THOMSON™

THOMSON™ NYLINER™ brand

THOMSON™ NYLINER™ BEARING

DESIGNER'S GUIDE

How to select, specify, and apply Thomson Engineering Polymer bearings and fastener solutions

50 years of leadership in friction, wear, and vibration solutions

Table of Contents

DANAHER
SENSORS & INDUSTRIAL CONTROLS

Danaher Sensors & Controls
Thomson Molded Products
2100 West Broadstreet
Elizabethtown, NC 28337

How We Provide Product Solutions

Thomson Molded Products Group provides customers with precision tolerance polymer bearing and fastener solutions in six diverse markets. Half a century ago, in 1954, our engineers invented the Thomson Nyliner Bearing product line. Our unmatched expertise in polymer wear, friction, and fastener value-added solutions has enabled our customers to enjoy benefits in the following areas:

- Cost Reduction
- Part Consolidation
- Noise Isolation
- Vibration Dampening
- Reduced Friction
- Assembly Consolidation
- Weight Reduction
- Corrosion Resistance

THOMSON™ NYLINER™ brand

No Lubrication Required with Thomson™ Nyliner™ Polymer Products

Our bearings eliminate wear, noise and vibration with our self-lubricationg bearing technology. No maintenance, corrosion resistance, low cost, and light weight.

High Performance with Thomson Engineered Polymers

Thomson Engineered Polymers (TEP) fit demanding applications such as high loads, high temperatures, and extreme long life. Products made with our “plus” TEP enable us to achieve application-specific load, speed, friction and temperature requirements.

Thomson Nyliner Solid Bearings

Thomson Nyliner Solid Bearings are a low-cost, drop-in alternative to bronze and metal bearings.

Custom Molded Fastener Solutions Give Your Design Precision Fit

Thomson has the ability to manufacture a complete line of fasteners such as spacers, grommets, hole plugs, leveling feet, door glides, hook, friction pads, and shelf supports. These components can be customized to your exact specification.

Danaher Industrial Controls Group

In 2002 Thomson Nyliner company was purchased by the Danaher Corporation (NYSE:DHR), a Fortune 500 company with worldwide manufacturing facilities in more than 30 countries. The Thomson Molded Products Group is located in a 180,000 square-foot manufacturing facility in Elizabethtown, North Carolina, and is part of the Danaher Industrial Controls Group (DICG) division.

Danaher Industrial Controls is likely to already be part of your world. Thomson polymer products are used in automobiles, tractors, lawnmowers, boat engines, golf carts, hospital beds, printers, cameras, dryers, dishwashers, ovens, and personal watercraft. Our total capability is based on more than 50 years of design experience in partnership with thousands of customers. Our polymer injection-mold expertise enables our customers to reduce component costs and consolidate assembly.

Fast Delivery

Danaher Industrial Controls is able to immediately produce thousands of product variations to support urgent customer requirements – the exact component you need, exactly when you need it.

- Same-day shipments available
- 3-day standard lead time on most products
- 24×7 online order capability on select products

The Danaher Business System

In the mid-80s, a Danaher division faced with intensifying competition launched an improvement effort based on the then-new principles of lean manufacturing. The initiative succeeded beyond expectations – reinforcing the division's industry leadership as well as spawning the Danaher Business System (DBS). Since this modest beginning, DBS has evolved from a collection of manufacturing improvement tools into a philosophy, a set of values, and ultimately a management philosophy and system. DBS defines who we are and how we do what we do.

The DBS engine drives the company through a never-ending cycle of improvement: exceptional people develop outstanding plans and use world-class tools to construct sustainable processes, resulting in superior performance. Guiding all efforts is a simple philosophy rooted in four customer-focused priorities: *Quality, Delivery, Cost, and Innovation.*

By constantly improving our business processes and continually innovating our product, we provide you with maximum product value, reliable quality and fast, dependable delivery.

10 Reasons Why Design Engineers Prefer Thomson Nyliner Products

1 New Product Development

Engineering new products to provide application solutions.

2 Catalog Offering

With more than 500 off-the-shelf polymer bearing and fastener products available.

3 Rapid Prototyping

Free samples for customer testing and performance validation. In addition, we fabricate single cavity molds to support low-volume production validation needs.

4 Production Tool Design & Build

Fabricated, custom tooling to optimize part geometry cost and assembly efficiency. These cost savings are passed to our customers.

5 Quality Control

We use DBS tools and state-of-the-art equipment to accurately monitor and measure part dimensions. Engineers have confidence in the quality of every part we ship.

6 Multi-Piece Assembly

Cellular on-piece flow assembly capabilities reduce cost and speed delivery. Plastic to metal, plastic to plastic, and multi-piece assembly.

7 Application Engineering

Customers receive free engineering assistance for wear and friction reduction, noise isolation, vibration dampening, part consolidation, assembly consolidation and weight reduction.

8 Material Selection

Material engineering support helps engineers specify and select the optimal materials for your application based on surface area, loads, speeds, temperature and coefficient of friction levels.

9 Customer Service

Customers appreciate the easy order entry process via EDI. We monitor and track customer request ship dates on a daily basis.

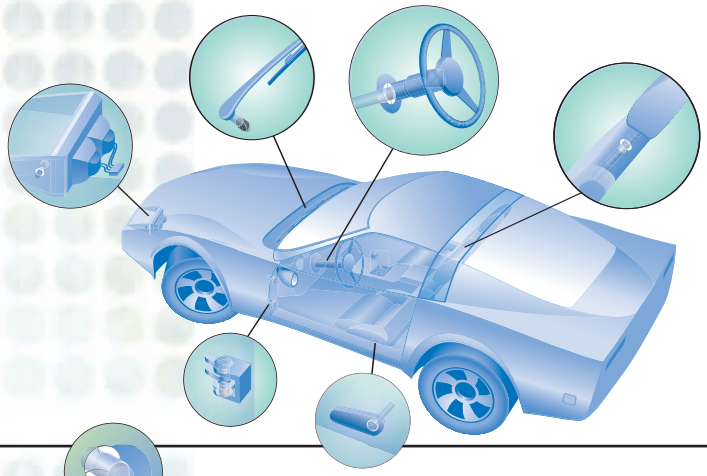
10 More Than 50 Years of Injection Molding Experience

Our U.S. based 180,000 square-foot manufacturing facility utilizes state-of-the art injection mold machines and tools with closed loop control systems to optimize part quality.

Where Thomson Products Are Used to

TRANSPORTATION

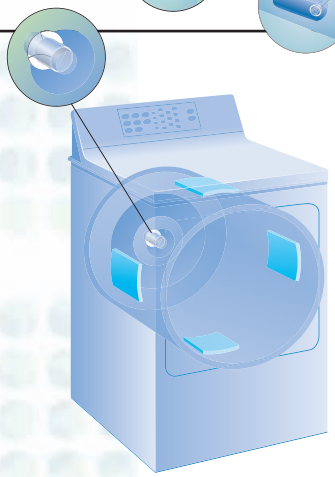
Off-Highway
RVs
Cars and Trucks
Trains
Aircraft
Bicycles
ATVs
Snowmobiles



- Pedal Pivots
- Mirror and Lamp Adjust
- Seat and Headrest Links
- Door Hinge Pivot
- Wiper Pivot
- Shift Linkages
- Steering
- King Pin Bushings
- Belt Tensioners
- Bolt Linkages

APPLIANCES

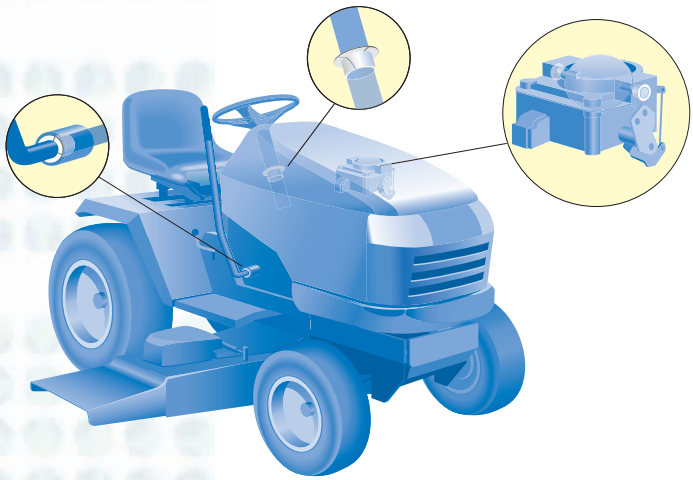
Refrigerators
HVAC – Fans
Vacuum Cleaners
Dishwashers
Sewing Machines
Ovens
Washers/Dryers
Vending Machines



- Wire Harness Clips
- Drive Shaft Bushings
- Door Hinge Pivots
- Drum Stabilizers
- Motors, Gears, Clutches
- Belt Tensioners
- Wear Strips
- Idler Wheels
- Door Glides
- Fan Output Shafts

LAWN AND GARDEN/ POWER TOOLS

Tractors
Mowers
Saws
Drills
Snow Blowers

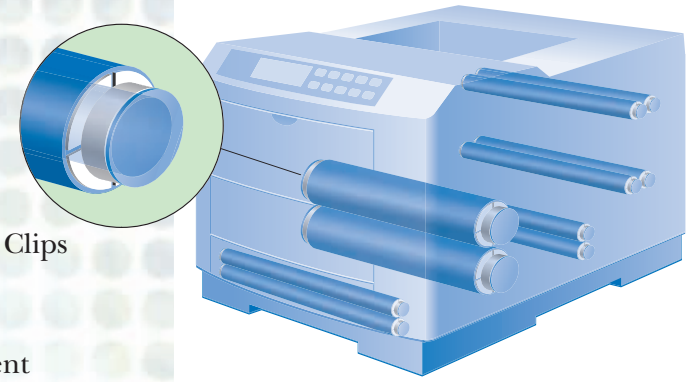


- Motors, Gears, Clutches
- Drive Shafts
- Belt Tensioners
- Reciprocating Bearings
- Swivel Arms
- Throttle and Shift Pivots
- Engine Shroud Pivots
- Mower Deck Output Shafts
- Steering Linkages
- Idler Wheels

Eliminate Wear, Vibration and Friction

OFFICE EQUIPMENT/ BUSINESS MACHINES

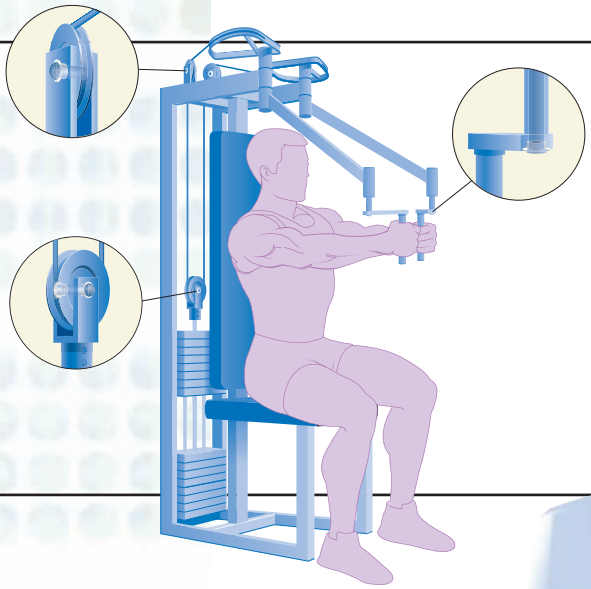
Copiers
Sorters
Printers
Computer/Circuit Board Clips
Cameras
Overhead Projectors
Paper Handling Equipment
Kiosk Stations



- Motors, Gears, Clutches
- Door Hinge Pivots
- Drive Shaft Bearings
- Swivel Arms
- Belt Tensioners
- Paper Feed/Eject Systems
- Gear Trains

MEDICAL/FITNESS

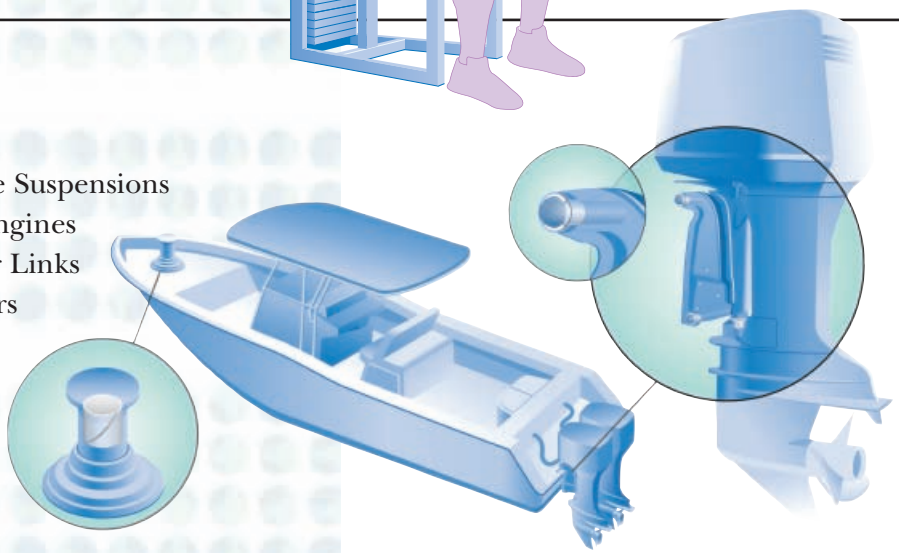
Hospital Beds
Operating Tables
Dental Chairs
Wheelchairs
X-Ray Machines
Fitness Equipment



- Swivel Arms
- Reciprocating Bearings
- Chair Lifts
- Height Adjusters
- Brake and Pedal Assemblies

MARINE

Jet Skis
Boats
Snow Mobile Suspensions
Outboard Engines
Hatch Cover Links
Down Riggers
Seat Adjust



- Winches
- Hatch Covers
- Pump Shafts
- Gears, Clutches
- Bolt Linkages
- Steering Pivots
- Isolation Bushings
- Windshield Wiper Pivots
- Throttle Control Linkages
- Bilge Pump Bearings

Thomson™ Nyliner™ Bearings

Low Cost Alternative to Bronze and Metal Bearings

Better bearing performance. Lower bearing cost.

Low-cost, high performance Thomson Nyliner bearings are the ideal alternative to sintered bronze or other metal bushings. Injection-molded from quality engineering thermoplastics, our bearings eliminate stick-slip and metal-on-metal contact—allowing smooth, accurate, low-friction linear, rotary or oscillating motion. In all areas of industry, these versatile precision plastic bearings are providing a logical, cost-effective solution to thousands of design problems—enjoying great success in applications as diverse as automotive break and clutch pedal assemblies, printer carriages, hydraulic cylinders, gear motors, truck suspensions, and many more. Several different basic types of bearings, available in a wide range of sizes, are stocked for immediate shipment. These are made from Thomson Engineering Polymer 110, our standard material. In addition, bearings are offered in premium, high-performance materials for the most demanding applications.

When to use Thomson Nyliner bearings

Popular applications for injection-molded bearings include those which demand low maintenance, long life and low cost. They are widely used by the automotive, appliance, office machine, and marine industries to provide smooth, accurate, low friction linear, rotary or oscillating motion. Thomson Nyliner bearings are ideal for use in extreme environments. Standard bearings operate in temperatures from –40°F to 450°F, with 400°F recommended for continuous operation. (Our Plus material will withstand operating temperatures greater than 500°F.) No other bearing requires as small an area for installation. The very thin walls (.032˝ thick in many cases) mean housing bore sizes need only be slightly larger than the shaft diameter. When product assembly must be fast and simple, Nyliner bearings are a designer's first choice. The compensation gap allows easy bearing installation in seconds, simply by squeezing the bearing and slipping it into its housing. When the bearing is released, hoop tension causes it to "hug" the housing bore prior to shaft installation.

Better performance by design.

A unique combination of design features assures outstanding bearing performance.

Advanced thin wall construction. State-of-the-art injection-molding technology allows Thomson to maintain the critical dimensional tolerance necessary for precision fits. This thin wall construction is especially effective in the prevention of heat build-up. Because thin wall bearings assure efficient heat transfer, the potential for bearing failure is greatly reduced.

Unique compensation gap. A standard feature of every Thomson Nyliner bearing is the built-in axial slot that allows the bearing diameter to adjust automatically due to variations in temperature or humidity.

Thomson Engineering Polymers. Our bearings are precision molded from Thomson Engineering Polymers, which are exclusive blends of bearing quality thermoplastics and unique additives. They are tough, resilient, water-resistant plastics with low coefficients of friction that require little or no lubrication. These plastics are virtually unaffected by alkalines and dilute acids, detergents, alcohol or organic solvents. They keep performing in hostile environments that can destroy ordinary plastics or corrode metal.

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Bearing Design Considerations

Pressure Velocity (PV) Calculation Guide

Basic Design Considerations

In order to select the right Thomson Nyliner bearing for your application, several important design factors must be considered. These are bearing load, shaft speed, operating clearance, shaft material and finish, duty cycle, environment and housing material.

Bearing Load, expressed as pressure (P), is measured in pounds per square inch (PSI). Square inch area is determined by multiplying the bearing's inside diameter by the bearing length.

$$\frac{Load}{Projected\ area} = Pressure\ (P)$$

Shaft Surface Speed, or velocity (V), is expressed in feet per minute (FPM).

$$V = Shaft\ rpm \times shaft\ diameter\ in\ inches \times .262$$

PV Value. The combined effect of pressure (P) multiplied by velocity (V), is known as the PV Value. PV Value defines the maximum combination of pressure and speed that a bearing material is capable of withstanding. Operating a bearing in excess of its PV may result in premature failure. Lubrication will significantly increase the PV rating of a bearing.

$$PV = Pressure\ (P) \times surface\ velocity\ (V)$$

Factors affecting PV rating

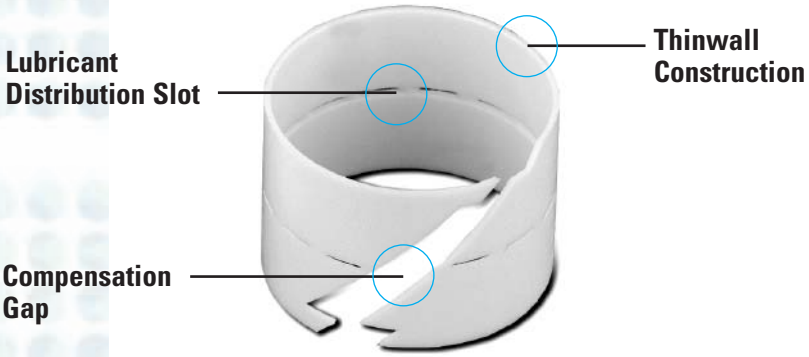
Clearance. The single most important factor governing PV performance of bearings is the bearing to shaft running clearance. Recommended clearances for all Thomson Nyliner bearings are given by bearing type.

Shaft hardness and material. The high surface toughness of Nyliner bearings demands high quality shafting. For long service life and optimum bearing performance, the use of carbon steel, case hardened to Rockwell C60, with a surface finish of 16 microinches Ra, is recommended. Non-ferrous shaft materials — such as aluminum or brass — are not recommended for use with the Nyliner bearings, but may be sufficient in certain applications.

Lubrication. Although Thomson Nyliner bearings may be operated dry, a few drops of oil added during the breaking period can significantly increase operating life. This initial lubrication creates a highly polished bearing surface, which maximizes the low friction characteristics of our bearings.

Operating cycles. Bearing PV ratings have been established during continuous operation. In applications which require only intermittent machine operation, it is possible to exceed PV ratings.

Housing material. Housing materials for Thomson Nyliner bearings should possess good heat transfer characteristics to minimize potential bearing overheating.



Bearing Design Considerations

Load ratings. The tables show load ratings (see page 27) for both dry operation and operation with oil lubrication. For dry operation, a film of lubricant should be present on the bearing surface during the initial break-in period. If for any reason the lubricant is removed, it should be replaced prior to putting the bearing in service. Bearings lubricated with liquids other than oil will operate satisfactorily at load ratings from 50% to 75% of the oil-lubricated ratings. Static-load capabilities are based on the compressive strength of proprietary Thomson Engineering Polymers and indicate the resistance of these materials to continuous heavy-duty, non-rotating loads or to impact loads without permanent deformation. Load ratings are based on continuous operation. For intermittent service, load ratings may be increased up to 100%.

Calculating PV

The PV value is a performance measurement that is the product of pressure (psi) and velocity, (surface feet per minute)

$$PV = Pressure\ (P) \times Bearing\ Velocity\ (V)$$

$$PV = \frac{F}{A} \times V$$

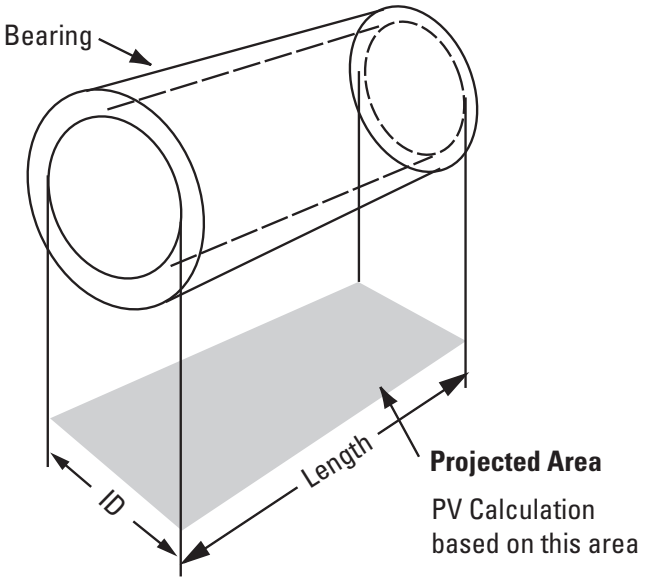
$$PV = \frac{F}{A} \times RPM \times ID \times .262$$

F = Radial Load (pounds)

A = Projected Area (in^2)

RPM = Revolutions Per Minute

ID = Inside Diameter of Bearing (in)



Bearing Design Considerations

How to install Thomson Nyliner bearings

Thomson Nyliner bearings should be installed in a housing bore that provides good support for the bearing. Some suggested retention methods are illustrated here.

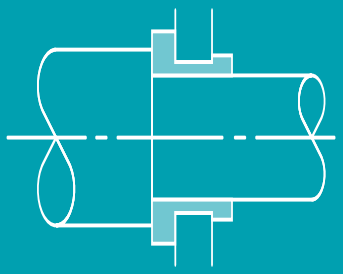
Shaft selection. For normal applications, steel shafts with a minimum hardness of Rockwell C60 are recommended. Shaft finishes should be 16 microinches Ra. When Thomson Nyliner bearings are operated continuously, without lubrication at elevated speeds, shafts should be hardened or plated to minimize shaft wear. Thomson 60 Case™ hardened and ground steel shafts are ideal for these critical applications. Unhardened stainless steel shafting is not recommended. Where corrosion is a problem, hardened stainless steel shafts (Thomson 60 Case shafts), chrome-plated, or nickel-plated shafts are recommended.

Establishing correct clearances. It is essential that adequate operating clearance be maintained between the shaft and the working surface of the bearing. This helps promote even distribution of lubricants and reduces the mechanism's chances of seizure.

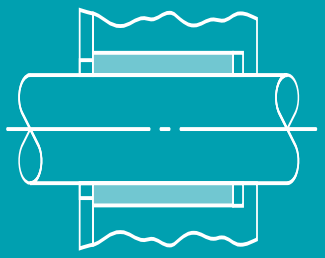
Diameters of housing bores should not be smaller than the diameters specified in this catalog unless shaft diameters are reduced accordingly. To check bearing I.D.s for clearance, the bearing should be installed in its housing bore. Plug gages with diameters corresponding to the minimum and maximum recommended I.D.s can then be used to establish whether or not clearance will be correct when the bearing is operated on a shaft. In applications where bearings operate in water, alcohol or chemical solutions, the absorption of liquid may cause the wall thickness of the bearing to increase. Bearing wall thickness may also increase in humid environments. In such cases, the initial clearance should be increased .001˝ by either reducing the maximum shaft diameter or increasing the housing bore diameter.

Initial break-in. If Thomson Nyliner bearings are to run without lubrication in service, performance will be improved if a few drops of oil are added to the surface and broken in on the shaft for a few hours.

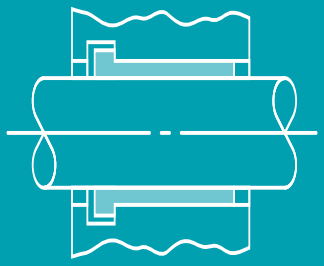
Lubrication. In many applications, our bearings can be run without lubrication, as long as recommended loads and speeds for non-lubricated operation are not exceeded. If loads and speeds are high enough to generate damaging heat, lubrication is mandatory. A good motor oil is the best lubricant. When lubricants other than oil are used, load ratings for lubricated operations should be reduced 25% to 50%.



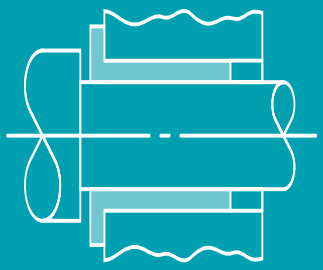
Snap-In



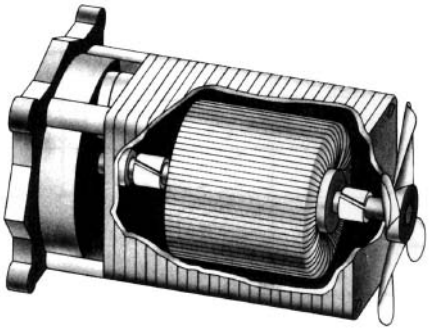
Shaft with Retaining Plate



Internal Groove Special Nyliners



Shaft Shoulder and Flanged Nyliner



1

Sleeve-type bearing with carbon steel outer sleeve (nickel plated optional)

Lubrication groove around circumference

Available in diameters 1/4″ to 1-1/8″

2

Sleeve-type bearing with carbon steel outer sleeve (nickel plated optional)

Available in diameters 1/4″ to 1-1/8″

3

Sleeve-type bearing

Lubrication groove around circumference

Available in diameters 3/16″ to 3″

4

Sleeve-type bearing

Available in diameters 3/16″ to 3″

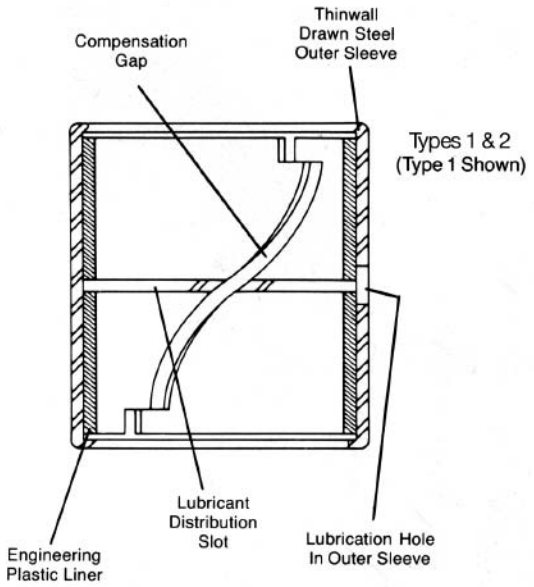
Types 1, 2, 3 and 4

Sleeve-type Thomson Nyliner bearings provide high radial and static load capacity in limited spaces. Types 1 and 2 bearings are supplied with carbon steel outer sleeves. Both types can also be supplied with nickel-plated steel outer sleeves for use in mildly corrosive environments. These bearings are designed especially for applications where press fitting into a housing bore is the most practical bearing retention method. Types 3 and 4 bearings are plain sleeve bearings. Types 1 and 3 feature a circumferential groove for lubricant distribution. Type 4 bearings are simple plastic sleeves with no lubricant groove. Both Types 3 and 4 require some external means of retaining the bearing in the housing bore. (For installation recommendations, see page 11.)

Clearances. The minimum diametral shaft to bearing clearances normally recommended is .001″ for bearing I.D. sizes to 1.000″; .0015″ for I.D. sizes from 1.000″ to 1.250″; and .002″ for I.D. sizes over 1.250″. These clearances are recommended to allow proper running clearance for trouble-free operation. Bearings will expand slightly due to frictional heat and moisture absorption. The majority of this expansion is accommodated by the compensation gap. Changes in wall thickness are minimal due to the thin wall construction of Thomson Nyliner bearings. These recommended running clearances can be reduced if Plus materials are used. These Thomson Engineering Polymers have significantly lower coefficients of linear thermal expansion than standard bearings. When Types 1 and 2 bearings with nickel-plated sleeves are used, the shaft diameter should be reduced by .001″ to compensate for the reduction in bearing I.D. by the addition of the nickel-plating to the steel sleeve.

Dimensions (Inches)—Types 1 and 2

Type 1 Bearing No.	Type 2 Bearing No.	Nominal Bearing Size I.D.	Nominal Bearing Size O.D.	Nominal Bearing Size Length +.000 –.010	Max. Recom. Shaft Diameter	Recommended Housing Bore Limits Min.	Recommended Housing Bore Limits Max.
4N6	4N6-D	1/4	11/32	11/32	.2500	.3430	.3435
5N7	5N7-D	5/16	7/16	7/16	.3125	.4370	.4380
6N8	6N8-D	3/8	1/2	1/2	.3750	.4990	.5000
8N8	8N8-D	1/2	5/8	5/8	.5000	.6240	.6250
10N12	10N12-D	5/8	3/4	3/4	.6250	.7490	.7500
12N12	12N12-D	3/4	7/8	3/4	.7500	.8740	.8750
14N12	14N12-D	7/8	1	1	.8750	.9990	1.0000
16N16	16N16-D	1	1-1/8	1-1/8	1.0000	1.1240	1.1250
18N16	18N16-D	1-1/8	1-1/4	1-1/4	1.1250	1.2490	1.2500



Dimensions (Inches)—Types 3 and 4

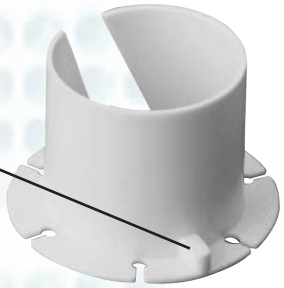
Type 3 Bearing No.	Type 4 Bearing No.	Nom. Bearing I.D.	Bearing I.D. I.D.	Bearing I.D. Tolerance –.000	Bearing I.D. Max. Shaft Diameter	Housing Bore	Bearing Length +0 –1/64	Min. Dist. Between Retaining Shoulders	Retaining Lips I.D. ±.005
—	3L4-D	3/16	.1885	+ .001	.1875	.2340	.205	.210	.205
4N6	4L6-D	1/4	.2510	+ .001	.2500	.2943	.315	.327	.268
5L7	5L7-D	5/16	.3135	+ .001	.3125	.3810	.370	.385	.335
—	5L9-D	5/16	.3135	+ .001	.3125	.3810	.540	.550	.335
6L8	6L8-D	3/8	.3760	+ .001	.3750	.4435	.432	.448	.395
8L8	8L8-D	1/2	.5010	+ .001	.5000	.5685	.432	.448	.520
—	8L12-D	1/2	.5010	+ .001	.5000	.5685	.750	.770	.520
9L8	—	9/16	.5635	+ .001	.5625	.6310	.484	.500	.585
10L12	10L12-D	5/8	.6260	+ .001	.6250	.6935	.670	.700	.645
—	10L16-D	5/8	.6260	+ .001	.6250	.6935	1.000	1.030	.645
—	12L5-D	3/4	.7510	+ .001	.7500	.8180	.330	.340	.770
12L12	12L12-D	3/4	.7510	+ .001	.7500	.8180	.670	.700	.770
14L12	14L12-D	7/8	.8760	+ .001	.8750	.9385	.670	.700	.893
16L16	—	1	1.0010	+ .001	1.0000	1.0585	.910	.940	1.020
—	16L18-D	1	1.0010	+ .001	1.0000	1.0935	1.125	1.156	1.020
18L16	—	1-1/8	1.1260	+ .001	1.1250	1.1850	.910	.940	1.145
—	18L18-D	1-1/8	1.1260	+ .001	1.1250	1.2185	1.125	1.156	1.145
20L16	—	1-1/4	1.2510	+ .001	1.2500	1.3110	.910	.940	1.270
—	20L18-D	1-1/4	1.2510	+ .001	1.2500	1.3435	1.125	1.156	1.270
24L20	—	1-1/2	1.5020	+ .002	1.5000	1.5860	1.148	1.190	1.535
—	24L24-D	1-1/2	1.5020	+ .002	1.5000	1.6245	1.500	1.550	1.540
—	32L39-D	2	2.0020	+ .003	2.0000	2.1250	2.437	2.470	2.040
—	48L28-D	3	3.0020	+ .004	3.0000	3.1250	1.750	1.770	3.040

5

Flanged-type bearing

Available in diameters 3/16″ to 1-1/2″ and 4mm to 25mm

6



Flanged-type bearing with anti-rotation key

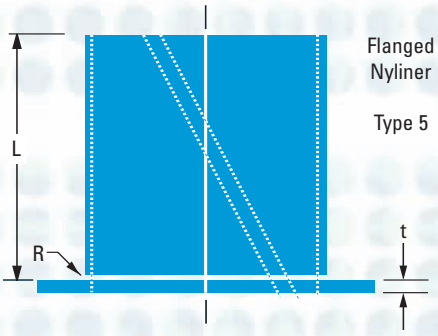
Available in diameters 3/16″ to 1-1/2″

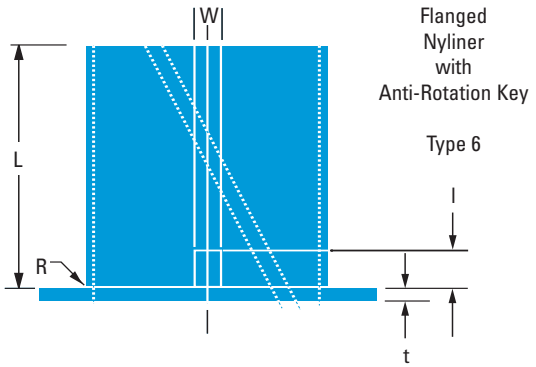
Also available in high-performance polymer

Types 5 and 6

Flanges permit Types 5 and 6 Thomson Nyliner bearings to take both axial and radial loads, while providing more secure retention than plain sleeve types. (For installation recommendations, see page 11.)

Clearances. The minimum diametral shaft to bearing clearance normally recommended for Types 5 and 6 bearings is .001″ for bearing I.D. sizes from 1.000″ to 1.250″; and .002″ for I.D. sizes from 1.250″ to 1.500″. These clearances are recommended to allow proper running clearance for trouble-free operation. Bearings will expand slightly due to frictional heat and moisture absorption. The majority of this expansion is accommodated by the compensation gap. Changes in wall thickness are minimal due to the thin wall construction of Thomson Nyliner bearings.





Dimensions (Inches)—Types 5 & 6

Bearing Number		Nominal Bearing I.D.	Bearing I.D.†		Maximum Shaft Diameter	Housing Bore	Bearing Length "L" +0, –1/64	Radius "R" Max.	Flange		Key	
Type 5	Type 6		I.D.	Tolerance					Dia. ± 1/64	"t" +.000, –.005	"w" +.000, –.010	"l" +0, –1/64
3L3-F	3L3-FK	3/16	0.1885	+ .001 / – .000	.1875	.2340	3/16	.010	5/16	.025	1/16	1/16
4L4-F	4L4-FK	1/4	0.2510	+ .001 / – .000	.2500	.2965	1/4	.010	13/32	.025	1/16	1/16
5L5-F	5L5-FK	5/16	0.3135	+ .001 / – .000	.3125	.3745	5/16	.015	1/2	.030	3/32	3/32
5L7-F	5L7-FK	5/16	0.3135	+ .001 / – .000	.3125	.3745	7/16	.015	1/2	.030	3/32	3/32
5L10-F	5L10-FK	5/16	0.3135	+ .001 / – .000	.3125	.3745	5/8	.015	1/2	.030	3/32	3/32
6L6-F	6L6-FK	3/8	0.3760	+ .001 / – .000	.3750	.4370	3/8	.015	19/32	.030	3/32	3/32
6L11-F	6L11-FK	3/8	0.3760	+ .001 / – .000	.3750	.4370	11/16	.015	19/32	.030	3/32	3/32
7L7-F	7L7-FK	7/16	0.4385	+ .001 / – .000	.4375	.4995	7/16	.015	21/32	.030	3/32	3/32
8L3½-F	8L3½-FK	1/2	0.5010	+ .001 / – .000	.5000	.5620	7/32	.015	3/4	.030	3/32	3/32
8L5½-F	8L5½-FK	1/2	0.5010	+ .001 / – .000	.5000	.5620	11/32	.015	3/4	.030	3/32	3/32
8L8-F	8L8-FK	1/2	0.5010	+ .001 / – .000	.5000	.5620	1/2	.015	3/4	.030	3/32	3/32
8L12-F	8L12-FK	1/2	0.5010	+ .002 / – .000	.5000	.5620	23/32	.015	3/4	1/32	1/8	1/8
10L5½-F	10L5½-FK	5/8	0.6260	+ .001 / – .000	.6250	.6870	11/32	.015	15/16	.030	1/8	1/8
10L7-F	10L7-FK	5/8	0.6260	+ .001 / – .000	.6250	.6870	7/16	.015	15/16	.030	1/8	1/8
10L10-F	10L10-FK	5/8	0.6260	+ .001 / – .000	.6250	.6870	5/8	.015	15/16	.030	1/8	1/8
10L14-F	10L14-FK	5/8	0.6260	+ .001 / – .000	.6250	.6870	7/8	.015	15/16	.030	1/8	1/8
10L18-F	10L18-FK	5/8	0.6260	+ .001 / – .000	.6250	.6870	1-1/8	.015	15/16	.030	1/8	1/8
12L12-F	12L12-FK	3/4	0.7510	+ .001 / – .000	.7500	.8120	3/4	.015	1-1/8	.030	1/8	1/8
12L18-F	12L18-FK	3/4	0.7510	+ .001 / – .000	.7500	.8120	1-1/8	.015	1-1/8	.030	1/8	1/8
14L7½-F	14L7½-FK	7/8	0.8760	+ .001 / – .000	.8750	.9370	15/32	.015	1-5/16	.030	1/8	1/8
14L14-F	14L14-FK	7/8	0.8760	+ .001 / – .000	.8750	.9370	7/8	.015	1-5/16	.030	1/8	1/8
16L16-F	16L16-FK	1	1.0015	+ .0015 / – .0000	1.0000	1.0935	1	.020	1-1/2	.045	5/32	5/32
18L18-F	18L18-FK	1-1/8	1.1265	+ .0015 / – .0000	1.1250	1.2185	1-1/8	.020	1-11/16	.045	5/32	5/32
20L20-F	20L20-FK	1-1/4	1.2515	+ .0015 / – .0000	1.2500	1.3435	1-1/4	.020	1-7/8	.045	5/32	5/32
24L24-F	24L24-FK	1-1/2	1.5020	+ .002 / – .000	1.5000	1.6245	1-1/2	.025	2-1/4	.060	3/16	3/16

†When installed in housing bore shown above.

Dimensions (Millimeters) — Type 5

Bearing Number	Nominal Bearing I.D.	Bearing I.D.† +.05, –0	Maximum Shaft Diameter	Housing Bore	Bearing Length "L" +0, –.4	Radius "R" Max.	Flange	
							Diameter ±.4	"t" +0 –.13
8000A	4	4.025	4	5.2	4	.4	7	.6
8001A	5	5.025	5	6.2	5	.4	8	.6
8002A	6	6.025	6	7.2	6	.4	9.5	.6
8003A	8	8.025	8	9.6	8	.4	12	.8
8004A	10	10.025	10	11.6	10	.4	15	.8
8005A	12	12.025	12	13.6	12	.4	18	.8
8006A	14	14.025	14	15.6	14	.4	21	.8
8007A	16	16.025	16	17.6	16	.4	24	.8
8008A	20	20.025	20	21.6	20	.4	30	.8
8009A	25	25.025	25	27.4	25	.4	37.5	1.2

†When installed in Housing Bore diameter shown.

7

Snap-in bearing for thin plates

Available in diameters 1/8˝ to 3/4˝ (for plates 0.04˝ to 0.135˝ thickness) and diameters 3mm to 12mm (for plates 2 to 3.5mm thickness)

Also available in high-performance polymer

8

Snap-lock bearing for thin plates

Permanently retained

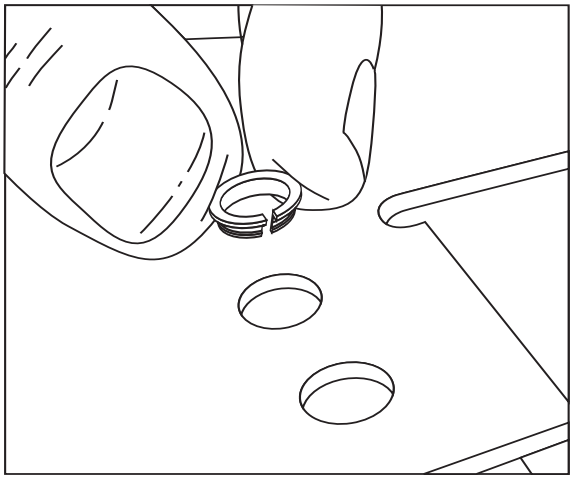
Available in metric diameters 6mm to 20mm (for plates 1.5 to 4.0mm)

Types 7 and 8

Types 7 and 8 snap-in Thomson Nyliner bearings are designed for easy installation in thin plates. Their double-flange construction assures positive bearing retention. The larger of the two flanges has sufficient area to take thrust loads.

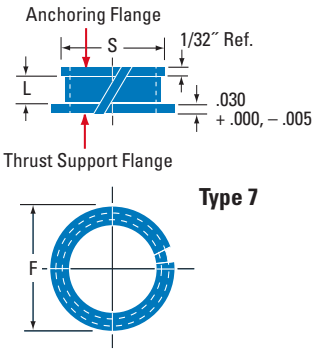
Clearances. The minimum diametral shaft to bearing clearance normally recommended for Types 7 and 8 bearings is .001˝. These clearances are recommended to allow proper running clearance for trouble-free operation. Bearings will expand slightly due to frictional heat and moisture absorption. The majority of this expansion is accommodated by the compensation gap. Changes in wall thickness are minimal due to the thin-wall construction of Thomson Nyliner bearings.

Installation. The bearings' compensation gap allows Types 7 and 8 bearings to be collapsed so the smaller flange can be easily spiralled through the mounting hole. Snap-in installation is fast and economical. During installation, the bearing is located over the hole with the gap facing up. Light finger pressure exerted to the left of the compensation gap spirals the bearing into position.



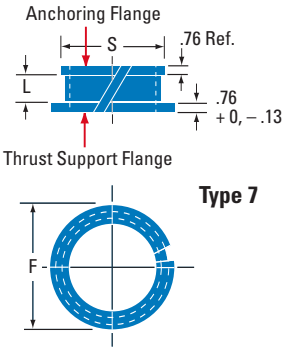
Dimensions (Inches) — Type 7

Bearing Number	Max. Shaft Dia.†	Min. Housing Bore†	Bearing ID†† +.003 -.000	Flange Diameter ±1/64 "F"	Flange Diameter ±1/64 "S"	Bearing Length "L" +1/64 –0	Recommended Plate Thickness
2L1-FF	1/8	11/64	.1260	1/4	3/16	.078	.040 to .075
2L2-FF	(.125)	(.1718)				.140	.072 to .135
3L1-FF	3/16	15/64	.1885	5/16	1/4	.078	.040 to .075
3L2-FF	(.1875)	(.2343)				.140	.072 to .135
4L1-FF	1/4	5/16	.2510	7/16	11/32	.078	.040 to .075
4L2-FF	(.250)	(.3125)				.140	.072 to .135
5L1-FF	5/16	3/8	.3135	1/2	13/32	.078	.040 to .075
5L2-FF	(.3125)	(.3750)				.140	.072 to .135
6L1-FF	3/8	7/16	.3760	9/16	15/32	.078	.040 to .075
6L2-FF	(.375)	(.4375)				.140	.072 to .135
7L1-FF	7/16	1/2	.4385	5/8	17/32	.078	.040 to .075
7L2-FF	(.4375)	(.500)				.140	.072 to .135
8L1-FF	1/2	9/16	.5010	11/16	19/32	.078	.040 to .075
8L2-FF	(.500)	(.5625)				.140	.072 to .135
10L1-FF	5/8	11/16	.6260	7/8	23/32	.078	.040 to .075
10L2-FF	(.625)	(.6875)				.140	.072 to .135
12L1-FF	3/4	13/16	.7510	1	27/32	.078	.040 to .075
12L2-FF	(.750)	(.8125)				.140	.072 to .135



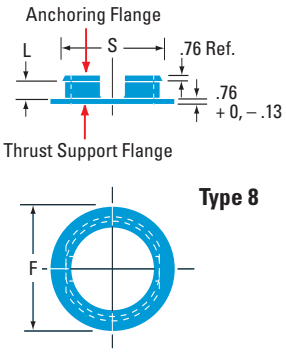
Dimensions (Millimeters) —Type 7

Bearing Number	Max. Shaft Diameter†	Housing Bore††	Bearing I.D.†† +.1/–0	Flange Diameter "F"	Flange Diameter "S"	Bearing Length "L"	Thrust Support Flange Thickness	Recommended Plate Thickness
8010A	3	4.2	3.025	6	4.8	2	0.6	1.45 to 1.92
8011A	4	5.2	4.025	7	5.9	2	0.6	1.45 to 1.92
8012A	5	6.2	5.025	8	6.8	2	0.6	1.45 to 1.92
8013A	6	7.2	6.025	11	7.8	2	0.6	1.45 to 1.92
8014A	8	9.6	8.025	13	10.4	2	0.8	1.45 to 1.92
8015A	10	11.6	10.025	15	12.4	2	0.8	1.45 to 1.92
8016A	12	13.6	12.025	17	14.4	2	0.8	1.45 to 1.92



Dimensions (Millimeters) —Type 8

Bearing Number	Max. Shaft Diameter†	Housing Bore††	Bearing I.D.†† +.1/–0	Flange Diameter "F"	Flange Diameter "S"	Bearing Length "L"	SS- ADD Max Plate Thickness (L Dim.)
6LSS	6	7.2	6.025	11	8	Add L	1.5
8LSS	8	9.6	8.025	13	10.5	Add L	2.0
10LSS	10	11.6	10.025	15	12.5	Add L	2.5
11LSS	11	12.6	11.025	16	13.5	Add L	3.0
12LSS	12	13.6	12.025	17	14.5	Add L	3.5
13LSS	13	14.6	13.025	18	15.5	Add L	4.0
15LSS	15	16.6	15.025	20	17.5	Add L	
20LSS	20	21.6	20.025	25	22.5	Add L	



After each part number SS-add recommended plate thickness (Example: 8LSS-2 = 8mm ID snap into 2mm max. plate)

† The minimum clearance for "snap-in" bearings is .0254″. "Snap-in" bearings can be used with shaft diameters approx. .08mm larger or smaller than shown in table by varying the "snap-in" housing bore a corresponding amount.

†† When installed in Housing Bore diameter shown.

9

Sleeve-type bearing

Thick-walled solid (no compensation gap)

Available in diameters 1/8″ to 2″ and 3mm to 40mm

Also available in high-performance polymer

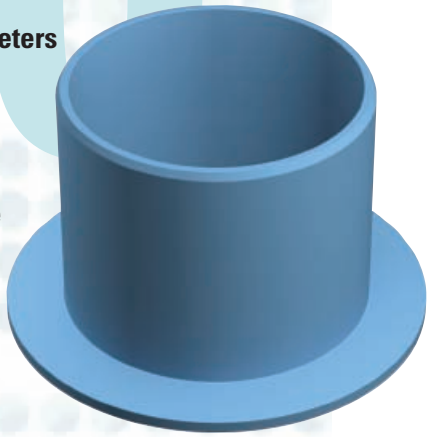
10

Flanged-type bearing

Thick-walled solid (no compensation gap)

Available in diameters 1/8″ to 2″ and 3mm to 40mm

Also available in high-performance polymer



Type 9 Solid Sleeve Bearings
Type 10 Solid Flanged Bearings

Thomson Nyliner self-lubricating solid bearings reduce wear and friction in the most challenging operating conditions. The plastics used are homogeneously structured and when combined with bonding materials and lubricants they mutually complement each other. Base materials can be reinforced with fibers or filler materials, especially for continuous stress/load applications. Microscopic particles of solid lubricants are embedded in millions of tiny chambers, and from the chambers the polymer releases tiny amounts of lubricant during movement.

Types 9 and 10 Thomson thick walled flange and sleeve bearings are dimensionally interchangeable with most metal bearings and can be retro-fitted without changing the housing bore or shaft.

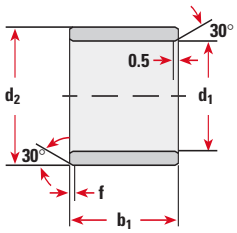
The polymers can absorb up to 8% moisture by weight in long-term, full submerged applications. Moisture adoptions result in dimensional changes in the form and are recommended for running clearance operations.

Typical Applications:

- Fitness Equipment
- Hydraulic Cylinders
- Pneumatic Cylinders
- Bike Pedals
- Pumps

Type 9 Dimensions - inches

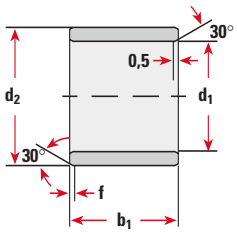
Part Number	d1	d2	b1	I.D. After Pressfit Max.	I.D. After Pressfit Min.	Housing Bore Max.	Housing Bore Min.	Shaft Size Max.	Shaft Size Min.
DIS-0203-06	1/8	3/16	3/8	0.1269	0.1251	0.1878	0.1873	0.1243	0.1236
DIS-0304-08	3/16	1/4	1/2	0.1892	0.1873	0.2503	0.2497	0.1865	0.1858
DIS-0405-12	1/4	5/16	3/4	0.2521	0.2498	0.3128	0.3122	0.2490	0.2481
DIS-0506-12	5/16	3/8	3/4	0.3148	0.3125	0.3753	0.3747	0.3115	0.3106
DIS-0607-12	3/8	15/32	3/4	0.3773	0.3750	0.4691	0.4684	0.3740	0.3731
DIS-0608-12	3/8	1/2	3/4	0.3783	0.3760	0.5015	0.5010	0.3750	0.3741
DIS-0708-08	7/16	17/32	1/2	0.4406	0.4379	0.5316	0.5309	0.4365	0.4355
DIS-0809-16	1/2	19/32	1	0.5030	0.5003	0.5941	0.5934	0.4990	0.4980
DIS-0810-12	1/2	5/8	3/4	0.5040	0.5013	0.6260	0.6250	0.5000	0.4990
DIS-0910-10	9/16	21/32	5/8	0.5655	0.5627	0.6566	0.6559	0.5615	0.5605
DIS-1011-30	5/8	23/32	1 7/8	0.6280	0.6253	0.7192	0.7184	0.6240	0.6230
DIS-1012-16	5/8	3/4	1	0.6290	0.6263	0.7510	0.7500	0.6250	0.6240
DIS-1112-14	11/16	25/32	3/4	0.6906	0.6879	0.7817	0.7809	0.6865	0.6855
DIS-1214-24	3/4	7/8	1-1/2	0.7541	0.7507	0.8755	0.8747	0.7491	0.7479
DIS-1416-24	7/8	1	1-1/2	0.8791	0.8757	1.0005	0.9997	0.8741	0.8729
DIS-1618-24	1	1-1/8	1-1/2	1.0041	1.0007	1.1255	1.1247	0.9991	0.9979
DIS-1820-24	1-1/8	1-9/32	1-1/2	1.1288	1.1254	1.2818	1.2808	1.1238	1.1226
DIS-2022-24	1-1/4	1-13/32	1-1/2	1.2548	1.2508	1.4068	1.4058	1.2488	1.2472
DIS-2224-26	1-3/8	1-17/32	1-5/8	1.3798	1.3758	1.5318	1.5308	1.3738	1.3722
DIS-2426-24	1-1/2	1-21/32	1-1/2	1.5048	1.5008	1.6568	1.6558	1.4988	1.4972



Based on I.D.
f = .019 → $d_1 \leq .393$
f = .031 → $.39 < d_1 \leq 1.181$
f = .047 → $d_1 > 1.259$

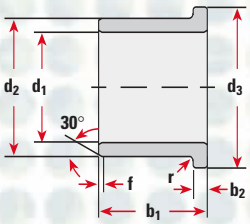
Type 9 Dimensions - metric

Part Number	d1	d1-Tolerance	d2	b1	I.D. After Pressfit Max.	I.D. After Pressfit Min.	Housing Bore Max.	Housing Bore Min.	Shaft Size Max.	Shaft Size Min.
DMS-0304-06	3.0	+0.014 +0.054	4.5	6.0	3.054	3.014	4.512	4.500	3.000	2.975
DMS-0405-06	4.0	+0.020 +0.068	5.5	6.0	4.068	4.020	5.512	5.500	4.000	3.970
DMS-0407-055	4.0	+0.020 +0.068	7.0	5.5	4.068	4.020	5.512	5.500	4.000	3.970
DMS-0506-07	5.0	+0.010 +0.040	6.0	7.0	5.040	5.010	6.012	6.000	5.000	4.970
DMS-0507-10	5.0	+0.020 +0.068	7.0	10.0	5.068	5.020	7.015	7.000	5.000	4.970
DMS-0607-17.5	6.0	+0.010 +0.040	7.0	17.5	6.040	6.010	7.015	7.000	6.000	5.970
DMS-0608-13	6.0	+0.020 +0.068	8.0	13.8	6.068	6.020	8.015	8.000	6.000	5.970
DMS-0708-19	7.0	+0.013 +0.049	8.0	19.0	7.049	7.013	8.015	8.000	7.000	6.964
DMS-0709-12	7.0	+0.025 +0.083	9.0	12.0	7.083	7.025	9.015	9.000	7.000	6.964
DMS-0809-12	8.0	+0.013 +0.049	9.0	12.0	8.049	8.013	9.015	9.000	8.000	7.964
DMS-0810-22	8.0	+0.025 +0.083	10.0	22.0	8.083	8.025	10.015	10.000	8.000	7.964
DMS-0911-06	9.0	+0.025 +0.083	11.0	6.0	9.083	9.025	11.018	11.000	9.000	8.964
DMS-1011-25	10.0	+0.013 +0.049	11.0	25.0	10.049	10.013	11.018	11.000	10.000	9.964
DMS-1012-20	10.0	+0.025 +0.083	12.0	20.0	10.083	10.025	12.018	12.000	10.000	9.964
DMS-1013-13	10.0	+0.025 +0.083	13.0	13.5	10.083	10.025	12.018	12.000	10.000	9.964
DMS-1213-15	12.0	+0.016 +0.059	13.0	15.0	12.059	12.016	13.018	13.000	12.000	11.957
DMS-1214-25	12.0	+0.032 +0.102	14.0	25.0	12.102	12.032	14.018	14.000	12.000	11.957
DMS-1215-22	12.0	+0.032 +0.102	15.0	22.0	12.102	12.032	15.018	15.000	12.000	11.957
DMS-1315-25	13.0	+0.032 +0.102	15.0	25.0	13.102	13.032	15.018	15.000	13.000	12.957
DMS-1416-25	14.0	+0.032 +0.102	16.0	25.0	14.102	14.032	16.018	16.000	14.000	13.957
DMS-1516-15	15.0	+0.016 +0.059	16.0	15.0	15.059	15.016	16.018	16.000	15.000	14.957
DMS-1517-25	15.0	+0.032 +0.102	17.0	25.0	15.102	15.032	17.018	17.000	15.000	14.957
DMS-1618-25	16.0	+0.032 +0.102	18.0	25.0	16.102	16.032	18.018	18.000	16.000	15.957
DMS-1819-15	18.0	+0.032 +0.102	19.0	15.0	18.102	18.032	20.021	20.000	18.000	17.957
DMS-1820-25	18.0	+0.032 +0.102	20.0	25.0	18.102	18.032	20.021	20.000	18.000	17.597
DMS-1922-06	19.0	+0.040 +0.124	22.0	6.0	19.124	19.040	22.021	22.000	19.000	18.957
DMS-2021-20	20.0	+0.020 +0.072	21.0	20.0	20.072	20.020	21.021	21.000	20.000	19.948
DMS-2023-25	20.0	+0.040 +0.124	23.0	25.0	20.124	20.040	23.021	23.000	20.000	19.948
DMS-2224-20	22.0	+0.040 +0.124	24.0	20.0	22.124	22.040	24.021	24.000	22.000	21.948
DMS-2225-25	22.0	+0.040 +0.124	25.0	25.0	22.124	22.040	24.021	24.000	22.000	21.948
DMS-2427-25	24.0	+0.040 +0.124	27.0	25.0	24.124	22.040	27.021	27.000	24.000	23.948
DMS-2526-25	25.0	+0.020 +0.072	26.0	25.0	25.072	25.020	26.021	26.000	25.000	24.948
DMS-2528-25	25.0	+0.040 +0.124	28.0	25.0	25.124	25.040	28.021	28.000	25.000	24.948
DMS-2630-16	26.0	+0.040 +0.124	30.0	16.0	26.124	26.040	28.021	28.000	25.000	24.948
DMS-2730-05	27.0	+0.040 +0.124	30.0	5.0	27.124	26.040	32.025	32.000	28.000	27.948
DMS-2832-25	28.0	+0.040 +0.124	32.0	25.0	28.124	28.040	32.025	32.000	28.000	27.948
DMS-3031-12	30.0	+0.020 +0.072	31.0	12.0	30.072	30.020	31.025	31.000	30.000	29.948
DMS-3034-25	30.0	+0.040 +0.124	34.0	25.0	30.124	30.040	34.025	34.000	30.000	29.948
DMS-3236-20	32.0	+0.050 +0.150	36.0	20.0	32.150	32.050	36.025	36.000	32.000	31.928
DMS-3539-25	35.0	+0.050 +0.150	39.0	25.0	35.150	35.050	39.025	39.000	35.000	34.938
DMS-4044-20	40.0	+0.050 +0.150	44.0	20.0	40.150	40.050	44.025	44.000	40.000	39.938



Based on I.D.
f = 0,5 → $d_1 \leq 10$
f = 0,8 → $10 < d_1 \leq 30$
f = 1,2 → $d_1 > 32$

Type 10 Dimensions - inches

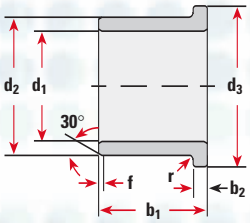


r = max. 0.5

Based on I.D.
f = .019 → $d_1 \leq .393$
f = .031 → .39 < $d_1 \leq 1.181$
f = .047 → $d_1 > 1.259$

Part Number	d1	d2	b1	d3	b2 –0.0055	I.D. After Pressfit Max.	I.D. After Pressfit Min.	Housing Bore Max.	Housing Bore Min.	Shaft Size Max.	Shaft Size Min.
DIF-0203-06	1/8	3/16	3/8	0.312	0.032	0.1269	0.1251	0.1878	0.1873	0.1243	0.1236
DIF-0304-08	3/16	1/4	1/2	0.375	0.032	0.1892	0.1873	0.2503	0.2497	0.1865	0.1858
DIF-0405-12	1/4	5/16	3/4	0.500	0.032	0.2521	0.2498	0.3128	0.3122	0.2490	0.2481
DIF-0506-12	5/16	3/8	3/4	0.562	0.032	0.3148	0.3125	0.3753	0.3747	0.3115	0.3106
DIF-0607-14	3/8	15/32	7/8	0.687	0.046	0.3773	0.3750	0.4691	0.4684	0.3740	0.3731
DIF-0708-08	7/16	17/32	1/2	0.750	0.046	0.4406	0.4379	0.5316	0.5309	0.4365	0.4355
DIF-0809-16	1/2	19/32	1	0.875	0.046	0.5030	0.5003	0.5941	0.5934	0.4990	0.4980
DIF-1011-24	5/8	23/32	1-1/2	0.937	0.046	0.6280	0.6253	0.7192	0.7184	0.6240	0.6230
DIF-1214-24	3/4	7/8	1-1/2	1.125	0.062	0.7541	0.7507	0.8755	0.8747	0.7491	0.7479
DIF-1416-24	7/8	1	1-1/2	1.250	0.062	0.8791	0.8757	1.0005	0.9997	0.8741	0.8729
DIF-1618-24	1	1-1/8	1-1/2	1.375	0.062	1.0041	1.0007	1.1255	1.1247	0.9991	0.9979
DIF-1820-24	1-1/8	1-9/32	1-1/2	1.562	0.078	1.1288	1.1254	1.2818	1.2808	1.1238	1.1226
DIF-2022-24	1-1/4	1-13/32	1-1/2	1.687	0.078	1.2548	1.2508	1.4068	1.4058	1.2488	1.2472
DIF-2224-16	1-3/8	1-17/32	1	1.875	0.078	1.3798	1.3758	1.5318	1.5308	1.3738	1.3722
DIF-2426-24	1-1/2	1-21/32	1-1/2	2.000	0.078	1.5048	1.5008	1.6568	1.6558	1.4988	1.4972
DIF-2831-32	1-3/4	1-15/16	2	2.375	0.093	1.7547	1.7507	1.9381	1.9371	1.7487	1.7471
DIF-3235-24	2	2-3/16	1-1/2	2.625	0.093	2.0052	2.0011	2.1883	2.1871	1.9981	1.9969

Type 10 Dimensions - metric



r = max. 0.5

Based on I.D.
f = 0,5 → $d_1 \leq 10$
f = 0,8 → 10 < $d_1 \leq 30$
f = 1,2 → $d_1 > 32$

Part Number	d1	d1-Tolerance	d2	d3 d13	b1 h13	b2 -0.14	I.D. After Pressfit Max.	I.D. After Pressfit Min.	Housing Bore Max.	Housing Bore Min.	Shaft Size Max.	Shaft Size Min.
DMF-0304-05	3.0	+0.014 +0.054	4.5	7.5	5.0	0.75	3.054	3.014	4.512	4.500	3.000	2.975
DMF-0405-06	4.0	+0.020 +0.068	5.5	9.5	6.0	0.75	4.068	4.020	5.512	5.500	4.000	3.970
DMF-0506-15	5.0	+0.010 +0.040	6.0	10.0	15.0	0.5	5.040	5.010	6.012	6.000	5.000	4.970
DMF-050709-05	5.0	+0.020 +0.068	7.0	9.0	5.0	1.0	5.068	5.020	7.015	7.000	5.000	4.970
DMF-0607-10	6.0	+0.010 +0.040	7.0	11.0	10.0	0.5	6.040	6.010	7.012	7.000	6.000	5.970
DMF-0608-10	6.0	+0.020 +0.068	8.0	12.0	10.0	1.0	6.068	6.020	8.015	8.000	6.000	5.970
DMF-060814-12	6.0	+0.020 +0.068	8.0	14.0	12.0	1.0	6.068	6.020	8.015	8.000	6.000	5.970
DMF-0708-08	7.0	+0.013 +0.049	8.0	12.0	8.0	0.5	7.049	7.013	8.015	8.000	7.000	6.964
DMF-0709-12	7.0	+0.025 +0.083	9.0	15.0	12.0	1.0	7.068	7.020	9.015	9.000	7.000	6.964
DMF-0809-08	8.0	+0.013 +0.049	9.0	15.0	8.0	0.5	8.049	8.013	9.015	9.000	8.000	7.964
DMF-1012-17	10.0	+0.025 +0.083	12.0	18.0	17.0	1.0	10.098	10.040	12.018	12.000	10.000	9.964
DMF-1213-12	12.0	+0.016 +0.059	13.0	17.0	12.0	0.5	12.059	12.016	13.018	13.000	12.000	11.957
DMF-1214-24	12.0	+0.032 +0.102	14.0	20.0	24.0	1.0	12.102	12.032	14.018	14.000	12.000	11.957
DMF-1416-21	14.0	+0.032 +0.102	16.0	22.0	21.0	1.0	14.102	14.032	16.018	16.000	14.000	13.957
DMF-1516-15	15.0	+0.016 +0.059	16.0	20.0	15.0	0.5	15.059	15.016	16.018	16.000	15.000	14.957
DMF-1517-20	15.0	+0.032 +0.102	17.0	23.0	20.0	1.0	15.102	15.032	17.018	17.000	15.000	14.957
DMF-1618-21	16.0	+0.032 +0.102	18.0	24.0	21.0	1.0	16.102	16.032	18.018	18.000	16.000	15.957
DMF-1622-12	16.0	+0.032 +0.102	22.0	25.0	12.0	1.0	16.102	16.032	18.018	18.000	16.000	15.957
DMF-1719-25	17.0	+0.032 +0.102	19.0	25.0	25.0	1.0	17.102	17.032	19.018	19.000	17.000	16.957
DMF-1820-22	18.0	+0.032 +0.102	20.0	26.0	22.0	1.0	18.102	18.032	20.021	20.000	18.000	17.957
DMF-182022-06	18.0	+0.032 +0.102	20.0	22.0	6.0	1.0	18.102	18.032	22.021	22.000	18.000	17.957
DMF-2021-20	20.0	+0.020 +0.072	21.0	25.0	20.0	0.5	20.072	20.020	21.021	21.000	20.000	19.948
DMF-2023-21	20.0	+0.040 +0.124	23.0	30.0	21.5	1.5	20.124	20.040	23.021	23.000	20.000	19.948
DMF-202326-21	20.0	+0.040 +0.124	23.0	26.0	21.5	1.5	20.124	20.040	23.021	23.000	20.000	19.948
DMF-202328-15	20.0	+0.040 +0.124	23.0	28.0	15.0	1.5	20.124	20.040	23.021	23.000	20.000	19.948
DMF-2427-10	24.0	+0.040 +0.124	27.0	32.0	10.0	1.5	24.124	24.040	27.021	27.000	24.000	23.948
DMF-2526-25	25.0	+0.020 +0.072	26.0	30.0	25.0	0.5	25.072	25.020	26.021	26.000	25.000	24.948
DMF-2528-21	25.0	+0.040 +0.124	28.0	35.0	21.5	1.5	25.124	25.040	28.021	28.000	25.000	24.948
DMF-2830-10	28.0	+0.040 +0.124	30.0	35.0	10.0	1.0	28.124	28.040	30.025	30.000	28.000	27.948
DMF-283239-20	28.0	+0.040 +0.124	32.0	39.0	20.0	2.0	28.124	28.040	32.025	32.000	28.000	27.948
DMF-3031-20	30.0	+0.040 +0.124	31.0	36.0	20.0	0.5	30.124	30.040	31.025	31.000	30.000	29.948
DMF-3032-22	30.0	+0.040 +0.124	32.0	37.0	22.0	1.0	30.124	30.040	32.025	32.000	30.000	29.948
DMF-3034-20	30.0	+0.040 +0.124	34.0	42.0	20.0	2.0	30.124	30.040	34.025	34.000	30.000	29.948
DMF-3236-16	32.0	+0.050 +0.150	36.0	40.0	16.0	2.0	32.150	32.050	36.025	36.000	32.000	31.938
DMF-3539-16	35.0	+0.050 +0.150	39.0	47.0	16.0	2.0	35.105	35.050	39.025	39.000	35.000	34.938
DMF-3842-22	38.0	+0.050 +0.150	42.0	54.0	22.0	2.0	38.150	38.050	42.025	42.000	30.000	29.938
DMF-4044-14	40.0	+0.050 +0.150	44.0	52.0	14.0	2.0	40.150	40.050	44.025	44.000	40.000	39.938

Custom Molded Fasteners

Thomson has the ability to manufacture a complete line of fastener components including:

- Spacers
- Grommets
- Hole Plugs
- Leveling Feet
- Wire Handling & Harnesses
- Custom Caps
- Door Glides
- Idler Wheels
- Friction Pads
- Shelf Supports
- Custom Molding

Our ability to utilize existing high customization technology has enabled us to manufacture tight-tolerance fastener components for automotive, appliance, marine and recreational markets. Contact the factory with your design specification requirements.

Custom Molding Solutions

Fifty years of experience in molding tight-tolerance polymer components enables us to provide our customers with a unique value-added approach for custom polymer design solutions.

- 180,000 square-foot plant
- Rapid prototyping
- Proprietary technology manufacturing
- Cellularized secondary assisting operations
- Specific design features can be molded into the product to enhance its functionality and performance in moisture and high temperature applications.
- Custom tool fabrication

Nyliner Plus Materials

Bearings made from Nyliner Plus Thomson Engineered Polymers (TEP) offer a greatly expanded performance range over Thomson's standard bearings which are molded from TEP 110. Thomson's standard Nyliner Plus materials are available off the shelf for all types and sizes of bearings in our catalog.

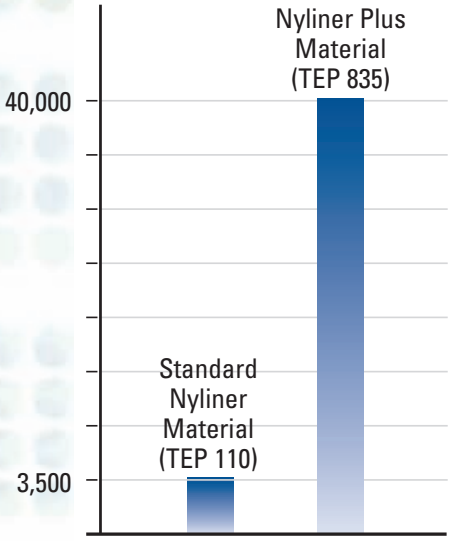
Greatly Increased PV Ratings. Thomson Nyliner Plus materials offer PV ratings previously only available in more expensive and difficult to use bearings. Nyliner Plus materials give PV ratings in the range of 10,000 to 40,000.

Higher Operating Temperatures. All Nyliner Plus materials offer elevated temperature capabilities. Some of these materials withstand temperatures over 400°F. This means higher ambient temperature possibilities and greater resistance to heat caused by running friction.

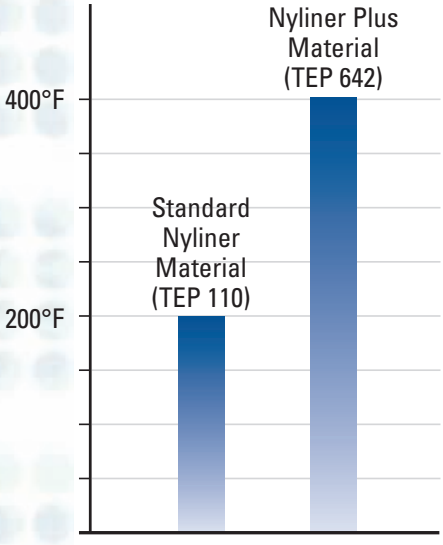
Lower Friction. With the addition of sophisticated internal lubricants, Nyliner Plus materials offer coefficients of friction as low as .06, even when bearings are operated without additional lubrication.

Greatly Increased Bearing Life. Utilizing a combination of high-performance resins and sophisticated internal reinforcement systems, Nyliner Plus material bearings offer extremely long operating life.

Limiting PV



Heat Deflection Temperature



Advantages Over Standard Nyliner Bearings

The charts on this page clearly demonstrate the performance increase of bearings made from Nyliner Plus TEP material compared to bearings made from standard TEP 110 material. (The materials comparison charts on the following pages more specifically compare a wide range of Thomson Engineering Polymers). Most significant is the dramatic increase in PV rating. For example, TEP 110 has a PV rating of 3500 and TEP 835 has a rating of 40,000.

Other characteristics of Nyliner Plus materials also offer significant improvements. For example, TEP 110 has a wear factor of 200. TEP 642 (a relatively economical and popular Nyliner Plus material) has a wear factor of only 18. This means that in similar situations, a bearing made of TEP 642 will last 10 times longer than the same bearing made of TEP 110.

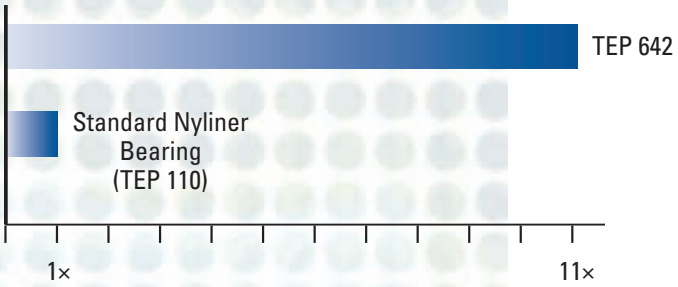
Nyliner Plus material bearings often replace other types of plain bearings. In many cases, cost is not the only advantage. For instance, sintered bronze bushings have always presented the bearing user with several serious disadvantages: they have an unpredictable supply of lubrication, they are subject to corrosion and environmental attack, they require press fitting (which may change during the life of the product), and they often require secondary operations to achieve final dimensional tolerances. Compare the performance characteristics and design advantages with other types of plain bearings. In many cases, Nyliner Plus materials are the best all-around solution to solving bearing-design challenges.

Applications. Use Nyliner Plus materials in applications that require high performance, easy installation, long life, and moderate cost. Some highly successful Nyliner Plus material applications include:

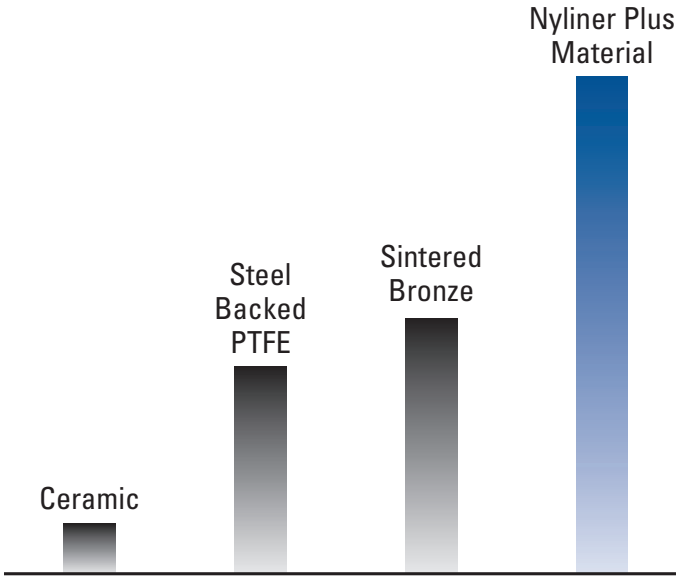
- Hydraulic cylinder piston rod bushings;
- High-load pivots in outboard marine engine mounts;
- Automotive and light-truck suspension bushings;
- Fractional horsepower electric motor bearings.

Call our Applications Engineering Department for help in deciding which Nyliner Plus material is best for your application.

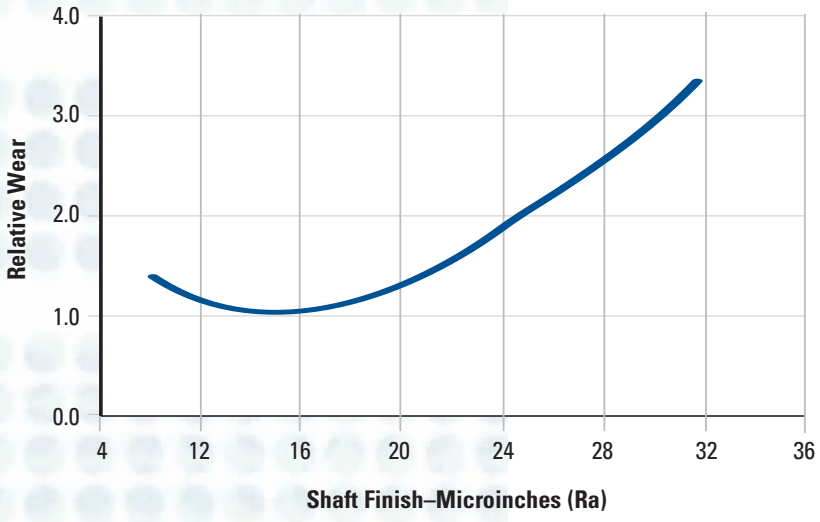
Relative Bearing Life



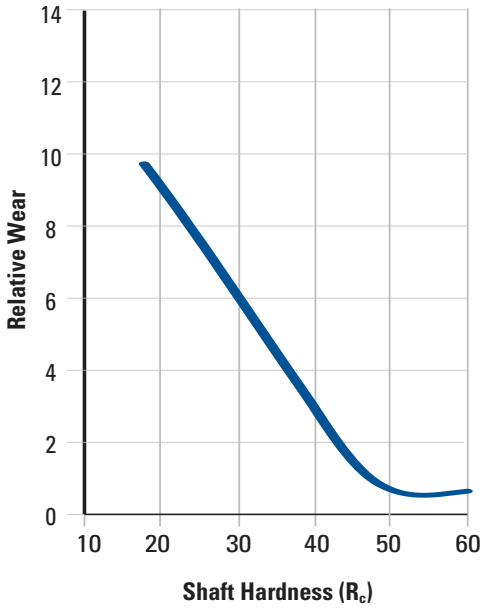
Plain Bearings— Performance to Cost Ratio Load Rating Per $



Bearing wear as affected by variations in shaft surface finish



Bearing wear as affected by variations in shaft hardness



Chemical Resistance at 77°F

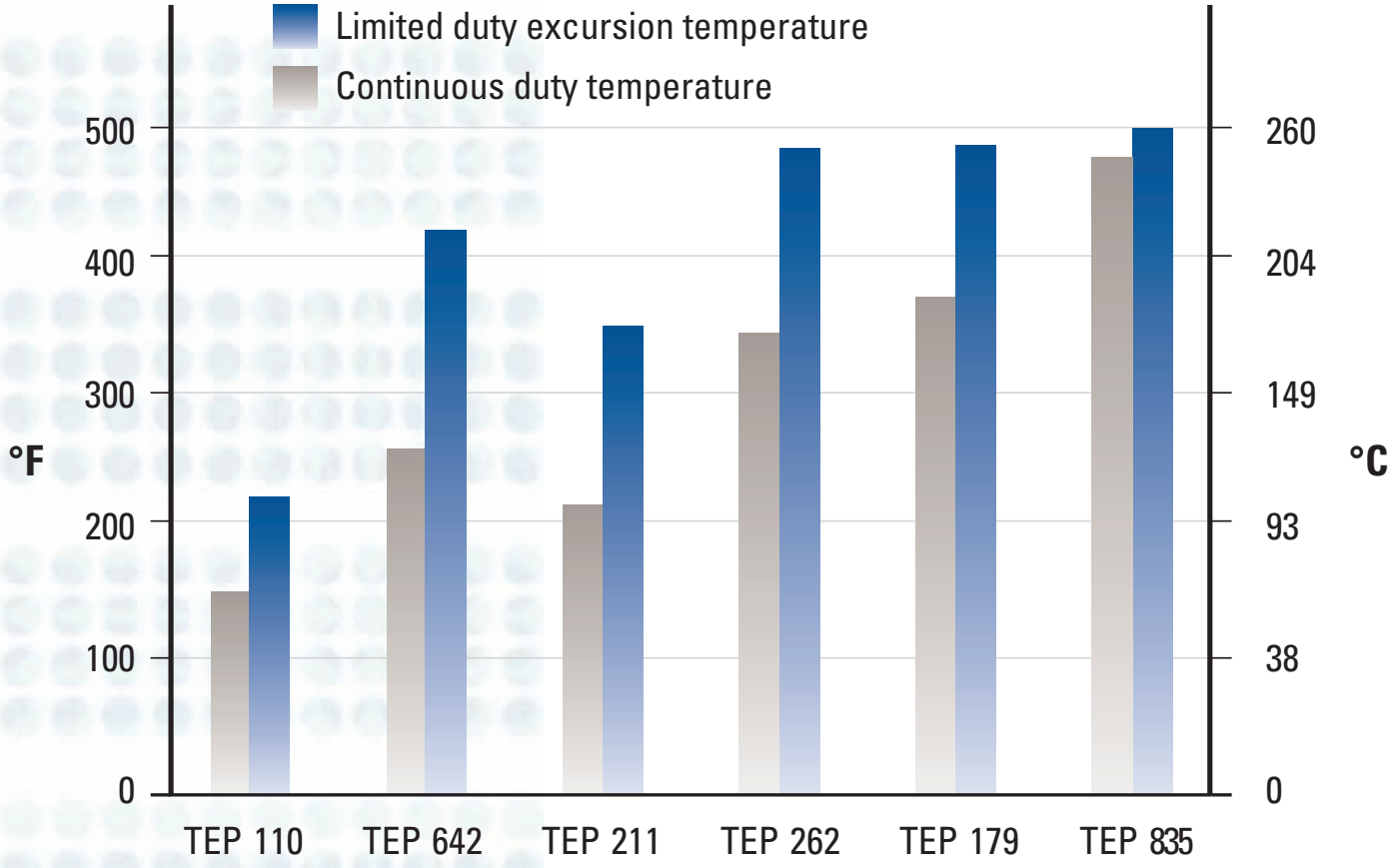
Shows the effect of various chemicals on selected Thomson bearing grade engineering polymers.

Material	Aromatic Solvents	Aliphatic Solvents	Chlorinated Solvents	Weak Bases and Salts	Strong Bases	Strong Acids	Strong Oxidants	Esters and Ketones
TEP 166	1	1	1	1	2	5	5	1
TEP 211	2–3	1	1–2	1–3	3–4	5	5	1
TEP 179	2	1	3	1	2	3	2	2
TEP 642†	1	1	1	1	2	5	5	1
TEP 835	5	1	5	1	5	1	1	5
TEP110††	1	1	1	2	1	5	5	1

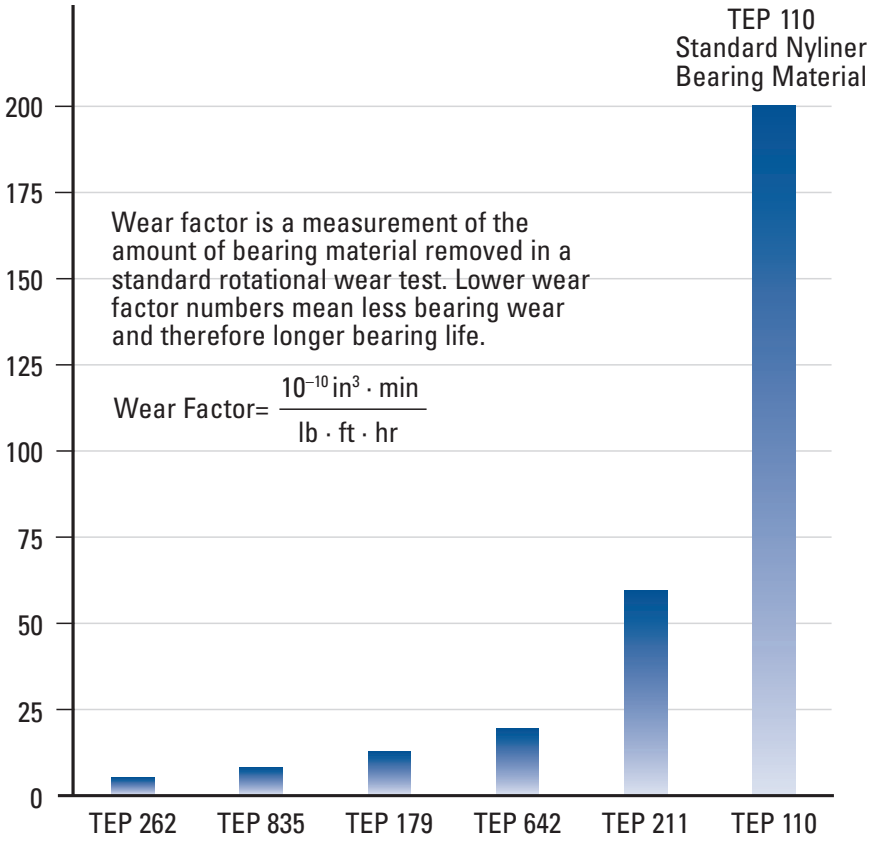
1) Inert
2) Little or no effect
3) Mild effect
4) Softening or swelling
5) Severe degradation of properties

† Thomson's standard Nyliner Plus bearing polymer
†† Thomson's standard Nyliner bearing polymer

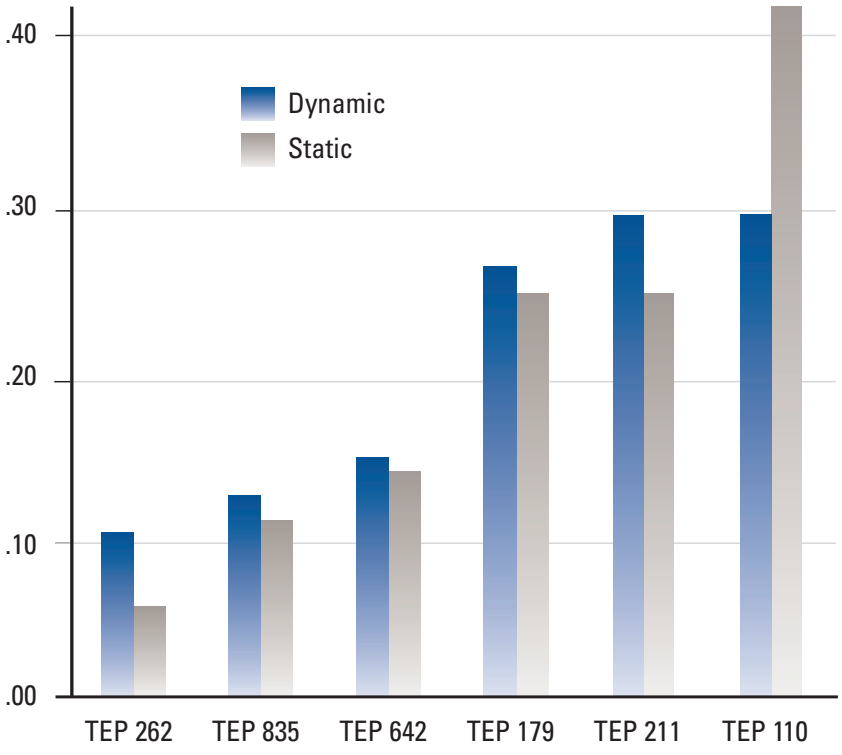
Operating Temperature Range



Wear Factor Against Steel



Coefficient of Friction



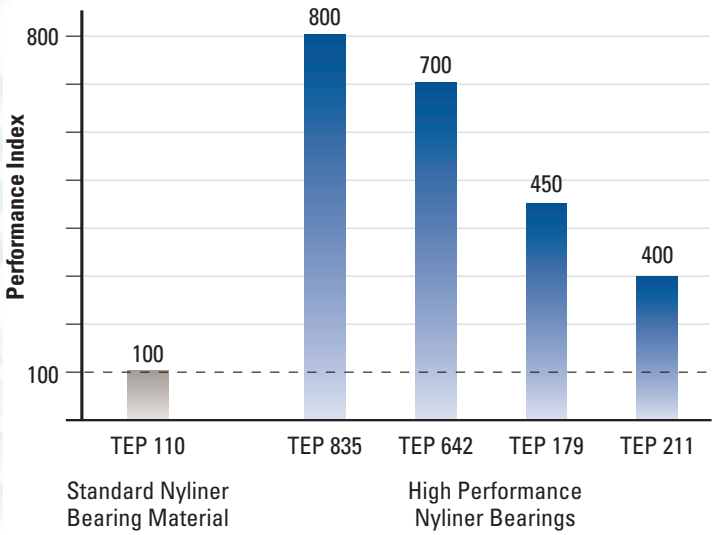
ASTM Property and Test Performance Data

Thomson Engineering Polymers

ASTM Property and Test Performance Data	Units	TEP† 110	TEP 166	TEP 179	TEP 835	TEP 211	TEP 262	TEP†† 642
Tensile Strength @ 73°F 23°C D – 638	psi (MPa)	11,800 (81.4)	13,500 (93.1)	13,500 (93.1)	23,500 (162)	10,000 (69)	6,500 (44.8)	13,500 (93.1)
Yield Strength @ 73°F 23°C D – 638	psi (MPa)	12,900 (88.9)	13,000 (89.6)	13,500 (93.1)	17,500 (120.6)	11,400 (78.6)	7,400 (51.0)	13,000 (89.6)
Flexural Modulus @ 73°F 23°C D – 790	psi (MPa)	410,000 (2827)	500,000 (3,447)	500,000 (3,447)	540,000 (3,723)	410,000 (2,827)	300,000 (2,068)	500,000 (3,447)
Compressive Strength (1% Deformation) D-695	psi (MPa)	4,900 (33.8)	17,500 (120.7)	13,000 (89.6)	17,000 (117.2)	5,200 (35.9)	1,800 (12.4)	17,500 (120.7)
Izod Impact (Notched) D – 256	ft. lb./in. (J/m)	0.9 (48.1)	1.0 (53.4)	0.7 (37.4)	1.0 (53.4)	1.4 (74.7)	0.6 (32.0)	1.0 (53.4)
Coefficient of Friction Static	N/A	0.45	0.13	0.25	0.12	0.6	0.07	0.13
Dynamic	N/A	0.3	0.14	0.26	0.13	0.66	0.15	0.14
Water Absorption (24 hours) D – 570	%	1.5	0.7	0.9	0.5	0.31	0.15	0.7
Heat Deflection Temp. (264psi) D – 648	°F (°C)	200 (93)	350 (177)	450 (232)	490 (254)	235 (113)	210 (99)	350 (177)
Coefficient of Linear Thermal Expansion D – 696	in./in./°F	4.5×10^{-5}	3.2×10^{-5}	1.1×10^{-5}	2.4×10^{-5}	5.8×10^{-5}	5.4×10^{-5}	3.2×10^{-5}
Limiting PV @ 100 RPM	psi × ft./min.	3,500	16,000	35,000	40,000	10,000	12,500	16,000
Wear Factor	10^{-10}in^{-5} • min lb • ft • hr	200	18	80	70	20	90	18

† Standard Nyliner Thomson Engineering Polymer
†† Thomson's standard Nyliner Plus bearing polymer

Relative Performance Index



The Relative Performance Index is based on combining values for flexural modulus, limiting PV, and heat deflection temperature. This provides a means of numerically comparing the performance of different Thomson Engineering Polymers. Call our Applications Engineering Department for help in comparing other engineering resins on this scale.

Thomson Engineered Polymer (TEP) 110 (Base Material)

Load Ratings (Pounds) — Types 1, 2, 3 and 4

				Radial Load Capacity in Pounds														
				10 RPM		25 RPM		50 RPM		100 RPM		250 RPM		500 RPM		1000 RPM	2000 RPM	Static
Type 1	Type 2	Type 3	Type 4	Oil Lube	Dry	Oil Lube	Dry	Oil Lube	Dry	Oil Lube	Dry	Oil Lube	Dry	Oil Lube	Dry	Oil Lube	Dry	Load
—	—	—	3L4-D	42	14	40	13	38	12.5	36	9	34	6	27	3	16	8.5	90
4N6	4N6-D	4L6	4L6-D	88	29	85	25	83	23	80	17	71	8	50	4	25	15	145
5N7	5N7-D	5L7	5L7-D	130	44	124	39	122	36	120	25	95	11	56	5	32	18	225
—	—	—	5L9-D	190	64	186	57	180	49	175	33	138	15	82	7	47	26	330
6N8	6N8-D	6L8	6L8-D	180	61	178	56	171	47	157	29	119	12	66	6	37	20	325
8N8	8N8-D	8L8	8L8-D	240	82	236	73	229	63	206	32	139	13	72	6	41	—	435
—	—	—	8L12-D	425	145	415	120	400	110	360	56	244	23	125	11	72	—	750
—	—	—	—	255	88	250	78	245	67	200	32	139	13	72	6	41	—	750
10N12	10N12-D	10L12	10L12-D	457	155	430	125	410	110	384	50	200	20	117	8	64	—	900
—	—	—	10L16-D	685	230	650	190	610	163	575	75	300	30	175	11	96	—	1300
—	—	—	12L5-D	274	94	258	75	240	60	202	25	100	9	57	4	3	—	490
12N12	12N12-D	12L12	12L12-D	570	195	540	157	500	125	420	52	210	19	120	8	6	—	1010
14N12	14N12-D	14L12	14L12-D	660	219	625	175	575	130	465	54	220	20	128	9	—	—	1260
16N16	16N16-D	16L16	—	1000	330	965	270	880	165	665	71	306	24	173	11	—	—	2000
—	—	—	16L18-D	1200	400	1160	325	1050	200	800	80	365	27	200	12	—	—	2400
18N16	18N16-D	18L16	—	1120	345	1060	285	960	170	680	75	320	26	170	12	—	—	2260
—	—	—	18L18-D	1350	420	1270	345	1170	205	815	83	380	30	205	13	—	—	2700
—	—	20L16	—	1230	348	1165	310	1050	175	700	77	308	28	172	13	—	—	2500
—	—	—	20L18-D	1500	425	1400	370	1250	210	840	88	390	31	210	14	—	—	3000
—	—	24L20	—	1900	560	1700	425	1430	212	915	92	408	32	220	15	—	—	3100
—	—	—	24L24-D	2500	740	2250	562	1880	280	1210	120	540	34	290	17	—	—	4850
—	—	—	32L39-D	5370	1510	4700	935	3650	480	2020	200	990	54	—	—	—	—	9700
—	—	—	48L28-D	5300	1560	4350	650	2600	340	1560	115	—	—	—	—	—	—	10500

Load Ratings (Pounds)—Types 5 and 6

		Radial† Load Capacity in Pounds														
		10 RPM		25 RPM		50 RPM		100 RPM		250 RPM		500 RPM		1000 RPM	2000 RPM	Static
Type 5	Type 6	Oil Lube	Dry	Oil Lube	Dry	Oil Lube	Dry	Oil Lube	Dry	Oil Lube	Dry	Oil Lube	Dry	Oil Lube	Dry	Load
3L3-F	3L3-FK	37	12.5	35	11.5	34	11	32	8	30	5	24	3	14	7.5	70
4L4-F	4L4-FK	68	22	66	19	64	16	62	12	55	6	39	3½	19	11	127
5L5-F	5L5-FK	107	33	102	37	100	28	99	20	78	9	46	4	26	14	202
5L7-F	5L7-FK	157	56	150	47	147	41	145	29	115	13	68	6	38	20	287
5L10-F	5L10-FK	210	70	204	64	200	56	198	40	156	18	92	8	52	28	404
6L6-F	6L6-FK	155	52	153	48	147	40	135	28	86	10	57	5	28	17	292
6L11-F	6L11-FK	296	100	294	92	280	77	258	54	195	20	108	10	56	33	557
7L7-F	7L7-FK	210	72	204	66	200	55	181	33	130	12	70	6	39	—	400
8L3½-F	8L3½-FK	125	43	123	38	119	33	107	17	72	7	37	3	21	—	218
8L5½-F	8L5½-FK	204	66	190	59	185	50	166	25	112	11	58	4	33	—	355
8L8-F	8L8-FK	290	95	270	84	262	72	236	37	158	16	82	7	47	—	525
—	8L12-FK	430	141	403	125	390	107	350	54	237	24	122	10	70	—	800
10L5½-F	10L5½-FK	240	81	220	65	215	57	202	26	105	10	61	4	33	—	445
10L7-F	10L7-FK	306	103	286	82	272	73	256	33	132	13	78	5	42	—	580
10L10-F	10L10-FK	437	148	410	119	390	105	367	48	190	19	112	7	61	—	830
10L14-F	10L14-FK	490	166	460	134	440	118	412	54	214	21	126	8	68	—	930
10L18-F	10L18-FK	630	213	590	172	560	151	530	68	276	26	161	10	88	—	1170
12L12-F	12L12-FK	640	220	610	177	563	140	470	58	236	21	135	8	70	—	1195
12L18-F	12L18-FK	720	248	680	198	630	157	528	65	265	23	152	9	78	—	1345
14L7½-F	14L7½-FK	465	155	440	123	405	86	328	35	155	13	90	5	—	—	870
14L14-F	14L14-FK	875	290	825	231	760	161	615	66	290	23	169	8	—	—	1630
16L16-F	16L16-FK	1110	367	1070	300	980	195	740	78	340	29	192	11	—	—	2140
18L18-F	18L18-FK	1420	440	1340	362	1220	210	865	86	407	30	218	12	—	—	2710
20L20-F	20L20-FK	1740	493	1645	440	1480	234	990	97	435	31	244	13	—	—	3360
24L24-F	24L24-FK	2500	740	2250	562	1880	280	1210	120	540	34	290	17	—	—	4850

†Thrust loads on flange section of bearings not to exceed 25–50% of loads in chart.

Thomson Engineered Polymer (TEP) 110 (Base Material)

Load Ratings (Pounds) — Types 7 and 8

Bearing Number	Nominal Brg. I.D.	Static	10 RPM	50 RPM	100 RPM	250 RPM
2L1-FF	1/8″	15	4	3	2	1
2L2-FF		28	8	6	4	3
3L1-FF	3/16″	24	4	4	3	2
3L2-FF		48	9	8	6	4
4L1-FF	1/4″	32	5	5	4	2
4L2-FF		64	11	10	6	4
5L1-FF	5/16″	40	8	6	4	2
5L2-FF		80	16	12	8	4
6L1-FF	3/8″	48	9	7	5	2
6L2-FF		96	19	15	10	4
7L1-FF	7/16″	56	12	9	5	2
7L2-FF		112	24	18	10	4
8L1-FF	1/2″	68	13	10	5	2
8L2-FF		135	27	20	10	4
10L1-FF	5/8″	83	16	12	6	2.5
10L2-FF		175	32	25	12	5
12L1-FF	3/4″	100	20	14	6	2.5
12L2-FF		200	40	28	12	5

Radial Load Capacity in Pounds at Various RPMs (Non-Lubricated)

Note: Radial load capacities shown are for maximum plate thickness and will vary in direct proportion to change in plate thickness.

Load Ratings (Pounds) — Types 7 and 8 (Metric)

Bearing Number	Nominal Brg. I.D.	Static	10 RPM	50 RPM	100 RPM	250 RPM
8010A	3	16	5	4	3	2
8011A	4	20	9	6	5	4
8012A	5	27	11	10	6	4
8013A	6	34	13	12	7	4
8014A	8	42	15	13	8	4
8015A	10	60	16	14	9	5
8016A	12	80	20	16	11	5

Radial Load Capacity in Pounds at Various RPMs (Non-Lubricated)

Thomson Engineered Polymer (TEP) 642 (Plus Material)

Load Ratings (Pounds)—Types 5 and 6 Nyliner Plus Bearings

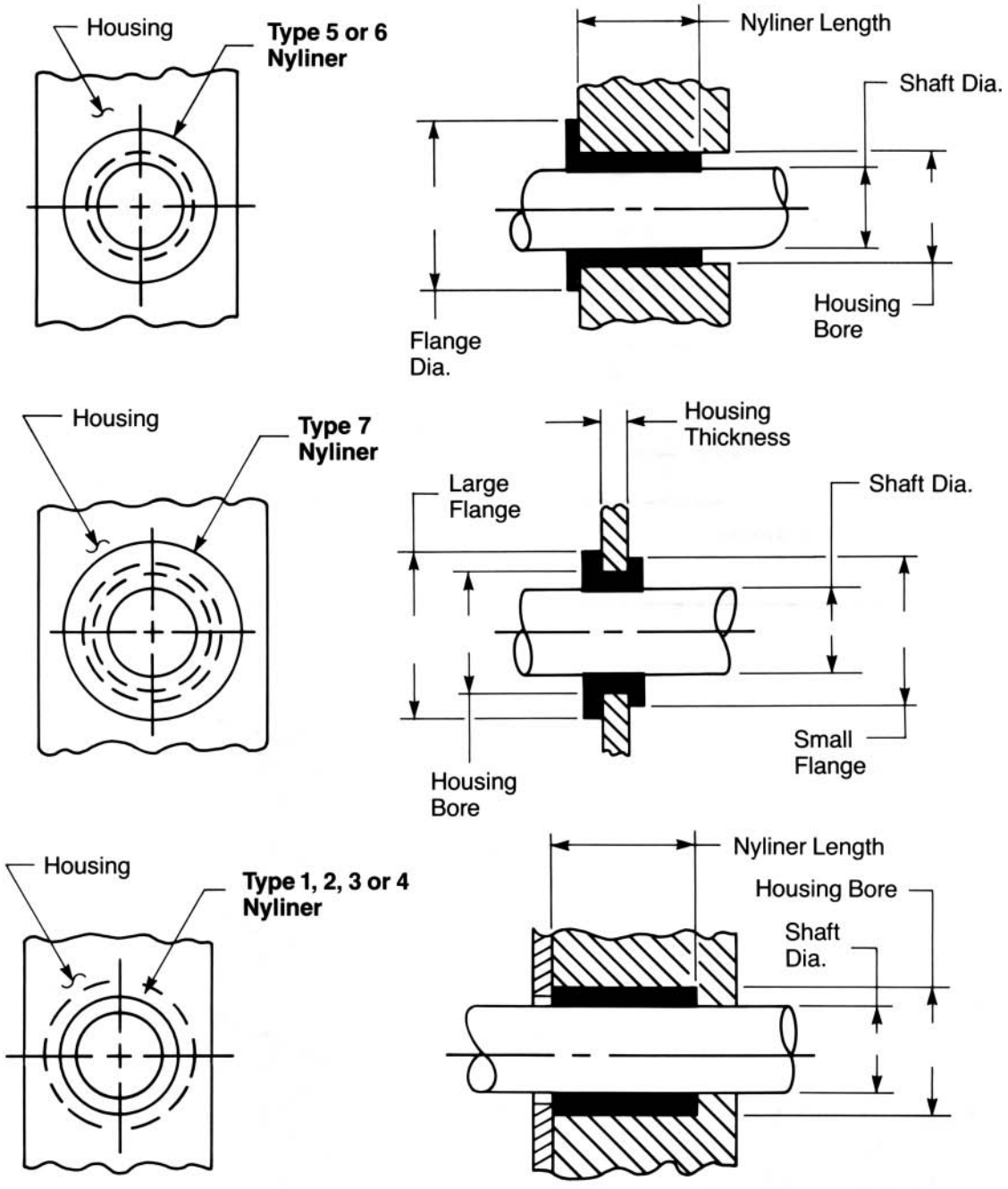
Bearing Number	Radial Load Capacity in Pounds						
	Static Load	10 RPM	25 RPM	50 RPM	100 RPM	250 RPM	500 RPM
3L3-F-642	159	44	39	36	32	24	12
4L4-F-642	288	77	64	52	48	32	16
5L5-F-642	459	126	107	91	80	40	20
5L7-F-642	651	186	157	133	116	57	28
5L10-F-642	917	245	214	182	160	82	41
6L6-F-642	663	182	161	130	112	48	24
6L11-F-642	1,264	350	308	250	216	89	44
7L7-F-642	908	252	221	179	132	57	28
8L3 1/2-F-642	495	151	127	107	68	28	14
8L5 1/2-F-642	806	231	198	163	100	44	22
8L8-F-642	1,192	333	281	234	148	65	32
10L5 1/2-F-642	1,010	284	218	185	104	44	22
10L7-F-642	1,317	361	275	237	132	57	28
10L10-F-642	1,884	518	399	341	192	81	40
10L14-F-642	2,111	581	449	384	216	113	57
10L18-F-642	2,656	746	576	491	272	145	73
12L12-F-642	2,713	770	593	455	232	97	48
12L18-F-642	3,053	868	663	510	260	145	73
14L7 1/2-F-642	1,975	543	412	280	140	61	30
14L14-F-642	3,700	1,015	774	523	264	113	57
16L16-F-642	4,858	1,285	1,005	634	312	129	65
18L18-F-642	6,152	1,540	1,213	683	344	145	73
20L20-F-642	7,627	1,726	1,474	761	388	161	81
24L24-F-642	11,010	2,590	1,883	910	480	194	97

Load Ratings (Pounds)—Types 7 and 8 Nyliner Plus Bearings

Bearing Number	Nominal Brg. I.D.	Static	10 RPM	50 RPM	100 RPM	250 RPM
2L1-FF-642	1/8"	34	12	10	8	4
2L2-FF-642	1/8"	64	24	20	15	12
3L1-FF-642	3/16"	54	12	13	11	8
3L2-FF-642	3/16"	109	27	27	23	16
4L1-FF-642	1/4"	73	15	17	15	8
4L2-FF-642	1/4"	145	33	34	30	16
5L1-FF-642	5/16"	91	24	20	19	8
5L2-FF-642	5/16"	182	48	40	38	16
6L1-FF-642	3/8"	109	27	23	19	8
6L2-FF-642	3/8"	218	57	50	38	16
7L1-FF-642	7/16"	127	36	30	19	8
7L2-FF-642	7/16"	254	72	60	38	16
8L1-FF-642	1/2"	154	39	34	19	8
8L2-FF-642	1/2"	306	81	67	38	16
10L1-FF-642	5/8"	188	48	40	23	10
10L2-FF-642	5/8"	397	96	84	45	20
12L1-FF-642	3/4"	227	60	47	23	10
12L2-FF-642	3/4"	454	120	94	45	20

Nyliner Bearings

Select your standard bearing style here.



Counter bore required for sleeve retention Types 3 and 4.

Press fit recommended for Types 9 and 10 solid bearings.

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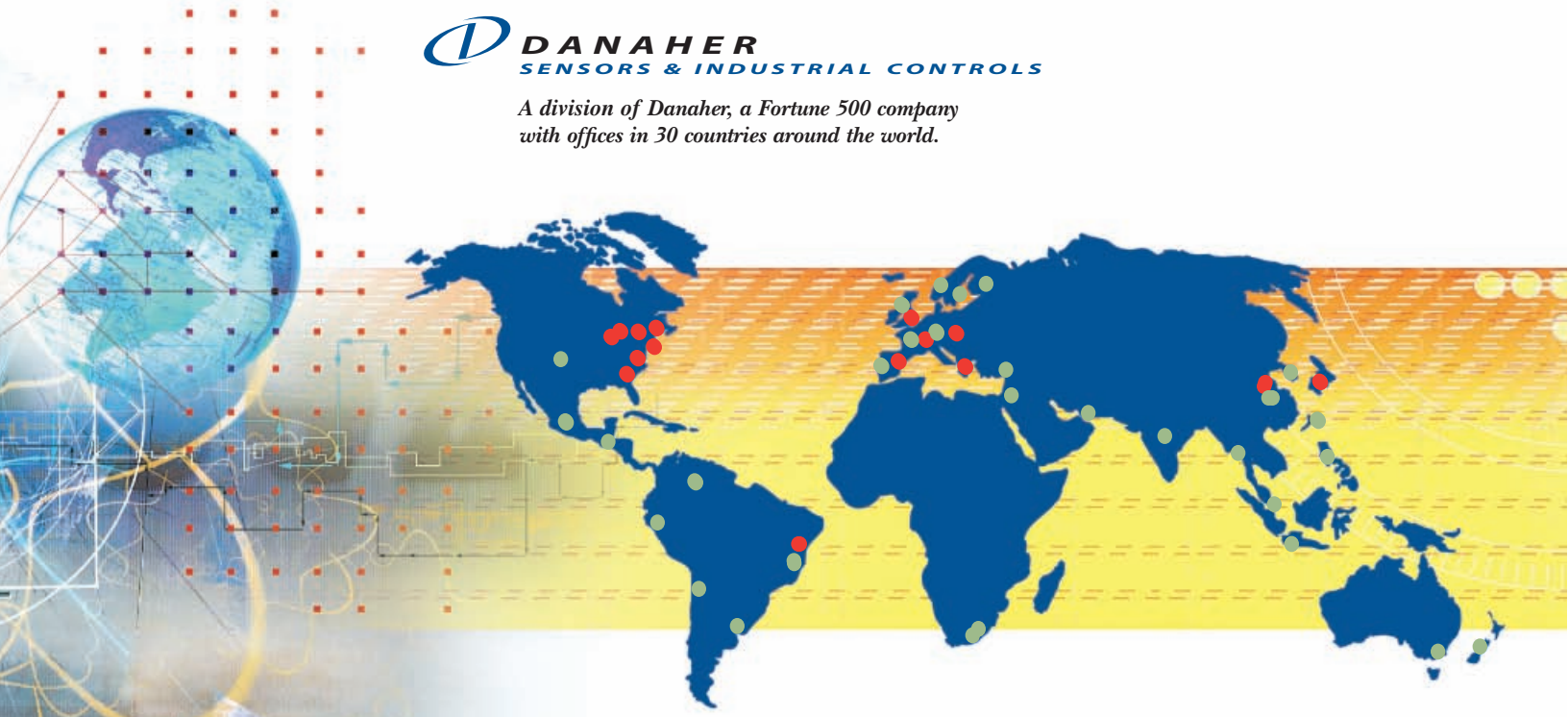

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