SLOVENSKI STANDARD
SIST EN 2067:2001

01-januar-2001

Aerospace series - Rod ends with self-aligning ball bearings - Technical specification

Aerospace series - Rod ends with self-aligning ball bearings - Technical specification

Luft- und Raumfahrt - Ösenköpfe mit Pendelkugellager - Technische Lieferbedingungen

Série aérospatiale - Embouts a rotule sur billes - Spécification technique

Ta slovenski standard je istoveten z: **EN 2067:1996**

ICS:

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

SIST EN 2067:2001 **en**

EUROPEAN STANDARD **EN 2067**

NORME EUROPÉENNE

EUROPÄISCHE NORM January 1996

ICS 49.040.30

Descriptors: aircraft industry, airacraft control, rod-end, rod-end with self-aligning ball bearing, threaded shank, specification

English version

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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.

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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of an identical text or by endorsement, at the latest by July 1996, and conflicting national standards shall be withdrawn at the latest by July 1996.

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, inspection and test methods, qualification and acceptance conditions for rod ends with self-aligning ball bearings designed to withstand (under load) slight swivelling and slow rotations only.

It is applicable whenever referenced.

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 5855-1	Aerospace - MJ threads - Part 1 : General requirements
ISO 5855-2	Aerospace - MJ threads - Part 2 : Limit dimensions for bolts and nuts
EN 2002-16	Aerospace series - Test methodes for metallic materials - Part 16 : Dye penetrant testing [1]
EN 3042	Aerospace series - Quality assurance - EN aerospace products - Qualification procedure

3 Definitions

For the purposes of this standard, the following definitions apply :

3.1 Surface discontinuities

3.1.1 Crack

Break in the material which may extend in all directions and be intercrystalline or transcrystalline in character

3.1.2 Score, scratch

Open surface defect

3.1.3 Lap

Surface defect where particles of metal or sharp edges are folded over and then rolled or forged into the surface

3.1.4 Seam

Unwelded fold which appears as an open defect in the material

3.2 Internal clearances

3.2.1 Radial

Total value of possible radial displacements of the inner ring in relation to the rod end body

3.2.2 Axial

Total value of possible axial displacements of the inner ring in relation to the rod end body

3.3 Starting torque at zero load

Maximum torque required to start the rotation of the inner ring of the bearing, with the rod end body held stationary

3.4 Production batch

Batch consisting of rod ends of the same type, the same dimensions and from the same materials batch, defined by the same product standard

3.5 Delivery batch

Batch consisting of rod ends with the same identity block which may come from different production batches

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1) In preparation at the date of publication of this standard

4 Required characteristics, inspection and test methods

See table 1.

Table 1

Sub-clause	Characteristics	Requirements	Inspection and test methods	Q [1]	A [2]
4.1	Materials	Shall conform with the product standards or design documentation	Chemical analysis or certificate of conformity issued by semi-finished products manufacturer	X	X
4.2	Dimensions and tolerances	Shall conform with the product standards or design documentation	Suitable measuring instruments	X	X
4.3	Mass	Shall conform with the product standards or design documentation	Suitable methods	X	X
4.4	Marking	Shall conform with the product standards or design documentation. It shall be legible and shall not alter the material or the functioning of the rod end.	Visual examination	X	X
4.5	Surface appearance				
4.5.1	of rod end body (except thread)	No surface discontinuity	[3] Suitable inspection methods Look for seams and cracks by dye penetrant process according to EN 2002-16 or magnetic process.	X	X
4.5.2	of the inner ring and balls	No surface discontinuity liable to alter the characteristics and endurance of these parts	Magnetic or dye penetrant inspection	X	X
4.6	Grooves	Shall not change the thread function	Visual examination and threaded gauge		X
4.7	Hardness	Shall conform with the product standards or design documentation	[3] Suitable processes and measuring instruments	X	X
4.8	Surface roughness	Shall conform with the product standards or design documentation	[3] Suitable measuring instruments or visual-tactile samples	X	X

(continued)

Table 1 (continued)

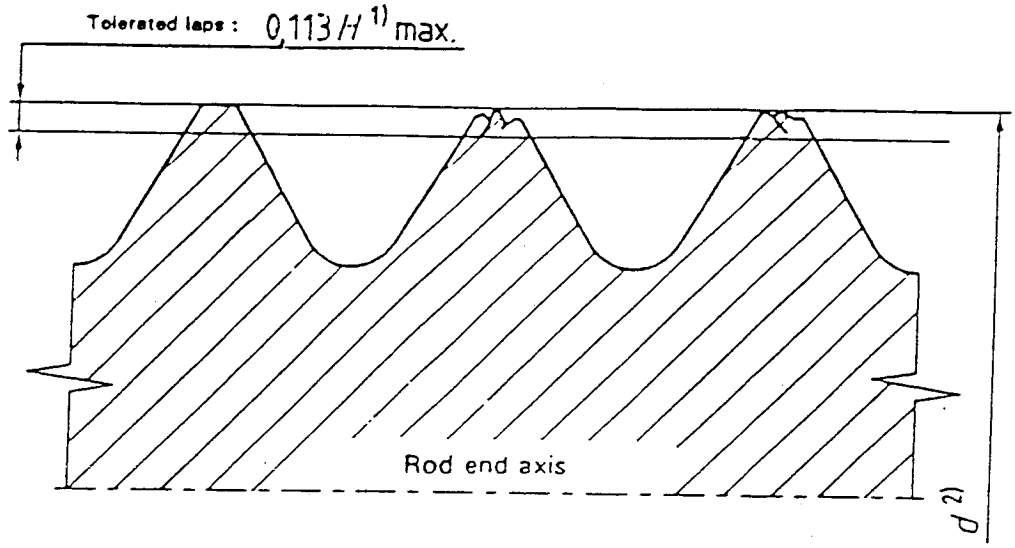
Sub-clause	Characteristics	Requirements	Inspection and test methods	Q [1]	A [2]
4.9	Surface treatment	Shall conform with the product standards or design documentation	Visual inspection As per surface treatment standard	X	X
4.10	Thread discontinuities	See figures 1 and 2	3) Examination of micrographic section for : - qualification: on finished parts; - acceptance: by sampling during manufacture.	X	X
4.11	Lubrication	At least 80 % of the free space in the rod end head shall be charged with the grease specified in the product standards or design documentation (see annex F).	Visual examination after removal of seals and shields	X	
			Visual examination during manufacture		X
4.12	Seals and shields				
4.12.1	Retention	- The seals and shields shall be fitted correctly on the rod end body, in such a way that the functioning of the self-aligning ball bearing is not affected. - After the test, the seals and shields shall not have loosened or become deformed.	Visual examination See annex A.	X	X
4.12.2	Sealing	The seals shall : - rub on the inner ring and retain the grease; - prevent the penetration of foreign bodies. After the test, the running behaviour of the rod ends shall conform with 4.14.1.	Visual examination after the inner ring is turned manually in relation to the rod end body.	X	X
			See annex B.	X	
4.12.3	Temperature test	After the test, the behaviour shall conform with 4.12.1.	See annex C.	X	

(continued)

Table 1 (concluded)

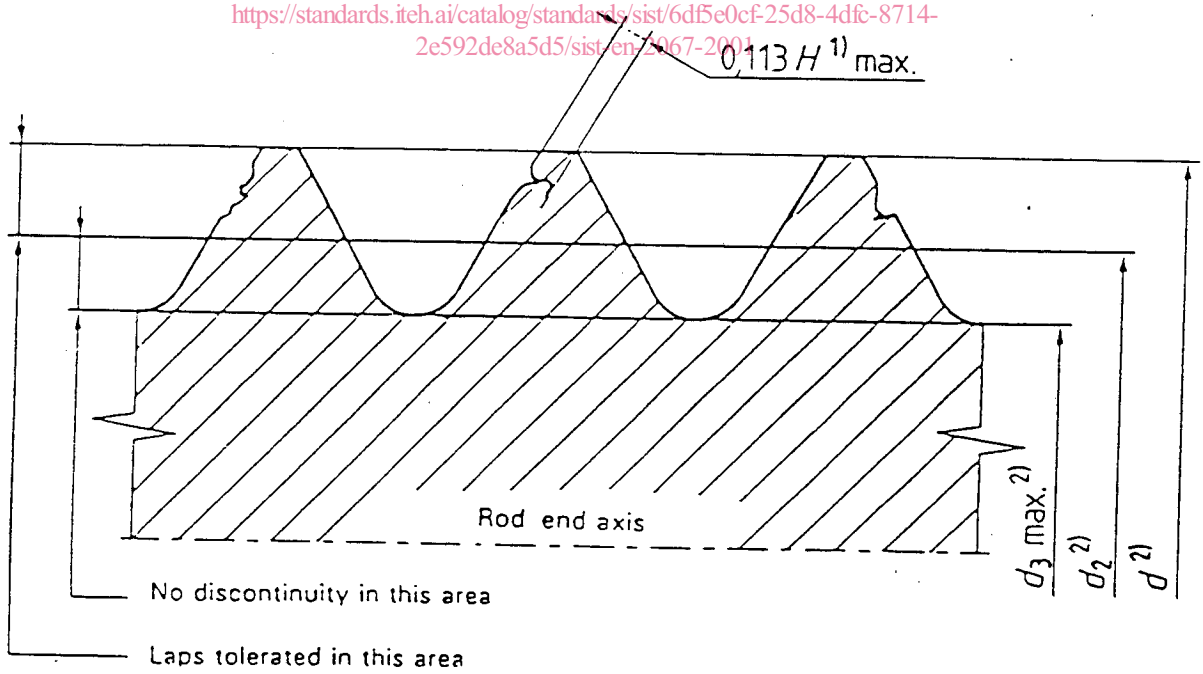
Sub-clause	Characteristics	Requirements	Inspection and test methods	Q [1]	A [2]
4.13	Internal clearances: - radial; - axial	Shall conform with the product standards or design documentation	See annex D.	X	X
4.14	Behaviour in rotation				
4.14.1	At ambient temperature	No tight spots	Manually rotating and oscillating the inner ring	X	X
4.14.2	At limit temperatures	- After the test, the mean starting torque shall not exceed 1,5 times the mean of the values recorded before the test. - No tight spots	See annex C. Manually rotating and oscillating the inner ring	X	
4.15	Starting torque at zero load	Shall conform with the product standards or design documentation	Suitable procedures and measuring instruments - Rotate the inner ring at least four times to distribute the lubricant evenly. - Measure at least five times the torque applied progressively to the inner ring of the bearing, in both directions, with the rod end held stationary. Only the highest value shall be taken into account.	X	X
4.16	Permissible static loads : - radial : C_s; - axial : F_a	Shall conform with the product standards or design documentation After the removal of the loads, no permanent deformations : - affecting the behaviour of the rod end in rotation and oscillation (see 4.14.1) ; - increasing the inner radial clearance by more than 5 μm ; - increasing the inner axial clearance by more than 15 μm.	See annex E.	X	
4.17	Ultimate static loads : - radial; - axial	After the removal of the loads, there shall be no cracks or deterioration of the rod end.	See annex E.	X	

1) Q = Qualification test
2) A = Acceptance test
3) These inspections shall be made in the absence of surface treatment, which, for the purpose of qualification, may be removed by a chemical process.



1) See ISO 5855-1.
2) See ISO 5855-2.

Figure 1 - Discontinuities on threads flank



1) See ISO 5855-1.
2) See ISO 5855-2.

Figure 2 - Discontinuities on threads flank

5 Quality assurance

5.1 Product qualification

See EN 3042 and tables 2 and 3.

Qualification shall be obtained for each rod end.

5.2 Acceptance conditions

5.2.1 Inspections and tests to be carried out by the manufacturer

See table 4.

5.2.2 User's quality control

The 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 can be carried out in the user's factory, or by special agreement with the manufacturer in the manufacturer's factory.

6 Packaging

The rod ends shall be packaged individually and in such a way that they will not be damaged during transportation.
They shall be protected against moisture, corrosion, dirt and other harmful substance.
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 ;
- 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 product standards or design documentation.

7 Certificate of conformity

All the rod ends supplied in accordance with this standard shall be accompanied by a certificate of conformity from the manufacturer.

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

Types of inspections and tests [1]		Defined in subclause	Serial number of samples								
			1[2]	2[2]	3	4	5	6	7	8	9
Materials		4.1	X	X	X	X	X	X	X	X	X
Dimensions and tolerances		4.2			X	X	X	X	X	X	X
Mass		4.3			X	X	X				
Marking		4.4	X	X	X	X	X	X	X	X	X
Grooves		4.6			X	X	X				
Surface treatment		4.9						X	X		
Retention of seals and shields		4.12.1						X	X		
Sealing		4.12.2						X	X		
Internal clearances	radial	4.13	X	X	X						
	axial					X	X				
Behaviour in rotation at ambient temperature		4.14.1	X	X	X	X	X	X	X	X	X
Starting torque at zero load		4.15	X	X	X	X	X	X	X	X	X

1) The order is left to the initiative of the qualification authority.
2) Samples without surface treatment

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

Types of inspections and tests [1]			Defined in subclause	Serial number of samples								
				1[5]	2[5]	3[5]	4	5	6	7	8	9
Surface appearance	of rod end body (except thread) [2]		4.5.1	X	X	X	X	X	X	X		
	of inner ring and balls [2]		4.5.2	X	X	X	X	X	X	X	X	X
Hardness [3]			4.7						X	X		
Surface roughness [2]			4.8						X	X		
Thread discontinuities	visual examination		4.10	X	X	X	X	X	X	X		
	micrographic inspection			X	X							
Lubrication [2]			4.11						X	X		
Sealing - Sand and dust test [4]			4.12.2									X
Behaviour in rotation and behaviour of rod end seals and shields at limit temperatures [4]			4.14 4.14.2								X	
Test under static load	radial	permissible (C_s)	4.16	X	X	X						
		ultimate	4.17	X	X	X						
	axial	permissible (F_a max.)	4.16				X	X				
		ultimate	4.17				X	X				

1) The order is left to the initiative of the qualification authority.
2) These tests are destructive because rod ends disassembly is required.
3) A minimum of three rolling elements shall be inspected.
4) These tests shall be carried out only on the first rod end of each range submitted for qualification.
5) Samples with no surface treatment