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SAE J1259 JUN89

Metric Spherical Rod Ends

SAE Standard
Revised June 1989

Submitted for Recognition as
an American National Standard

SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®

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PARTS AND COMPONENTS STANDARD

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SAE J1259

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METRIC SPHERICAL ROD ENDS

1. GENERAL SPECIFICATIONS:

1.1 Scope: This SAE Standard covers the general and dimensional data for industrial quality spherical rod ends commonly used on control linkages in metric automotive, marine, construction, and industrial equipment applications.

The rod ends described are available from several manufacturers within the range of the interchangeable specifications. The sliding contact spherical self-aligning bearing members (ball and socket) are available in a variety of materials in the types shown. The load capacities and wear capabilities vary considerably with the design and fabrication. It is suggested that the manufacturers be consulted for recommendations for the type and design appropriate to particular applications.

1.2 Dimensions: All dimensions are in millimeters. See SAE J1120 for the U.S. Customary unit specification for spherical rod ends.

1.3 Sizes: The spherical rod end sizes are normally specified by a number indicating the ball bore in millimeters (size 5 = 5 mm). The housing threads (external or internal) used for mounting, as well as the stud thread if required, are equal in size to the nominal ball bore. Sizes larger than those listed are available in both standard and special configurations.

1.4 Threads: Thread form, diameter, and associated pitches are in accordance with ISO 965/II and ANSI B1.13, tolerance class 6g external and 6H internal.

The threads shall be right hand unless otherwise specified. The threads must be chamfered to insure a clean start according to good industrial practice.

1.5 Material: The spherical rod end housing members are normally made from low-carbon steel turned, forged, or headed.

The race and ball materials vary according to the manufacturer's preference for bearing materials.

For special applications, spherical rod ends can be produced from alloy steel, corrosion resistant steel, brass, bronze, or other materials. The charted combinations illustrate the preferred materials in each category available as standard.

The spherical rod ends are available with the ball and race material options listed below:

MATERIAL OPTIONS

Rod End	Housing	Race	Ball
Type A (Fig. 2)	Mild Steel, Alloy Steel, Stainless Steel, Hardened Steel Aluminum Bronze, Brass	Sintered Phosphor Bronze	Hardened Sintered Nickel Steel, Oil Impregnated Case Hardened Steel, Tin Nickel Plated
		Wrought Bronze, Brass	Hardened Sintered Steel
		Mild Steel, Cad Plated	Hardened 52100 Steel, Chrome Plated Hardened Sintered Steel
		Hardened Steel	Hardened Sintered Nickel Steel, Oil Impregnated Sintered Bronze, Oil Impregnated Hardened 52100
Type B (Fig. 3)		Nylon Reinforced, Delrin, TFE Lined	Case Hardened Steel, Cad or Tin Nickel Plated Hardened Sintered Nickel Steel, Oil Impregnated Hardened 52100
Type C (Fig. 4)		None	Hardened 52100 Hardened Sintered Iron, Oil Impregnated Case Hardened Steel, Tin Nickel Plated

1.5 (Continued):

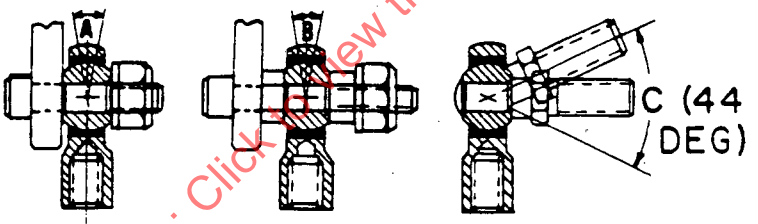
The studs (Fig. 5), which may be secured in the bore of any of the ball variations, are normally made from turned low-carbon steel or headed blanks. The studs with greater strength to resist bending are also available by agreement between the user and manufacturer.

The ball studs, which combine ball and stud as a single part, are mild steel case hardened.

1.6 Angle of Misalignment: If a spherical rod end is mounted between the legs of a fork or clevis, the total misalignment angle will be limited by that portion of the housing head that contacts the legs. This angle varies from 12-18 deg. Specific information for a given size and type should be requested from the manufacturer if this is a critical element of the application. See illustration, Fig. 1A.

If a spherical rod end is mounted on a shouldered shaft or with washers having a diameter equal to ball dimension "O", the shaft cone angle will vary from 24-30 deg. See Illustration, Fig. 1B.

The use of a stud for mounting increases the limit of total misalignment to a minimum of 44 deg. See illustration, Fig. 1C.



Rod End Size	Min A Deg	Min B Deg
5	13	24
6	12	24
8	14	26
10	14	26
12	14	26
14	18	30
16	17	30
20	17	28

FIGURE 1 - A - Housing Strikes Yoke or Lever
B - Washer or Shouldered Shaft with DIA "O" Strikes Race ID
C - Stud Strikes Race ID

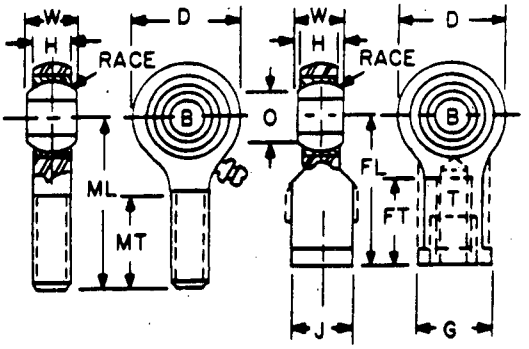


FIGURE 2 - Type A - Metallic Race

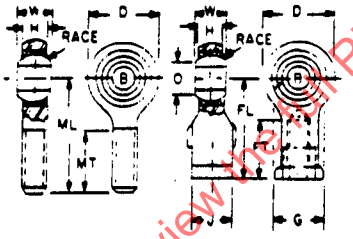


FIGURE 3 - Type B - Molded Race

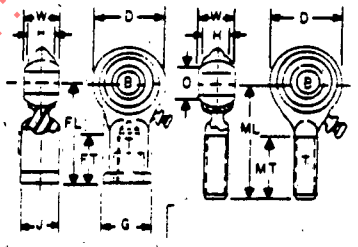


FIGURE 4 - Type C - Raceless

1.7 Finishes: Unless otherwise specified, low-carbon steel housing, races, and studs shall be furnished with cadmium or zinc protective finish and shall meet the requirements of 32 h Salt Spray (Fog) Testing in accordance with ASTM B 117. At manufacturer's option, a subsequent chromate treatment may be used. A black oxide treatment for studs may also be employed.

Nonsintered balls and ball studs shall be plated according to the manufacturer's preference for corrosion protection appropriate to their use as bearing elements.

Ø TABLE 1 - Dimensions For Rod Ends - Type A (Fig. 2), Type B (Fig. 3), and Type C (Fig. 4)

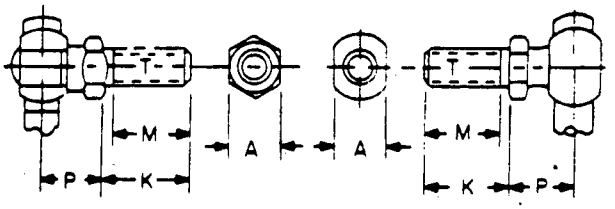
Rod End Size	B	D	G	H	J	T	W	FL	FT	ML	MT	Ball Dia Ref	O
	+0.07 -0.00	Max	±0.25	±0.15	Ref	Nominal Thread Size	±0.15	+1.5 -0.8	Min	±1.5 -0.8	Min		Ref
5	5	18	11	6.00	9.0	M5 x 0.80	8	26	9	32	19	11.1	7.7
6	6	22	13	6.75	10.0	M6 x 1.00	9	29	11	35	21	12.7	8.9
8	8	26	16	9.00	12.5	M8 x 1.25	12	35	15	41	24	15.8	10.4
10	10	30	19	10.50	15.0	M10 x 1.50	14	42	19	47	28	19.1	12.9
12	12	34	22	12.00	17.5	M12 x 1.75	16	49	21	54	32	22.2	15.4
14	14	38	25	13.50	20.0	M14 x 2.00	19	56	24	59	35	25.4	16.8
16	16	42	27	15.00	22.0	M16 x 2.00	21	63	27	65	39	28.6	19.3
20	20	50	34	18.00	27.5	M20 x 1.50	25	76	32	77	46	34.9	24.3

1.8 Lubrication: Unless otherwise specified by the user, spherical rod ends shall be supplied with ball sockets suitably lubricated in accordance with the manufacturer's practice, including vacuum impregnation of self-lubrication sintered bearing elements.

The grease fittings for supplemental lubrication are provided upon request for most types. The standard location is shown. Special locations at 12 o'clock and 3 o'clock positions are also available.

1.9 Workmanship: Industrial quality spherical rod ends must be free from burrs, loose scale, sharp edges, and any other defects.

1.10 Ball Bore Chamfer: The ball bores are chamfered at both faces to break the edge 0.13 mm or up to a maximum of 0.8 mm according to the manufacturer's preference and the method of fabrication. The user is cautioned against seating bolt heads against the ball face during mounting because bolt fillets under the head may distort or crack the ball. The use of a washer or other suitable alternate is recommended.



Rod End Size	A	K	M	P	T
	Ref	=0.25	Min	=1	Nominal Thread Size
5	8	13.0	10.0	9.0	M5 x 0.80
6	10	14.0	11.0	10.0	M6 x 1.00
8	12	17.5	14.0	12.0	M8 x 1.25
10	14	23.0	19.5	16.5	M10 x 1.50
12	16	28.5	24.5	19.5	M12 x 1.75
14	20	33.0	29.0	20.5	M14 x 2.00
16	22	38.0	34.0	24.0	M16 x 2.00
20	25	46.0	40.0	28.5	M20 x 1.50

FIGURE 5 - Studded Assemblies

The phi (Ø) symbol is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. If the symbol is next to the report title, it indicates a complete revision of the report.