken N	STAINLESS STEEL SPRING
	23727	Timken N	
	23736	Timken N	STAINLESS STEEL SPRING; 9010 FILLER RING
87	26078	Timken ES	NO BUTTONS, .093" THK METAL INSERT
88	26079	Timken N	STAINLESS STEEL SPRING
	26185	Timken ES	NO BUTTONS
88NS	26589	Timken V	NO SPRING
113	21503	Timken N	
	21927	Timken N	
123	21814	Timken ES	
142	21485	Timken	MOLDED LIP ONLY, BUTT JOINT
145A	221757	BUTYL	

## Oil Seals Appendix C – Compound Compatibility Chart

Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMO			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 Chloronaphthalene	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

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

## Appendix C – Compound Compatibility Chart Oil Seals

Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMO			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
O-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

Rating Key: 1 = Excellent compatibility up to given temperature  
2 = Good comp atibility up to given temperature

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4 = Poor compatibility up to given temperature

## Oil Seals Appendix C – Compound Compatibility Chart

Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMO			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

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

## Appendix C – Compound Compatibility Chart Oil Seals

Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMO			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
Octachloroluene	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

Rating Key: 1 = Excellent compatibility up to given temperature  
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## Oil Seals Appendix C – Compound Compatibility Chart

Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMO			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	1	212	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  
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## Appendix C – Compound Compatibility Chart Oil Seals

Compound Code	Timken Black NBR			Timken Blue HNBR			Timken Green FKM			Silicone VMO			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 Hexafluoride	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  
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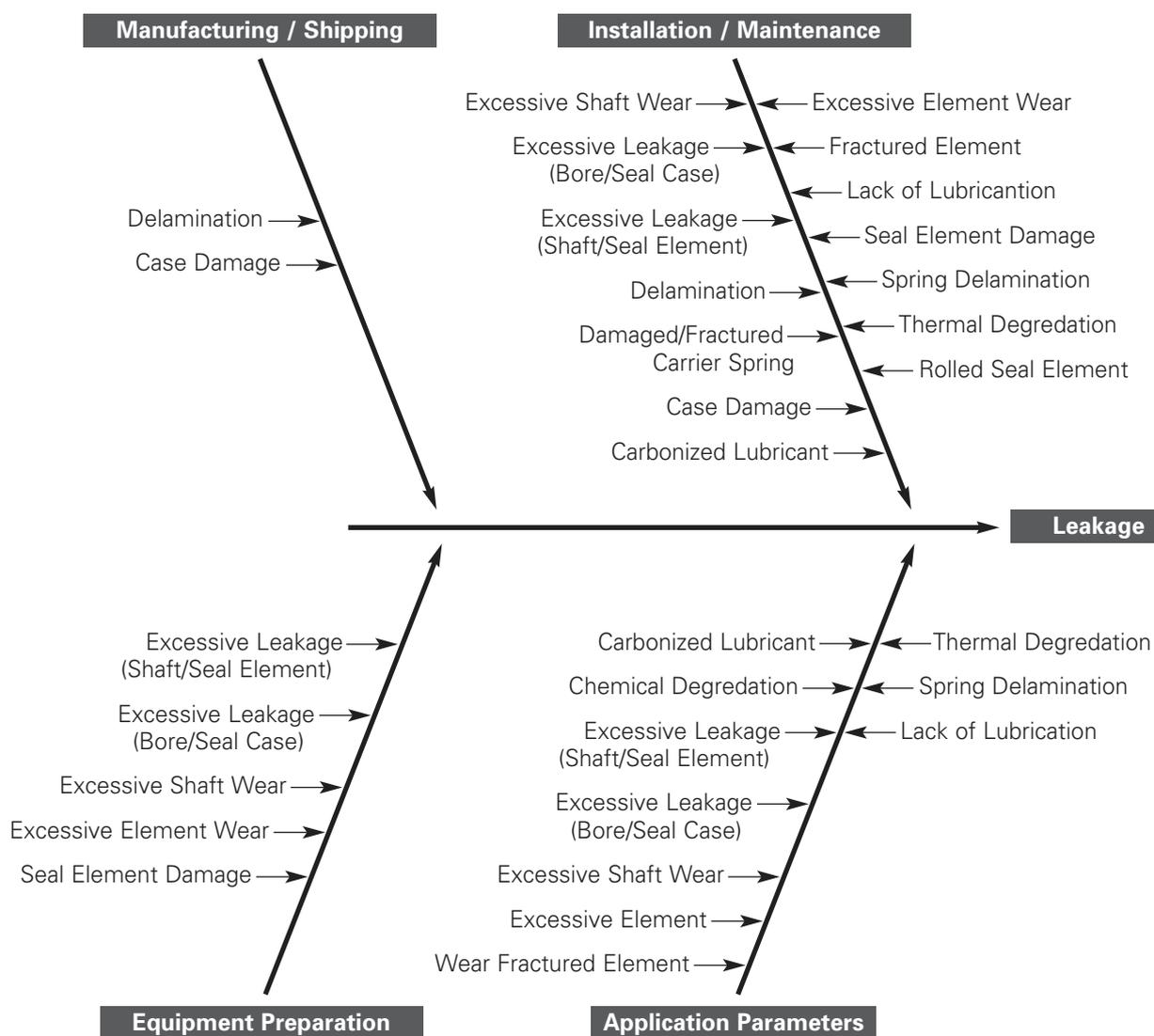
**Oil Seals** Appendix D – Failure Analysis

**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



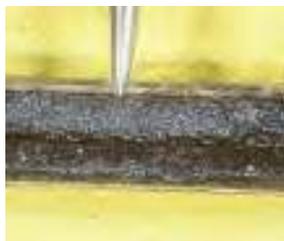
Appendix D – Failure Analysis **Oil Seals**

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](http://www.timken.com/industrialseals).

**Carbonized Lubricant**

*Problem*

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



*Potential Cause*

- Bearing lubricant becomes overheated

*Potential Solution*

- Use a lubricant that can withstand greater temperatures or decrease the temperature for current lubricant

**Case Damage**

*Problem*

Seal case is damaged



*Potential Cause*

- Improper installation
- Improper shipping

*Potential Solution*

- Change installation technique to prevent damage
- Contact your Timken sales representative to discuss shipping alternatives and replacement

**Chemical Degradation**

*Problem*

Abnormal swelling or distortion of the sealing element



*Potential Cause*

- Sealing element material and the material being sealed (i.e. lubricant, coolant) are chemically incompatible

*Potential Solution*

- Upgrade to sealing element that is compatible with the material being sealed

**Delamination**

*Problem*

Seal material separates, interfering with sealing capabilities



*Potential Cause*

- Trapped air due to:
- Improper installation
  - Improper shipping
  - Manufacturing defect

*Potential Solution*

- Change installation technique to prevent damage
- Contact your Timken sales representative to discuss shipping alternatives and replacement
- Contact your Timken sales representative to report manufacturing defect and arrange for replacement

## Oil Seals Appendix D – Failure Analysis

**Fractured Carrier Spring***Problem*

Ineffective sealing due to distortion or cracking of the carrier spring

*Potential Cause*

- Improper installation
- Excessive load

*Potential Solution*

- Change installation technique to prevent damage
- 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*

- Incorrect seal/shaft size
- Rough surface finish on shaft
- Too much lubricant used during installation
- Shaft machined lead (spiral grooves)
- Cocked seal installation
- Excessive shaft movement (TIR)
- Previously mentioned failure modes

*Potential Solution*

- Use correct seal size
- Refinish shaft surface to seal specifications
- Reduce amount of installation lubricant
- Refinish shaft surface to seal specifications
- Install seal squarely into housing bore
- Move seal closer to bearing
- Reference previously mentioned sources/solutions

**Excessive Leakage (Bore/Seal Case)***Problem*

Leakage occurs between bore and seal case

*Potential Cause*

- Incorrect seal/bore size
- Rough surface finish on bore
- Use of lubricant during installation
- Cocked seal installation

*Potential Solution*

- Use correct seal size
- Refinish bore surface to seal specifications
- Do not use lubricant during installation (not recommended for the bore and seal case)
- Install seal squarely into housing bore

**Excessive Seal Element Wear***Problem*

Wider than normal wear pattern on the surface of seal element

*Potential Cause*

- Excessive internal pressure
- High misalignment/runout
- Rough surface finish on shaft
- Insufficient lubrication
- Extended seal service
- Oversized shaft

*Potential Solution*

- Clean drain ports and chamber vents or upgrade to seal with higher pressure capabilities
- Upgrade to seal with higher misalignment/runout capabilities
- Refinish surface of shaft to seal specifications
- Properly lubricate the seal
- Upgrade to extended service element material or change maintenance schedule to accommodate new seal life requirements
- Use proper seal size

**Rolled Seal Element***Problem*

Seal was rolled

*Potential Cause*

- Damage during installation

*Potential Solution*

- Change installation technique or use proper tools to prevent seal damage

Appendix D – Failure Analysis **Oil Seals**

**Fractured Element**

*Problem*  
Seal fractures or splits



*Potential Cause*

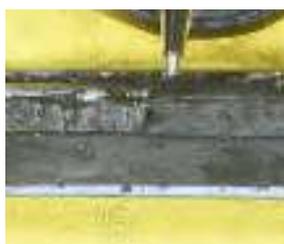
- Damage during installation
- Excessive load
- Thermal degradation
- Insufficient lubrication

*Potential Solution*

- Change installation technique to prevent seal damage
- Do not allow seal to carry the weight of the shaft
- Reduce operating temperature or upgrade to a compatible seal element
- Apply proper amount of lubrication at sealing interface during installation

**Low Lubrication Levels**

*Problem*  
Cracks or wear patterns develop, hindering sealing capabilities



*Potential Cause*

- Insufficient lubrication
- High internal pressure

*Potential Solution*

- Increase lubrication during installation
- Decrease internal pressure

**Excessive Shaft Wear**

*Problem*  
Excess wear groove in shaft



*Potential Cause*

- Abrasive damage during installation
- Abrasive damage during operation
- Soft shaft material

*Potential Solution*

- Clean shaft and seal prior to installation
- Prevent abrasive materials from collecting at sealing interface during operation
- Make sure shaft hardness is sufficient for seal specifications

**Seal Element Damage**

*Problem*  
Seal element has nicks, cuts or tears



*Potential Cause*

- Rough surface finish on shaft
- Damage during installation

*Potential Solution*

- Refinish shaft to seal specifications
- Change installation technique to prevent damage

**Spring Delamination**

*Problem*  
Sealing element and spring separate, causing leakage



*Potential Cause*

- Excessive load
- Excessive operating temperature

*Potential Solution*

- Upgrade to seal material with higher misalignment capabilities
- Upgrade to seal material with higher temperature capabilities

**Thermal Delamination**

*Problem*  
Cracks occur on sealing lip, causing leakage and contamination



*Potential Cause*

- High temperature at sealing interface

*Potential Solution*

- Upgrade to seal material that is compatible with application's temperature requirements, or reduce application's operating temperature

**Oil Seals Appendix E – Surface Speed Chart**

