SLOVENSKI STANDARD
SIST EN 2337:2009

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Nadomeġļa:
SIST EN 2337:2001

Aeronavtika - Kroglasti drsni zgibi - Tehniļna specifikacija

Aerospace series - Spherical plain bearings - Technical specification

Luft- und Raumfahrt - Gelenklager - Technische Lieferbedingungen

Série aérospatiale - Rotules lisses - Spécification technique

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

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EUROPEAN STANDARD

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Aerospace series - Spherical plain bearings - Technical specification

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This European Standard was approved by CEN on 26 October 2005.

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Foreword

This European Standard (EN 2337:2006) has been prepared by the European Association of Aerospace Manufacturers - Standardization (AECMA-STAN).

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 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of an identical text or by endorsement, at the latest by November 2006, and conflicting national standards shall be withdrawn at the latest by November 2006.

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 European Standard supersedes EN 2337:1996.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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.

1 Scope

This standard specifies the required characteristics, inspection and test methods, qualification and acceptance conditions for spherical plain bearings designed to withstand static loads and loads with slight swivelling.

It is applicable whenever referenced.

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 2335, *Aerospace series – Bearings, spherical plain in corrosion resisting steel without assembly slot – Dimensions and loads.*

EN 2336, *Aerospace series – Bearings, spherical plain in steel with assembly slots – Dimensions and loads.*

EN 2588, *Aerospace series – Bearings, spherical plain in corrosion resisting steel with assembly slots – Dimensions and loads.*

EN 4265, *Aerospace series – Bearings, spherical plain, in corrosion resisting steel – Wide series – Dimensions and loads – Inch series.* [1)]

EN 4266, *Aerospace series – Bearings, spherical plain, in corrosion resisting steel, cadmium plated – Wide series – Dimensions and loads – Inch series.* [1)]

EN 6046, *Aerospace series – Bearings, spherical plain, in corrosion resisting steel – Narrow series – Dimensions and loads – Inch series.* [1)]

EN 9100, *Aerospace series – Quality management systems – Requirements (based on ISO 9001:2000) and Quality systems – Model for quality assurance in design, development, production, installation and servicing (based on ISO 9001:1994).*

EN 9133, *Aerospace series – Quality management systems – Qualification Procedure for aerospace standard parts.*

EN 10204, *Metallic products – Types of inspection documents.*

TR 4475, *Aerospace series – Bearings and mechanical transmissions for airframe applications – Vocabulary.* [2)]

3 Terms and definitions

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

4 Required characteristics, inspection and test methods

See Table 1.

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1) Published as AECMA Prestandard at the date of publication of this standard.

2) Published as AECMA Technical Report at the date of publication of this standard.

Table 1

Subclause	Characteristics	Requirements	Inspection and test methods	Q [a]	A [b]
4.1	**Materials**	In accordance with the product standards or design documentation	Chemical analysis or certificate 2.1 according to EN 10204 issued by semi-finished products manufacturer	X	X
4.2	**Dimensions**	In accordance with the product standards or design documentation	Suitable measuring instruments Measurement of bore and outer diameter: — Rings with a width of ≤ 10 mm: in the centre plane. — Rings with a width of > 10 mm: in two planes parallel to the outer faces and at a distance from these faces of twice the maximum value of the ring chamfer. The minimum and maximum diameters are determined in each measuring plane. Measurement of ring width: — The width of each ring (distance between the two faces) is verified at a minimum of four points.	X	X
4.3	**Masses**	In accordance with the product standards or design documentation	Suitable methods	X	
4.4	**Marking**	In accordance with the product standards or design documentation. It shall be legible and shall not adversely affect the material or the functioning of the bearing.	Visual examination	X	X
4.5	**Surface appearance**	The bearing shall be free of surface discontinuities liable to have an adverse effect on their characteristics and endurance.			
4.5.1	**Assembled spherical bearings**		Visual examination using suitable methods	X	X
4.5.2	**Unassembled rings**		Magnetic or dye penetrant inspection	X	X
4.6	**Hardness**	In accordance with the product standards or design documentation	Suitable processes and measuring instruments	X	X

(continued)

Table 1 *(concluded)*

Subclause	Characteristics	Requirements	Inspection and test methods	Q [a]	A [b]
4.7	**Surface roughness**	In accordance with the product standards or design documentation	Suitable measuring instruments or visual-tactile samples	X	X
4.8	**Lubrication**	In accordance with the product standards or design documentation. The dry lubricant shall be compatible with the code A or code B grease (see Annex C) which may be used in accordance with the product standards or design documentation.	Visual inspection Suitable method	X	X
4.9	**Internal clearance:** — **radial** — **axial**	In accordance with the product standards or design documentation	See Annex A	X	X
4.10	**Behaviour in rotation and swivelling**	The bearings shall be able to move freely within the angular limits specified in the product standards or design documentation for swivelling.	Manual inspection	X	X
4.11	**Permissible static loads:**	In accordance with the product standards or design documentation	See Annex B	X	
	— **radial: C_s**	After the removal of the loads, no permanent deformations > 0,07 mm			
	— **axial: C_a**	After the removal of the loads, no permanent deformations > 0,10 mm			
4.12	**Ultimate static loads:** — **radial** — **axial**	After the removal of the loads, there shall be no cracks or deterioration of the bearing	See Annex B	X	

[a] Q: Qualification test

[b] A: Acceptance test

5 Quality assurance

5.1 Product qualification

According to EN 9133 and Tables 2 and 3 and Annex D.

Qualification shall be obtained for each bearing.

However, "de facto" qualification of a bearing is acquired if it has been obtained for the bearing immediately before and the one immediately after the bearing in question within the range of bearings indicated in the product standard.

5.2 Acceptance conditions

5.2.1 Inspections and tests to be carried out by the manufacturer

See Table 4.

5.2.2 Purchaser's (user's) quality control

The purchaser (user) may, on acceptance of a delivery batch, proceed to inspect it by using the inspections specified in Table 4, in full or in part, to ensure that the items conform to the required quality level, and to determine whether the delivery batch is acceptable.

This inspection may be carried out in the purchaser's (user's) factory, or, by special agreement, in the manufacturer's factory.

6 Packaging

The bearings shall be packaged either individually or in rolls so that they will not be damaged during transportation.

They shall be protected against moisture, corrosion, dirt and other harmful substances.

The packaging material in contact with the bearing shall provide this protection and be grease-resistant.

The following indications shall be affixed to each individual package:

— manufacturer's name and address;

— quantity (for rolls);

— identity block as defined by product standards or design documentation;

— packaging date;

— lubrication date.

The following indications at least shall appear on collective packaging:

— manufacturer's name and address;

— number of order;

— quantity;

— identity block(s) as defined by the product standards or design documentation.

7 Certificate of compliance

All the bearings supplied in accordance with this standard shall be accompanied by a certificate of compliance according to EN 10204, 2.1 or 3.1 issued by the manufacturer for each production batch.

Table 2 — Non-destructive inspections and tests to be carried out for qualification

Types of inspections and tests [a]	Defined in subclause	Serial number of samples				
		1	2	3	4	5
Materials	4.1	X	X	X	X	X
Dimensions	4.2	X	X	X	X	X
Mass	4.3	X	X	X	X	X
Marking	4.4	X	X	X	X	X
Surface appearance	4.5	X	X	X	X	X
Hardness	4.6	X	–	–	–	–
Surface roughness	4.7	X	–	–	–	–
Lubrication	4.8	X	X	X	X	X
Internal clearances	4.9	X	X	X	X	X
Behaviour in rotation and swivelling	4.10	X	X	X	X	X

[a] The order is left to the initiative of the qualification authority.

Table 3 — Destructive inspections and tests to be carried out for qualification

Types of inspections and tests [a]			Defined in subclause	Serial number of samples				
				1	2	3	4	5
Test under static load	radial	permissible (C_s)	4.11	–	X	X	X	–
		ultimate	4.12	X	X	X	–	–
	axial	permissible (C_a)	4.11	–	X	X	X	–
		ultimate	4.12	–	–	–	X	X

[a] The order is left to the initiative of the qualification authority.

Table 4 — Inspections and tests to be carried out for acceptance

Types of inspections and tests [a]		Defined in subclause	Sampling plan [b, c]
Materials		4.1	Chemical analysis or certificate 2.1 according to EN 10204 issued by semi-finished product manufacturer.
Dimensions		4.2	10 % [d]
Marking		4.4	100 %
Surface appearance	Assembled spherical bearings	4.5.1	10 % [d]
	Unassembled rings	4.5.2	10 % [d]
Hardness		4.6	5 % [d]
Surface roughness		4.7	5 % [d]
Lubrication		4.8	100 %
Internal clearance		4.9	10 % [d]
Behaviour in rotation and swivelling		4.10	100 %

[a] The order is left to the initiative of the acceptance authority. These inspections may be carried out at the time of manufacture.

[b] When the sampling is not 100 %, any defect found in the course of an inspection or test requires this inspection to be extended to 100 %.

[c] May vary with the approval of the purchaser (user) or authority responsible for acceptance.

[d] Minimum one part.