



**SLOVENSKI STANDARD**  
**SIST EN 2079:2001**  
**01-januar-2001**

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**Aerospace series - Bearings, precision ball with flange in corrosion resisting steel, for instruments and equipment - Dimensions and loads**

Aerospace series - Bearings, precision ball with flange in corrosion resisting steel, for instruments and equipment - Dimensions and loads

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

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

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**Ta slovenski standard je istoveten z: EN 2079:1995**

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**ICS:**

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

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EUROPEAN STANDARD

EN 2079

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 1995

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

English version

**Aerospace series - Bearings, precision ball with  
flange in corrosion resisting steel, for instruments  
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## CEN

European Committee for Standardization  
Comité Européen de Normalisation  
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## 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.

According to the Common CEN / CENELEC Rules, the following countries are bound to implement this European Standard.

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 :

- with 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 $D \leq 150$ mm - Aerospace series <sup>1)</sup>                                                 |
| EN 2130  | Aerospace series - Precision ball bearings in corrosion resisting steel for instruments and equipment - Technical specification <sup>2)</sup> |

## 3 Symbols

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

|                    |                                                                     |
|--------------------|---------------------------------------------------------------------|
| $d$                | : Nominal bore diameter                                             |
| $\Delta_{ds}$      | : Deviation of a single bore diameter                               |
| $\Delta_{dmp}$     | : 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                                          |
| $\Delta_{Ds}$      | : Deviation of a single outside diameter                            |
| $\Delta_{Dmp}$     | : Single plane mean outside diameter deviation                      |
| $V_{Dp}$           | : Outside diameter variation in a single radial plane               |
| $V_{Dmp}$          | : Mean outside diameter variation                                   |
| $D_1$              | : Nominal outside diameter of the outer ring flange                 |
| $\Delta_{D1s}$     | : Deviation of a single outside diameter of the outer ring flange   |
| $B$                | : Nominal width of the rings                                        |
| $\Delta_{Bs}$      | : Deviation of a single ring width                                  |
| $V_{Bs}$           | : Variation in the width of the rings                               |
| $C_1$              | : Nominal outer ring flange width                                   |
| $\Delta_{C1s}$     | : Deviation of a single outer ring flange width                     |
| $VC_{1s}$          | : Outer ring flange width variation                                 |
| $r_s \text{ min.}$ | : Smallest permissible single chamfer dimension                     |
| $r_s \text{ max.}$ | : 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             |
| $S_{ea1}$          | : Assembled bearing outer ring flange back face runout with raceway |

1) Published as AECMA Standard at the date of publication of the present standard

2) In preparation at the date of publication of the present standard

## 4 Required characteristics

### 4.1 Materials

Rings and balls : steel EN 2030 ; minimum hardness = 650 HV5

Cage, shields and circlips : corrosion resisting steel

Seals : polytetrafluoroethylene (PTFE) or PTFE plastic material reinforced with glass fibre

### 4.2 Dimensions - Radial clearance - Tolerances - Loads

Configuration : see figures 1 and 2 ; the design and mounting of shields and seals (figure 2) and the choice of cage design 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

- Esther 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.

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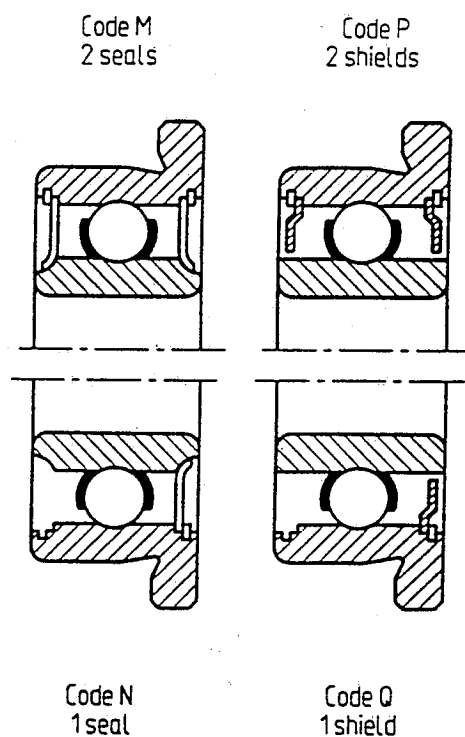
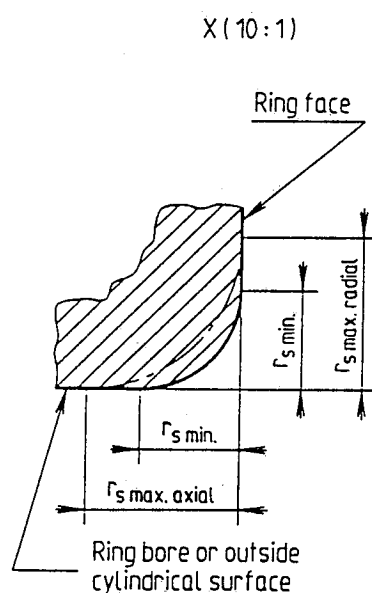
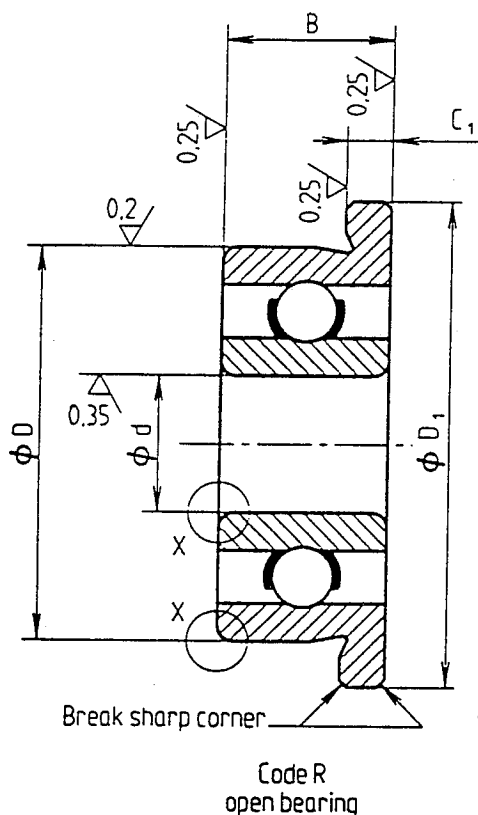


Figure 1

Figure 2

Table 1

Dimensions in millimetres

| Code | d<br>nom. | D<br>nom. | B<br>nom. | D <sub>1</sub><br>nom. | C <sub>1</sub><br>nom. | r <sub>s</sub> min. | r <sub>s</sub> max. |       | Series : 1) |        |
|------|-----------|-----------|-----------|------------------------|------------------------|---------------------|---------------------|-------|-------------|--------|
|      |           |           |           |                        |                        |                     | radial              | axial | diam.       | dimen. |
| 154  | 1,5       | 4         | 2,0       | 5,0                    | 0,6                    | 0,05                | 0,10                | 0,10  | 8           | 38     |
| 155  | 1,5       | 5         | 2,0       | 6,5                    | 0,6                    | 0,15                | 0,30                | 0,30  | 9           | 19     |
| 205  | 2,0       | 5         | 2,3       | 6,1                    | 0,6                    | 0,08                | 0,16                | 0,30  | 8           | 38     |
| 206  | 2,0       | 6         | 2,3       | 7,5                    | 0,6                    | 0,15                | 0,30                | 0,60  | 9           | 19     |
| 256  | 2,5       | 6         | 2,6       | 7,1                    | 0,8                    | 0,08                | 0,16                | 0,30  | 8           | 38     |
| 257  | 2,5       | 7         | 3,5       | 8,5                    | 0,9                    | 0,15                | 0,30                | 0,60  | 9           | 39     |
| 307  | 3,0       | 7         | 3,0       | 8,1                    | 0,8                    | 0,10                | 0,20                | 0,40  | 8           | 38     |
| 308  | 3,0       | 8         | 4,0       | 9,5                    | 0,9                    | 0,15                | 0,30                | 0,60  | 9           | 39     |
| 310  | 3,0       | 10        | 4,0       | 11,5                   | 1,0                    | 0,15                | 0,30                | 0,60  | 2           | 02     |
| 409  | 4,0       | 9         | 4,0       | 10,3                   | 1,0                    | 0,10                | 0,20                | 0,40  | 8           | 38     |
| 411  | 4,0       | 11        | 4,0       | 12,5                   | 1,0                    | 0,15                | 0,30                | 0,60  | 9           | 19     |
| 413  | 4,0       | 13        | 5,0       | 15,0                   | 1,0                    | 0,20                | 0,50                | 0,80  | 2           | 02     |
| 511  | 5,0       | 11        | 5,0       | 12,5                   | 1,0                    | 0,15                | 0,30                | 0,60  | 8           | 38     |
| 513  | 5,0       | 13        | 4,0       | 15,0                   | 1,0                    | 0,20                | 0,50                | 0,80  | 9           | 19     |
| 516  | 5,0       | 16        | 5,0       | 18,0                   | 1,0                    | 0,30                | 0,60                | 1,00  | 2           | 02     |
| 613  | 6,0       | 13        | 5,0       | 15,0                   | 1,1                    | 0,15                | 0,30                | 0,60  | 8           | 28     |
| 615  | 6,0       | 15        | 5,0       | 17,0                   | 1,2                    | 0,20                | 0,50                | 0,80  | 9           | 19     |
| 714  | 7,0       | 14        | 5,0       | 16,0                   | 1,1                    | 0,15                | 0,30                | 0,60  | 8           | 28     |
| 816  | 8,0       | 16        | 6,0       | 18,0                   | 1,3                    | 0,20                | 0,50                | 0,80  | 8           | 38     |

1) Series conforming to ISO 15.

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4.5 Normal internal radial clearance

See table 2.

Table 2

| d<br>nominal<br>mm | Clearance<br>$\mu\text{m}$ |         |          |
|--------------------|----------------------------|---------|----------|
|                    | Group A                    | Group B | Group C  |
| 1,5 to 8           | 0 to 6                     | 4 to 11 | 10 to 20 |

4.6 Reduced internal radial clearance

See table 3.

Table 3

| d<br>nominal<br>mm | Clearance<br>$\mu\text{m}$ |         |         |          |          |          |
|--------------------|----------------------------|---------|---------|----------|----------|----------|
|                    | Group D                    | Group E | Group F | Group G  | Group H  | Group J  |
| 1,5 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<br>nominal<br>mm | Tolerances<br>$\mu\text{m}$ |                      |                         |                          |                      |                         |                         |                         |                         |
|--------------------|-----------------------------|----------------------|-------------------------|--------------------------|----------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                    | $\Delta_{\text{dmp}}$       | $\Delta_{\text{ds}}$ | $V_{\text{dp}}$<br>max. | $V_{\text{dmp}}$<br>max. | $\Delta_{\text{Bs}}$ | $V_{\text{Bs}}$<br>max. | $K_{\text{ja}}$<br>max. | $S_{\text{d1}}$<br>max. | $S_{\text{ia}}$<br>max. |
| 1,5 to 8           | 0<br>- 5                    | 0<br>- 5             | 3                       | 3                        | 0<br>- 25            | 5                       | 3,5                     | 7                       | 7                       |

NOTE : The tolerance of face runout with bore ( $S_{\text{d}}$ ) may be obtained by the approximate formula :

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

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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<br>nominal<br>mm | Tolerances<br>$\mu\text{m}$ |                      |                         |                          |                      |                         |                          |                      |                 |                         |                        |                         |                 |                 |                   |                          |
|--------------------|-----------------------------|----------------------|-------------------------|--------------------------|----------------------|-------------------------|--------------------------|----------------------|-----------------|-------------------------|------------------------|-------------------------|-----------------|-----------------|-------------------|--------------------------|
|                    | $\Delta_{\text{Dmp}}$       | Types MNPQ           |                         |                          | Type R               |                         |                          | B                    |                 | $K_{\text{ea}}$<br>max. | $S_{\text{D}}$<br>max. | $S_{\text{ea}}$<br>max. | $\Delta D_{1s}$ | $\Delta C_{1s}$ | $VC_{1s}$<br>max. | $S_{\text{ea1}}$<br>max. |
|                    |                             | $\Delta_{\text{Ds}}$ | $V_{\text{Dp}}$<br>max. | $V_{\text{Dmp}}$<br>max. | $\Delta_{\text{Ds}}$ | $V_{\text{Dp}}$<br>max. | $V_{\text{Dmp}}$<br>max. | $\Delta_{\text{Bs}}$ | $V_{\text{Bs}}$ |                         |                        |                         |                 |                 |                   |                          |
| 4 to 16            | 0<br>- 5                    | +1<br>- 6            | 5                       | 5                        | 0<br>- 5             | 3                       | 3                        | 0<br>- 25            | 5               | 5                       | 8                      | 8                       | 0<br>- 25       | 0<br>- 50       | 5                 | 10                       |



**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<br>nominal<br>mm | Tolerances<br>$\mu\text{m}$ |                      |                         |                          |                      |                         |                         |                         |                         |
|--------------------|-----------------------------|----------------------|-------------------------|--------------------------|----------------------|-------------------------|-------------------------|-------------------------|-------------------------|
|                    | $\Delta_{\text{dmp}}$       | $\Delta_{\text{ds}}$ | $V_{\text{dp}}$<br>max. | $V_{\text{dmp}}$<br>max. | $\Delta_{\text{Bs}}$ | $V_{\text{Bs}}$<br>max. | $K_{\text{ia}}$<br>max. | $S_{\text{d1}}$<br>max. | $S_{\text{ia}}$<br>max. |
| 1,5 to 8           | 0<br>- 5                    | 0<br>- 5             | 2,5                     | 2,5                      | 0<br>- 25            | 2,5                     | 2,5                     | 3                       | 3                       |

NOTE : See note on 4.7.1.

**4.8.2 Outer ring**

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See table 7.

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| D<br>nominal<br>mm | Tolerances<br>$\mu\text{m}$ |                      |                         |                          |                      |                         |                          |                      |                 |                         |                        |                         |                 |                 |                   |                          |
|--------------------|-----------------------------|----------------------|-------------------------|--------------------------|----------------------|-------------------------|--------------------------|----------------------|-----------------|-------------------------|------------------------|-------------------------|-----------------|-----------------|-------------------|--------------------------|
|                    | $\Delta_{\text{Dmp}}$       | Types MNPQ           |                         |                          | Typ R                |                         |                          | B                    |                 | $K_{\text{ea}}$<br>max. | $S_{\text{D}}$<br>max. | $S_{\text{ea}}$<br>max. | $\Delta D_{1s}$ | $\Delta C_{1s}$ | $VC_{1s}$<br>max. | $S_{\text{ea1}}$<br>max. |
|                    |                             | $\Delta_{\text{Ds}}$ | $V_{\text{Dp}}$<br>max. | $V_{\text{Dmp}}$<br>max. | $\Delta_{\text{Ds}}$ | $V_{\text{Dp}}$<br>max. | $V_{\text{Dmp}}$<br>max. | $\Delta_{\text{Bs}}$ | $V_{\text{Bs}}$ |                         |                        |                         |                 |                 |                   |                          |
| 4 to 16            | 0<br>- 5                    | +1<br>- 6            | 5                       | 5                        | 0<br>- 5             | 2,5                     | 2,5                      | 0<br>- 25            | 2,5             | 3,5                     | 4                      | 5                       | 0<br>- 25       | 0<br>- 50       | 2,5               | 8                        |