



# SLOVENSKI STANDARD SIST EN 4613:2009

01-september-2009

## Aeronavtika - Kroglasti drsni ležaji iz korozijsko odpornega jekla s samomazalno oblogo, ozki tip - Mere in nosilnosti - Colski tip

Aerospace series - Spherical plain bearings in corrosion resisting steel with self-lubricating liner, narrow series - Dimensions and loads - Inch series

Luft- und Raumfahrt - Gelenklager aus korrosionsbeständigem Stahl mit selbstschmierender Beschichtung, schmale Reihe - Maße und Belastungen - Inch Reihe

Série aérospatiale - Rotules lisses résistant à la corrosion à garniture autolubrifiante, série étroite - Dimensions et charges - Séries en inches

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Ta slovenski standard je istoveten z: EN 4613:2009

### ICS:

49.060 Štejni sistemski električni opremljeni letalski sistemi  
Aerospace electric equipment and systems

SIST EN 4613:2009

en

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 4613**

June 2009

ICS 49.035

English Version

**Aerospace series - Spherical plain bearings in corrosion  
resisting steel with self-lubricating liner, narrow series -  
Dimensions and loads - Inch series**

Série aéronautique - Rotules lisses résistant à la corrosion à  
garniture autolubrifiante, série étroite - Dimensions et  
charges - Séries en inches

Luft- und Raumfahrt - Gelenklager aus  
korrosionsbeständigem Stahl mit selbstschmierender  
Beschichtung, schmale Reihe - Maße und Belastungen -  
Inch Reihe

This European Standard was approved by CEN on 20 March 2009.

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This European Standard exists 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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## Foreword

This document (EN 4613:2009) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-STAN).

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 December 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

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

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This standard was reviewed by the Domain Technical Coordinator of ASD-STAN's Mechanical Domain.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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**EN 4613:2009 (E)****1 Scope**

This standard specifies the characteristics of bearings, spherical plain in corrosion resisting steel with self-lubricating liner, narrow series for aerospace applications.

They are intended for use in fixed or moving parts of the aircraft structure and control mechanisms.

They shall be used in the temperature range – 55 °C to 163 °C.

**2 Normative references**

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 2030, *Aerospace — Steel FE-PM43 — Hardened and tempered — Bars  $D \leq 150$  mm*<sup>1</sup>

EN 2133, *Aerospace series — Cadmium plating of steels with specified tensile strength  $\leq 1\,450$  MPa, copper, copper alloys and nickel alloys*

EN 2424, *Aerospace series — Marking of aerospace products*

EN 2755, *Aerospace series — Bearings, spherical plain in corrosion resisting steel with self-lubricating liner — Elevated load at ambient temperature — Technical specification*<sup>2</sup>

EN 3161, *Aerospace series — Steel FE-PM3801 (X5CrNiCu17-4) — Air melted, solution treated and precipitation treated, bar a or  $D \leq 200$  mm —  $R_m \geq 930$  MPa*

ISO 1132-1, *Rolling bearings — Tolerances — Part 1: Terms and definitions*

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

TR 4475, *Aerospace series — Bearings and mechanical transmissions for airframe applications — Vocabulary*<sup>3</sup>

**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in TR 4475 apply.

**4 Symbols and abbreviations**

Symbols of limit deviations are in accordance with definitions of ISO 1132-1.

$\alpha$  = 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 (see Figures 1 and 2);

$C_a$  = permissible static axial load;

$C_s$  = permissible static radial load;

1 Published as ASD Standard at the date of publication of this standard.

2 Published as ASD Prestandard at the date of publication of this standard.

3 Published as ASD Technical Report at the date of publication of this standard.

- $C_{25}$  = permissible dynamic radial load by 25 000 cycles;  
 $\Delta_{dmp}$  = single plane mean bore diameter deviation;  
 $\Delta_{Dmp}$  = single plane mean outside diameter deviation;  
 $\Delta_{ds}$  = deviation of a single bore diameter;  
 $\Delta_{Ds}$  = deviation of a single outside diameter.

## 5 Requirements

### 5.1 Configuration, dimensions, tolerances and mass

According to Figures 1 and 2 and Table 1. Dimensions and tolerances are expressed in millimetres (inches).

Values after passivating and/or cadmium plating.

### 5.2 Surface roughness

In accordance with Figures 1 and 2. Values in micrometres (micro inches), apply prior to surface treatment.

### 5.3 Material

- Inner ring: according to EN 2030 hardness 55 < HRC < 62;  
 Outer ring: according to EN 3161 hardness 28 < HRC < 38 before swaging;  
 Liner: self-lubricating liner according to EN 2755.

### 5.4 Surface treatment

Code T: Surface treatment according to ISO 8075 for inner ring before swaging.

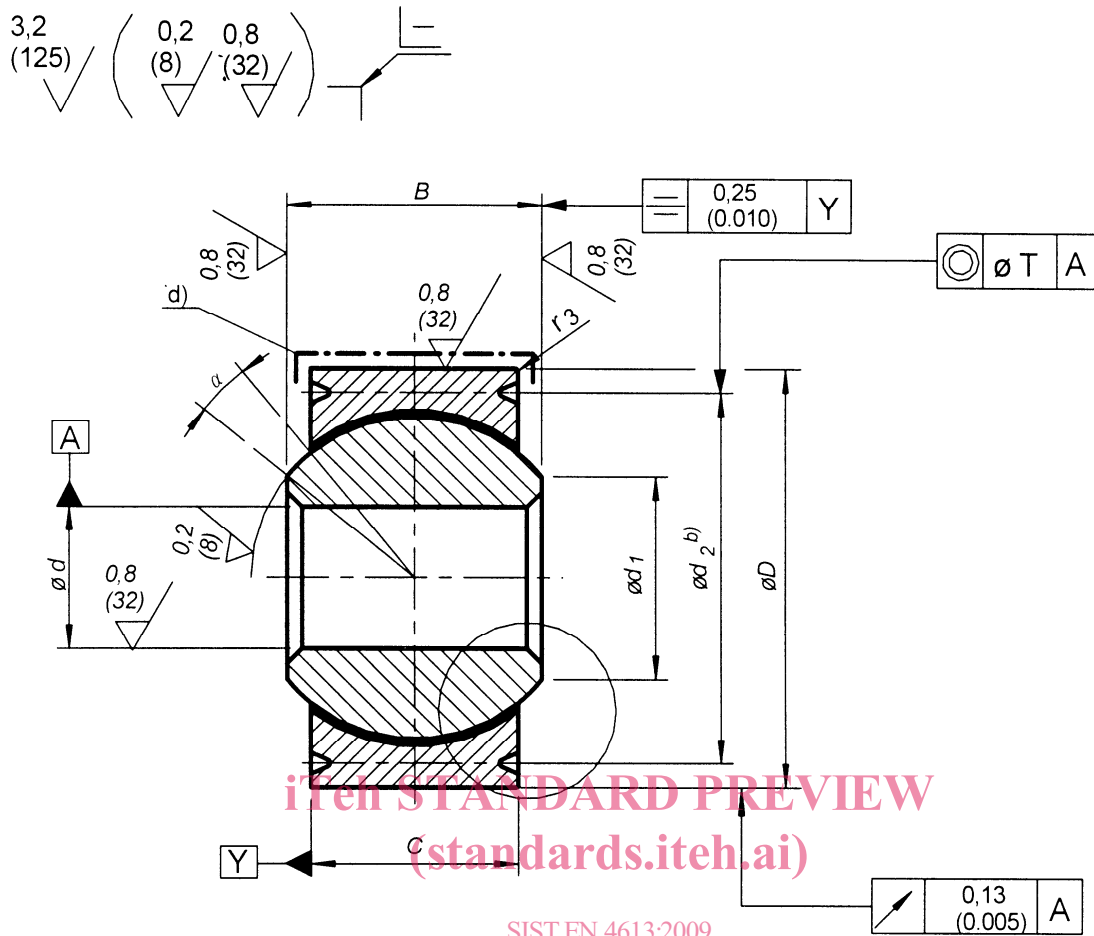
Code P:

Without swaging groove code S: Surface treatment according to ISO 8075 for inner ring before swaging. Cadmium plating of outer ring: 5  $\mu\text{m}$  to 8  $\mu\text{m}$  (0,2  $\mu\text{in}$  to 0,3  $\mu\text{in}$ ) according to EN 2133 (cylindrical surface area and chamfers and both end surfaces at manufacturer's option), followed by chromating.

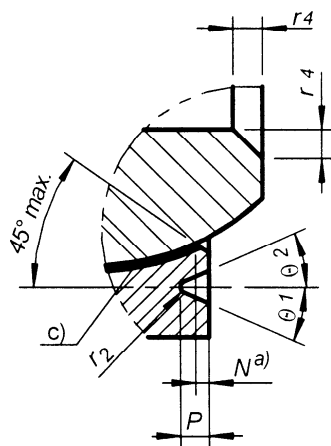
With swaging groove code R: Surface treatment according to ISO 8075 for inner ring before swaging. Cadmium plating of outer ring: 5  $\mu\text{m}$  to 8  $\mu\text{m}$  (0,2  $\mu\text{in}$  to 0,3  $\mu\text{in}$ ) according to EN 2133 (cylindrical surface area, broken angles and radii, respectively, as well as both end surfaces up to the swaging grooves), followed by chromating.

### 5.5 Loads and starting torque values

According to Tables 2 and 3.



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**Key**

- a Set back
- b Swaging groove
- c TFE liner
- d Cadmium plated

Figure 1 — Code R — with swaging grooves



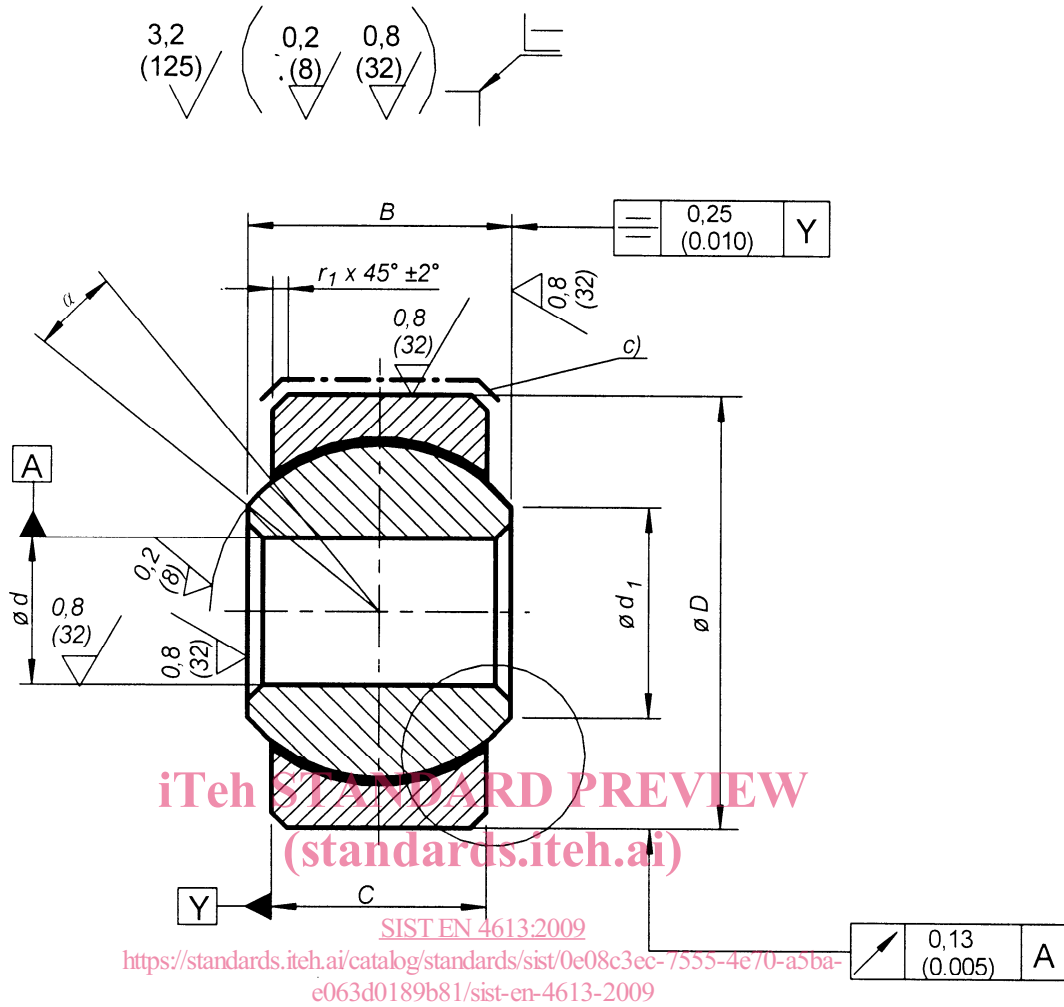


Figure 2 — Code S — without swaging grooves