SLOVENSKI STANDARD
SIST EN 3446:2001

01-januar-2001

Aerospace series - Bearings, precision ball without flange in corrosion resisting steel, for instruments and equipment - Dimensions and loads

Aerospace series - Bearings, precision ball without flange in corrosion resisting steel, for instruments and equipment - Dimensions and loads

Luft- und Raumfahrt - Präzisionskugellager ohne Flansch aus korrosionsbeständigem Stahl für Instrumente und Geräte - Maße und Belastungen

Série aérospatiale - Roulements à billes de précision sans collet en acier résistant a la corrosion pour instruments et équipements - Dimensions et charges

Ta slovenski standard je istoveten z: **EN 3446:1995**

ICS:

49.035	Sestavni deli za letalsko in vesoljsko gradnjo	Components for aerospace construction

SIST EN 3446:2001 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 3446

February 1995

ICS 49.040.30

Descriptors: aircraft industry, aircraft instruments, precision bearings, ball bearings, dimensions

English version

Aerospace series - Bearings, precision ball without flange in corrosion resisting steel, for instruments and equipment - Dimensions and loads

Série aérospatiale - Roulements à billes de précision sans collet en acier résistant à la corrosion pour instruments et équipements - Dimensions et charges

Luft- und Raumfahrt - Präzisionskugellager ohne Flansch aus korrosionsbeständigem Stahl für Instrumente und Geräte - Maße und Belastungen

This European Standard was approved by CEN on 1995-02-01. CEN members are bound to comply with the CEN/CENELEC 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 Central Secretariat or to any CEN member.

The European Standards exist in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

Foreword

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

After inquiries and votes carried out in accordance with the rules of this Association, this Standard has successively received the approval of the National Associations and the Official Services of the member countries of AECMA, prior to its presentation to CEN.

This European Standard shall be given the status of a National Standard, either by publication of an identical text or by endorsement, at the latest by August 1995, and conflicting national standards shall be withdrawn at the latest by August 1995.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

1 Scope

This standard specifies the required characteristics for precision ball bearings in corrosion resisting steel :

- without flange;
- with radial contact;
- with deep groove;
- without filling slot;

for use in instruments and aircraft equipment.

2 Normative references

This European Standard incorporates by dated or undated reference provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 15	Rolling bearings - Radial bearings - Boundary dimensions - General plan
ISO 1132	Rolling bearings - Tolerances - Definitions
ISO 1224	Rolling bearings - Instrument precision bearings
EN 2030	Steel FE-PM43 - Hardened and tempered - Bars D ≤ 150 mm - Aerospace series [1]
EN 2130	Aerospace series - Precision ball bearings in corrosion resisting steel for instruments and equipment - Technical specification [2]

3 Symbols

The following symbols are in conformity with ISO 1224. Definitions to ISO 1132.

d	:	Nominal bore diameter
Δ_{ds}	:	Deviation of a single bore diameter
Δ_{dmp}	:	Single plane mean bore diameter deviation
V_{dp}	:	Bore diameter variation in a single radial plane
V_{dmp}	:	Mean bore diameter variation
D	:	Nominal outside diameter
Δ_{Ds}	:	Deviation of a single outside diameter
Δ_{Dmp}	:	Single plane mean outside diameter deviation
V_{Dp}	:	Outside diameter variation in a single radial plane
V_{Dmp}	:	Mean outside diameter variation
B	:	Nominal width of the rings
Δ_{Bs}	:	Deviation of a single ring width
V_{Bs}	:	Variation in the width of the rings
$r_{s\ min.}$	:	Smallest permissible single chamfer dimension
$r_{s\ max.}$	:	Largest permissible single chamfer dimension
K_{ia}	:	Radial runout of assembled bearing inner ring
K_{ea}	:	Radial runout of assembled bearing outer ring
S_d	:	Face runout with bore
S_{d1}	:	Variation of bore generatrix inclination with face
S_D	:	Variation of outside surface generatrix inclination with face
S_{ia}	:	Assembled bearing inner ring face runout with raceway
S_{ea}	:	Assembled bearing outer ring face runout with raceway

1) Published as AECMA Standard at the date of publication of this standard
2) In preparation at the date of publication of this standard

4 Required characteristics

4.1 Materials

Rings and balls : steel EN 2030, minimum hardness = 650 HV5
Cages, shields and circlips : corrosion resisting steel
Seals : polytetrafluoroethylene (PTFE) or PTFE plastic material reinforced with glass fibre

4.2 Dimensions - Radial clearances - Tolerances - Loads

Configuration : see figures 1 and 2 ; the design and mounting of seals and shields (figure 2) and the choice of cages are at the discretion of the manufacturer.
Dimensions : see table 1.
Clearances : see tables 2 and 3.
Tolerances : see tables 4, 5, 6 and 7.
Loads : see table 8.

4.3 Lubrication

- Ester type grease : code 1
- Synthetic oil : code 2

For essential characteristics : see EN 2130.

4.4 Surface roughness - Closure type

See figures 1 and 2.

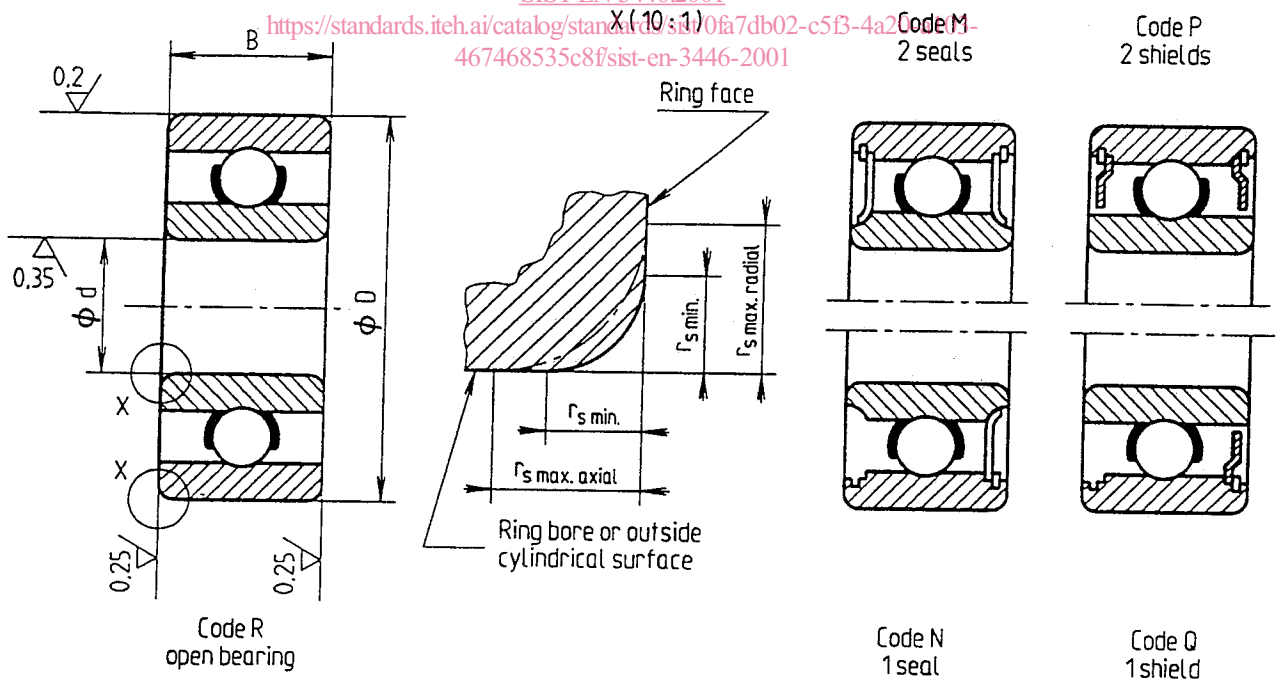

Figure 1

Figure 2

Table 1

Dimensions in millimetres

Code	d nom.	D nom.	B nom.	r_s min.	r_s max.		Series : 1)	
					radial	axial	diam.	dimen.
103	1,0	3	1,0	0,05	0,10	0,10	8	18
154	1,5	4	2,0	0,05	0,10	0,10	8	38
155	1,5	5	2,0	0,15	0,30	0,30	9	19
205	2,0	5	2,3	0,08	0,16	0,30	8	38
206	2,0	6	2,3	0,15	0,30	0,60	9	19
256	2,5	6	2,6	0,08	0,16	0,30	8	38
257	2,5	7	3,5	0,15	0,30	0,60	9	39
307	3,0	7	3,0	0,10	0,20	0,40	8	38
308	3,0	8	4,0	0,15	0,30	0,60	9	39
310	3,0	10	4,0	0,15	0,30	0,60	2	02
409	4,0	9	4,0	0,10	0,20	0,40	8	38
411	4,0	11	4,0	0,15	0,30	0,60	9	19
413	4,0	13	5,0	0,20	0,50	0,80	2	02
511	5,0	11	5,0	0,15	0,30	0,60	8	38
513	5,0	13	4,0	0,20	0,50	0,80	9	19
516	5,0	16	5,0	0,30	0,60	1,00	2	02
613	6,0	13	5,0	0,15	0,30	0,60	8	28
615	6,0	15	5,0	0,20	0,50	0,80	9	19
714	7,0	14	5,0	0,15	0,30	0,60	8	28
816	8,0	16	6,0	0,20	0,50	0,80	8	38

1) Series conforming to ISO 15.

4.5 Normal internal radial clearance

See table 2.

Table 2

d nominal mm	Clearance μm		
	Group A	Group B	Group C
1 to 8	0 to 6	4 to 11	10 to 20

4.6 Reduced internal radial clearance

See table 3.

Table 3

d nominal mm	Clearance μm					
	Group D	Group E	Group F	Group G	Group H	Group J
1 to 8	1 to 5	4 to 8	7 to 11	10 to 15	14 to 20	18 to 28

4.7 Tolerances group K

Shall conform to those of class 5A from ISO 1224.

4.7.1 Inner ring

See table 4.

Table 4

d nominal mm	Tolerances μm								
	Δ_{dmp}	Δ_{ds}	V_{dp} max.	V_{dmp} max.	Δ_{Bs}	V_{Bs} max.	K_{ia} max.	S_{d1} max.	S_{ia} max.
1 to 8	0 − 5	0 − 5	3	3	0 − 25	5	3,5	7	7

NOTE : The tolerance of face runout with bore (S_d) may be obtained by the approximate formula :

$$S_{d\ max.} = S_{d1\ max.} \frac{F}{2(B - 2r_{s\ max.})}$$

where F is the inner ring raceway contact diameter. F may be indicated by each manufacturer or, when the ball diameter (D_2) is known, the following approximate value may be used for F :

$$F = \frac{D + d}{2} - D_2$$

4.7.2 Outer ring

See table 5.

Table 5

D nominal mm	Tolerances μm											
	Δ_{Dmp}	Types MNPQ			Type R			B		K_{ea} max.	S_D max.	S_{ea} max.
		Δ_{Ds}	V_{Dp} max.	V_{Dmp} max.	Δ_{Ds}	V_{Dp} max.	V_{Dmp} max.	Δ_{Bs}	V_{Bs}			
3 to 16	0 − 5	+ 1 − 6	5	5	0 − 5	3	3	0 − 25	5	5	8	8

4.8 Tolerances group L

Shall conform to those of class 4A from ISO 1224.

4.8.1 Inner ring

See table 6.

Table 6

d nominal mm	Tolerances μm								
	Δ_{dmp}	Δ_{ds}	V_{dp} max.	V_{dmp} max.	Δ_{Bs}	V_{Bs} max.	K_{ia} max.	S_{d1} max.	S_{ia} max.
1 to 8	0 − 5	0 − 5	2,5	2,5	0 − 25	2,5	2,5	3	3

NOTE : See note on 4.7.1.

4.8.2 Outer ring

See table 7.

Table 7

D nominal mm	Tolerances μm											
	Δ_{Dmp}	Types MNPQ			Type R			B		K_{ea} max.	S_D max.	S_{ea} max.
		Δ_{Ds}	V_{Dp} max.	V_{Dmp} max.	Δ_{Ds}	V_{Dp} max.	V_{Dmp} max.	Δ_{Bs}	V_{Bs}			
3 to 16	0 − 5	+ 1 − 5	5	5	0 − 5	2,5	2,5	0 − 25	2,5	3,5	4	5