

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.

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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 $+163^{\circ}\text{C}$.

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

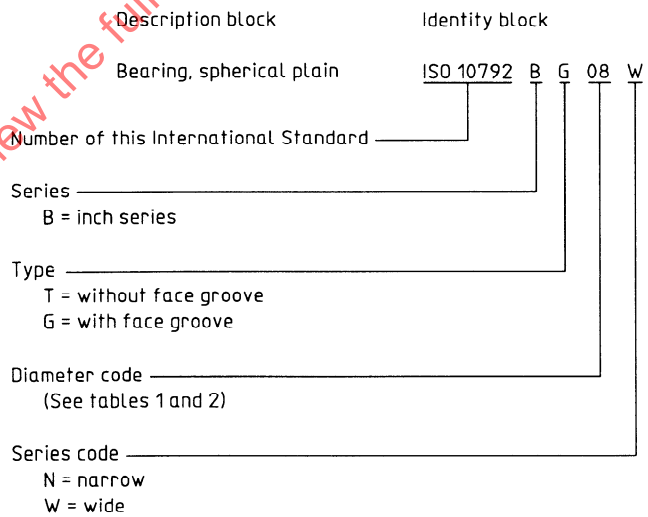
A surface treatment shall be applied to the inner ring material in accordance with ISO 8075. The application of this same surface treatment to the outer ring material is optional.

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

$Ra 3,2 / \left(Ra 0,8 / Ra 0,2 \right)$

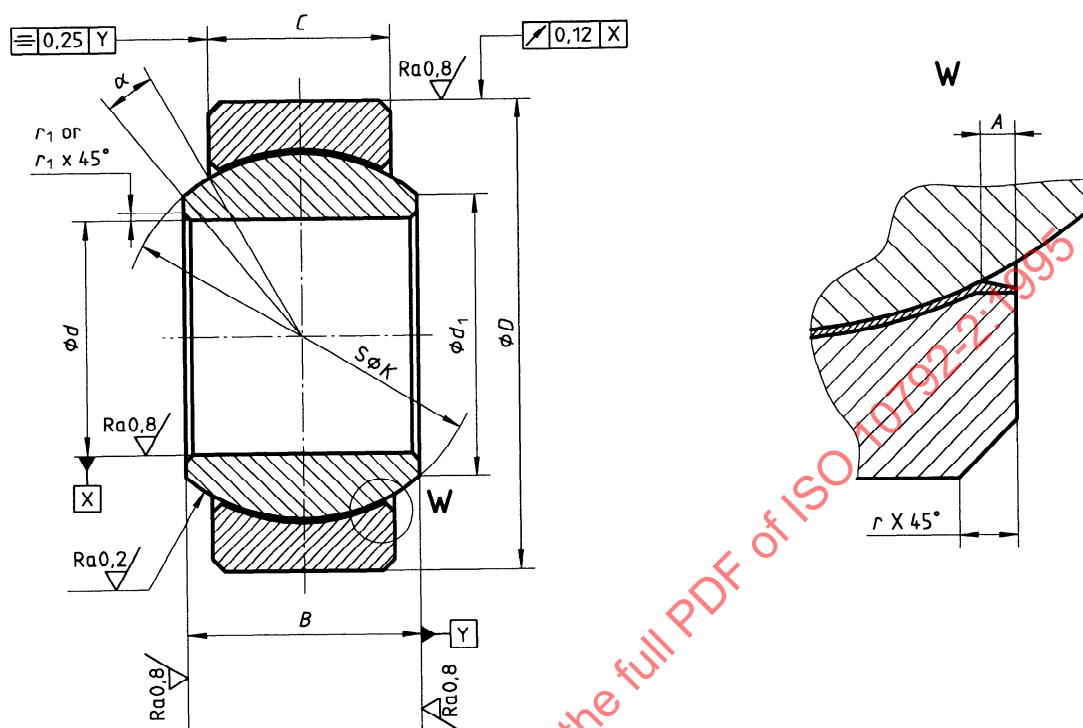


Figure 1 — Spherical plain bearing with self-lubricating liner without face groove

Dimensions in millimetres
Surface roughness values in micrometres

$Ra 3,2 / \left(Ra 0,8 / Ra 0,2 \right)$

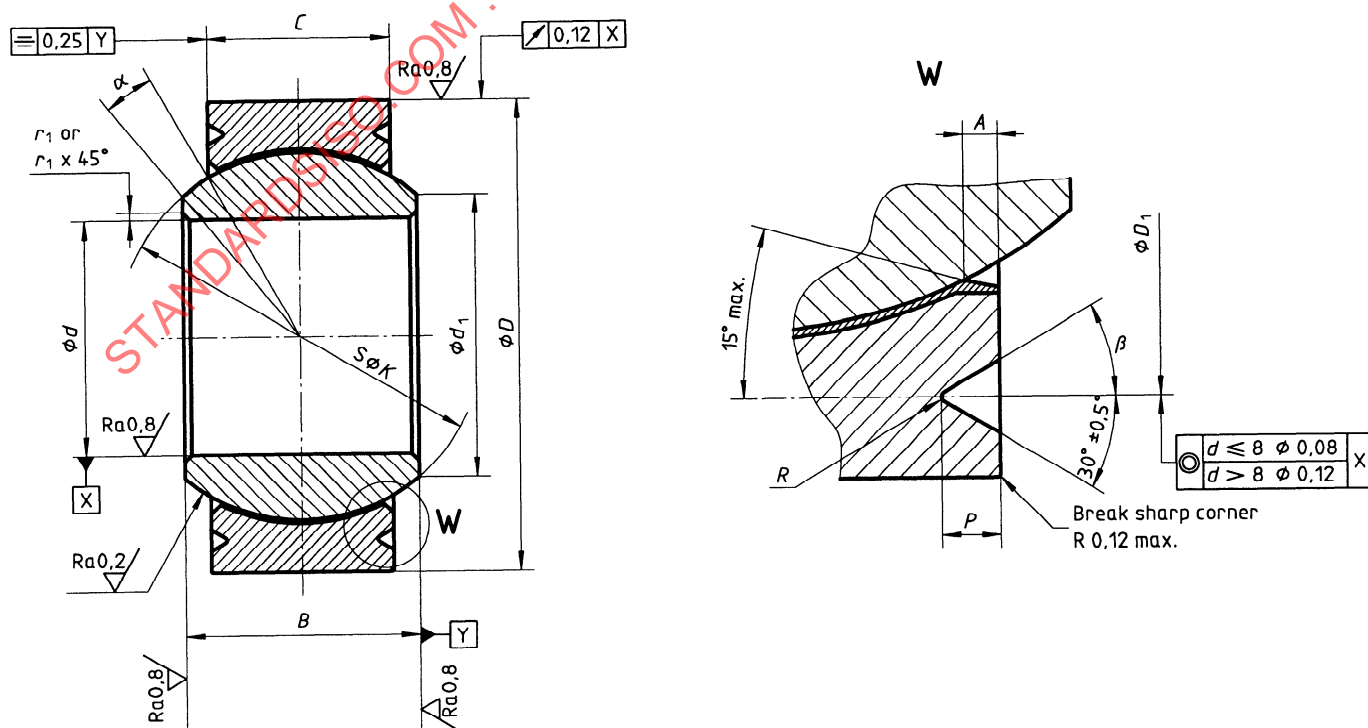


Figure 2 — Spherical plain bearing with self-lubricating liner with face groove

Table 1 — Narrow series — Dimensions, tolerances and masses

Dimensions in millimetres

Tolerances in micrometres

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

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

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

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

Table 3 — Narrow series — Loads

Diameter code	Permissible static load		Permissible dynamic radial load C_{25} kN	Starting torque N·m
	radial C_s kN	axial C_a kN		
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	

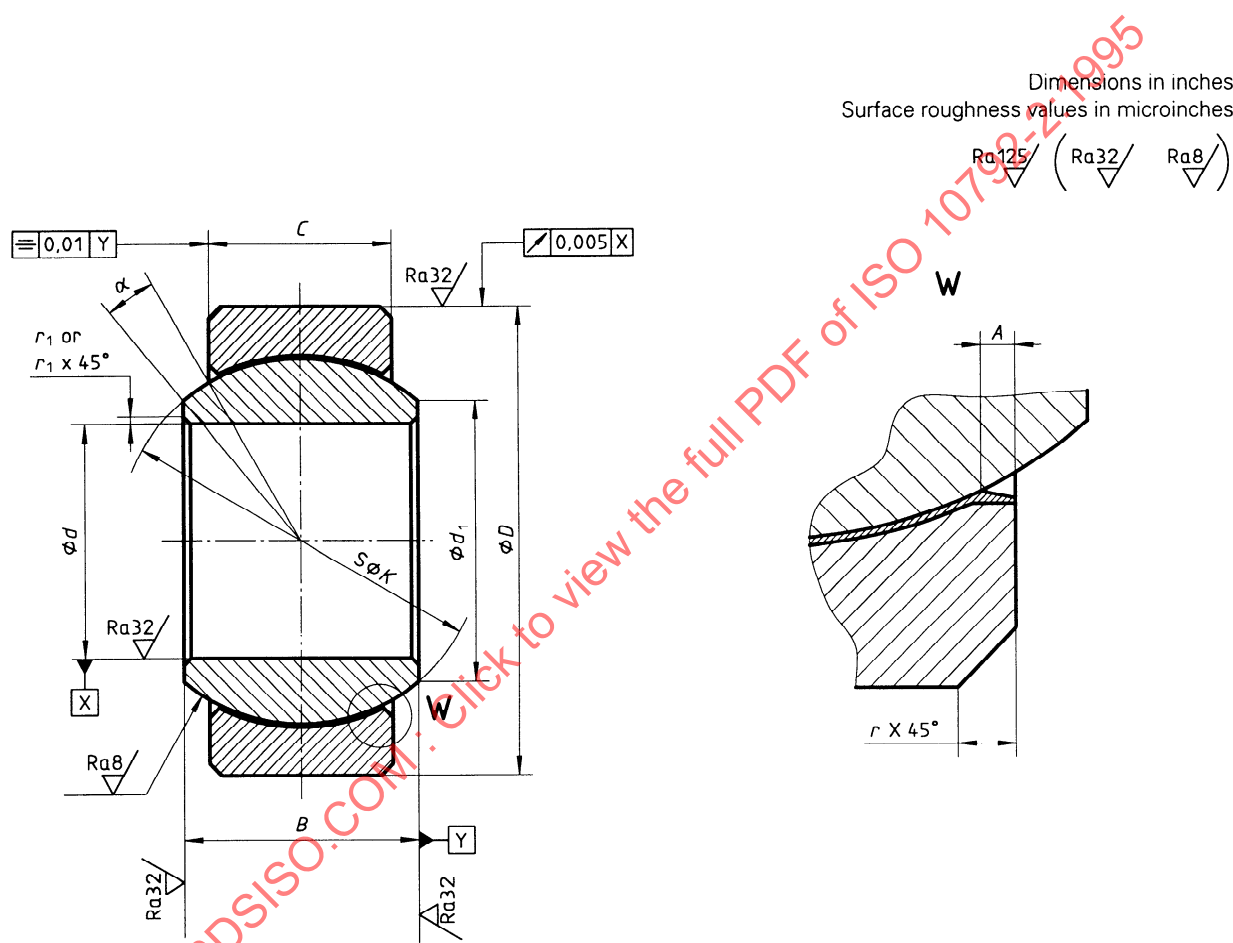
Table 4 — Wide series — Loads

Diameter code	Permissible static load		Permissible dynamic radial load C_{25} kN	Starting torque N·m
	radial C_s kN	axial C_a kN		
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	0,03 to 1,35
14	290	48	149,4	
16	609,4 ¹⁾	85,8	250,2	0,04 to 2
20	568,4	115,9	295,5	
24	706	137,7	367,1	0,06 to 2,7
28	859,4	161,7	445,5	
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



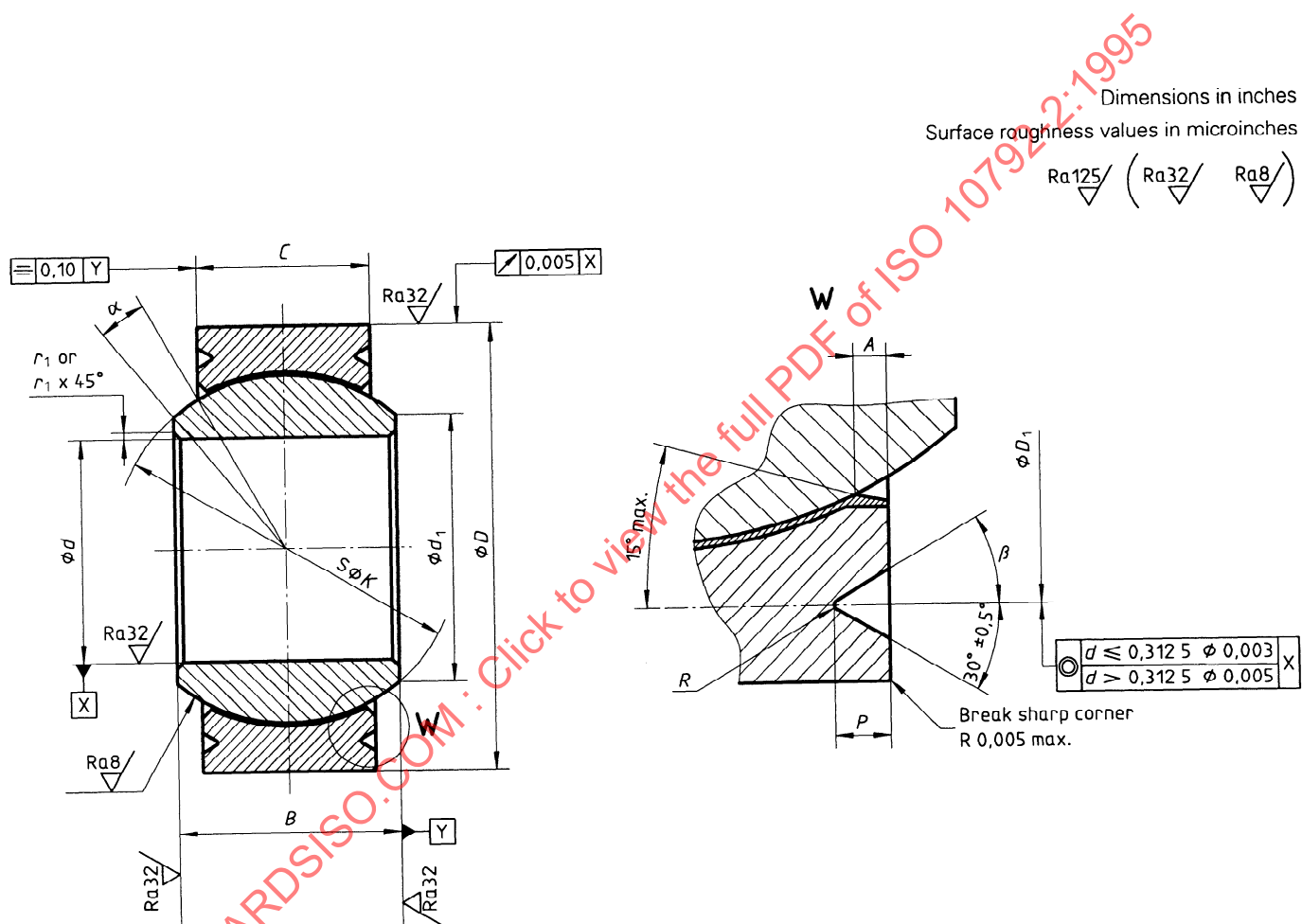


Figure A.2 — Spherical plain bearing with self-lubricating liner with face groove

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

Dimensions in inches
Tolerances in inches

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

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

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	<i>d</i>	<i>D</i>	<i>C</i> +0,005 −0,005	<i>B</i> 0 −0,002	Δ_{dmp}	Δ_{ds}	Δ_{Dmp}	Δ_{Ds}	<i>d</i> ₁ min.	<i>r</i> ₁	<i>r</i> 0 −0,01 max.	<i>A</i> max.	<i>D</i> ₁ 0 −0,008	<i>P</i> 0 −0,01	<i>R</i> min.	<i>K</i> ~ ref.	β ± 0,5°	$\alpha^{1)}$ 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 0,015	0,02	0,03	0,563	0,025	0,005 to 0,01	0,53	20°	15°	0,031		
04	0,25								0,36				0,625					0,683	8°	0,06	
05	0,312 5								0,687 5				0,317					0,466	0,03	0,035	0,712
06	0,375	0,812 5	0,406	0,5					0,537	0,837	0,871	9°	0,1								
07	0,437 5	0,937 5	0,442	0,562					0,607	0,9	0,996	10°	0,135								
08	0,5	1	0,505	0,625					0,721	0,04		1,025	0,035		1,059	12°	0,16				
09	0,562 5	1,125	0,536	0,687					0,747			1,087			1,216	13°	0,24				
10	0,625	1,187 5	0,567	0,75					0,845	0,04	0,045	1,251	0,055	0,01 to 0,017	1,325	6°	0,35				
12	0,75	1,375	0,63	0,875					+0,000 1 −0,000 6						+0,000 2 −0,000 7		0,995	1,501	1,871	12°	0,97
14	0,875	1,625	0,755														1,269	2,001	12,5°	1,1	
16	1	2,125	1,005	1,375													1,462	2,251	13°	1,54	
20	1,25	2,375	1,13	1,5													1,697	2,563	12,5°	1,99	
24	1,5	2,687 5	1,223	1,687													1,965	2,876		2,31	
28	1,75	3	1,317	1,812													2,209	3,124		2,937	
32	2	3,25	1,38	1,937																	

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

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

Table A.3 — Narrow series — Loads

Diameter code	d in	Permissible static load		Permissible dynamic radial load C ₂₅ lbf	Starting torque in·lb
		radial C _s lbf	axial C _a lbf		
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	d in	Permissible static load		Permissible dynamic radial load C ₂₅ lbf	Starting torque in·lb
		radial C _s lbf	axial C _a lbf		
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.