INTERNATIONAL STANDARD

ISO 10792-2

First edition
1995-07-15

Aerospace — Airframe spherical plain bearings in corrosion-resisting steel with self-lubricating liner —

Part 2:
Inch series

Aéronautique — Rotules en acier résistant à la corrosion, à garniture autolubrifiante, utilisées dans la structure des aéronefs —

Partie 2: Séries en inches

Reference number
ISO 10792-2:1995(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10792-2 was prepared by Technical Committee ISO/TC 20, *Aircraft and space vehicles*, Subcommittee SC 15, *Airframe bearings*.

ISO 10792 consists of the following parts, under the general title *Aerospace — Airframe spherical plain bearings in corrosion-resisting steel with self-lubricating liner* :

— *Part 1: Metric series*

— *Part 2: Inch series*

— *Part 3: Technical specification*

Annexe A of this part of ISO 10792 is for information only.

International Organization for Standardization
Case postale 56 ● CH-1211 Genève 20 ● Switzerland

Printed in Switzerland

Aerospace — Airframe spherical plain bearings in corrosion-resisting steel with self-lubricating liner —

Part 2:
Inch series

1 Scope

This part of ISO 10792 specifies the characteristics of spherical plain bearings in corrosion-resisting steel with self-lubricating liner, narrow and wide series, for elevated loads at ambient temperature, for use in fixed or moving parts of the aircraft structure and control mechanisms at temperatures of −55 °C to +163 °C.

It is applicable to self-lubricating spherical plain bearings (without rolling elements) consisting of an outer ring having a concave sphered sliding contact surface with self-lubricating liner and inner ring having a matched convex sphered sliding contact surface.

At the time that this part of ISO 10792 was developed, airframe spherical plain bearings with dimensions originally specified in Imperial units were dominant in world application. For this part of ISO 10792, the dimensions of these bearings have been converted into metric units with the original characteristics given in annex A for information only.

For new applications, the use of the bearings specified in ISO 10792-1 is recommended.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 10792. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 10792 are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 683-16:1976, *Heat-treated steels, alloy steels and free-cutting steels — Part 16: Precipitation hardening stainless steels.*

ISO 683-17:1976, *Heat-treated steels, alloy steels and free-cutting steels — Part 17: Ball and roller bearing steels.*

ISO 1132:1980, *Rolling bearings — Tolerances — Definitions.*

ISO 6811:1983, *Spherical plain bearings — Vocabulary.*

ISO 8075:1985, *Aerospace— Surface treatment of hardenable stainless steel parts.*

ISO 10792-1:1995, *Aerospace — Airframe spherical plain bearings in corrosion-resisting steel with self-lubricating liner — Part 1: Metric series.*

ISO 10792-3:1995, *Aerospace — Airframe spherical plain bearings in corrosion-resisting steel with self-lubricating liner — Part 3: Technical specification.*

3 Definitions

For the purposes of this part of ISO 10792, the definitions given in ISO 6811 and ISO 10792-1 apply. In addition, definitions of the concepts related to the tolerances specified in this part of ISO 10792 are given in ISO 1132.

4 Symbols

For the purposes of this part of ISO 10792, the symbols given in ISO 1132 and ISO 10792-1 apply.

5 Characteristics

5.1 Dimensions and tolerances

The dimensions and tolerances for narrow-series spherical plain bearings shall conform to table 1; those for wide-series spherical plain bearings shall conform to table 2.

The configuration of spherical plain bearings shall conform to either figure 1 for those without face grooves or to figure 2 for those with face grooves.

5.2 Mass

The mass of spherical plain bearings shall conform to the values given in tables 1 and 2.

5.3 Loads and starting torques

Loads and starting torques shall conform to the values given in table 3 for narrow-series bearings and to those given in table 4 for wide-series bearings.

5.4 Materials

Inner ring Bearing steel, type 21, in accordance with ISO 683-17, quenched and tempered, except for hardnesses 55 HRC to 62 HRC.

Outer ring Bearing steel, type 1, in accordance with ISO 683-16, except with maximum molybdenum content of 0,5 %, heat treatment R 093, hardnesses 28 HRC to 37 HRC, before swaging.

Liner Self-lubricating, wear-resisting material with a low coefficient of friction.

5.5 Surface treatment

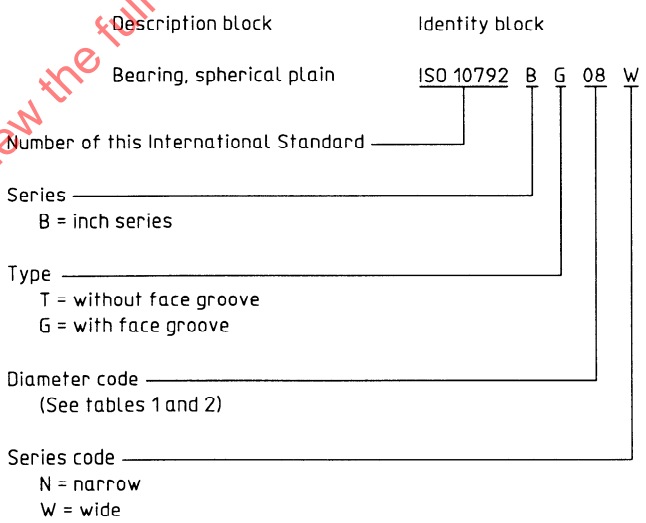
A surface treatment shall be applied to the inner ring material in accordance with ISO 8075. The application of this same surface treatment to the outer ring material is optional.

6 Technical specification

Spherical plain bearings supplied in accordance with this part of ISO 10792 shall conform with the requirements of ISO 10792-3.

7 Designation

Each spherical plain bearing in accordance with this part of ISO 10792 shall be designated as in the following example:



8 Marking

In addition to the manufacturer's identification, each spherical plain bearing shall be marked using the identity block as defined in clause 7. Marking position and method are at the manufacturer's option but shall not adversely affect the working of the spherical plain bearing.

Dimensions in millimetres
Surface roughness values in micrometres

Ra3,2 (Ra0,8 Ra0,2)

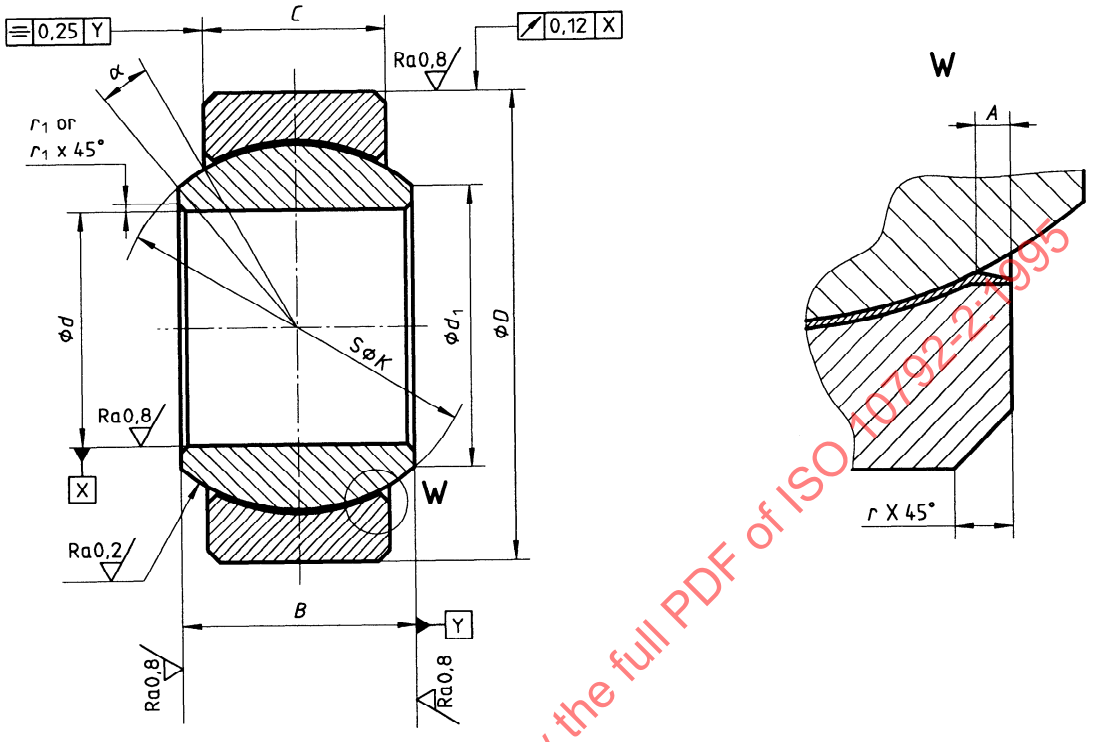


Figure 1 — Spherical plain bearing with self-lubricating liner without face groove

Dimensions in millimetres
Surface roughness values in micrometres

Ra3,2 (Ra0,8 Ra0,2)

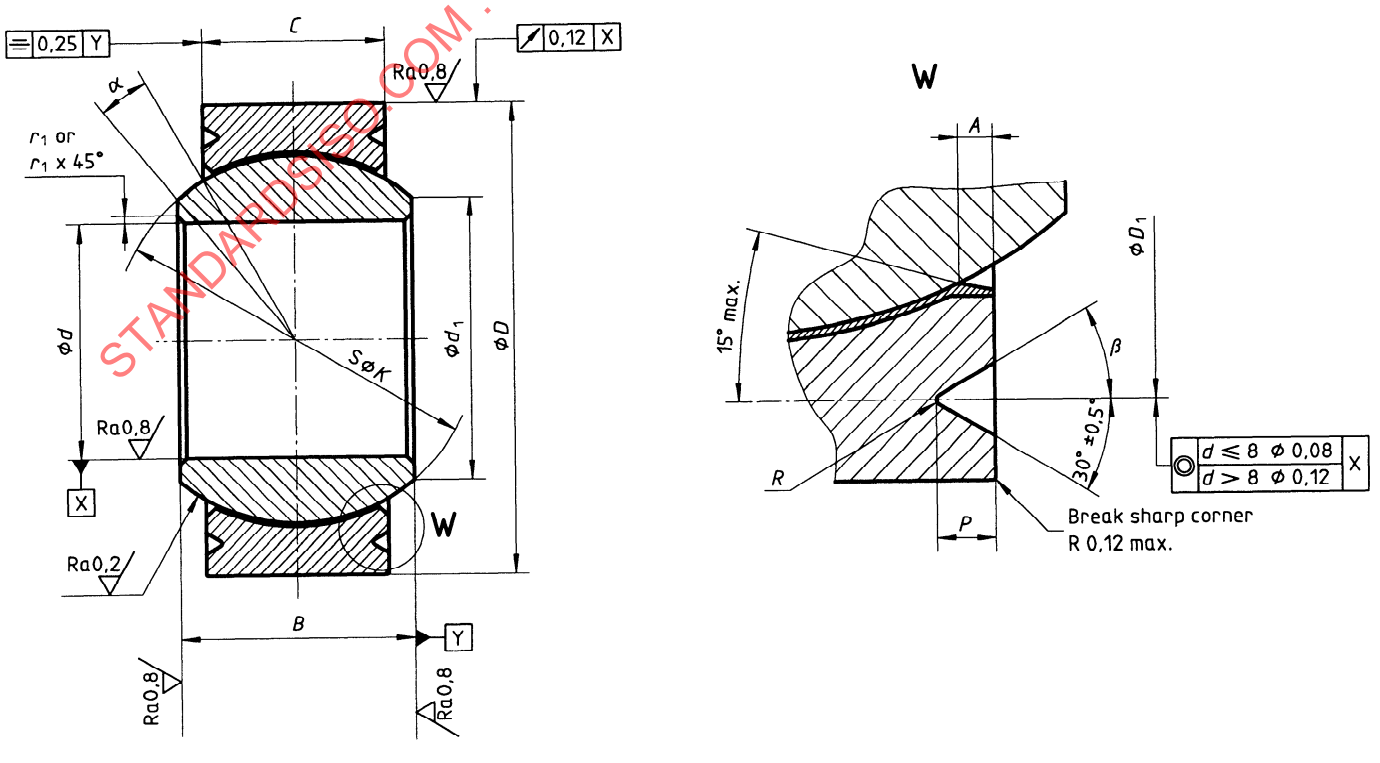


Figure 2 — Spherical plain bearing with self-lubricating liner with face groove

Table 1 — Narrow series — Dimensions, tolerances and masses

Dimensions in millimetres
Tolerances in micrometres

Diameter code	d	D	C +127 −127	B 0 −51	Δ_{dmp}	Δ_{ds}	Δ_{Dmp}	Δ_{Ds}	d_1 min.	r_1	r 0 −254	A max.	D_1 0 −203	P 0 −254	R	K ref.	β ±0,5°	$\alpha^{1)}$ min.	Mass ≈ g
03	4,826	14,288	5,54	7,137					7,74				12,7		0,127	10,312			9
04	6,35	16,668	6,35	8,712					9,25		0,508	0,762	15,09	0,635	to	12,7	20°	10°	9
05	7,938	19,05	7,14	9,525					10,64				16,81		0,254	14,275			14
06	9,525	20,638	7,92	10,312		0 −13		0 −13	12,06				18,08	0,889		15,875		9°	18
07	11,112	23,018	8,71	11,1					13,46			0,889	20,47			17,45			23
08	12,7	25,4	9,91	12,7					15,24		0,762		22,25			19,837			32
09	14,288	27,78	11,1	14,275					17,02	0,127			24,54			22,2			41
10	15,875	30,162	12,7	15,875	0 −13		0 −13		18,77	to		1,016	27			24,587		8°	54
12	19,05	36,512	15,06	19,05					23,37	0,381			33,35		0,254	30,15			95
14	22,225	39,688	17,86	22,225					24,89				36,52		to	33,376	30°		122
16	25,4	44,45	20,24	25,4		+3 −15		+6 −19	28,4				41,3	1,397	0,432	38,1		9°	177
20	31,75	50,8	23,92	27,762					36,42		1,016	1,143	47,65			45,8		5,5°	240
24	38,1	61,912	28,7	33,325					46,42				58,75			57,15		5°	435
28	44,45	71,437	33,45	38,887					50,71				68,27			63,9		5,5°	668
32	50,8	80,962	38,23	44,45					61,98				77,83			76,2		5°	952

1) In use, this value is the permissible maximum.

Table 2 — Wide series — Dimensions, tolerances and masses

Dimensions in millimetres
Tolerances in micrometres

Diameter code	d	D	C +127 −127	B 0 −51	Δ_{dmp}	Δ_{ds}	Δ_{Dmp}	Δ_{Ds}	d_1 min.	r_1	r 0 −254	A max.	D_1 0 −203	P 0 −254	R	K ref.	β ±0,5°	$\alpha^{1)}$ min.	Mass ≈ g
03	4,826														0,127				
04	6,35	15,875	8,31	11,1					7,62		0,508	0,762	14,3	0,635	to	13,462	20°	15°	14
05	7,938	17,462	8,05						9,14				15,87		0,254	14,376		14°	16
06	9,525	20,638	10,31	12,7		0 −13		0 −13	11,84				18,08	0,889		17,348		8°	27
07	11,112	23,812	11,23	14,275					13,64			0,889	21,26			19,736		10°	36
08	12,7	25,4	12,83	15,875					15,42		0,762		22,86	0,889		22,123		9°	45
09	14,288	28,575	13,61	17,45					18,31	0,127			26,03			25,298		10°	61
10	15,875	30,162	14,4	19,05	0 −13		0 −13		18,97	to		1,016	27,6			26,899		12°	73
12	19,05	34,925	16	22,225					21,46	0,381			31,78		0,254	30,886	30°	13°	109
14	22,225	41,275	19,18						25,27				38,12		to	33,665		6°	159
16	25,4	53,975	25,53	34,925		+3 −15		+6 −19	32,23				50,82		0,432	47,523		12°	440
20	31,75	60,325	28,7	38,1					37,15		1,016	1,143	57,17	1,397		53,162		12,5°	500
24	38,1	68,262	31,06	42,85					45,5				66,1			62,5		13°	700
28	44,45	76,2	33,45	46,02					49,9				73,05			67,868			900
32	50,8	82,55	35,05	49,19					56,1				79,35			74,599		12,5°	1 050

1) In use, this value is the permissible maximum.

Table 3 — Narrow series — Loads

Diameter code	Permissible static load		Permissible dynamic radial load	Starting torque
	radial	axial		
	C_s kN	C_a kN	C_{25} kN	N·m
03	17,7	0,67	6,7	0,03 to 0,56
04	26,9	1,9	14,8	
05	38,9	3,1	24,3	0,03 to 0,9
06	46,9	4,9	29,4	
07	58,7	6,2	35,8	
08	79,6	9,3	46,3	
09	103,2	16,4	57,8	
10	135,7	21	73,2	
12	206,4	30	105	
14	278,4	41,6	134,6	0,03 to 1,35
16	365,6	54,1	169	
20	405	78	200,3	0,04 to 2
24	619,4	117,1	322,1	
28	816,6	164	418,2	0,06 to 2,7
32	1 123,1	218,2	575,2	

Table 4 — Wide series — Loads

Diameter code	Permissible static load		Permissible dynamic radial load	Starting torque
	radial	axial		
	C_s kN	C_a kN	C_{25} kN	N·m
03	40[1]	7,9	21,8	0,03 to 0,56
04				
05	41,8	7,3	26,9	0,03 to 0,9
06	60,9	11,7	37	
07	92,1	16,3	52,3	
08	95,2	22,1	66,5	
09	118,3	23,9	80,5	
10	129	27,3	90,1	
12	164,6	34,4	116,5	
14	290	48	149,4	0,03 to 1,35
16	609,4[1]	85,8	250,2	
20	568,4	115,9	295,5	0,04 to 2
24	706	137,7	367,1	
28	859,4	161,7	445,5	0,06 to 2,7
32	996,1	180	518	

1) The values reflect only bearing capability. Mounting hardware may restrictability to use full capacity.

Annex A
(informative)

Original characteristics

Dimensions in inches
Surface roughness values in microinches

Ra125 (Ra32 Ra8)

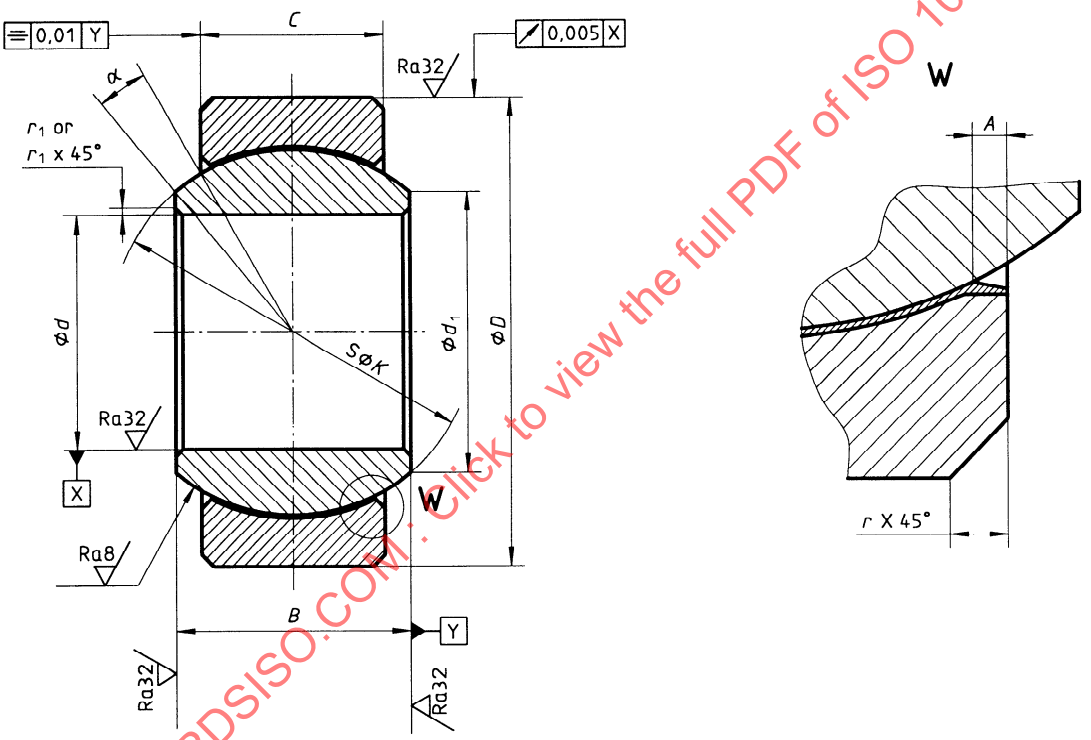


Figure A.1 — Spherical plain bearing with self-lubricating liner without face groove

Dimensions in inches

Surface roughness values in microinches

Ra125 (Ra32 Ra8)

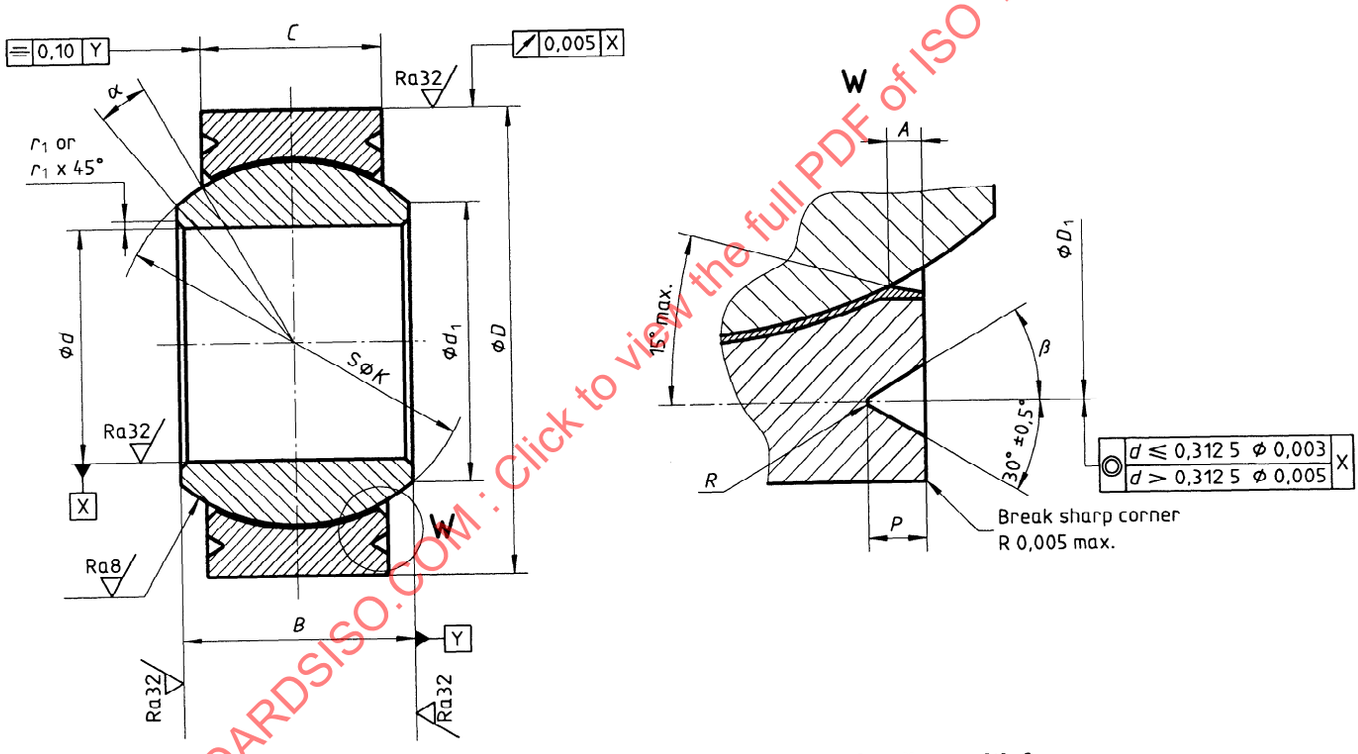


Figure A.2 — Spherical plain bearing with self-lubricating liner with face groove

Table A.1 — Narrow series — Dimensions, tolerances and masses

Dimensions in inches
Tolerances in inches

Diameter code	d	D	C +0,005 −0,005	B 0 −0,002	Δ_{dmp}	Δ_{ds}	Δ_{Dmp}	Δ_{Ds}	d_1 min.	r_1	r 0 −0,01	A max.	D_1 0 −0,008	P 0 −0,01	R min.	K ≈ ref.	β ± 0,5°	$\alpha^{1)}$ min.	Mass ≈ lb
03	0,19	0,562 5	0,218	0,281	0 −0,000 5	0 −0,000 5	0 −0,000 5	0 −0,000 5	0,293	0,005 to 0,015	0,02	0,03	0,5	0,025	0,005 to 0,01	0,406	20°	10°	0,02
04	0,25	0,656 2	0,25	0,343					0,364				0,594			0,5			
05	0,312 5	0,75	0,281	0,375					0,419				0,66	0,035		0,562			0,03
06	0,375	0,812 5	0,312	0,406					0,475		0,03	0,035	0,712		0,01 to 0,017	0,625	30°	9°	0,04
07	0,437 5	0,906 2	0,343	0,437					0,53				0,806			0,687		8°	0,05
08	0,5	1	0,39	0,5					0,6				0,876	0,055		0,781			0,07
09	0,562 5	1,093 7	0,437	0,562					0,67			0,04	0,97			0,874			0,09
10	0,625	1,187 5	0,5	0,625					0,739				1,063			0,968			0,12
12	0,75	1,437 5	0,593	0,75		+0,000 1 −0,000 6		+0,000 2 −0,000 7	0,92		0,04	0,045	1,313			1,187			0,21
14	0,875	1,562 5	0,703	0,875					0,98				1,438			1,134			0,27
16	1	1,75	0,797	1					1,118				1,626			1,5		9°	0,39
20	1,25	2	0,942	1,093					1,434				1,876			1,803		5,5°	0,53
24	1,5	2,437 5	1,13	1,312					1,827				2,313			2,25		5°	0,96
28	1,75	2,812 5	1,317	1,531					1,996				2,688			2,515		5,5°	1,475
32	2	3,187 5	1,505	1,75					2,44				3,064			3		5°	2,1

1) In use, this value is the permissible maximum.

Table A.2 — Wide series — Dimensions, tolerances and masses

Dimensions in inches
Tolerances in inches

Diameter code	d	D	C +0,005 −0,005	B 0 −0,002	Δ_{dmp}	Δ_{ds}	Δ_{Dmp}	Δ_{Ds}	d_1 min.	r_1	r 0 −0,01	A max.	D_1 0 −0,008	P 0 −0,01	R min.	K ≈ ref.	β ± 0,5°	α[1] min.	Mass ≈ lb
03	0,19	0,625	0,327	0,437	0 −0,000 5	0 −0,000 5	0 −0,000 5	0 −0,000 5	0,3	0,005 to 0,01	0,02	0,03	0,563	0,025	0,005 to 0,01	0,53	20°	15°	0,031
04	0,25																		
05	0,312 5	0,687 5	0,317						0,36				0,625			0,566	30°	14°	0,035
06	0,375	0,812 5	0,406	0,5					0,466		0,03	0,035	0,712	0,035	0,01 to 0,017	0,683		8°	0,06
07	0,437 5	0,937 5	0,442	0,562					0,537				0,837			0,777		10°	0,08
08	0,5	1	0,505	0,625					0,607				0,9			0,871		9°	0,1
09	0,562 5	1,125	0,536	0,687					0,721			0,04	1,025			0,996		10°	0,135
10	0,625	1,187 5	0,567	0,75					0,747				1,087			1,059		12°	0,16
12	0,75	1,375	0,63	0,875		+0,000 1 −0,000 6		+0,000 2 −0,000 7	0,845		0,04	0,045	1,251	0,055		1,216		13°	0,24
14	0,875	1,625	0,755						0,995				1,501			1,325		6°	0,35
16	1	2,125	1,005	1,375					1,269				2,001			1,871		12°	0,97
20	1,25	2,375	1,13	1,5					1,462				2,251			2,092		12,5°	1,1
24	1,5	2,687 5	1,223	1,687					1,697				2,563			2,378		13°	1,54
28	1,75	3	1,317	1,812					1,965				2,876			2,672		12,5°	1,99
32	2	3,25	1,38	1,937					2,209				3,124			2,937			2,31

1) In use, this value is the permissible maximum.

Table A.3 — Narrow series — Loads

Diameter code		Permissible static load		Permissible dynamic radial load	Starting torque
		radial	axial		
	d in	C_s lbf	C_a lbf	C_{25} lbf	in·lb
03	0,19	3 975	150	1,5	0,25 to 5
04	0,25	6 040	450	3,32	
05	0,312 5	8 750	700	5,46	0,25 to 8
06	0,375	10 540	1 100	6,6	
07	0,437 5	13 200	1 400	8,05	
08	0,5	17 900	2 100	10,4	
09	0,562 5	23 200	3 600	13	
10	0,625	30 500	4 720	16,45	
12	0,75	46 400	6 750	23,6	
14	0,875	62 200	9 350	30,25	0,25 to 12
16	1	82 200	12 160	38	
20	1,25	91 050	17 530	45,03	0,4 to 18
24	1,5	139 250	26 330	72,41	
28	1,75	183 590	36 870	94,02	0,6 to 24
32	2	252 490	49 050	129,32	

Table A.4 — Wide series — Loads

Diameter code		Permissible static load		Permissible dynamic radial load	Starting torque
		radial	axial		
	d in	C_s lbf	C_a lbf	C_{25} lbf	in·lb
03	0,19	9 000[1)]	1 700	4,9	0,25 to 5
04	0,25				
05	0,312 5	9 400	1 640	6,05	0,25 to 8
06	0,375	13 700	2 630	8,31	
07	0,437 5	20 700	3 650	11,75	
08	0,5	21 400	4 970	14,95	
09	0,562 5	26 600	5 370	18,1	
10	0,625	29 000	6 130	20,25	
12	0,75	37 000	7 730	26,2	
14	0,875	65 200	10 800	33,6	0,25 to 12
16	1	137 000[1)]	19 300	56,25	
20	1,25	127 890	26 080	66,45	0,4 to 18
24	1,5	158 850	30 990	82,54	
28	1,75	193 370	36 390	100,18	0,6 to 24
32	2	224 140	40 450	116,46	

1) The values reflect only bearing capability. Mounting hardware may restrict ability to use full capacity.