

BEARINGS

RADIAL BEARINGS & ACCESSORIES



PIC Design has recently added several new bearing products to its already extensive offerings. What's more, PIC has expanded the coverage available from its existing products. The new lines, including Spherical Bearings, Rod Ends, and Tapered Outside Diameter Ball Bearings complement the expanded ABEC and equivalent ISO Ball Bearings. PIC Design ball bearings are available in inch and metric sizes. PIC Design Bearings — a brief overview.

BALL BEARINGS:

PIC offers a comprehensive and varied line of ball bearings. Engineers and designers can precisely select bearings for specific applications. The ABEC rating of a bearing is determined by radial runout and tolerancing:

ABEC-7 Precision Bearings used in instrument applications, disk drives and applications with low noise requirements.

ABEC-3 Semi-Precision Bearings are used in applications such as office equipment and computer print heads.

ABEC-1 Commercial Bearings are used in applications such as gear trains, chain drive systems, and other applications requiring long service life and good load carrying capabilities, but not necessarily high degrees of precision.

Tapered Outside Diameter Precision Bearings eliminate mounting problems in sheet metal or soft metal housings.

Metric Precision Bearings available in standard and extra-small series for use with metric shafts and housings.

Extra Thin section bearings save space and are appropriate for aerospace applications and anywhere a need for reduced weight exists.

EXTENDED INNER RING BEARINGS:

Used to provide a mounting clearance between the inner and outer race.

THRUST BEARINGS:

Designed for low speed and high thrust application. Available in carbon steel and stainless steel materials.

NON-METALLIC BEARINGS:

PIC offers a line of non-corrosive ball bearings which are particularly desirable for use in chemical or magnetic environments.

SPHERICAL BEARINGS:

Designed for use in applications where high loads are present and compensation for angular misalignment is required.

ROD ENDS:

Used as connecting links in many applications, with allowance for angular misalignment.

SINTERED BRONZE BEARINGS:

PIC offers a line of self-lubricating, oil impregnated bronze bearings which are particularly desirable for maintenance free applications.

Precision Bearings: Direct replacement for ball bearings.

Sleeve and Flanged: For inexpensive low speed systems. Available in inch and metric sizes.

ENGINEERED PLASTIC BEARINGS:

Similar to sleeve and flanged bronze bearings, but made of custom blended material for ease of maintenance and lube-free performance.

BEARING MOUNTING ACCESSORIES:

- Cam followers
- Bearing housings
- Shims and spacers
- Pre-load springs

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TECHNICAL SECTION

To help customers select the most appropriate bearings for use in particular applications, PIC Design has included an Application Guide and an ABEC and ISO Tolerancing Chart.

The Application Guide assists in determining the bearing quality necessary for your system. If you do not find your specific applications listed, use ones which are most similar.

Table 1. Application Guide

| Application | ABEC Grade | | | |
|------------------------------|------------|---|---|---|
| | 1 | 3 | 5 | 7 |
| Electric Motors | | ✓ | | |
| Tape Guides | | | | ✓ |
| Gyro Gimbals | | | | ✓ |
| Commercial Gear Trains | ✓ | ✓ | | |
| Precision Gear Trains | | | ✓ | ✓ |
| AGMA Q14 Gear Trains | | | | ✓ |
| Very High Speed Applications | | | | ✓ |
| Timing Pulley Supports | ✓ | ✓ | | |
| "No-Slip" Pulley Systems | | ✓ | ✓ | |
| Chain Drive Systems | ✓ | | | |
| Bread Board Experiments | | | | ✓ |
| Computer Disk Drive | | | | ✓ |
| Laser Aligning Equipment | | | ✓ | ✓ |
| Hand Adjusted Settings | ✓ | | | |
| Robotics | | | ✓ | ✓ |
| Encoder Applications | | | ✓ | ✓ |
| Office Equipment | | ✓ | ✓ | |
| Print Heads | | ✓ | ✓ | |

Table 2. ABEC & ISO Tolerancing Chart

| ABEC Grade | Radial Runout | | Mean Diameter Tolerance | | | ISO Class |
|------------|---------------|------------|-------------------------|--------------------|-----------|---------------|
| | Inner Ring | Outer Ring | Bore | O.D. | O.D. Size | |
| 1 | .0003 | .0005 | +0.0000 -0.0003 | +0.0000 -0.0003 | 0-18 mm | 0 (Normal) |
| 3 | .0003 | .0004 | +0.0000 -0.0002 | +0.0000 -0.0003 | 0-30 mm | 6 |
| 5 | .00015 | .0002 | +0.0000 -0.0002 | +0.0000 -0.0002 | 0-30 mm | 5 |
| 7 | .0001 | .00015 | +0.0000 -0.0002 | +0.0000 -0.0002 | 0-30 mm | 4 |

This information is intended for reference only. All dimensions are in inches.

BEARING SELECTION:

Bearing Size

A variety of criteria may have an influence on bearing size selection for different installations:

Mating parts. One or more of the bearing dimensions may be governed by the size of a mating part (e.g. shaft, housing).

Capacity. Bearing loading, dynamic and static, will establish minimum capacity requirements and influence size selection because capacity generally increases with size.

Speedability. Smaller bearings can usually operate at higher speeds than large bearings, hence the speed requirement of an application may affect size selection.

Stiffness. Large bearings yield less than small bearings and are the better choice where bearing stiffness is crucial.

Weight. In some cases, bearing weight may have to be considered and factored into the selection process.

Torque. Reducing the ball size and using wider raceway curvatures are tactics which may be used to reduce torque.

AISI 440 stainless steel is the standard material for miniature and instrument bearings and torque tube bearings. It is optional for spindle and turbine bearings. This is a hardenable, corrosion-resistant steel with adequate fatigue resistance, good load-carrying capacity, excellent stability and wear resistance. Operating temperature range is -400°F to 300°F for miniature and instrument bearings.

SAE 52100 chrome steel is the standard material for spindle and turbine bearings. It is also available in many miniature and instrument sizes, and may be preferable when fatigue life and static capacity are critical. This material has excellent capacity, fatigue resistance and stability. Operating temperature limit is 400°F when used in spindle and turbine bearings.

Preloading Techniques

Preloading is the removal of internal clearance in a bearing by applying a permanent thrust load to it. Preloading is used to:

- Eliminate radial and axial play
- Increase system rigidity
- Reduce nonrepetitive runout
- Lessen the difference in contact angles between the balls and both inner and outer rings at very high speeds
- Prevent ball skidding under very high accelerations
- Suppress noise

Bearings should be preloaded as lightly as is necessary to achieve the desired results. This avoids excessive heat generation, which reduces speed capability and bearing life.

There are three basic methods of preloading — springs, axial adjustment and duplex bearings.

Limiting Speeds

Limiting speed is defined as the speed at which the internally generated temperature in a mounted bearing reaches the lowest maximum temperature permissible for any of its components, including the lubricant.

There are many factors which combine to determine the limiting speeds of ball and roller bearings. Therefore it is not possible to calculate these speeds with accuracy. Frequently it is necessary to estimate the speed limit of a bearing on the basis of experience with bearings operating under conditions similar to those in question. For small and medium size bearings of the same type and dimension series, operating under similar conditions, the speed limit is approximately inversely proportional to the bearing bore. For large bearings this no longer applies as their speed limits are relatively lower. A bearing of light section has a higher speed limit than a bearing of heavy section. As a result a more general comparison can be made between speeds of different radial bearings by using the bearing mean diameter d_m as a reference instead of the bore d . From the above, the following formulas are derived:

$$\text{For Radial and Angular Contact Bearings. } N = \frac{A}{d_m}$$

$$\text{Where: } N = \text{The speed Limit, RPM} \\ d_m = \text{The Bearing, mean diameter} = \frac{d + D}{2}$$

d = The bearing bore in mm

D = The bearing O.D., mm

A = A value Single Row Ball: 400,000

Single Row Angular Contact:

Low Contact Angle: 800,000

High Contact Angle: 500,000

The above values for A are useful as a quick orientation regarding speed limits for different bearing types and sizes operating under a moderate load and otherwise favorable conditions.

The speed limits calculated using these formulas and values of A should be considered a maximum. These values apply only to bearings lubricated with oil. When bearings are lubricated with grease, use 70% of the above for A .

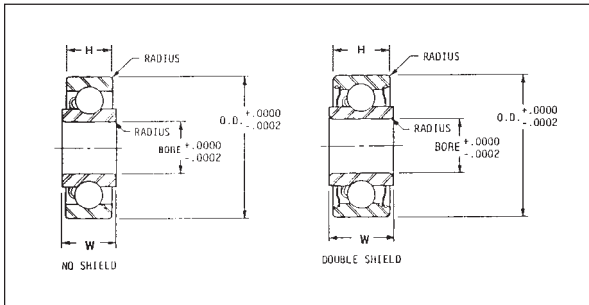
EXTENDED INNER RACE BEARINGS

TOLERANCES: ABEC 3 & 7

Material: 440 Stainless Steel

Lubrication: Open - Oil per MIL-L-6085

Double Shielded: Grease per MIL-G-23827



| BORE | O.D. | H | W | Shield DATA | ABEC 3 Part No. | ABEC 7 Part No. |
|-------|-------|-------|-------|---------------|-----------------|-----------------|
| .1250 | .2500 | .0937 | .125 | Open | E1-OE-3 | E1-OE-7 |
| | | .1094 | .1406 | Double Shield | E1-SE-3 | E1-SE-7 |
| .1875 | .3125 | .1094 | .1406 | Open | E2-OE-3 | E2-OE-7 |
| | | .125 | .1562 | Double Shield | E2-SE-3 | E2-SE-7 |
| .2500 | .3750 | .125 | .1562 | Open | E3-OE-3 | E3-OE-7 |
| | | | | Double Shield | E3-SE-3 | E3-SE-7 |
| .3125 | .5000 | .1562 | .1875 | Open | E4-OE-3 | E4-OE-7 |
| | | | | Double Shield | E4-SE-3 | E4-SE-7 |

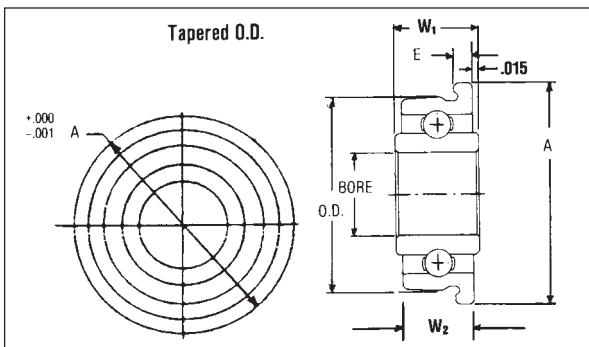
TAPERED O.D. BEARINGS

TOLERANCES: ABEC 7

Material: 440 Stainless Steel

Lubricated: Grease Per MIL-G-23827

Supplied With Double Shield



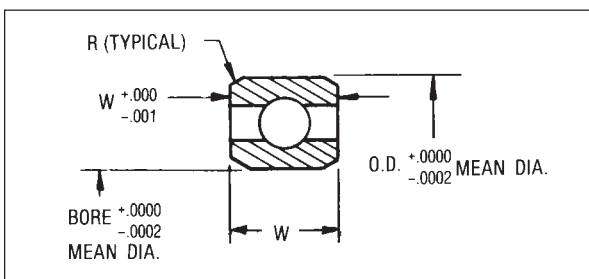
| Bore | O.D. | W ₁ | W ₂ | A | E | Part No. |
|-------|-------|----------------|----------------|-------|------|----------|
| .1250 | .3757 | .189 | .163 | .4380 | .037 | E8-1 |
| .1875 | .5632 | .251 | .226 | .6250 | .042 | E8-2 |
| .2498 | .6257 | .251 | .226 | .6850 | .042 | E8-3 |
| .3125 | .6887 | .251 | .226 | .7500 | .042 | E8-4 |

EXTRA THIN BALL BEARINGS

TOLERANCES: ABEC-5 OPEN

Material: 440 Stainless Steel

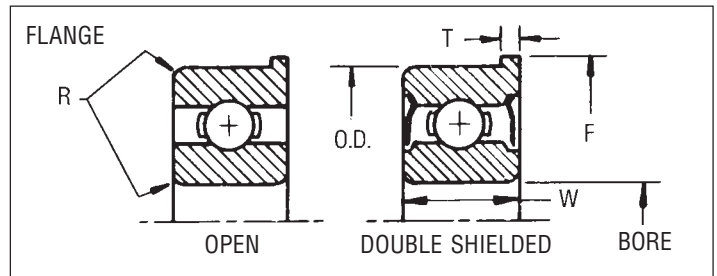
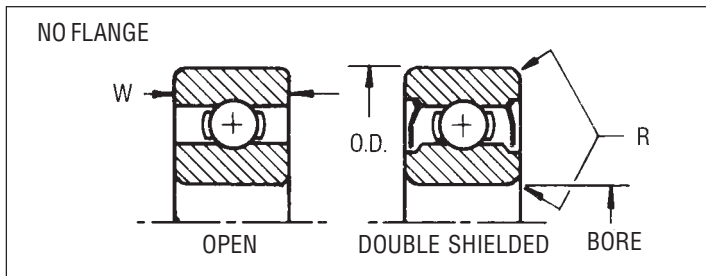
Oil Per MIL-L-6085



| Bore | O.D. | W | R | Load Rating | | Part No. |
|-------|--------|-------|------|-------------|--------|----------|
| | | | | Dyn. | Static | |
| .3750 | .6250 | .1562 | .010 | 96 | 53 | E5-1 |
| .5000 | .7500 | .1562 | .010 | 112 | 67 | E5-2 |
| .6250 | .8750 | .1562 | .010 | 116 | 81 | E5-3 |
| .7500 | 1.0000 | .1562 | .010 | 129 | 98 | E5-4 |

PRECISION BALL BEARINGS

ABEC 1,3, And 7 Tolerances



Material: ABEC 3 & 7 440 Stainless Steel
ABEC 1 - 52100 Steel

Lubrication: Open - Oil per MIL-L-6085
Double Shielded & Sealed: Grease per MIL-G-23827

Standard Radial Play: .0002-.0005 (Inch)
0.005-0.013 (Millimeter)

Sealed: Buna N Rubber or Teflon at PIC Option

| Bore | O.D. | W | F | T | R Radius | Shield Data | Radial Load Rating (lbs.) | | No Flange | | | Flanged | | | |
|-------|-------|-------------------------|-------|--------------|----------|------------------------------------------|---------------------------|--------|---------------------------|--------------------|------------------|--------------------|--------------------|--------------------|--|
| | | | | | | | Dynamic | Static | ABEC 1 Part No. | ABEC 3 Part No. | ABEC 7 Part No. | ABEC 1 Part No. | ABEC 3 Part No. | ABEC 7 Part No. | |
| | | | | | | | | | | | | | | | |
| .0400 | .1250 | .0469 | | | .003 | Open | 19 | 6 | | E1-16-3 | E1-16 | | | | |
| .0469 | .1562 | .0625 .0937 | .203 | .013 .031 | .005 | Open Dbl. Shield | 27 | 9 | | E3-11-3 E3-12-3 | E3-11 E3-12 | | E4-11-3 E4-12-3 | E4-11 E4-12 | |
| .0550 | .1875 | .0781 .1094 | .234 | .023 .031 | .005 | Open Dbl. Shield | 46 | 14 | | E3-13-3 E3-14-3 | E3-13 E3-14 | | E4-13-3 E4-14-3 | E4-13 E4-14 | |
| .0781 | .2500 | .0937 .1406 | .296 | .023 .031 | .006 | Open Dbl. Shield | 59 | 19 | | E3-1-3 E3-2-3 | E3-1 E3-2 | | E4-1-3 E4-2-3 | E4-1 E4-2 | |
| .0937 | .1875 | .0625 .0937 | .234 | .018 .031 | .006 | Open Dbl. Shield | 34 | 10 | E13-01 E13-S1 | E13-03 E13-S3 | E13-07 E13-S7 | E13-01F E13-S1F | E13-03F E13-S3F | E13-07F E13-S7F | |
| .0937 | .3125 | .1094 .1406 | .359 | .023 .031 | .006 | Open Dbl. Shield | 101 | 33 | | E3-3-3 E3-4-3 | E3-3 E3-4 | | E4-3-3 E4-4-3 | E4-3 E4-4 | |
| .1250 | .2500 | .0937 .1094 | .296 | .023 .031 | .005 | Open Dbl. Shield | 51 | 18 | | E3-5-3 E3-6-3 | E3-5 E3-6 | | E4-5-3 E4-6-3 | E4-5 E4-6 | |
| .1250 | .3125 | .1094 .1406 | .359 | .023 .031 | .006 | Open Dbl. Shield | 100 | 32 | | E3-7-3 E3-8-3 | E3-7 E3-8 | | E4-7-3 E4-8-3 | E4-7 E4-8 | |
| .1250 | .3750 | .1094 .1406 | .422 | .023 .031 | .005 | Open Dbl. Shield | 102 | 33 | | | | E2-16-1 E2-17-1 | E2-16-3 E2-17-3 | E2-16 E2-17 | |
| .1250 | .3750 | .1562 | .440 | .030 | .012 | Open Dbl. Shield Dbl. Seal | 115 | 41 | E1-1-1 E6-2 E6-3 | E1-1-3 E1-3-3 | E1-1 E1-3 | E2-1-1 E2-3-1 | E2-1-3 E2-3-3 | E2-1 E2-3 | |
| .1562 | .3125 | .1094 .1250 | .359 | .023 .036 | .006 | Open Dbl. Shield | 70 | 26 | E14-01 E14-S1 | E14-03 E14-S3 | E14-07 E14-S7 | E14-01F E14-S1F | E14-03F E14-S3F | E14-07F E14-S7F | |
| .1875 | .3125 | .1094 .1250 | .359 | .023 .036 | .006 | Open Dbl. Shield | 70 | 26 | E15-01 E15-S1 | E15-03 E15-S3 | E15-07 E15-S7 | E15-01F E15-S1F | E15-03F E15-S3F | E15-07F E15-S7F | |
| .1875 | .3750 | .1250 | .422 | .023 .031 | .005 | Open Dbl. Shield | 129 | 50 | E1-2-1 E1-5-1 | E1-2-3 E1-5-3 | E1-2 E1-5 | E2-2-1 E2-5-1 | E2-2-3 E2-5-3 | E2-2 E2-5 | |
| .1875 | .5000 | .1562 .1960 .1960 | .565 | .042 | .012 | Open Open Dbl. Shield Dbl. Seal | 236 | 88 | E1-4-1 E6-5 E6-6 | E1-4-3 E1-6-3 | E1-4 E1-6 | E2-4-1 E2-6-1 | E2-4-3 E2-6-3 | E2-4 E2-6 | |
| .2500 | .3750 | .1250 | .422 | .023 .036 | .005 | Open Dbl. Shield | 76 | 37 | E1-8-1 E1-11-1 | E1-8-3 E1-11-3 | E1-8 E1-11 | E2-8-1 E2-11-1 | E2-8-3 E2-11-3 | E2-8 E2-11 | |
| .2500 | .5000 | .1250 .1875 | .547 | .023 .045 | .005 | Open Dbl. Shield | 150 | 67 | E1-12-1 E1-13-1 | E1-12-3 E1-13-3 | E1-12 E1-13 | E2-12-1 E2-13-1 | E2-12-3 E2-13-3 | E2-12 E2-13 | |
| .2500 | .6250 | .1960 | .690 | .042 | .012 | Open Dbl. Shield Dbl. Seal | 265 | 107 | E1-7-1 E6-8 E6-9 | E1-7-3 E1-9-3 | E1-7 E1-9 | E2-7-1 E2-9-1 | E2-7-3 E2-9-3 | E2-7 E2-9 | |
| .2500 | .7500 | .2188 .2812 | | | .012 | Open Dbl. Shield | 434 | 164 | E16-01 E16-S1 | E16-03 E16-S3 | E16-07 E16-S7 | | | | |
| .3125 | .5000 | .1562 | .547 | .031 | .016 | Open Dbl. Shield | 98 | 42 | E6-01 E6-S1 | E6-03 E6-S3 | E6-07 E6-S7 | E6-01F E6-S1F | E6-03F E6-S3F | E6-07F E6-S7F | |
| .3750 | .8750 | .2188 .2812 .2812 | .969 | .062 | .016 | Open Open Dbl. Shield Dbl. Seal | 599 | 252 | E1-14-1 E6-11 E6-12 | E1-14-3 E1-15-3 | E1-14 E1-15 | E2-14-1 E2-15-1 | E2-14-3 E2-15-3 | E2-14 E2-15 | |
| .5000 | 1.125 | .2500 .3125 | 1.225 | .062 | .016 | Open Dbl. Shield | 696 | 402 | E7-01 E7-S1 | E7-03 E7-S3 | E7-07 E7-S7 | E7-S1F E7-S3F | E7-S3F E7-S7F | E7-S7F | |

Continued on page 6-5

PRECISION BALL BEARINGS

Continued from page 6-4

ABEC 1, 3, and 7 Tolerances

| Bore | O.D. | W | F | T | R Radius | Shield Data | Radial Load Rating (lbs.) | | No Flange | | | Flanged | | | | | | | |
|---------|--------|----------------|---|---|-------------|---------------------|------------------------------|--------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|----------------|----------------|------------------|------------------|------------------|
| | | | | | | | Dynamic | Static | ABEC 1 Part No. | ABEC 3 Part No. | ABEC 7 Part No. | ABEC 1 Part No. | ABEC 3 Part No. | ABEC 7 Part No. | | | | | |
| | | | | | | | | | | | | | | | E9-01 E9-S1 | E9-03 E9-S3 | E10-01 E10-S1 | E10-03 E10-S3 | E11-01 E11-S1 |
| .6250 | 1.375 | .2812 .3438 | | | .031 | Open Dbl. Shield | 1072 | 582 | | | | | | | | | | | |
| .7500 | 1.625 | .3125 .4375 | | | .031 | Open Dbl. Shield | 1688 | 1048 | | | | | | | | | | | |
| .8750 | 1.875 | .3750 .5000 | | | .031 | Open Dbl. Shield | 1816 | 1048 | | | | | | | | | | | |
| 1.000 | 2.000 | .3750 .5000 | | | .031 | Open Dbl. Shield | 1816 | 1048 | | | | | | | | | | | |
| *1.1250 | 2.1250 | .5000 | | | .031 | Open Dbl. Shield | 2384 | 1488 | | | | | | | | | | | |
| *1.2500 | 2.250 | .3750 .5000 | | | .031 | Open Dbl. Shield | 2384 | 1488 | | | | | | | | | | | |
| *1.5000 | 2.625 | .4375 .5625 | | | .031 | Open Dbl. Shield | 3016 | 2072 | | | | | | | | | | | |

*Material ABEC 1 and 3 — 52100 chrome steel

METRIC PRECISION BALL BEARINGS

TOLERANCES: ISO Class 4 or Normal

Material: 440 Stainless Steel

| Bore | O.D. | W | F | T | R | Shield Data | Radial Load Rating (N) | | No Flange Part No. | Flanged Part No. |
|------|------|------------|------|------------|-------------|------------------|---------------------------|--------|-----------------------|---------------------|
| | | | | | | | Dynamic | Static | | |
| 3 | 7 | 2.0 3.0 | 8.1 | 0.5 0.8 | 0.2 0.15 | Open Shielded | 248 | 88 | MBG1-1 MBG2-1 | MBG3-1 MBG4-1 |
| 3 | 10 | 4.0 | 11.5 | 1.0 | 0.3 | Open Shielded | 504 | 172 | MBG5-1 MBG6-1 | MBG7-1 MBG8-1 |
| 4 | 9 | 2.5 4.0 | 10.3 | 0.6 1.0 | 0.25 0.5 | Open Shielded | 512 | 180 | MBG1-2 MBG2-2 | MBG3-2 MBG4-2 |
| 4 | 13 | 5.0 | 15.0 | 1.0 | 0.4 | Open Shielded | 1040 | 388 | MBG5-2 MBG6-2 | MBG7-2 MBG8-2 |
| 4 | 16 | 5.0 | 18.0 | 1.0 | 0.5 | Open Shielded | 1072 | 416 | MBG5-3 MBG6-3 | MBG7-3 MBG8-3 |
| 5 | 11 | 3.0 5.0 | 12.5 | 0.8 1.0 | 0.3 0.2 | Open Shielded | 572 | 226 | MBG1-3 MBG2-3 | MBG3-3 MBG4-3 |
| 5 | 16 | 5.0 | 18.0 | 1.0 | 0.5 | Open Shielded | 1382 | 540 | MBG5-4 MBG6-4 | MBG7-4 MBG8-4 |
| 6 | 13 | 3.5 5.0 | 15.0 | 1.0 1.1 | 0.3 0.2 | Open Shielded | 864 | 352 | MBG1-4 MBG2-4 | MBG3-4 MBG4-4 |
| 6 | 19 | 6.0 | 22.0 | 1.5 | 0.5 | Open Shielded | 1868 | 716 | MBG5-5 MBG6-5 | MBG7-5 MBG8-5 |
| 7 | 22 | 7.0 | | | 0.3 | Open Shielded | 2632 | 1104 | MBG7-0 MBG7-S | |
| 8 | 16 | 4.0 5.0 | 18.0 | 1.0 | 0.4 0.3 | Open Shielded | 1000 | 474 | MBG1-5 MBG2-5 | MBG3-5 MBG4-5 |
| 8 | 22 | 7.0 | 25.0 | 1.5 | 0.5 | Open Shielded | 2632 | 1104 | MBG5-6 MBG6-6 | MBG7-6 MBG8-6 |
| 10 | 19 | 5.0 7.0 | | | 0.5 | Open Shielded | 1372 | 670 | MBG1-6 MBG2-6 | |
| 10 | 26 | 8.0 | | | 0.5 | Open | 3470 | 1950 | MBG5-7 | |
| 12 * | 28 | 8.0 | | | 0.5 | Open Shielded | 4340 | 1910 | MBG10-0 MBG10-S | |
| 15 * | 32 | 9.0 | | | 0.5 | Open Shielded | 4750 | 2270 | MBG15-0 MBG15-S | |
| 20 * | 42 | 12.0 | | | 1.0 | Open Shielded | 7960 | 4050 | MBG20-0 MBG20-S | |
| 25 * | 47 | 12.0 | | | 1.0 | Open Shielded | 8550 | 4690 | MBG25-0 MBG25-S | |
| 30 * | 55 | 13.0 | | | 1.5 | Open Shielded | 11240 | 6610 | MBG30-0 MBG30-S | |
| 40 * | 68 | 15.0 | | | 1.5 | Open Shielded | 14250 | 9220 | MBG40-0 MBG40-S | |

* ISO Class Normal 52100 Chrome Steel

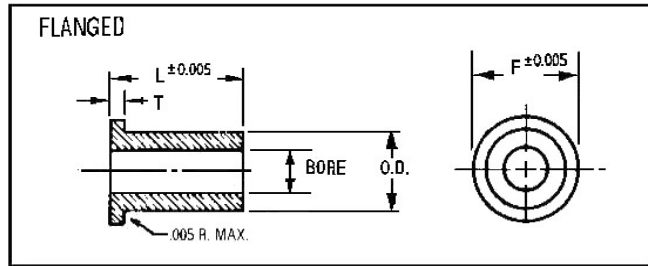
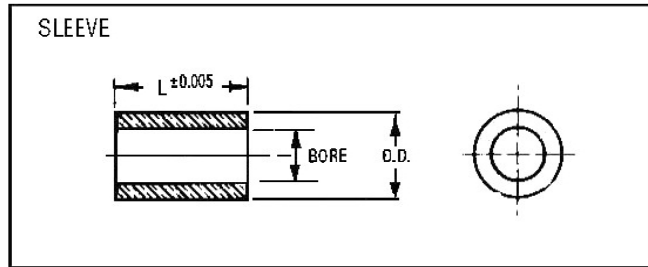
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SINTERED BRONZE BEARINGS

Oil-Impregnated

Sleeve & Flanged



Material: Bronze, MIL-B-438/438
Type 2, Grade 1

Specifications:

Density: 6.4 -6.8 gm/cm³ PV (100ft./min.): 50,000
 Porosity (% by Vol.): 19 min. Static, P: 8,000 PSI
 Tensile Strength: 14,000 PSI Dynamic P: 2,000 PSI
 Compressive Yield Strength: 11,000 PSI Speed V: 1,200 fpm

Bearing Design Calculations For Loads & Speed: The load carrying capability of sleeve bearings is expressed by a PV factor in the following formula:

Where:
 $PV = \frac{.262 WN}{L}$ P = Load, PSI V = Shaft Speed (fpm)
 $P = \frac{W}{LD}$ W = Load (lbs.)
 $V = .262 DN$ L = Bearing Length (In.)
 D = Bearing I.D. (In.)
 N = Shaft Speed (Rpm)

Recommended Press Fits

| Outside Diameter In. | Press Fit, In. | |
|-------------------------|----------------|---------|
| | Minimum | Maximum |
| Up to 0.760 | 0.001 | 0.003 |
| 0.761 to 1.510 * | 0.0015 | 0.004 |
| 1.511 to 2.510 | 0.002 | 0.005 |
| 2.511 to 3.010 | 0.002 | 0.006 |
| Over 3.010 | 0.002 | 0.007 |

Running Clearances

| Shaft Size In | Clearance, min. in. Sintered Bronze |
|------------------|----------------------------------------|
| Up to 0.760 | 0.0005 |
| 0.761 to 1.510 * | 0.0010 |
| 1.511 to 2.510 | 0.0015 |
| Over 2.510 | 0.0020 |

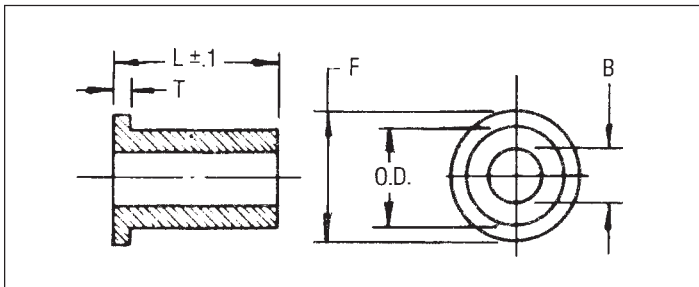
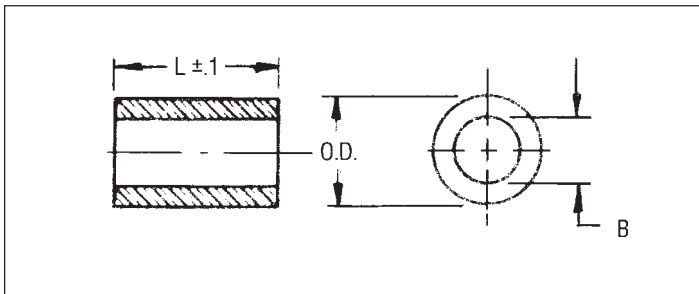
*Revised
1/8/08

| Shaft Size | Bore +.000 -.001 | O.D. +.000 -.001 | L ±.005 | F ±.005 | T ±.0025 | Part No. Sleeve | Part No. Flange |
|------------|------------------------|------------------------|------------|------------|-------------|------------------------------------------------|------------------------------------------------|
| 1/8 | .127 | .252 | .125 | .360 | .047 | B10-1 B10-2 B10-3 | B11-1 B11-2 B11-3 |
| | | | .250 | | | | |
| | | | .375 | | | | |
| 3/16 | .189 | .314 | .250 | .370 | .047 | B10-5 B10-6 B10-7 B10-8 | B11-5 B11-6 B11-7 B11-8 |
| | | | .375 | | | | |
| | | | .500 | | | | |
| | | | .625 | | | | |
| 1/4 | .252 | .377 | .250 | .560 | .047 | B10-9 B10-10 B10-11 B10-12 | B11-9 B11-10 B11-11 B11-12 |
| | | | .375 | | | | |
| | | | .500 | | | | |
| 1/4 | .252 | .439 | .375 | | | B10-31 B10-32 B10-33 B10-34 | |
| | | | .500 | | | | |
| | | | .625 | | | | |
| | | | .750 | | | | |
| 1/4 | .252 | .503 | .500 | .625 | .062 | B10-49 — B10-51 | — B11-50 B11-51 |
| | | | .625 | | | | |
| | | | .750 | | | | |
| 5/16 | .315 | .440 | .250 | .563 | .062 | B10-13 B10-14 B10-15 B10-16 | B11-13 B11-14 B11-15 B11-16 |
| | | | .375 | | | | |
| | | | .500 | | | | |
| | | | .625 | | | | |
| 3/8 | .377 | .502 | .250 | .625 | .062 | | B11-17 B11-18 B11-19 B11-20 B11-21 |
| | | | .375 | | | | |
| | | | .500 | | | | |
| | | | .625 | | | | |
| 3/8 | .378 | .503 | .250 | | | B10-17 B10-18 B10-19 B10-20 B10-21 | |
| | | | .375 | | | | |
| | | | .500 | | | | |
| | | | .625 | | | | |
| 1/2 | .502 | .628 | .375 | | | B10-22 B10-23 B10-24 B10-25 B10-26 | |
| | | | .500 | | | | |
| | | | .625 | | | | |
| | | | .750 | | | | |
| 1/2 | .502 | .627 | .375 | .875 | .062 | | B11-22 B11-23 B11-24 B11-25 B11-26 |
| | | | .500 | | | | |
| | | | .625 | | | | |
| | | | .750 | | | | |
| 5/8 | .628 | .753 | .500 | | | B10-52 B10-53 B10-54 | |
| | | | .750 | | | | |
| | | | 1.000 | | | | |
| 5/8 | .627 | .753 | .500 | 1.000 | .094 | | B11-52 B11-53 B11-54 |
| | | | .750 | | | | |
| | | | 1.000 | | | | |
| 3/4 | .753 | 1.003 | .500 | 1.125 | .125 | B10-55 B10-56 B10-57 B10-58 | B11-55 B11-56 B11-57 B11-58 |
| | | | .750 | | | | |
| | | | 1.000 | | | | |
| | | | 1.250 | | | | |
| 7/8 | .878 | 1.003 | .500 | | | B10-59 B10-60 B10-61 | |
| | | | .750 | | | | |
| | | | 1.000 | | | | |
| 7/8 | .878 | 1.128 | .625 | 1.500 | .125 | — B10-63 B10-64 | B11-62 B11-63 B11-64 |
| | | | .750 | | | | |
| | | | 1.000 | | | | |
| 1 | 1.004 | 1.254 | .500 | | | B10-65 B10-66 B10-67 | |
| | | | .750 | | | | |
| | | | 1.000 | | | | |
| 1 | 1.003 | 1.253 | .750 | 1.625 | .125 | | B11-68 B11-69 B11-70 |
| | | | 1.000 | | | | |
| | | | 1.250 | | | | |

METRIC SINTERED BRONZE BEARINGS

Oil-Impregnated

ISO Standard



All Dimensions in Millimeters

Material: Bronze, Per MIL-B-438/438
Type 2, Grade 1 (BP 25)

Bearing Tolerances

(Before Fitting):

Bore (B)

Unflanged Bearing F7
Flanged Bearing F8

O.D.

Unflanged Bearing s7
Flanged Bearing s8

Flange

Diameter (F) js13
Thickness (T) js14

T.I.R. O.D. and Bore .060 μ

Bore After Assembly

Unflanged H7
Flanged H8

Recommended Housing H7

Features:

Eliminates Lubrication Points

Reduces Maintenance

Max Speed 30,000 rpm

Dynamic Load 1500 daN/cm²

Temperature -20° to +100°C

No Seizing

Permanent Presence of a Veritable Cushion of Oil.

Silent Running

| Shaft Size F7 | Bore | O.D. | L | F | T | Part No. Unflanged | Part No. Flanged |
|---------------|------|------|----|----|-----|------------------------------------------|------------------|
| 3 | 3 | 6 | 4 | 9 | 1.5 | MBG9-1 MBG9-2 MBG9-3 | MBG10-1 |
| | | | 6 | | | | MBG10-2 |
| | | | 10 | | | | MBG10-3 |
| 4 | 4 | 8 | 4 | 12 | 2 | MBG9-4 MBG9-5 MBG9-7 | MBG10-4 |
| | | | 8 | | | | MBG10-5 |
| | | | 12 | | | | MBG10-7 |
| 5 | 5 | 8 | 5 | 12 | 2 | MBG9-8 MBG9-9 MBG9-10 MBG9-11 | |
| | | | 8 | | | | |
| | | | 12 | | | | |
| | | | 16 | | | | |
| 6 | 6 | 10 | 6 | 14 | 2 | MBG9-12 MBG9-13 MBG9-14 MBG9-15 | MBG10-12 |
| | | | 10 | | | | MBG10-13 |
| | | | 12 | | | | * MBG10-14 |
| | | | 16 | | | | MBG10-15 |
| 8 | 8 | 12 | 8 | 16 | 2 | MBG9-16 MBG9-17 MBG9-18 | MBG10-16 |
| | | | 12 | | | | MBG10-17 |
| | | | 16 | | | | MBG10-18 |
| 10 | 10 | 13 | 10 | 16 | 1.5 | MBG9-19 MBG9-20 MBG9-21 | MBG10-19 |
| | | | 16 | | | | MBG10-20 |
| | | | 20 | | | | MBG10-21 |
| 12 | 12 | 17 | 12 | 22 | 2.5 | MBG9-22 MBG9-23 MBG9-24 | MBG10-22 |
| | | | 16 | | | | MBG10-23 |
| | | | 20 | | | | MBG10-24 |
| 16 | 16 | 22 | 16 | 28 | 3 | MBG9-25 MBG9-26 MBG9-27 | MBG10-25 |
| | | | 20 | | | | MBG10-26 |
| | | | 25 | | | | MBG10-27 |
| | | | | | | | |
| 20 | 20 | 26 | 16 | 32 | 3 | MBG9-28 MBG9-29 MBG9-30 MBG9-31 | MBG10-28 |
| | | | 20 | | | | MBG10-29 |
| | | | 25 | | | | MBG10-30 |
| | | | 32 | | | | MBG10-31 |
| 25 | 25 | 30 | 20 | 35 | 2.5 | MBG9-32 MBG9-33 MBG9-34 MBG9-35 | MBG10-32 |
| | | | 25 | | | | MBG10-33 |
| | | | 32 | | | | MBG10-34 |
| | | | 40 | | | | |

* Flange thickness on MBG10-14 = 1.2mm

Tolerances per ISO 286-2 μ m

| Bore | O.D. | F7 | F8 | s7 | s8 |
|------|------|-----|-----|-----|-----|
| 3 | 6 | +16 | +21 | +31 | +37 |
| | | +7 | +7 | +19 | +19 |
| 4 | 8 | +22 | +28 | +38 | +45 |
| | | +10 | +10 | +23 | +23 |
| 5 | 8 | +22 | | +38 | |
| | | +10 | | +23 | |
| 6 | 10 | +22 | +28 | +38 | +45 |
| | | +10 | +10 | +23 | +23 |
| 8 | 12 | +28 | +35 | +46 | +55 |
| | | +13 | +13 | +28 | +28 |
| 10 | 13 | +28 | +35 | +46 | +55 |
| | | +13 | +13 | +28 | +28 |
| 12 | 17 | +34 | +43 | +46 | +55 |
| | | +16 | +16 | +28 | +28 |
| 16 | 22 | +34 | +43 | +56 | +68 |
| | | +16 | +16 | +35 | +35 |
| 20 | 26 | +41 | +53 | +56 | +68 |
| | | +20 | +20 | +35 | +35 |
| 25 | 30 | +41 | +53 | +56 | +68 |
| | | +20 | +20 | +35 | +35 |

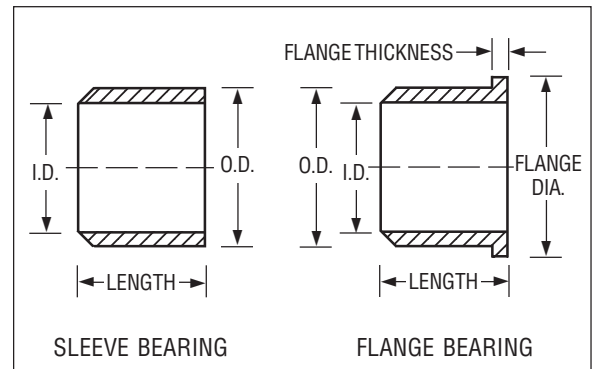
NON-METALLIC BEARINGS

Sleeve & Flanged

Material: This self-lubricating, maintenance-free bearing is manufactured from a custom blended material that exhibits excellent abrasion resistance and long life. It's an all-purpose bearing for rotational, linear and oscillating movements with low & medium loads.

Specifications:

Operating Temperature Range -40° to 176°F (+338° short term)
 Max PV 3,400 PSI x FPM
 Max V (continuous) FPM Rotating Oscillating Linear
 118 157 492
 Coefficient of friction approximate .2
 Chemical resistance Parts are resistant to alkalis and most weak organic and inorganic acids. Insoluble in normal organic solution.



| Nominal Sizes | | | | | I.D. When In Housing | | Housing Bore | | Recommend Shaft Size | | Sleeve Part No. | Flanged Part No. |
|---------------|-------|-------------------------------|-----------|---------------------|----------------------|--------|--------------|--------|----------------------|-------|--------------------------------------------------------------------|--------------------------------------------------------------------|
| I.D. | O.D. | LENGTH | FLG. Dia. | FLG. TH. (-0.0055") | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | | |
| 1/8 | 1/4 | 1/4 3/8 | .360 | .047 | .1280 | .1262 | .2515 | .2510 | .1250 | .1241 | BS-0204-04 BS-0204-06 | BF-0204-04 BF-0204-06 |
| 3/16 | 5/16 | 1/4 3/8 1/2 | .370 | .047 | .1905 | .1887 | .3140 | .3135 | .1875 | .1866 | BS-0305-04 BS-0305-06 BS-0305-08 | BF-0305-04 BF-0305-06 BF-0305-08 |
| 1/4 | 3/8 | 1/4 5/16 3/8 1/2 | .560 | .047 | .2539 | .2516 | .3765 | .3760 | .2500 | .2491 | BS-0406-04 BS-0406-05 BS-0406-06 BS-0406-08 | BF-0406-04 BF-0406-05 BF-0406-06 BF-0406-08 |
| 5/16 | 7/16 | 3/8 1/2 5/8 | .560 | .062 | .3164 | .3141 | .4390 | .4385 | .3125 | .3116 | BS-0507-06 BS-0507-08 BS-0507-10 | BF-0507-06 BF-0507-08 BF-0507-10 |
| 3/8 | 1/2 | 3/8 1/2 5/8 3/4 | .625 | .062 | .3789 | .3766 | .5015 | .5010 | .3750 | .3741 | BS-0608-06 BS-0608-08 BS-0608-10 BS-0608-12 | BF-0608-06 BF-0608-08 BF-0608-10 BF-0608-12 |
| 1/2 | 5/8 | 3/8 1/2 5/8 3/4 1 | .875 | .062 | .5047 | .5020 | .6260 | .6250 | .5000 | .4990 | BS-0810-06 BS-0810-08 BS-0810-10 BS-0810-12 BS-0810-16 | BF-0810-06 BF-0810-08 BF-0810-10 BF-0810-12 BF-0810-16 |
| 5/8 | 13/16 | 1/2 5/8 3/4 1 | 1.063 | .156 | .6297 | .6270 | .8135 | .8125 | .6250 | .6240 | BS-1013-08 BS-1013-10 BS-1013-12 BS-1013-16 | BF-1013-08 BF-1013-10 BF-1013-12 BF-1013-16 |
| 3/4 | 1 | 5/8 3/4 1 | 1.250 | .156 | .7559 | .7525 | 1.0010 | 1.0000 | .7500 | .7490 | BS-1216-10 BS-1216-12 BS-1216-16 | BF-1216-10 BF-1216-12 BF-1216-16 |
| 1 | 1-1/4 | 1/2 3/4 1 | 1.500 | .188 | 1.0059 | 1.0025 | 1.2510 | 1.2500 | 1.0000 | .9990 | BS-1620-08 BS-1620-12 BS-1620-16 | BF-1620-08 BF-1620-12 BF-1620-16 |

Tolerances for Sleeve and Flange Bearings

(Dimensions shown in inches)

| Range | Length | Flange Diameter |
|------------------------|-----------|-------------------|
| 1/8 to 3/8 | 0/-0.0087 | -0.0016 / -0.0102 |
| above 3/8 to 11/16 | 0/-0.0106 | -0.0020 / -0.0126 |
| above 11/16 to 1-1/8 | 0/-0.0130 | -0.0026 / -0.0156 |
| above 1-1/8 to 1-15/16 | 0/-0.0150 | -0.0031 / -0.0185 |
| above 1-15/16 to 3-1/8 | 0/-0.0180 | -0.0040 / -0.0220 |

Sold & Serviced By:



Toll Free Phone (877) SERV098
 Toll Free Fax (877) SERV099
www.electromate.com
sales@electromate.com

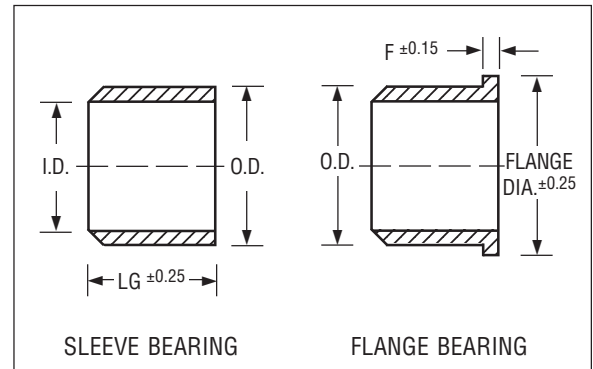
METRIC NON-METALLIC BEARINGS

Sleeve & Flanged

Material: A custom blended formulation for a self-lubricating, maintenance-free bearing with high performance in almost any environment.

Specifications:

Operating Temperature Range -40° to 82°C
 Max PV (continuous) 0.35 N/mm² x m/sec
 Max P 18 N/mm²
 Max V (continuous) cm/sec Rotating 60 Oscillating 80 Linear 250
 Coefficient of Friction approximate .2
 Chemical Resistance Parts are resistant to alkalis and most weak organic and inorganic acids. Insoluble in normal organic solution.



| Nominal Sizes | | | | | I.D. In Housing | | Housing Bore | | Recommend Shaft Size | | Sleeve Part No. | Flanged Part No. |
|---------------|------|-----|-----------|----------|-----------------|--------|--------------|--------|----------------------|--------|-----------------|----------------------------------------------------------|
| I.D. | O.D. | LG. | FLG. Dia. | FLG. TH. | MAX. | MIN. | MAX. | MIN. | MAX. | MIN. | | |
| 3 | 6 | 4 | 9 | 1.5 | 3.078 | 3.030 | 6.012 | 6.000 | 3.000 | 2.975 | MBS-0306-4 | MBF-0306-4 |
| 4 | 8 | 4 | 12 | 2 | 4.078 | 4.030 | 8.015 | 8.000 | 4.000 | 3.970 | — | MBF-0408-4 MBF-0408-6 |
| | | 6 | | | | | | | | | MBS-0408-6 | |
| 5 | 9 | 5 | 13 | 2 | 5.078 | 5.030 | 9.015 | 9.000 | 5.000 | 4.970 | MBS-0509-5 | MBF-0509-5 MBF-0509-6 MBF-0509-8 |
| | | 6 | | | | | | | | | — | |
| | | 8 | | | | | | | | | MBS-0509-8 | |
| 6 | 10 | 6 | 14 | 2 | 6.078 | 6.030 | 10.015 | 10.000 | 6.000 | 5.970 | MBS-0610-6 | MBF-0610-6 MBF-0610-10 |
| | | 10 | | | | | | | | | MBS-0610-10 | |
| 8 | 12 | 6 | 16 | 2 | 8.098 | 8.040 | 12.018 | 12.000 | 8.000 | 7.964 | MBS-0812-6 | MBF-0812-6 MBF-0812-8 MBF-0812-12 |
| | | 8 | | | | | | | | | — | |
| | | 12 | | | | | | | | | MBS-0812-12 | |
| 10 | 16 | 6 | 20 | 3 | 10.130 | 10.040 | 16.018 | 16.000 | 10.000 | 9.964 | MBS-1016-6 | MBF-1016-6 MBF-1016-8 MBF-1016-10 MBF-1016-16 |
| | | 8 | | | | | | | | | — | |
| | | 22 | | | | | | | | | — | |
| | | 16 | | | | | | | | | MBS-1016-16 | |
| 12 | 18 | 8 | 24 | 3 | 12.160 | 12.050 | 18.018 | 18.000 | 12.000 | 11.957 | MBS-1218-8 | MBF-1218-8 MBF-1218-10 MBF-1218-15 MBF-1218-20 |
| | | 10 | | | | | | | | | — | |
| | | 15 | | | | | | | | | — | |
| | | 20 | | | | | | | | | MBS-1218-20 | |
| 16 | 22 | 12 | 28 | 3 | 16.160 | 16.050 | 22.021 | 22.000 | 16.000 | 15.957 | MBS-1622-12 | MBF-1622-12 MBF-1622-15 MBF-1622-20 MBF-1622-25 |
| | | 15 | | | | | | | | | — | |
| | | 20 | | | | | | | | | — | |
| | | 25 | | | | | | | | | MBS-1622-25 | |
| 20 | 26 | 15 | 32 | 3 | 20.195 | 20.065 | 26.021 | 26.000 | 20.000 | 19.948 | MBS-2026-15 | MBF-2026-15 MBF-2026-20 MBF-2026-30 |
| | | 20 | | | | | | | | | — | |
| | | 30 | | | | | | | | | MBS-2026-30 | |
| 25 | 32 | 20 | 38 | 4 | 25.195 | 25.065 | 32.025 | 32.000 | 25.000 | 24.948 | MBS-2532-20 | MBF-2532-20 MBF-2532-30 MBF-2532-40 |
| | | 30 | | | | | | | | | — | |
| | | 40 | | | | | | | | | MBS-2532-40 | |

Sold & Serviced By:

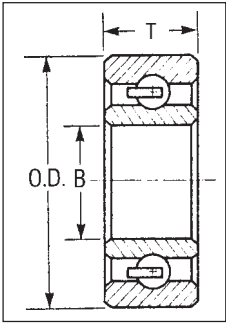


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NON-CORROSIVE BALL BEARINGS

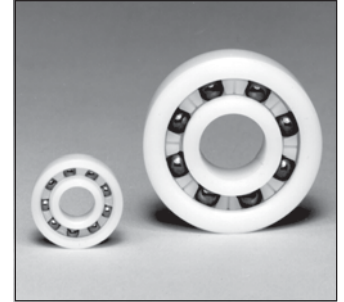
Inch & Metric

Plastic Races



Material: Acetal Races & Cage
Stainless Steel or Glass Balls

Acetal polymer bearings have excellent corrosion resistance & dielectric properties. Ball bearings are available with stainless steel or hard glass balls. The glass balls offer additional corrosion resistance, have good electrical insulation and magnetic properties. These bearings are ideal for use in gas or liquid media and food processing applications. They can be washed and remain corrosion free. Their main features are: resistance to chemicals and corrosion; lubrication free/no maintenance; light weight, low friction, non magnetic properties; operating temperature range from -22° to +220° F (intermittent temperature range from -67° to 284° F).



Inch Sizes

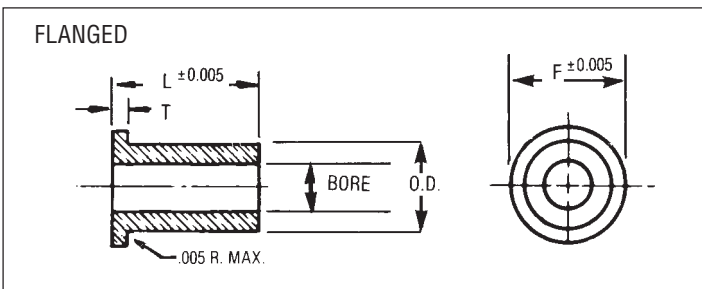
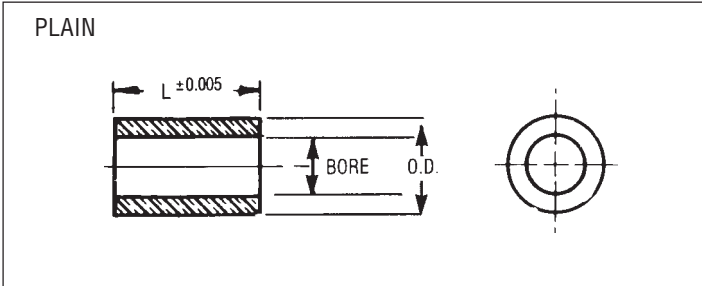
| B +.003 -.000 | O.D. +.000 -.003 | T ±.005 | Load Capacity Radial (LB) | | Max Speed In Air (RPM) | Part No. Ball Type Glass | Part No. Ball Type Stainless Steel |
|---------------------|------------------------|------------|---------------------------|--------|---------------------------|--------------------------------|------------------------------------------|
| | | | Dyn. | Static | | | |
| .250 | .625 | .1960 | 27 | 18 | 2300 | | ES-250 |
| .375 | .875 | .2187 | 58 | 42 | 1600 | EG-375 | ES-375 |
| .375 | 1.375 | .4375 | 86 | 64 | 1600 | EG-375B | ES-375B |
| .500 | 1.125 | .2500 | 84 | 59 | 1150 | EG-500 | ES-500 |
| .500 | 1.375 | .4375 | 86 | 60 | 1150 | EG-500B | ES-500B |
| .625 | 1.125 | .2500 | 86 | 64 | 1070 | EG-625 | ES-625 |
| .625 | 1.375 | .4375 | 96 | 64 | 1070 | EG-625B | ES-625B |
| 1.000* | 2.000** | .5000 | 160 | 92 | 750 | | ES-1000 |

* Bore Tolerance +.004, -.000
** OD Tolerance +.000, -.004

Metric Sizes

| B +.07 -.00 | O.D. +.00 -.09 | T +.00 -.09 | Load Capacity Radial (N) | | Max Speed In Air (RPM) | Part No. Ball Type Glass | Part No. Ball Type Stainless Steel |
|-------------------|----------------------|-------------------|--------------------------|--------|---------------------------|--------------------------------|------------------------------------------|
| | | | Dyn. | Static | | | |
| 6 | 19 | 6 | 65 | 35 | 3500 | MEG-6 | MES-6 |
| 8 | 22 | 7 | 80 | 53 | 2600 | MEG-8 | MES-8 |
| 10 | 26 | 8 | 160 | 110 | 2200 | MEG-10 | MES-10 |
| 12 | 28 | 8 | 240 | 150 | 2050 | MEG-12 | MES-12 |
| 15 | 32 | 9 | 280 | 170 | 1800 | MEG-15 | MES-15 |
| 17 | 35 | 10 | 325 | 215 | 1640 | MEG-17 | MES-17 |
| 20 | 42 | 12 | 415 | 275 | 1365 | MEG-20 | MES-20 |

TEFLON FILLED POLYMER BEARINGS

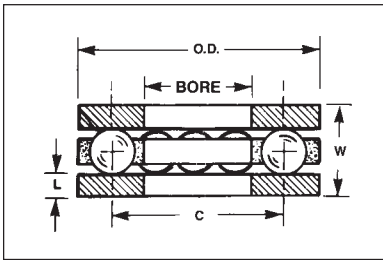


| Shaft Size | Bore +.002 -.000 | O.D. +.000 -.002 | L | F | T ±.003 | Part No. PLAIN | Part No. FLANGED |
|------------|------------------------|------------------------|---------------|-------|------------|-------------------|---------------------|
| 1/8" | .126 | .253 | .250 .375 | .360 | .047 | - | B15-1A B15-2A |
| 1/8" | .129 | .253 | .250 .375 | .344 | .062 | B14-1 B14-2 | B15-1 B15-2 |
| 3/16" | .191 | .315 | .250 .500 | .437 | .062 | B14-3 B14-4 | B15-3 B15-4 |
| 1/4" | .254 | .378 | .375 .500 | .500 | .062 | B14-5 B14-6 | B15-5 B15-6 |
| 5/16" | .316 | .437 | .375 .500 | .562 | .062 | - | B15-7A B15-8A |
| 5/16" | .316 | .503 | .375 .500 | .625 | .094 | B14-7 B14-8 | B15-7 B15-8 |
| 3/8" | .379 | .565 | .500 .750 | .875 | .125 | B14-9 B14-10 | B15-9 B15-10 |
| 3/8" | .379 | .628 | .500 .750 | .875 | .125 | - | B15-13 B15-14 |
| 1/2" | .504 | .753 | .500 1.000 | 1.000 | .125 | B14-11 B14-12 | B15-11 B15-12 |

Specifications: Temperature Limits -400° F to +550° F
Coefficient of Friction Approximate 0.20
Recommended Max. PV 10,000 PSI x FPM
Recommended Max V 400 FPM
Recommended Max. P 1000 PSI
Chemical Resistance Excellent
Water Absorption Zero
Outgassing Negligible at 10⁻⁷ TORR

Material: Heavy Duty TFE Filled Polymer
(Practically inert to all acids, bases, and solvents)

THRUST BEARINGS



Material: STAINLESS STEEL MODEL
 Races — 410 SS. RC 42-45
 Balls — 440C SS Hardened
 Retainer — Nylon 8200

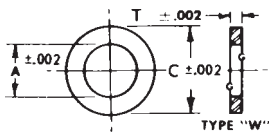
CARBON STEEL MODEL
 Races — C1075 Steel. RC 59-61
 Balls — Hardened Carbon Steel
 Retainer — Nylon 8200

| Bore +.008 -.000 | O.D. +.000 -.008 | C | W | L ±.002 | NO. OF BALLS | 410 Stainless Steel | | C1075 Carbon Steel | |
|------------------------|------------------------|--------|------|------------|-----------------|-----------------------------|----------|-----------------------------|----------|
| | | | | | | LOAD RATING AT 15 RPM | Part No. | LOAD RATING AT 15 RPM | Part No. |
| .128 | .434 | 9/32 | .195 | .050 | 6 | 63 LBS. | ET-02-S | 89 LBS. | ET-02-C |
| .190 | .497 | 11/32 | .195 | .050 | 7 | 73 LBS. | ET-03-S | 104 LBS. | ET-03-C |
| .253 | .559 | 13/32 | .195 | .050 | 8 | 83 LBS. | ET-04-S | 119 LBS. | ET-04-C |
| .315 | .622 | 15/32 | .195 | .050 | 9 | 94 LBS. | ET-05-S | 134 LBS. | ET-05-C |
| .378 | .809 | 19/32 | .249 | .062 | 6 | 104 LBS. | ET-06-S | 149 LBS. | ET-06-C |
| .503 | .934 | 23/32 | .249 | .062 | 8 | 139 LBS. | ET-08-S | 198 LBS. | ET-08-C |
| .628 | 1.122 | 7/8 | .342 | .093 | 6 | 170 LBS. | ET-10-S | 243 LBS. | ET-10-C |
| .753 | 1.247 | 1" | .342 | .093 | 8 | 255 LBS. | ET-12-S | 322 LBS. | ET-12-C |
| 1.003 | 1.622 | 1-5/16 | .437 | .125 | 10 | 347 LBS. | ET-16-S | 496 LBS. | ET-16-C |
| 1.253 | 1.872 | 1-9/16 | .437 | .125 | 14 | 486 LBS. | ET-20-S | 694 LBS. | ET-20-C |

THRUST WASHERS

Oil Impregnated Bronze & Steel

STEEL-HARDENED AND GROUND



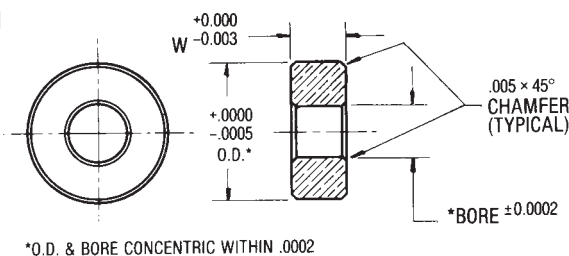
| A | Bronze C | Steel C | T | Bronze Part No. | Steel Part No. |
|------|-------------|------------|------|--------------------|-------------------|
| .130 | .370 | .250 | .062 | AH-1-W | AJ-1-W |
| .192 | .495 | .375 | .062 | AH-2-W | AJ-2-W |
| .255 | .620 | .500 | .062 | AH-3-W | AJ-3-W |
| .318 | .745 | .625 | .093 | AH-4-W | AJ-4-W |
| .380 | .870 | .750 | .125 | AH-5-W | AJ-5-W |
| .505 | 1.125 | 1.000 | .187 | AH-6-W | AJ-6-W |

Material: Tool Steel
 Hardened and Ground RC55-60
 Bronze (Oil Impregnated)

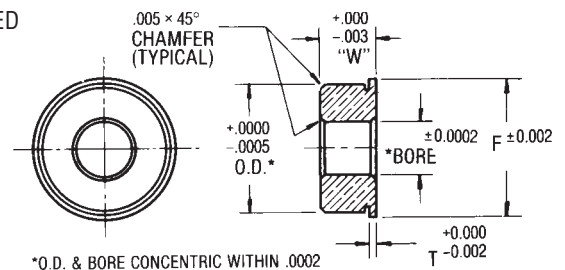
PRECISION BRONZE BEARINGS

Oil Impregnated

PLAIN



FLANGED



Material: Bronze ASTM B438
 Type 2, Grade 1

| Bore | O.D. | W | F | T | Plain | | Flanged | |
|-------|-------|-------|------|------|----------|-----------------------------------------------|----------|-----------------------------------------------|
| | | | | | Part No. | Interchangeable with Ball Bearing Part No. | Part No. | Interchangeable with Ball Bearing Part No. |
| .1250 | 2500 | .0937 | .296 | .023 | AM-10 | E3-5 to E3-6 | AM-14 | E4-5 to E4-6 |
| .1250 | .3125 | .1094 | .359 | .023 | AM-11 | E3-7 to E3-8 | AM-15 | E4-7 to E4-8 |
| .1250 | .3750 | .1562 | .440 | .030 | AM-1 | E1-1 to E1-3 | AM-5 | E2-1 to E2-3 |
| .1875 | .5000 | .1562 | | | AM-2 | E1-4 | | |
| .1875 | .5000 | .1960 | .565 | .042 | AM-3 | E1-5 to E1-6 | AM-6 | E2-4 to E2-6 |
| .2500 | .6250 | .1960 | .690 | .042 | AM-4 | E1-7 to E1-9 | AM-7 | E2-7 to E2-9 |

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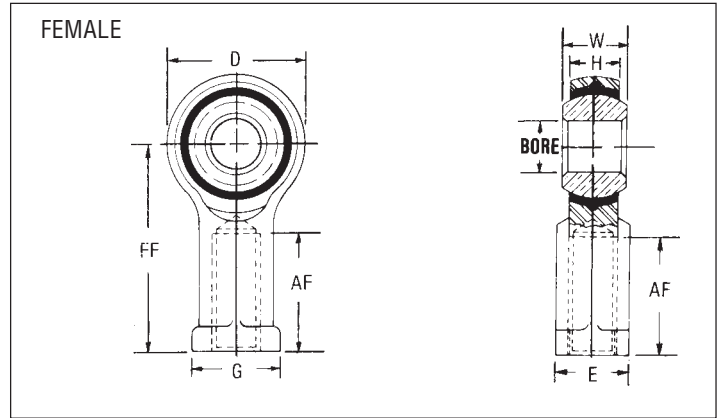
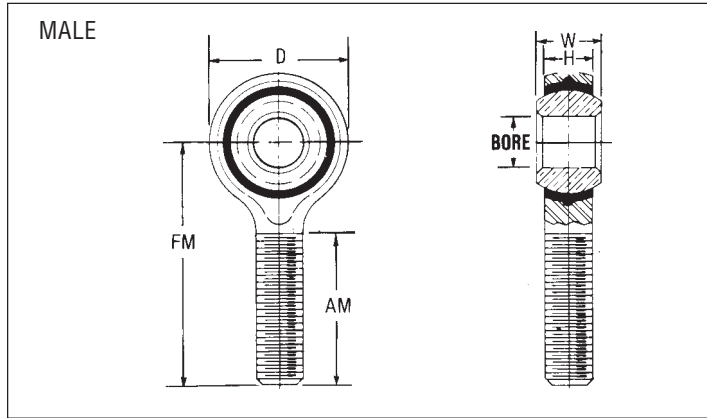
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ROD ENDS

Nylon & Phosphor Bronze Races



Integral Nylon Race

Materials: Housing — Mild Steel, Plated.
 Race — Nylon Integrally Molded Around The Ball.
 Ball — Case Hardened, Plated
 — Sintered Oil Impregnated Ball Available On Special
 Quotes And Orders Only

| Bore | W | H | AM | FM | AF | FF | D | G | E | Thread | Angle of misalignment Degrees | Ultimate Radial Static Load Rating (lbs.) | | PART NUMBER | | | | |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|-------------------------------|-------------------------------------------|--------|-------------|-------|--------|-------|--|
| | | | | | | | | | | | | Male | Female | MALE | | FEMALE | | |
| | | | | | | | | | | | | | | RH | LH | RH | LH | |
| + .0025 - .0005 | ± .005 | (Ref.) | ± .062 | ± .030 | ± .030 | ± .030 | ± .010 | (Ref.) | (Ref.) | Class UNF-2 | | | | | | | | |
| .1900 | .312 | .250 | .750 | 1.250 | .562 | 1.062 | .625 | .406 | .312 | 10-32 | 24 | 1150 | 1200 | PE3-1 | PE4-1 | PE5-1 | PE6-1 | |
| .2500 | .375 | .281 | 1.000 | 1.562 | .750 | 1.312 | .750 | .468 | .375 | 1/4-28 | 28 | 1600 | 1650 | PE3-2 | PE4-2 | PE5-2 | PE6-2 | |
| .3125 | .437 | .344 | 1.250 | 1.875 | .750 | 1.375 | .875 | .500 | .437 | 5/16-24 | 24 | 2700 | 2800 | PE3-3 | PE4-3 | PE5-3 | PE6-3 | |
| .3750 | .500 | .406 | 1.250 | 1.938 | .937 | 1.625 | 1.000 | .687 | .562 | 3/8-24 | 22 | 3200 | 3250 | PE3-4 | PE4-4 | PE5-4 | PE6-4 | |
| .5000 | .625 | .500 | 1.500 | 2.438 | 1.187 | 2.125 | 1.312 | .875 | .750 | 1/2-20 | 20 | 5800 | 6400 | PE3-5 | PE4-5 | PE5-5 | PE6-5 | |

*Ultimate static load in lbs.

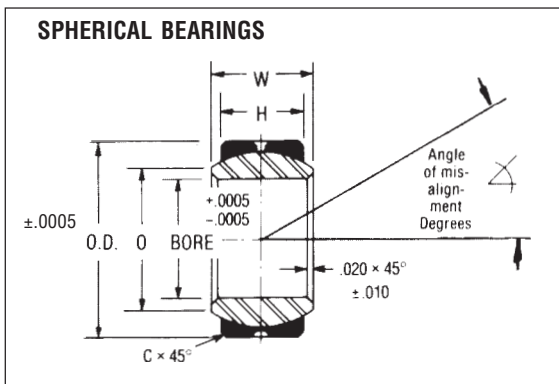
Phosphor Bronze Race

Materials: Housing — Mild Steel, Cadmium Plated.
 Race — Sintered Phosphor Bronze Oil Impregnated
 Ball — Case Hardened Carbon Steel, Tin-Nickel Plated

| Bore | W | H | AM | FM | AF | FF | D | G | E | Thread | Angle of misalignment Degrees | Ultimate Radial Static Load Rating (lbs.) | | PART NUMBER | | | | |
|--------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------------|-------------------------------|-------------------------------------------|--------|-------------|--------|--------|--------|--|
| | | | | | | | | | | | | Male | Female | MALE | | FEMALE | | |
| | | | | | | | | | | | | | | RH | LH | RH | LH | |
| + .0025 - .0005 | ± .005 | (Ref.) | ± .060 | ± .030 | ± .030 | ± .030 | ± .010 | (Ref.) | (Ref.) | Class UNF-2 | | | | | | | | |
| .1900 | .312 | .250 | .750 | 1.250 | .562 | 1.062 | .750 | .406 | .312 | 10-32 | 22 | 1600 | 1800 | PE13-1 | PE14-1 | PE15-1 | PE16-1 | |
| .2500 | .375 | .281 | 1.000 | 1.562 | .750 | 1.312 | .750 | .468 | .375 | 1/4-28 | 26 | 2250 | 2300 | PE13-2 | PE14-2 | PE15-2 | PE16-2 | |
| .3125 | .437 | .344 | 1.250 | 1.875 | .750 | 1.375 | .875 | .500 | .437 | 5/16-24 | 22 | 2850 | 2900 | PE13-3 | PE14-3 | PE15-3 | PE16-3 | |
| .3750 | .500 | .406 | 1.250 | 1.938 | .937 | 1.625 | 1.000 | .687 | .562 | 3/8-24 | 20 | 3900 | 4300 | PE13-4 | PE14-4 | PE15-4 | PE16-4 | |
| .5000 | .625 | .500 | 1.500 | 2.438 | 1.187 | 2.125 | 1.312 | .875 | .750 | 1/2-20 | 20 | 7400 | 8400 | PE13-5 | PE14-5 | PE15-5 | PE16-5 | |

Metric Sizes Available
 Inquire for Price and Availability

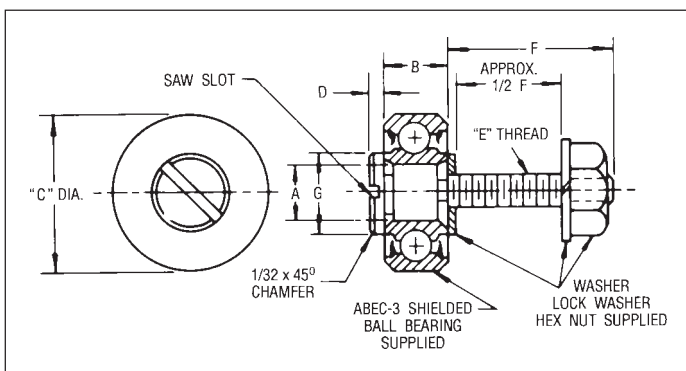
SPHERICAL BEARINGS



| Bore | O.D. | H | W | C | Ball Dia. | 0 | Degrees | Ultimate (Radial) Static Load Rating (lbs.) | Part No. |
|-------|--------|------|------|------|-----------|------|---------|---------------------------------------------|----------|
| .1900 | .5625 | .218 | .281 | .010 | .500 | .416 | 17° | 4800 | PE12-1 |
| .2500 | .6562 | .250 | .343 | .010 | .594 | .485 | 21° | 7720 | PE12-2 |
| .3125 | .7500 | .281 | .375 | .020 | .670 | .556 | 18.5° | 10550 | PE12-3 |
| .3750 | .8125 | .312 | .406 | .020 | .718 | .592 | 17.5° | 13700 | PE12-4 |
| .5000 | 1.0000 | .390 | .500 | .020 | .880 | .725 | 16.5° | 22500 | PE12-5 |

Materials: Race-Hardened Steel
Ball-Impregnated Nickel Iron

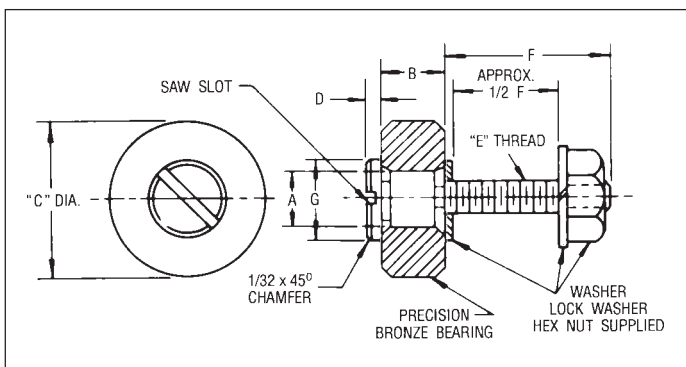
CAM FOLLOWER WITH BALL BEARINGS



| A | B | C | D | E | F | G | Part No. |
|-------|-------|-------|------|--------|------|------|----------|
| .0781 | .1406 | .2500 | 3/32 | #1-64 | 1/4 | 5/32 | P1-21 |
| .0937 | .1406 | .3125 | 3/32 | #2-56 | 1/4 | 3/16 | P1-22 |
| .1250 | .1094 | .2500 | 1/8 | #4-40 | 9/32 | 3/16 | P1-23 |
| .1250 | .1406 | .3125 | 1/8 | #4-40 | 5/16 | 7/32 | P1-24 |
| .1250 | .1562 | .375 | 1/8 | #4-40 | 5/16 | 1/4 | P1-25 |
| .1875 | .1960 | .500 | 5/32 | #8-32 | 3/8 | 5/16 | P1-26 |
| .2500 | .1960 | .625 | 5/32 | #10-32 | 1/2 | 3/8 | P1-27 |

Material: Bearings — 440 Stainless Steel
Screw — 303 Stainless Steel
Nut & Washer — 300 Series Stainless Steel

CAM FOLLOWER WITH BRONZE BEARINGS



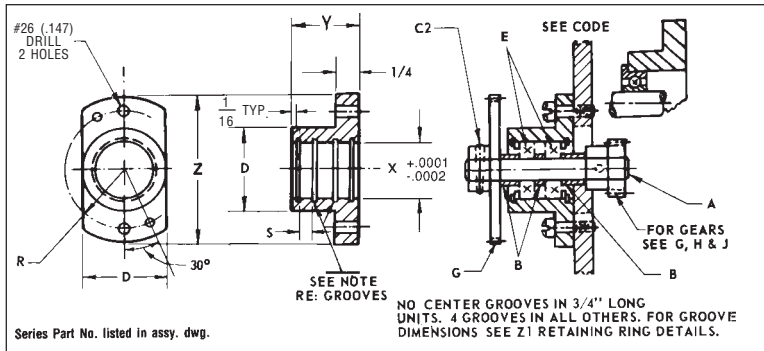
| A | B | C | D | E | F | G | Part No. |
|-------|-------|-------|------|--------|------|------|----------|
| .1250 | .0937 | .2500 | 1/8 | #4-40 | 9/32 | 3/16 | P1-23B |
| .1250 | .1094 | .3125 | 1/8 | #4-40 | 5/16 | 7/32 | P1-24B |
| .1250 | .1562 | .375 | 1/8 | #4-40 | 5/16 | 1/4 | P1-25B |
| .1875 | .1960 | .500 | 5/32 | #8-32 | 3/8 | 5/16 | P1-26B |
| .2500 | .1960 | .625 | 5/32 | #10-32 | 1/2 | 3/8 | P1-27B |

Material: Bearings — Bronze, Oil Impregnated
Screw — 416 Stainless Steel
Nut & Washer — 300 Series Stainless Steel

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BEARING HOUSING — 3/8", 1/2" and 5/8" Bores



| X | Y | D | Z | R | S | Part No. (Tap Holes) | Part No. (Cl. Drill) |
|-------|-------------------|-------|-------|------|------|-------------------------|-------------------------|
| .3750 | 3/4 1 1-1/2 | 3/4 | 1-1/2 | .562 | .187 | AA1-1 AA1-2 AA1-3 | AA2-1 AA2-2 AA2-3 |
| .5000 | 3/4 1 1-1/2 | 7/8 | 1-5/8 | .625 | .260 | AA3-1 AA3-2 AA3-3 | AA4-1 AA4-2 AA4-3 |
| .6250 | 3/4 1 1-1/2 | 15/16 | 1-3/4 | .687 | .260 | AA5-1 AA5-2 AA5-3 | AA6-1 AA6-2 AA6-3 |

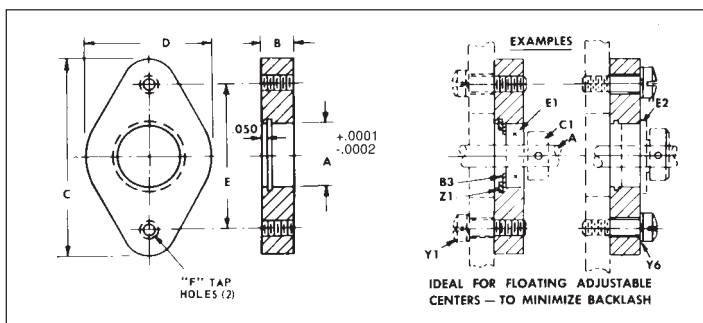
Material: Aluminum

Finish: Anodized

Above assembly drawing depicts a common usage with PIC parts. Consult Series Index for description of parts shown.

See Section 3 for alternate Bearing Housings

BEARING MOUNTING PLATE



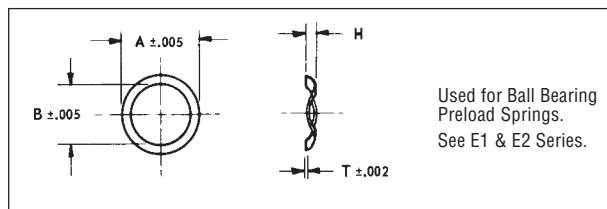
| Shaft Size | A | B | C | D | E | F Holes | Part No. |
|------------|-------|------|-------|---|-------|---------|----------|
| | | | | | | Tap | |
| 1/4 | .6250 | .312 | 1-3/4 | 1 | 1.375 | #6-32 | AP-3 |

See Section 3 for alternate Bearing Housings

Material: Aluminum

Finish: Anodized

WAVE SPRING WASHERS

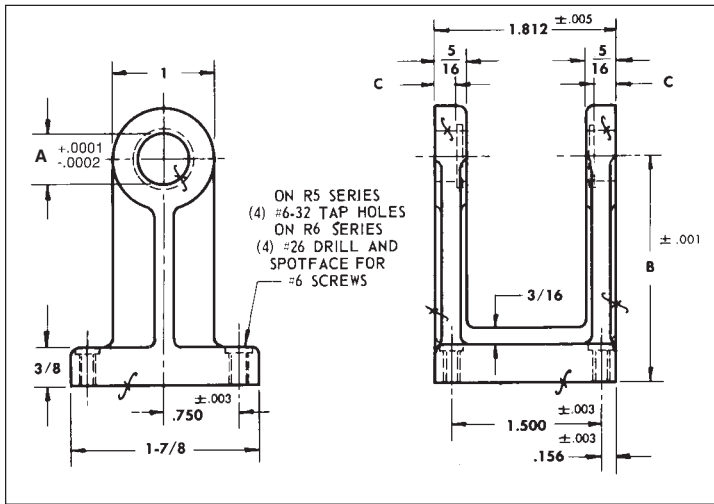


Material: 300 Series Stainless Steel - spring tempered, except where noted with " * " it is high carbon steel

Note: A and B dimensions shown in above diagram indicate blank size before forming.

| A | B | T | H (Approx.) | H ₁ (Approx.) | Load in Lbs. H Deflected to H ₁ (Approx.) | Part No. |
|---------|-------|------|-------------|--------------------------|------------------------------------------------------|----------|
| .367 | .265 | .006 | .030 | .015 | 2-4 | D6-1 |
| .492 | .350 | .007 | .035 | .020 | 3-5 | D6-2 |
| .618 | .440 | .008 | .040 | .025 | 3-5 | D6-4 |
| .734 | .531 | .009 | .050 | .030 | 4-7 | D6-5 |
| .855 | .650 | .010 | .060 | .030 | 4-7 | D6-6 |
| 1.102 * | .856 | .012 | .075 | .037 | 9-13 | D6-7 |
| 1.351 | 1.051 | .015 | .099 | .049 | 16-20 | D6-8 |
| 1.543 * | 1.201 | .017 | .105 | .053 | 19-23 | D6-9 |
| 1.819 * | 1.404 | .020 | .125 | .062 | 26-34 | D6-10 |
| 2.028 * | 1.575 | .022 | .140 | .069 | 31-39 | D6-11 |
| 2.420 * | 1.872 | .022 | .168 | .082 | 40-50 | D6-12 |

DOUBLE SHAFT HANGER / BEARING HOUSING



| Shaft Size Bearing I.D. | A | B | C | Part No. (Tap Holes) | Part No. (Clearance Holes) |
|----------------------------|-------|-------|------|-------------------------|-------------------------------|
| 1/8 | .3750 | 1.000 | 3/16 | R5-1 | R6-1 |
| | | 1.500 | | R5-2 | R6-2 |
| | | 2.000 | | R5-3 | R6-3 |
| | | 2.250 | | R5-4 | R6-4 |
| | | 2.500 | | R5-5 | R6-5 |
| 3/16 | .5000 | 1.000 | 7/32 | R5-6 | R6-6 |
| | | 1.500 | | R5-7 | R6-7 |
| | | 2.000 | | R5-8 | R6-8 |
| | | 2.250 | | R5-9 | R6-9 |
| | | 2.500 | | R5-10 | R6-10 |
| 1/4 | .6250 | 1.000 | 7/32 | R5-11 | R6-11 |
| | | 1.500 | | R5-12 | R6-12 |
| | | 2.000 | | R5-13 | R6-13 |
| | | 2.250 | | R5-14 | R6-14 |
| | | 2.500 | | R5-15 | R6-15 |

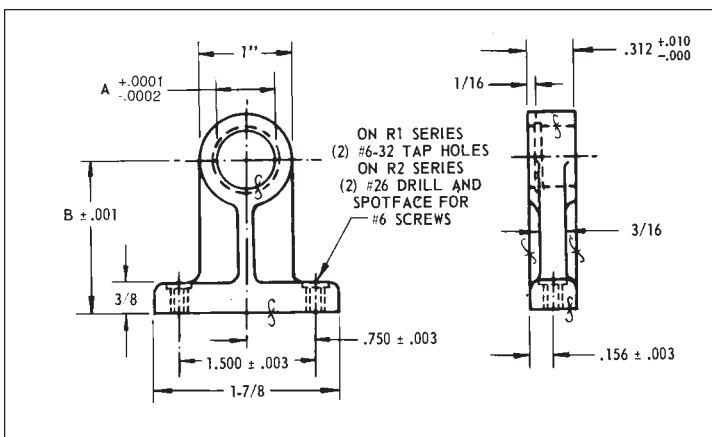
See E Series for Ball Bearings, AM Series for Oil Impregnated Bearings and Z Series for Retaining Rings.

See R1 Series for Bearing and Spacer Arrangements.

Material: Aluminum
Finish: Anodized

See Section 3 for alternate Bearing Housings

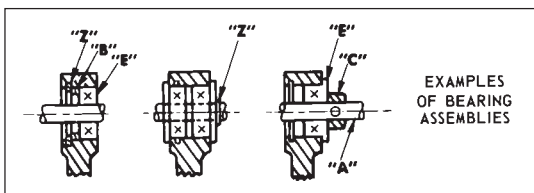
UNIVERSAL SHAFT HANGER / BEARING HOUSING



| Shaft Size Bearing I.D. | A | B | Part No. (Tap Holes) | Part No. (Clearance Holes) |
|----------------------------|-------|-------|-------------------------|-------------------------------|
| 1/8 | .3750 | 1.000 | R1-1 | R2-1 |
| | | 1.500 | R1-2 | R2-2 |
| | | 2.000 | R1-3 | R2-3 |
| | | 2.250 | R1-13 | R2-13 |
| | | 2.500 | R1-4 | R2-4 |
| 3/16 | .5000 | 1.000 | R1-5 | R2-5 |
| | | 1.500 | R1-6 | R2-6 |
| | | 2.000 | R1-7 | R2-7 |
| | | 2.250 | R1-14 | R2-14 |
| | | 2.500 | R1-8 | R2-8 |
| 1/4 | .6250 | 1.000 | R1-9 | R2-9 |
| | | 1.500 | R1-10 | R2-10 |
| | | 2.000 | R1-11 | R2-11 |
| | | 2.250 | R1-15 | R2-15 |
| | | 2.500 | R1-12 | R2-12 |

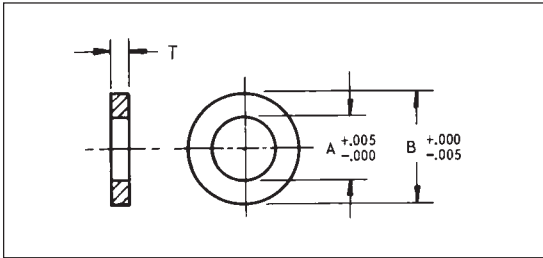
Material: Aluminum
Finish: Anodized

See Section 3 for alternate Bearing Housings



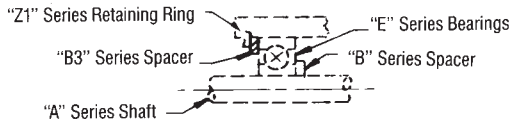
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OUTER RACE SHIM SPACERS



Material: 300 Series Stainless Steel

EXAMPLE



| THICKNESS TOLERANCES | | | |
|----------------------|--------------|--------------|--------------|
| T | .003 to .007 | .010 to .020 | .062 to .500 |
| Tolerance | ±.0005 | ±.001 | ±.002 |

| Bearing Size (Ref.) I.D. X O.D. | A | B | T | Part No. |
|------------------------------------|------|------|------|--------------|
| 3/64 X 5/32 | .088 | .153 | .003 | B3-39 |
| | | | .005 | B3-40 |
| | | | .007 | B3-41 |
| | | | .010 | B3-42 |
| | | | .020 | B3-43 |
| .055 X 3/16 | .123 | .178 | .003 | B3-44 |
| | | | .005 | B3-45 |
| | | | .007 | B3-46 |
| | | | .010 | B3-47 |
| | | | .020 | B3-48 |
| 5/64 X 1/4 & 1/8 X 1/4 | .167 | .248 | .003 | B3-31 |
| | | | .005 | B3-32 |
| | | | .007 | B3-33 |
| | | | .010 | B3-34 |
| | | | .020 | B3-49 |
| 3/32 X 5/16 & 1/8 X 5/16 | .206 | .310 | .003 | B3-35 |
| | | | .005 | B3-36 |
| | | | .007 | B3-37 |
| | | | .010 | B3-38 |
| | | | .020 | B3-50 |
| 1/8 X 3/8 & 3/16 X 3/8 | .253 | .373 | .003 | B3-1 |
| | | | .005 | B3-2 |
| | | | .007 | B3-3 |
| | | | .010 | B3-4 |
| | | | .020 | B3-5 |
| | | | .062 | B3-16 |
| | | | .125 | B3-17 |
| | | | .250 | B3-18 |
| | | | .375 | B3-19 |
| | | | .500 | B3-20 |

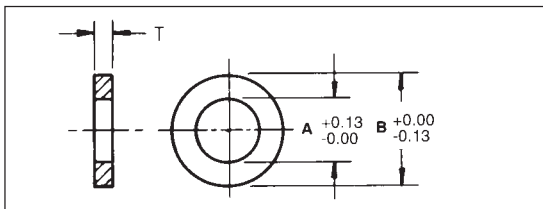
| Bearing Size (Ref.) I.D. X O.D. | A | B | T | Part No. |
|------------------------------------|------|------|------|--------------|
| 3/16 X 1/2 & 1/4 X 1/2 | .378 | .498 | .003 | B3-6 |
| | | | .005 | B3-7 |
| | | | .007 | B3-8 |
| | | | .010 | B3-9 |
| | | | .020 | B3-10 |
| 1/4 X 5/8 | .503 | .623 | .062 | B3-21 |
| | | | .125 | B3-22 |
| | | | .003 | B3-11 |
| | | | .005 | B3-12 |
| | | | .007 | B3-13 |
| 3/8 X 7/8 | .687 | .873 | .010 | B3-14 |
| | | | .020 | B3-15 |
| | | | .125 | B3-26 |
| | | | .062 | B3-27 |
| | | | .003 | B3-51 |
| | | | .005 | B3-52 |
| | | | .007 | B3-53 |
| | | | .010 | B3-54 |
| | | | .020 | B3-55 |
| | | | .062 | B3-56 |

OUTER RACE KITS

| | | |
|-----------------------------------------------------------------------------------------------------------|-----|------|
| Bearing Shaft Spacers—Stainless Steel Outer Race, Assorted Thickness for 1/8", 3/16" & 1/4" Bearing Bores | 350 | Y28K |
|-----------------------------------------------------------------------------------------------------------|-----|------|

METRIC OUTER RACE SHIM SPACERS

All Dimensions in Millimeters



Material: 300 Series Stainless Steel

EXAMPLE



| Bearing Size (Ref.) I.D. X O.D. | A | B | T | Part No. |
|------------------------------------|-----|-------|------|----------------|
| 3 X 7 | 5 | 6.95 | 0.1 | MSP6-1 |
| | | | 0.25 | MSP6-2 |
| | | | 0.5 | MSP6-3 |
| | | | 1.5 | MSP6-4 |
| 4 X 9 | 6.5 | 8.95 | 0.1 | MSP6-5 |
| | | | 0.25 | MSP6-6 |
| | | | 0.5 | MSP6-7 |
| | | | 1.5 | MSP6-8 |
| 5 x 11 | 8 | 10.95 | 0.1 | MSP6-9 |
| | | | 0.25 | MSP6-10 |
| | | | 0.5 | MSP6-11 |
| | | | 1.5 | MSP6-12 |

| Bearing Size (Ref.) I.D. X O.D. | A | B | T | Part No. |
|------------------------------------|------|-------|------|----------------|
| 6 X 13 | 9.5 | 12.95 | 0.1 | MSP6-13 |
| | | | 0.25 | MSP6-14 |
| | | | 0.5 | MSP6-15 |
| | | | 1.5 | MSP6-16 |
| 8 X 16 | 12 | 15.95 | 0.1 | MSP6-17 |
| | | | 0.25 | MSP6-18 |
| | | | 0.5 | MSP6-19 |
| | | | 1.5 | MSP6-20 |
| 10 x 19 | 14.5 | 18.95 | 0.1 | MSP6-21 |
| | | | 0.25 | MSP6-22 |
| | | | 0.5 | MSP6-23 |
| | | | 1.5 | MSP6-24 |

| THICKNESS TOLERANCES | | | | |
|----------------------|--------|--------|--------|-------|
| Thickness (T) | 0.1 | 0.25 | 0.5 | 1.5 |
| Tolerance | ±0.013 | ±0.025 | ±0.025 | ±0.05 |

Sold & Serviced By:

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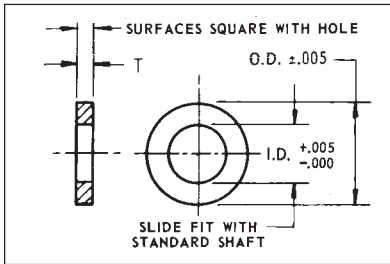
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INNER RACE SHAFT SPACERS — 3/32" To 1/2" Bores



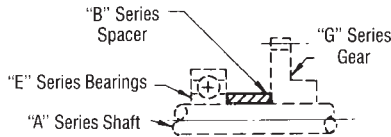
Material: 300 Series Stainless Steel

| Shaft | I.D. | O.D. |
|-------|------|------|
| 5/64 | .078 | .164 |
| 3/32 | .093 | .203 |
| 1/8 | .125 | .187 |
| 3/16 | .188 | .250 |
| 1/4 | .250 | .375 |
| 5/16 | .313 | .500 |
| 3/8 | .375 | .562 |
| 1/2 | .500 | .750 |

| T | Tolerance |
|--------------|-----------|
| .002 to .008 | ±.0005 |
| .010 to .016 | ±.001 |
| .031 to .500 | ±.002 |

| T | 5/64" Spacer Part No. | 3/32" Spacer Part No. | 1/8" Spacer Part No. | 3/16" Spacer Part No. | 1/4" Spacer Part No. | 5/16" Spacer Part No. | 3/8" Spacer Part No. | 1/2" Spacer Part No. |
|------|-----------------------|-----------------------|----------------------|-----------------------|----------------------|-----------------------|----------------------|----------------------|
| .002 | B8-23 | B6-23 | B4-23 | B6-24 | B8-24 | B14-23 | B12-23 | B15-23 |
| .004 | B8-16 | B6-16 | B4-1 | B6-1 | B8-1 | B14-16 | B12-1 | B15-16 |
| .006 | B8-17 | B6-17 | B4-2 | B6-2 | B8-2 | B14-17 | B12-2 | B15-17 |
| .008 | B8-18 | B6-18 | B4-3 | B6-3 | B8-3 | — | B12-3 | — |
| .010 | B8-19 | B6-19 | B4-4 | B6-4 | B8-4 | B14-19 | B12-4 | B15-19 |
| .012 | B8-20 | B6-20 | B4-5 | B6-5 | B8-5 | B14-20 | B12-5 | B15-20 |
| .014 | B8-21 | B6-21 | B4-6 | B6-6 | B8-6 | B14-21 | B12-6 | B15-21 |
| .016 | B8-22 | B6-22 | B4-7 | B6-7 | B8-7 | B14-22 | B12-7 | B15-22 |
| .031 | — | — | B4-8 | B6-8 | B8-8 | B14-24 | B12-8 | B15-24 |
| .063 | — | — | B4-9 | B6-9 | B8-9 | B14-25 | B12-9 | B15-25 |
| .094 | — | — | B4-10 | B6-10 | B8-10 | — | B12-10 | — |
| .125 | — | — | B4-11 | B6-11 | B8-11 | — | B12-11 | — |
| .188 | — | — | B4-12 | B6-12 | B8-12 | — | B12-12 | — |
| .250 | — | — | B4-13 | B6-13 | B8-13 | — | B12-13 | — |
| .375 | — | — | B4-14 | B6-14 | B8-14 | — | B12-14 | — |
| .500 | — | — | B4-15 | B6-15 | B8-15 | — | B12-15 | — |

EXAMPLE

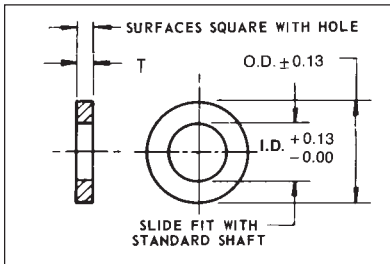


INNER RACE KITS

| | | |
|---------------------------------------------------------------------------------------------------------|-----|------|
| Bearing Shaft Spacers—Stainless Steel Inner Race. Assorted Thickness for 1/8", 3/16" & 1/4" Shaft Sizes | 350 | Y27K |
|---------------------------------------------------------------------------------------------------------|-----|------|

METRIC INNER RACE SHAFT SPACERS — 3, 4, 6 & 10 mm Bores

All Dimensions in Millimeters



Material: 300 Series Stainless Steel

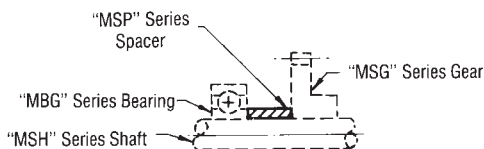
| Shaft Size | Spacer | |
|------------|-------------|--------------|
| | Inside Dia. | Outside Dia. |
| 3 | 3.05 | 5 |
| 4 | 4.05 | 6 |
| 6 | 6.05 | 10 |
| 10 | 10.05 | 14 |

| T | Tolerance |
|-----------|-----------|
| 0.05-0.20 | ±0.013 |
| 0.25-0.40 | ±0.025 |
| 0.80-12.0 | ±0.050 |

| T | 3 Shaft Spacer Part Number | 4 Shaft Spacer Part Number | 6 Shaft Spacer Part Number | 10 Shaft Spacer Part Number |
|-------|----------------------------|----------------------------|----------------------------|-----------------------------|
| 0.05 | MSP1-1 | MSP2-1 | MSP3-1 | MSP4-1 |
| 0.10 | MSP1-2 | MSP2-2 | MSP3-2 | MSP4-2 |
| 0.15 | MSP1-3 | MSP2-3 | MSP3-3 | MSP4-3 |
| 0.20 | MSP1-4 | MSP2-4 | MSP3-4 | MSP4-4 |
| 0.25 | MSP1-5 | MSP2-5 | MSP3-5 | MSP4-5 |
| 0.30 | MSP1-6 | MSP2-6 | MSP3-6 | MSP4-6 |
| 0.35 | MSP1-7 | MSP2-7 | MSP3-7 | MSP4-7 |
| 0.40 | MSP1-8 | MSP2-8 | MSP3-8 | MSP4-8 |
| 0.80 | MSP1-9 | MSP2-9 | MSP3-9 | MSP4-9 |
| 1.60 | MSP1-10 | MSP2-10 | MSP3-10 | MSP4-10 |
| 2.40 | MSP1-11 | MSP2-11 | MSP3-11 | MSP4-11 |
| 3.00 | MSP1-12 | MSP2-12 | MSP3-12 | MSP4-12 |
| 4.50 | MSP1-13 | MSP2-13 | MSP3-13 | MSP4-13 |
| 6.00 | MSP1-14 | MSP2-14 | MSP3-14 | MSP4-14 |
| 10.00 | MSP1-15 | MSP2-15 | MSP3-15 | MSP4-15 |
| 12.00 | MSP1-16 | MSP2-16 | MSP3-16 | MSP4-16 |

Special Spacers Available. Consult Factory.

EXAMPLE



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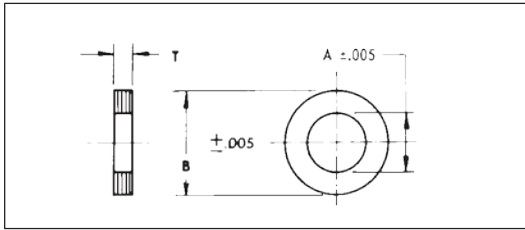
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LAMINATED BRASS SHIM SPACERS



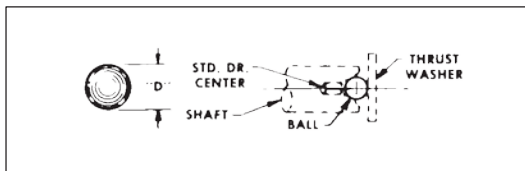
Material: Laminated Brass Shims (.002 Lamination)

| Shaft Size | Type | A | B | T | Part No. |
|------------|-----------------|------|------|------|-------------|
| 1/8 | Outer Race | .312 | .370 | 1/32 | B1-1 |
| 3/16 | Bearing | .375 | .498 | | B1-2 |
| 1/4 | Spacer | .437 | .623 | | B1-3 |
| 3/8 | (See Note) | .687 | .873 | | B1-4 |
| 1/8 | Shaft Spacer | .135 | .234 | 1/32 | B2-1 |
| 3/16 | | .193 | .375 | | B2-2 |
| 1/4 | | .255 | .500 | | B2-3 |
| 3/8 | | .380 | .620 | | B2-4 |

NOTE: B1 SERIES OD TOLERANCE +.000
-.005

PRECISION BALLS — Inch and Metric

Stainless Steel & Nylon



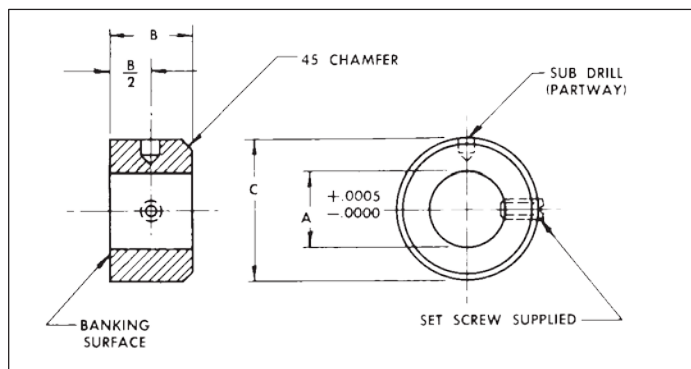
Material: 440 Stainless Steel, Grade #25
Hardened to RC58-65
Sphericity .000025
Zytel 101 Nylon
Sphericity .001

| Nylon | | Stainless Steel | |
|-------|----------|-----------------|----------|
| D | Part No. | D | Part No. |
| .0937 | AL-1 | .06250 | AK-1 |
| .1250 | AL-2 | .09375 | AK-2 |
| .1562 | AL-3 | .12500 | AK-3 |
| .1875 | AL-4 | .15625 | AK-4 |
| .2187 | AL-5 | .18750 | AK-5 |
| .2500 | AL-6 | .25000 | AK-6 |
| .3750 | AL-7 | .31250 | AK-7 |
| .5000 | AL-8 | .37500 | AK-8 |
| ±.002 | | .50000 | AK-9 |
| | | ±.0001 | |

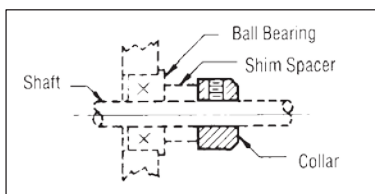
| METRIC Stainless Steel | |
|---------------------------|----------|
| D | Part No. |
| 1.5000 | MBL1-1 |
| 2.5000 | MBL1-2 |
| 3.0000 | MBL1-3 |
| 4.0000 | MBL1-4 |
| 5.0000 | MBL1-5 |
| 6.0000 | MBL1-6 |
| ±.0013 | |

All dimensions in Millimeters

PRECISION SET SCREW COLLARS



Material: 303 Stainless Steel



| Shaft Size | A | B | C | Set Screw | Part No. |
|------------|-------|-----|------|-----------|--------------|
| 3/32 | .0935 | .12 | 1/4 | # 0-80 | C1-8 |
| 1/8 | .1248 | .18 | 5/16 | # 2-56 | C1-1 |
| 5/32 | .1560 | .18 | 5/16 | # 2-56 | C1-5 |
| 3/16 | .1873 | .22 | 3/8 | # 4-40 | C1-2 |
| 1/4 | .2498 | .25 | 1/2 | # 6-32 | C1-3 |
| 5/16 | .3123 | .28 | 9/16 | # 6-32 | C1-9 |
| 3/8 | .3748 | .37 | 3/4 | #10-32 | C1-10 |
| 1/2 | .4998 | .50 | 1 | 1/4-20 | C1-11 |

Dimensions Below Are In Millimeters

| Shaft Size | A | B | C | Set Screw | Part No. |
|------------|--------|------|------|-----------|---------------|
| 3 | 2.995 | 4.57 | 7.9 | M2X.4 | MSC1-1 |
| 4 | 3.995 | 5.59 | 9.5 | M2X.4 | MSC1-2 |
| 5 | 4.995 | 5.59 | 9.5 | M3X.5 | MSC1-3 |
| 6 | 5.995 | 6.35 | 12.7 | M3X.5 | MSC1-4 |
| 8 | 7.995 | 7.11 | 14.3 | M3X.5 | MSC1-5 |
| 10 | 9.995 | 9.4 | 19.1 | M5X.8 | MSC1-6 |
| 12 | 11.995 | 12.7 | 25.4 | M6X.1 | MSC1-7 |

Special Collars Available, Consult Factory.
For "No-Mar" Set Screws See CS Series.

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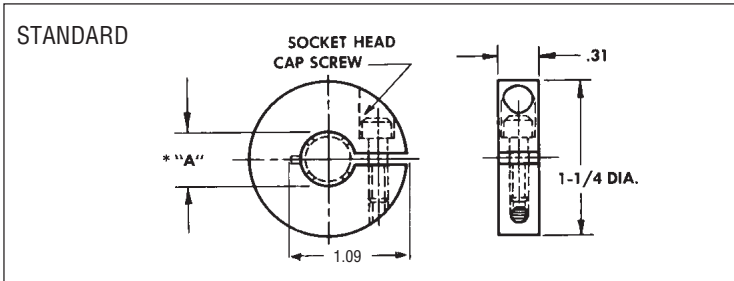
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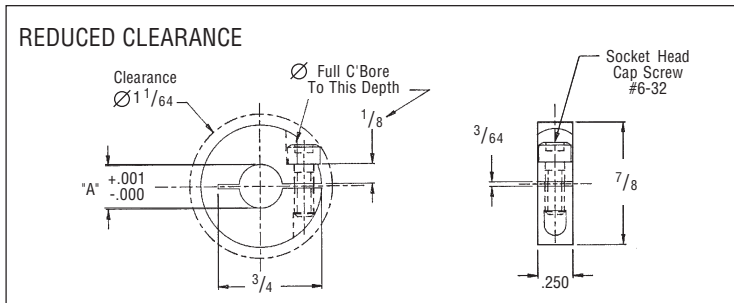
CLAMPS - SPLIT & SCREW TYPES — 1/8" To 1/2" Shaft Size

SPLIT TYPE



| Ref. Gear Bore | *A +.001 -.000 | Part Number |
|----------------|-------------------|-------------|
| 5/16 | .375 | L1-20 |
| 3/8 | .437 | L1-21 |
| 1/2 | .562 | L1-22 |

Material: 303 Stainless Steel
Clearance radius .63

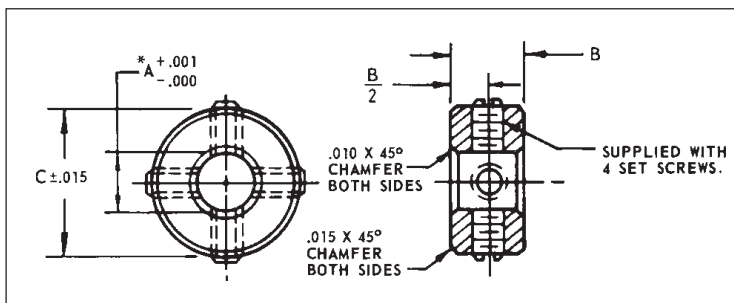


| Ref. Gear Bore | *A +.001 -.000 | Part Number |
|----------------|-------------------|-------------|
| 1/8 | .188 | L4-1 |
| 3/16 | .250 | L4-2 |
| 1/4 | .313 | L4-3 |

Also available in Aluminum, Consult Factory

Material: 303 Stainless Steel
Clearance radius .508

SCREW TYPE



*NOTE: "A" diameter is O.D. of split hub gear or sprocket hub & is I.D. of clamp.

| Ref. Gear Bore | *A +.001 -.000 | A | C | Set Screws | Part Number |
|----------------|-------------------|-----|-----|------------|-------------|
| 1/8 | .188 | .25 | .37 | #4-40 | L4-13 |
| 3/16 | .250 | .25 | .50 | #6-32 | L4-14 |
| 1/4 | .313 | .25 | .50 | #6-32 | L4-15 |

Also available in Aluminum, Consult Factory

Material: 303 Stainless Steel

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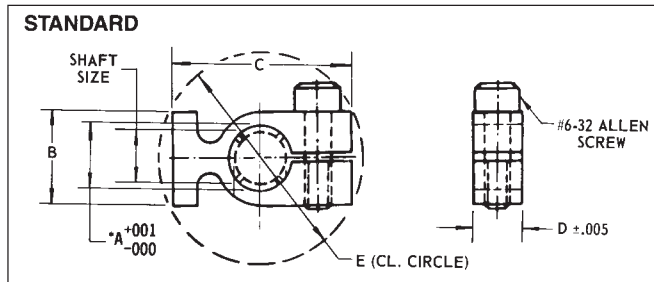
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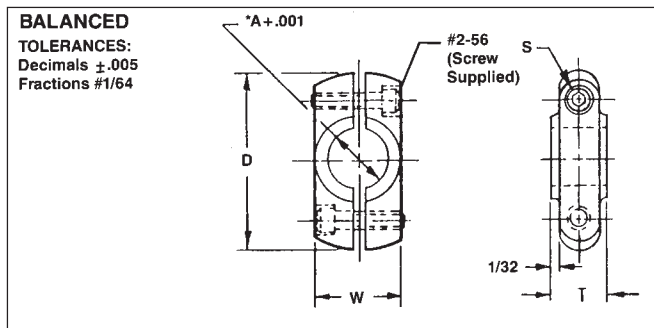
ADJUSTABLE HUB CLAMP



Material: 416 Stainless Steel — Heat Treated RC38-45

| Ref. Gear Bore | *A | B | C | D | E | Finish | Part No. |
|----------------|------|------|-------|------|--------|-----------------|----------|
| 1/8 | .188 | 5/16 | 11/16 | | 7/8 | Black Passivate | L1-1 |
| 3/16 | .250 | 3/8 | 13/16 | .240 | 1-1/32 | | L1-2 |
| 1/4 | .312 | 7/16 | 13/16 | | 1-1/8 | | L1-3 |
| 1/8 | .188 | 5/16 | 11/16 | | 7/8 | Clear Passivate | L1-4 |
| 3/16 | .250 | 3/8 | 13/16 | .240 | 1-1/32 | | L1-5 |
| 1/4 | .312 | 7/16 | 13/16 | | 1-1/8 | | L1-6 |

*NOTE: "A" diameter is O.D. of split hub gear or sprocket hub & is I.D. of clamp.



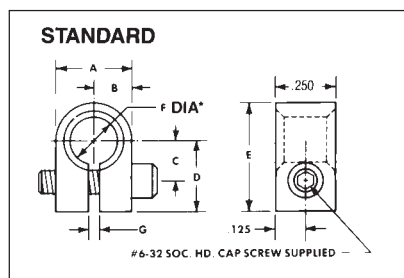
Material: 416 Stainless Steel — Heat Treated RC38-45

| Ref. Gear Bore | *A | D | T | W | Type Balance | Part No. |
|----------------|------|-------|------|------|--------------|----------|
| 1/8 | .188 | 23/32 | .240 | 5/16 | As Machined | L1-7 |
| 3/16 | .250 | 3/4 | .240 | 3/8 | | L1-8 |
| 1/4 | .312 | 7/8 | .240 | 7/16 | | L1-9 |

Dynamically balanced units available on request. Consult Factory.

ADJUSTABLE HUB CLAMP — .188" To .438" Bores

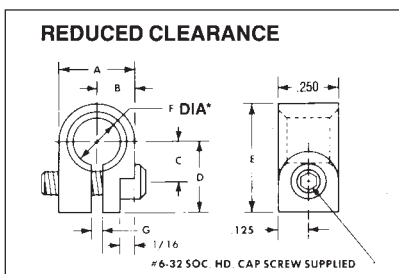
Miniature



Material: 303 Stainless Steel
416 Stainless Steel Available on Request, Consult Factory.

| Ref. Gear Bore | F Dia. ±.0005 | A | B | C | D | E | G | Part No. |
|----------------|---------------|------|------|------|------|-------|------|----------|
| 1/8 | .188 | .312 | .156 | .187 | .312 | 15/32 | .031 | L5-1 |
| 3/16 | .251 | .375 | .188 | .256 | .375 | 9/16 | .046 | L5-2 |
| 1/4 | .313 | .437 | .218 | .250 | .375 | 19/32 | .046 | L5-3 |
| 5/16 | .376 | .500 | .250 | .281 | .406 | 21/32 | .046 | L5-4 |
| 3/8 | .438 | .625 | .312 | .343 | .468 | 25/32 | .046 | L5-5 |

*NOTE: "F" diameter is O.D. of split hub gear or sprocket hub & is I.D. of clamp.



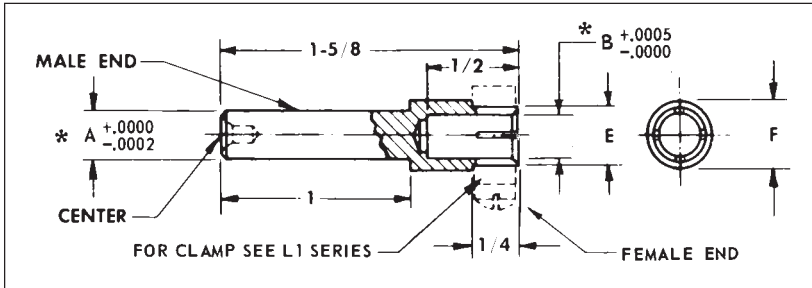
Material: 303 Stainless Steel
416 Stainless Steel Available on Request, Consult Factory

| Ref. Gear Bore | F Dia. ±.0005 | A | B | C | D | E | G | Part No. |
|----------------|---------------|------|------|------|------|-------|------|----------|
| 1/8 | .188 | .312 | .156 | .187 | .312 | 15/32 | .031 | L6-1 |
| 3/16 | .251 | .375 | .188 | .256 | .375 | 9/16 | .046 | L6-2 |
| 1/4 | .313 | .437 | .218 | .250 | .375 | 19/32 | .046 | L6-3 |
| 5/16 | .376 | .500 | .250 | .281 | .406 | 21/32 | .046 | L6-4 |
| 3/8 | .438 | .625 | .312 | .343 | .468 | 25/32 | .046 | L6-5 |

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SHAFT EXTENSIONS

1/4", 3/8" Bores



| Shaft Size | A* | B** | E | F | Part No. |
|----------------|-------|-------|------|------|----------|
| Male to Female | | | | | |
| 1/4 to 1/4 | .2497 | .2498 | .312 | .375 | AU-3 |
| 3/16 to 1/4 | .1872 | .2498 | .312 | .375 | AU-6 |
| 1/4 to 1/8 | .2497 | .1248 | .188 | .250 | AU-8 |
| 1/4 to 3/8 | .2497 | .3748 | .437 | .500 | AU-11 |
| 3/8 to 1/4 | .3747 | .2498 | .312 | .375 | AU-12 |

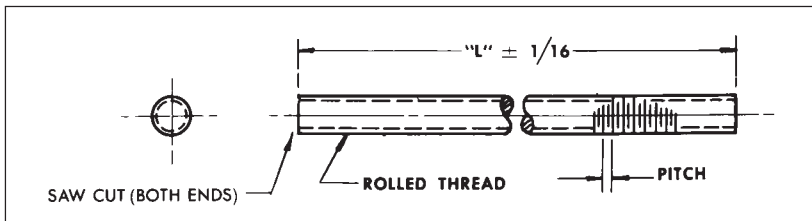
*Inch Shaft Dia. Toler. +.0000, -.0002

**Inch Bores Toler. +.0005, -.0000

Material: 303 Stainless Steel

*Diameters Concentric Within .0005 T.I.R.

STAINLESS THREADED STOCK — #2-56 To 3/8 -16

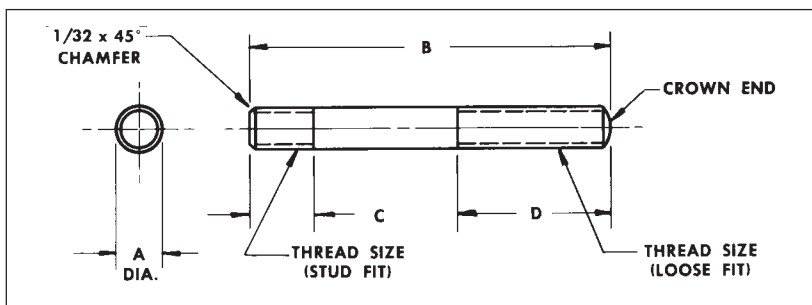


| Thread | D | Pitch | L | Part No. |
|---------|------|-------|----|----------|
| # 2-56 | .086 | .018 | 12 | A9-10 |
| # 4-40 | .112 | .025 | | A9-11 |
| # 6-32 | .138 | .031 | | A9-1 |
| # 8-32 | .164 | .031 | 16 | A9-2 |
| #10-32 | .190 | .031 | | A9-4 |
| 1/4 -20 | 1/4 | .050 | | A9-5 |
| 1/4 -28 | 1/4 | .036 | 24 | A9-6 |
| 5/16-18 | 5/16 | .055 | | A9-7 |
| 3/8 -16 | 3/8 | .062 | | A9-8 |

Material: 300 Series Stainless Steel

Other Lengths, Diameters and Modifications Available, Consult Factory.

STAINLESS THREADED STUDS — #6-32 To 1/4 -20



| Thread Size | A | B | C | D | Part No. |
|-------------|------|-------|------|-----|----------|
| #6-32 | .138 | 1 | 7/32 | 1/2 | 2040 |
| | | 1-1/4 | | 5/8 | 2041 |
| | | 1-1/2 | | 3/4 | 2042 |
| | | 1-3/4 | | 3/4 | 2043 |
| #8-32 | .164 | 1 | 7/32 | 1/2 | 2045 |
| | | 1-1/4 | | 5/8 | 2046 |
| | | 1-1/2 | | 3/4 | 2047 |
| | | 1-3/4 | | 3/4 | 2048 |
| | | 2 | | 3/4 | 2049 |

| Thread Size | A | B | C | D | Part No. |
|-------------|------|-------|------|-----|----------|
| #10-32 | .190 | 1 | 7/32 | 1/2 | 2055 |
| | | 1-1/4 | | 5/8 | 2056 |
| | | 1-1/2 | | 3/4 | 2057 |
| | | 1-3/4 | | 3/4 | 2058 |
| 1/4-20 | .250 | 2 | 9/32 | 3/4 | 2059 |
| | | 1-1/4 | | 5/8 | 2060 |
| | | 1-1/2 | | 5/8 | 2061 |
| | | 1-3/4 | | 3/4 | 2062 |
| | | 2 | | 3/4 | 2063 |
| | | 2-1/2 | | 3/4 | 2064 |
| | | 3 | | 1 | 2065 |

Material: 303 Stainless Steel

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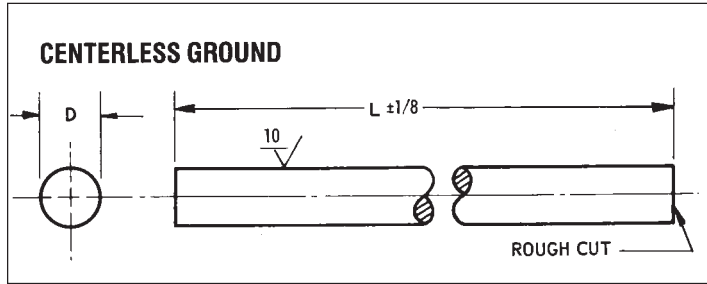
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PRECISION GROUND SHAFTING — 1/32" To 1" Diameter

Nominal, Undersized and Oversized Diameters



Material: 303 Stainless Steel

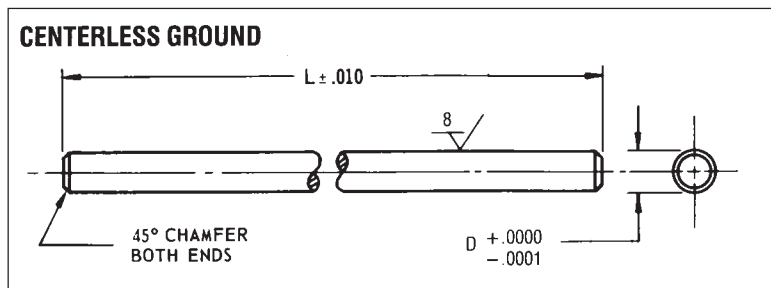
| Diameter Tolerance | |
|--------------------|--------------------|
| 1/32 TO 1/2 | + .0000 - .0002 |
| 5/8 TO 1 | + .0000 - .0004 |

| Fractional Dia. (Ref.) | D | L | Part No. |
|------------------------|-------|----|----------|
| 1/32 | .0313 | 12 | A8-1 |
| | .0317 | | A8-23 |
| 1/16 | .0622 | 12 | A8-24 |
| | .0626 | | A8-2 |
| | .0630 | | A8-25 |
| 5/64 | .0778 | 12 | A8-20 |
| | .0781 | | A8-22 |
| | .0786 | | A8-26 |
| 3/32 | .0934 | 12 | A8-21 |
| | .0938 | | A8-3 |
| | .0942 | | A8-27 |
| 1/8 | .1247 | 24 | A8-6 |
| | .1250 | 12 | A8-5 |
| | .1251 | | A8-4 |
| | .1255 | 24 | A8-28 |
| 5/32 | .1559 | 24 | A8-29 |
| | .1562 | | A8-18 |
| | .1567 | | A8-30 |
| 3/16 | .1872 | 24 | A8-9 |
| | .1875 | | A8-7 |
| | .1880 | | A8-31 |
| 7/32 | .2184 | 24 | A8-32 |
| | .2187 | | A8-19 |
| | .2192 | | A8-33 |
| 1/4 | .2497 | 24 | A8-11 |
| | .2497 | 36 | A8-34 |

| Fractional Dia. (Ref.) | D | L | Part No. |
|------------------------|-------|----|----------|
| 1/4 | .2500 | 24 | A8-10 |
| | | 36 | A8-35 |
| 5/16 | .3122 | 24 | A8-13 |
| | | | .3125 |
| 3/8 | .3747 | 16 | A8-15 |
| | | 36 | A8-38 |
| | | 16 | A8-14 |
| | | 36 | A8-39 |
| 1/2 | .4997 | 16 | A8-17 |
| | | 36 | A8-41 |
| | | 16 | A8-16 |
| | | 36 | A8-42 |
| 5/8 | .6247 | 36 | A8-44 |
| | | | .6250 |
| 3/4 | .7497 | 36 | A8-47 |
| | | | .7500 |
| 1 | .9997 | 36 | A8-50 |
| | | | 1.0000 |

For Pre-Cut and Chamfered Precision Ground Shafting, See A1 through A7 Series.
Other Lengths, Diameters and Modifications Available, Consult Factory.

ULTRA PRECISION SHAFTING — 1/8", 3/16" and 1/4" Diameter



Material: 303 Stainless Steel

| Diameter | D | Straightness Tolerance |
|----------|--------|------------------------|
| 1/8 | .12475 | .0002 |
| 3/16 | .18725 | .00015 |
| 1/4 | .24975 | .0001 |

| L | 1/8 Dia. Part No. | 3/16 Dia. Part No. | 1/4 Dia. Part No. |
|------|-------------------|--------------------|-------------------|
| 1.00 | A4-10 | — | — |
| 1.12 | A4-11 | — | — |
| 1.25 | — | A5-12 | — |
| 1.37 | A4-13 | — | — |
| 1.50 | — | A5-15 | A6-15 |
| 1.75 | A4-17 | A5-17 | — |
| 1.88 | A4-18 | — | — |
| 2.00 | A4-20 | A5-20 | A6-20 |
| 2.50 | — | — | A6-25 |
| 2.75 | — | — | A6-27 |
| 3.00 | — | A5-30 | — |
| 3.12 | — | — | A6-31 |
| 3.25 | A4-32 | — | — |
| 3.50 | — | — | A6-35 |
| 4.00 | — | — | A6-40 |
| 4.25 | — | — | A6-42 |

Sold in increments of 5 pcs.
Other Lengths, Diameters and Modifications Available, Consult Factory.

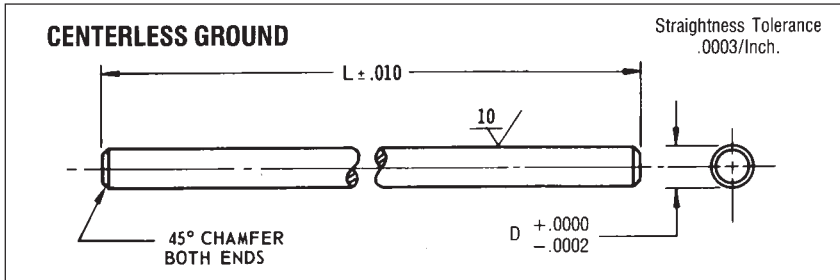
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PRECISION GROUND SHAFTING — 1/8", 3/16", 1/4", & 3/8" Diameters

Designed to fit "E" Series Ball Bearings, and "AM" Oil-Impregnated Bearings

PIC Ground Stock Shafting has been established to meet the majority of precision shaft requirements. All shaft material made of 303 Stainless Steel is ground to a 10 micro finish or better.

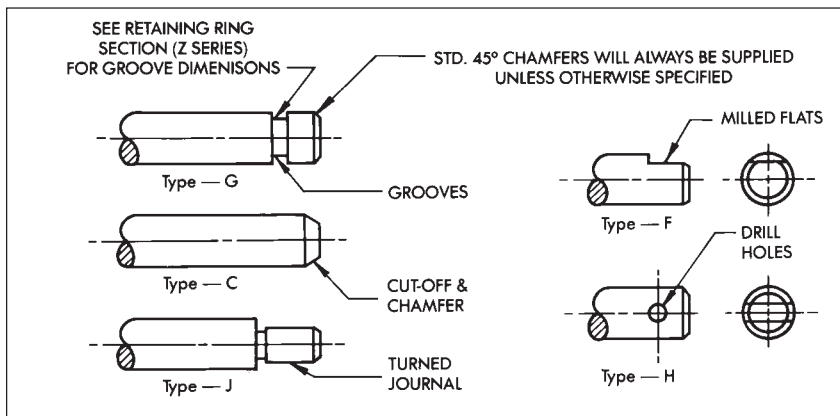


Material: 303 Stainless Steel

| Dia. | D |
|-------|-------|
| 1/8" | .1247 |
| 3/16" | .1872 |
| 1/4" | .2497 |
| 3/8" | .3747 |

SHAFT MODIFICATIONS

Illustrated below are standard shaft modifications available on request. For other configurations, send drawing or sketch for quotation.



| *L | 1/8 Dia. Part No. | 3/16 Dia. Part No. | 1/4 Dia. Part No. | 3/8 Dia. Part No. |
|-------|-------------------|--------------------|-------------------|-------------------|
| 1.00 | A1-10 | A2-10 | A3-10 | — |
| 1.12 | A1-11 | A2-11 | A3-11 | — |
| 1.25 | A1-12 | A2-12 | A3-12 | — |
| 1.37 | A1-13 | A2-13 | A3-13 | — |
| 1.50 | A1-15 | A2-15 | A3-15 | — |
| 1.62 | A1-16 | A2-16 | A3-16 | — |
| 1.75 | A1-17 | A2-17 | A3-17 | — |
| 1.87 | A1-18 | A2-18 | A3-18 | — |
| 2.00 | A1-20 | A2-20 | A3-20 | A7-20 |
| 2.12 | A1-21 | A2-21 | A3-21 | — |
| 2.25 | A1-22 | A2-22 | A3-22 | A7-22 |
| 2.37 | A1-23 | A2-23 | A3-23 | — |
| 2.50 | A1-25 | A2-25 | A3-25 | A7-25 |
| 2.62 | A1-26 | A2-26 | A3-26 | — |
| 2.75 | A1-27 | A2-27 | A3-27 | A7-27 |
| 2.87 | A1-28 | A2-28 | A3-28 | — |
| 3.00 | A1-30 | A2-30 | A3-30 | A7-30 |
| 3.12 | A1-31 | A2-31 | A3-31 | — |
| 3.25 | — | A2-32 | A3-32 | A7-32 |
| 3.37 | — | A2-33 | A3-33 | — |
| 3.50 | A1-35 | A2-35 | A3-35 | A7-35 |
| 3.62 | — | A2-36 | A3-36 | — |
| 3.75 | — | A2-37 | A3-37 | A7-37 |
| 3.87 | — | — | A3-38 | — |
| 4.00 | A1-40 | A2-40 | A3-40 | A7-40 |
| 4.12 | — | — | A3-41 | — |
| 4.25 | A1-42 | — | A3-42 | A7-42 |
| 4.37 | — | — | A3-43 | — |
| 4.50 | A1-45 | A2-45 | A3-45 | A7-45 |
| 4.62 | — | — | A3-46 | — |
| 4.75 | — | — | A3-47 | A7-47 |
| 4.87 | — | — | A3-48 | — |
| 5.00 | A1-50 | A2-50 | A3-50 | A7-50 |
| 5.12 | A1-51 | — | A3-51 | — |
| 5.25 | A1-52 | A2-52 | A3-52 | A7-52 |
| 5.37 | A1-53 | — | A3-53 | — |
| 5.50 | A1-55 | — | A3-55 | A7-55 |
| 5.62 | A1-56 | — | A3-56 | — |
| 5.75 | A1-57 | A2-57 | A3-57 | A7-57 |
| 5.87 | — | — | A3-58 | — |
| 6.00 | A1-60 | A2-60 | A3-60 | A7-60 |
| 6.25 | — | A2-62 | A3-62 | — |
| 6.37 | — | — | A3-63 | — |
| 6.50 | — | — | A3-65 | A7-65 |
| 6.62 | — | — | A3-66 | — |
| 6.75 | A1-67 | — | — | — |
| 7.00 | — | A2-70 | A3-70 | — |
| 7.50 | — | A2-75 | A3-75 | — |
| 8.00 | — | A2-80 | A3-80 | A7-80 |
| 8.50 | — | A2-85 | A3-85 | — |
| 9.00 | A1-90 | — | A3-90 | A7-90 |
| 9.50 | — | — | A3-95 | — |
| 10.00 | — | A2-100 | A3-100 | A7-100 |
| 11.00 | — | — | — | A7-110 |
| 12.00 | A1-120 | A2-120 | A3-120 | A7-120 |
| 13.00 | — | — | A3-130 | — |
| 14.00 | — | — | A3-140 | — |
| 15.00 | — | — | A3-150 | — |
| 16.00 | A1-160 | — | A3-160 | A7-160 |
| 20.00 | — | — | — | A7-200 |
| 24.00 | — | — | — | A7-240 |

For Longer Lengths, See "A8" Series.

* A1, A2 and A3 series, 1" thru 6" lengths, are sold in increments of 5 pcs.

Other Lengths, Diameters and Modifications Available, Consult Factory.

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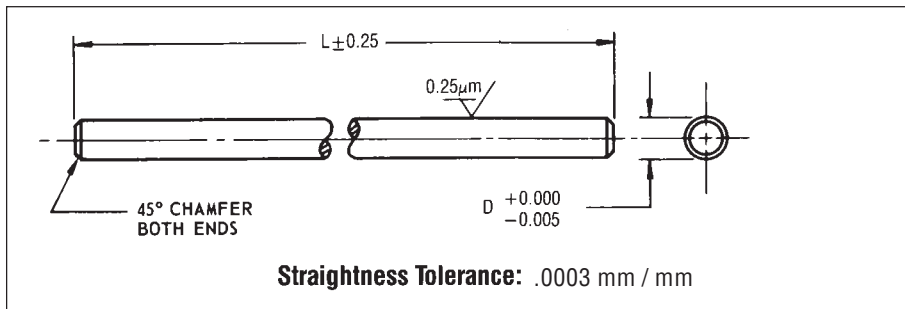
Toll Free Fax (877) SERV099

www.electromate.com

sales@electromate.com

METRIC PRECISION GROUND SHAFTING — 3, 4, 5 & 6 mm Diameters

All Dimensions in Millimeters



Material: 303 Stainless Steel

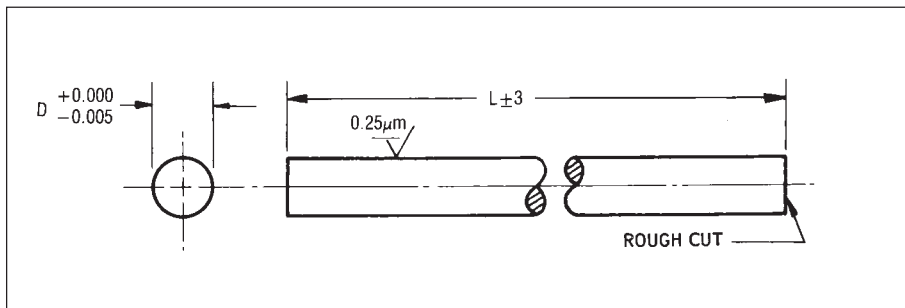
| Diameter | D |
|----------|-------|
| 3 | 2.993 |
| 4 | 3.993 |
| 5 | 4.993 |
| 6 | 5.993 |

| Length | 3 mm Part No. | 4 mm Part No. | 5 mm Part No. | 6 mm Part No. |
|--------|---------------|---------------|---------------|---------------|
| 25 | MSH1-1 | MSH2-1 | MSH3-1 | MSH4-1 |
| 30 | MSH1-2 | MSH2-2 | MSH3-2 | MSH4-2 |
| 35 | MSH1-3 | MSH2-3 | MSH3-3 | MSH4-3 |
| 40 | MSH1-4 | MSH2-4 | MSH3-4 | MSH4-4 |
| 45 | MSH1-5 | MSH2-5 | MSH3-5 | MSH4-5 |
| 50 | MSH1-6 | MSH2-6 | MSH3-6 | MSH4-6 |
| 55 | MSH1-7 | MSH2-7 | MSH3-7 | MSH4-7 |
| 60 | MSH1-8 | MSH2-8 | MSH3-8 | MSH4-8 |
| 65 | MSH1-9 | MSH2-9 | MSH3-9 | MSH4-9 |
| 70 | MSH1-10 | MSH2-10 | MSH3-10 | MSH4-10 |
| 75 | MSH1-11 | MSH2-11 | MSH3-11 | MSH4-11 |
| 80 | MSH1-12 | MSH2-12 | MSH3-12 | MSH4-12 |
| 85 | MSH1-13 | MSH2-13 | MSH3-13 | MSH4-13 |
| 90 | MSH1-14 | MSH2-14 | MSH3-14 | MSH4-14 |
| 95 | MSH1-15 | MSH2-15 | MSH3-15 | MSH4-15 |
| 100 | MSH1-16 | MSH2-16 | MSH3-16 | MSH4-16 |
| 105 | MSH1-17 | MSH2-17 | MSH3-17 | MSH4-17 |
| 110 | MSH1-18 | MSH2-18 | MSH3-18 | MSH4-18 |
| 115 | MSH1-19 | MSH2-19 | MSH3-19 | MSH4-19 |
| 120 | MSH1-20 | MSH2-20 | MSH3-20 | MSH4-20 |
| 125 | MSH1-21 | MSH2-21 | MSH3-21 | MSH4-21 |
| 150 | MSH1-22 | MSH2-22 | MSH3-22 | MSH4-22 |
| 175 | MSH1-23 | MSH2-23 | MSH3-23 | MSH4-23 |
| 200 | MSH1-24 | MSH2-24 | MSH3-24 | MSH4-24 |
| 225 | MSH1-25 | MSH2-25 | MSH3-25 | MSH4-25 |
| 250 | MSH1-26 | MSH2-26 | MSH3-26 | MSH4-26 |

Other Lengths, Diameters and Modifications Available, Consult Factory.

METRIC PRECISION GROUND SHAFTING — 3, 4, 6, 8, 10 & 12 mm Dia.

All Dimensions in Millimeters



Material: 303 Stainless Steel

| D | L | Part No. |
|--------|------|----------|
| 2.993 | 600 | MSH7-1 |
| 3.000 | | MSH7-2 |
| 3.993 | 600 | MSH7-3 |
| 4.000 | | MSH7-4 |
| 5.993 | 600 | MSH7-5 |
| 6.000 | | MSH7-6 |
| 7.993 | 600 | MSH7-7 |
| 8.000 | | MSH7-8 |
| 9.993 | 1000 | MSH7-9 |
| 10.000 | | MSH7-10 |
| 11.993 | 1000 | MSH7-11 |
| 12.000 | | MSH7-12 |

Other Lengths, Diameters and Modifications Available, Consult Factory.

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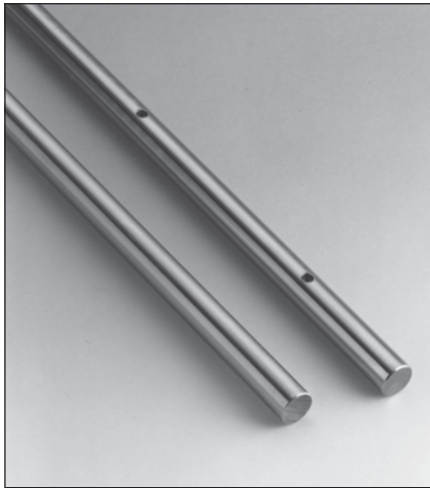
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PRECISION CASE HARDENED & GROUND SHAFTING

Inch and Metric

For Linear Motion Applications



Materials and Hardness:

C-1060 steel, case hardened to Rockwell 60-65C

440 C stainless steel, case hardened to Rockwell 50-55C

303 stainless steel, (for use with engineered plastic bearings),
has approximate hardness of Rockwell 75-95B.

*C-1060 can be supplied with hard satin chrome finish at additional cost. Special orders only.
(Adds .0001 to .0002 to diameter).*

Finish: Normally between 10 and 16 micro-inches RMS. Other finishes can be furnished to meet special requirements.

Length Tolerances: Shafting is stocked in 6 to 10 foot lengths, and is supplied to required lengths $\pm 1/16"$ ($\pm 1.5\text{mm}$). If required, closer length tolerances can be supplied at additional cost.

Straightness: With the exception of 1/4" and 3/8" diameters, the standard straightness tolerance is .001"-.002" per foot cumulative. Straighter lengths to meet more stringent requirements can be supplied at additional cost.

Chamfered Ends: Normally, all shafts are rough cut. Precision chamfers or other dimensions are classified as a special fabrication and carry extra charges.

Maximum Lengths: The maximum lengths in stock for each diameter are shown in the tables.

HOW TO ORDER

When ordering shafts that do not require any special machining, simply add length (in inches or mm) requirement to Part Number. Example: A10-8-20".

Inch Shaft Diameters

| Nominal Diameter (Inches) | Size & Tol. (Inches) | Max Length (ft) | C-1060 Steel Hardened & Ground | | 440 C stainless Hardened & Ground | | 303 Stainless Steel Ground Part No. |
|---------------------------|--------------------------------|-----------------|--------------------------------|-------------------|-----------------------------------|-------------|-------------------------------------|
| | | | Case Depth | Part No. | Case Depth | Part No. | |
| 1/4 | .2485/.2490 .2490/.2495 | 6 | .040 | A10-4 A10L-4 | — | — | A11-4 — |
| 3/8 | .3735/.3740 .3740/.3745 | 6 | .040 | A10-6 A10L-6 | — | — | A11-6 — |
| 1/2 | .4985/.4990 .4990/.4995 | 6 | .060 | A10-8 A10L-8 | .060 | A12-8 — | A11-8 — |
| 5/8 | .6235/.6240 .6240/.6245 | 10 | .060 | A10-10 A10L-10 | .060 | A12-10 — | A11-10 — |
| 3/4 | .7485/.7490 .7490/.7495 | 10 | .060 | A10-12 A10L-12 | .060 | A12-12 — | A11-12 — |
| 1 | .9985/.9990 .9990/.9995 | 10 | .080 | A10-16 A10L-16 | .080 | A12-16 — | A11-16 — |
| 1 1/4 | 1.2485/1.2490 1.2490/1.2495 | 10 | .080 | A10-20 A10L-20 | .080 | A12-20 — | A11-20 — |
| 1 1/2 | 1.4984/1.4989 1.4989/1.4994 | 10 | .080 | A10-24 A10L-24 | .080 | A12-24 — | A11-24 — |

Note: L Series shafting should be used with self-aligning linear bearings.

Metric Shaft Diameters

| Nominal Diameter (mm) | Tolerance μm | Max. Length (mm) | C-1060 Steel Hardened & Ground | | 440C Stainless Steel Hardened & Ground | | 303 Stainless Steel Ground Part No. |
|-----------------------|-------------------------|------------------|--------------------------------|----------|----------------------------------------|----------|-------------------------------------|
| | | | Case Depth | Part No. | Case Depth | Part No. | |
| 5 | 0/-10 | 700 | 1.0 | MA10-05 | 1.0 | MA12-05 | MA11-05 |
| 8 | 0/-10 | 1500 | 1.0 | MA10-08 | 1.0 | MA12-08 | MA11-08 |
| 12 | 0/-10 | 3000 | 1.0 | MA10-12 | 1.0 | MA12-12 | MA11-12 |
| 16 | 0/-10 | 3000 | 1.5 | MA10-16 | 1.5 | MA12-16 | MA11-16 |
| 20 | 0/-12 | 3000 | 1.5 | MA10-20 | 1.5 | MA12-20 | MA11-20 |
| 25 | 0/-12 | 3000 | 1.5 | MA10-25 | 1.5 | MA12-25 | MA11-25 |
| 30 | 0/-12 | 3000 | 2.0 | MA10-30 | 2.0 | MA12-30 | MA11-30 |
| 40 | 0/-15 | 3000 | 2.0 | MA10-40 | 2.0 | MA12-40 | MA11-40 |

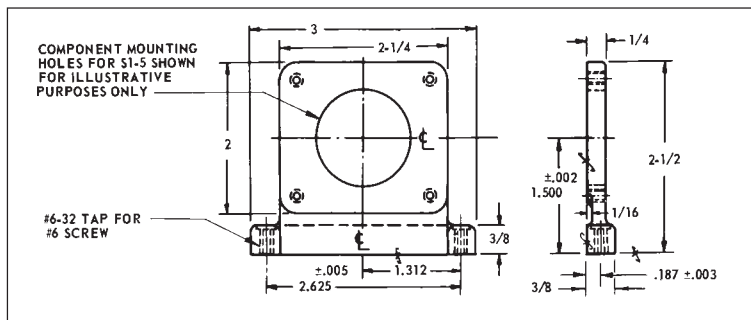
SPECIAL PRECISION MACHINING

Quotations are provided after receipt of a faxed drawing, rough sketch or verbal description. Indicate quantity required.

Metric Conversion To Inches: .03937 x metric dimension

Inch Conversion To Metric: 25.4 x inch dimension

COMPONENT MTG. HANGERS

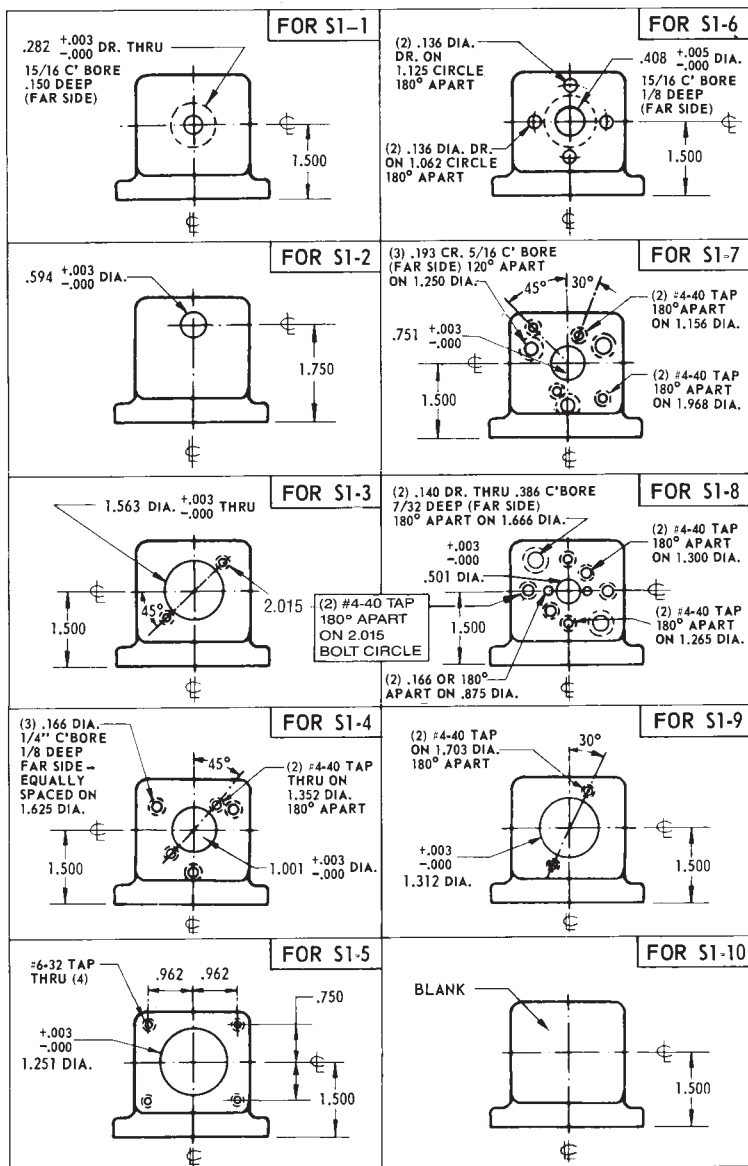


Material: Aluminum
Finish: Anodized

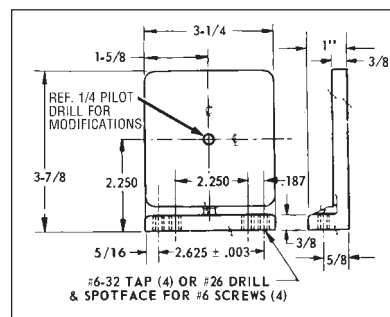
| Part No. |
|----------|
| S1-1 |
| S1-2 |
| S1-3 |
| S1-4 |
| S1-5 |

| Part No. |
|----------|
| S1-6 |
| S1-7 |
| S1-8 |
| S1-9 |
| S1-10 |

COMPONENT MOUNTING DATA



LARGE BLANK COMPONENT HANGERS



Material: Aluminum
Finish: Chromic Acid Anodize

| Part No. (Tap Hole) | Part No. (Clearance Hole) |
|---------------------|---------------------------|
| S3-1 | S4-1 |

PIC will modify any series hanger for special rotating components on request.

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Toll Free Fax (877) SERV099
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sales@electromate.com