



SLOVENSKI STANDARD
SIST EN 2335:2001
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Aerospace series - Bearings, spherical plain in corrosion resisting steel without assembly slot - Dimensions and loads

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Luft- und Raumfahrt - Gelenklager aus korrosionsbeständigem Stahl ohne Einführnut - Maße und Belastungen

Série aérospatiale - Rotules lisses en acier résistant a la corrosion sans encoche d'assemblage - Dimensions et charges

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Ta slovenski standard je istoveten z: EN 2335:1988

ICS:

49.035	Sestavni deli za letalsko in vesoljsko gradnjo	Components for aerospace construction
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EUROPEAN STANDARD
 NORME EUROPÉENNE
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Key words : Aeronautical industry, plain bearing, spherical bearing, corrosion resisting steel, dimensions, static loads.

English version

**Aerospace series
 Bearings-spherical plain
 in corrosion resisting steel
 without assembly slot
 Dimensions and loads**

**Série aéronautique
 Rotules lisses
 en acier résistant à la corrosion
 sans encoche d'assemblage
 Dimensions et charges**

**Luft- und Raumfahrt
 Gelenklager
 aus korrosionsbeständigem Stahl
 ohne Einführnut
 Maße und Belastungen**

SIST EN 2335:2001

This European Standard was accepted by CEN on 1987-11-16. CEN members are bound to comply with the requirements of CEN Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
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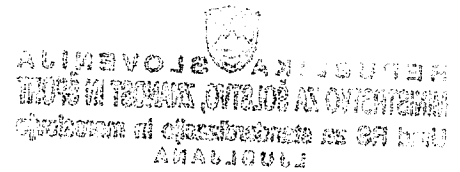
Brief history

This European Standard has been prepared by the European Association of Aerospace Manufacturers (AECMA).

After enquiries and votes carried out in accordance with the rules of this Association, this draft has successively received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to C.E.N. According to the Common CEN/CENELEC Rules, following countries are bound to implement this European Standard:

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1 Scope

This standard specifies the characteristics of spherical plain bearings :

- without assembly slot
- with and without swaging grooves
- with and without grease holes
- with and without lubrication grooves
- in corrosion resisting steel

intended for fixed and moveable structural elements in aircraft and their control mechanisms.

2 Field of application

The spherical plain bearings defined by this standard are to be used within the temperature range -54 to $+150$ °C.

However, because of lubrication with the following greases (see EN 2337) :

- ester type extreme pressure grease (code A) limits of use -73 to $+121$ °C or
- synthetic hydrocarbon extreme pressure grease, for general purpose (code B) limits of use -54 to $+177$ °C,

the field of application in the case of lubrication with grease A is limited to 121 °C.

In both cases the spherical surface of the outer ring shall be smeared with a dry film lubricant (anti-seize treatment).

3 References

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ISO 1132-1980, Rolling bearings - Tolerances - Definitions

EN 2030 , Steel FE-PM43 - Hardened and tempered - Bars $D \leq 150$ mm - Aerospace series

EN 2136 , Steel FE-PM42 - $900 \text{ MPa} \leq R_m < 1100 \text{ MPa}$ - Bars $D_e \leq 100$ mm Aerospace series

EN 2337 , Aerospace series 1) Spherical plain bearings - Technical specification

EN 2539 , Aerospace series - Steel FE-PM61 - $R_m \geq 960 \text{ MPa}$ - Bars $D_e \leq 90$ mm

4 Symbols and definitions

The tolerance symbols and their definitions are in accordance with ISO 1132.

Δ_{dmp} : difference between a single plane mean bore diameter and the nominal bore diameter

Δ_{ds} : difference between a single bore diameter and the nominal bore diameter

Δ_{Dmp} : difference between a single plane mean outside diameter and the nominal outside diameter

Δ_{Ds} : difference between a single outside diameter and the nominal outside diameter

α : maximum angle of tilt of the outer ring with respect to the inner ring with the spherical raceway of the outer ring being completely in contact with the inner ring.

1) In preparation.

5 Materials

Inner ring : Steel EN 2030 - Hardness $55 \leq \text{HRC} \leq 62$

Outer ring : Steel EN 2136 or EN 2539 - Hardness after forming $23 \leq \text{HRC} \leq 40$

6 Required characteristics

6.1 Dimensions - Tolerances - Mass

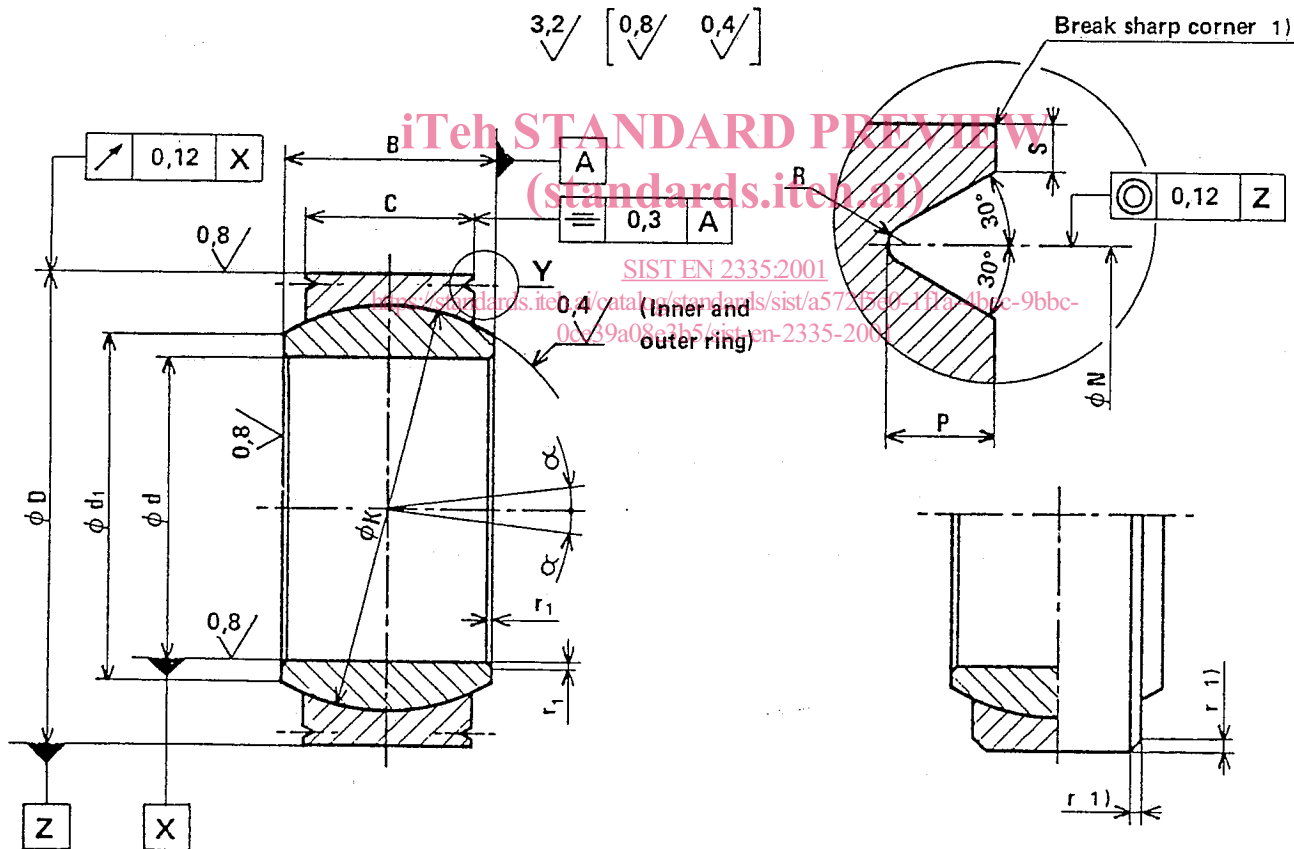
The configuration shall correspond with figures 1, 2, 3, 4 and 5.

The dimensions, tolerances and mass shall conform with the values given in table 1.

6.2 Surface roughness

See figure 1.

Detail Y



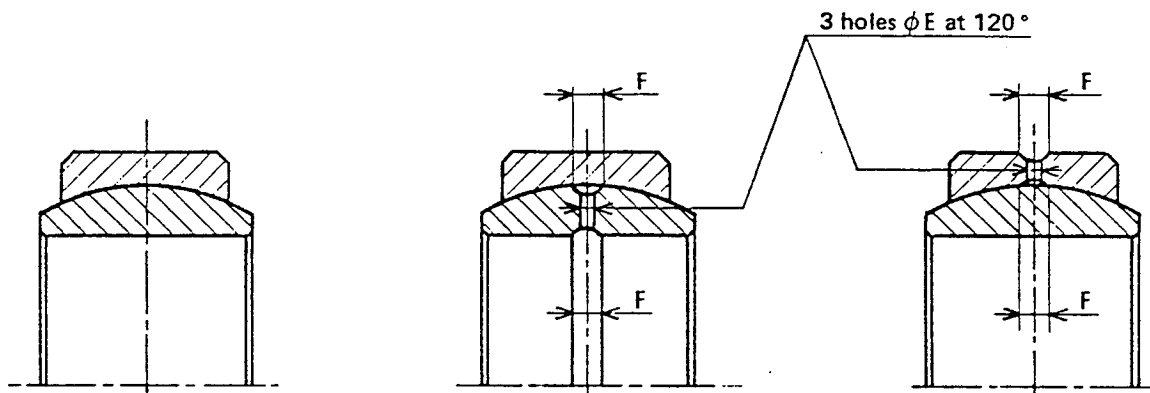
Code R : with swaging grooves

Figure 1

Code S : without swaging groove

Figure 2

1) When there is a swaging groove, the bearings have a broken corner instead of a chamfer.



Code E : without grease hole or lubrication groove

Figure 3

Code F : with grease holes in inner ring and lubrication groove :

- on inner ring bore
- on spherical surface of one of the rings on option

Figure 4

Code G : with grease holes in outer ring and lubrication groove :

- on external face of the outer ring
- on spherical surface of one of the rings on option

Figure 5

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Table 1

Dimensions in millimetres

d		B	C	D	Tolerances μm				d_1	E	F	K	N	P	R	S	r	r_1	α	Mass	
Code	Nom.	h11	0 -0,25		Δd_{mp}	ΔD_{mp}	Δd_s	ΔD_s	min.	$\pm 0,2$	$\pm 0,2$	\approx	+0,1 0	0 -0,2	+0,1 0	min.		min. degree	\approx g		
04	4	5	3	12	0 -8	0 -8	+ 2 -10	+ 5 -13	6	1)	2)	8	20,2	0,7	0,2	0,4	0,3 to 0,8	0,3 to 0,6	16	3	
05	5	6	4	14					8										10	13	5
06	6	6	4	14					10										13	15	8
08	8	8	5	16					13										16	12	12
10	10	9	6	19					15										18	11	17
12	12	10	7	22					18										22	8	32
15	15	12	9	26					20										25	10	49
17	17	14	10	30					24										29	9	65
20	20	16	12	35					29										36	7	115
25	25	20	16	42					34										41	6	160
30	30	22	18	47	39	47	6	230													
35	35	25	20	55	0 -12	0 -13	+ 3 -15	+ 8 -19	25	4	25	33,2	0,9	0,3	0,7	0,8 to 1,7	0,6 to 1	7	315		
40	40	28	22	62															45	53	460
45	45	32	25	68															50	60	560
50	50	35	28	75															55	66	1100
60	60	44	36	90	0 -15	0 -15	+ 4 -19	+13 -28	66	3	4,5	80	2)			1,2 to 1,7	6				

1) Without grease hole or lubrication groove.
 2) Without swaging groove.

6.3 Loads and clearances

They shall conform with the values indicated in table 2.

Table 2

d code	Permissible static loads kN			Internal axial clearance μm		Internal radial clearance max. μm	
	Radial C_s	Axial C_a		Normal Code N	Reduced Code P	Normal Code N	Reduced Code P
		Without swaging groove	With swaging grooves 1)				
04	7,2	0,45	—	35 to 75	5 to 35	20	10
05	12,6	0,80					
06	16	1					
08	21	1,80					
10	31	2,50					
12	40,5	3,50					
15	70	5,30					
17	91,4	6,70	6,70	40 to 80	5 to 40	25	12
20	130	9,80	9,80	50 to 100	5 to 50	30	15
25	216,7	18	18				
30	277,5	25	25				
35	359,9	31	31				
40	428,8	38	38	60 to 120	5 to 60	35	20
45	558,4	50	44 2)				
50	760,1	64	50 2)				
60	1056	104	—				

1) After swaging
2) Limited by the swaging loads.