SLOVENSKI STANDARD
SIST EN 3727:2009

01-september-2009

Aeronavtika - Kotalni leģaji za letala, ģlebasti krogliļ ni leģaji s samonastavljivo prirobnico - Tehniļ na specifikacija

Aerospace series - Bearings, airframe rolling rigid with flanged alignment housing - Technical specification

Luft- und Raumfahrt - Flugwerklager Rillenkugellager mit selbsteinstellendem Flansch - Technische Lieferbedingungen

Série aérospatiale - Roulements pour structures d'aéronefs rigides, avec bague d'alignement à collerette - Spécification technique

Ta slovenski standard je istoveten z: **EN 3727:2006**

ICS:

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

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EUROPEAN STANDARD

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English Version

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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 Central Secretariat has the same status as the official versions.

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Foreword

This European Standard (EN 3727:2006) 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of an identical text or by endorsement, at the latest by December 2006, and conflicting national standards shall be withdrawn at the latest by December 2006.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.

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 airframe bearings with flanged alignment housing.

This standard applies 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.

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

EN 3059, *Aerospace series — Bearings, airframe rolling — Rigid single row ball bearings in steel with flanged alignment housing, cadmium plated — Dimensions and loads.*

EN 3060, *Aerospace series — Bearings, airframe rolling — Rigid single row ball bearings in steel, cadmium plated, with flanged alignment housing, cadmium plated — Dimensions and loads.*

EN 3061, *Aerospace series — Bearings, airframe rolling — Rigid single row ball bearings in corrosion resisting steel, with flanged alignment bush — Dimensions and loads.*

EN 4041, *Aerospace series — Bearings, airframe rolling — Rigid single row ball bearings in corrosion resisting steel, with extended inner ring and flanged alignment bush – Dimensions and loads.*

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.* 1)

AS7949, *Bearing, ball, airframe, antifriction.* 2)

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

2) Published by: Society of Automotive Engineers, Inc. (SAE), 400 Commonwealth Drive, Warrendale, PA 15096-0001 USA.

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in ISO 1132-1 or TR 4475 and the following apply.

3.1
starting torque without load
maximum torque required to start the rotation of the outer ring with the inner ring held stationary

4 Description

4.1 General

These bearings are full complement ball bearings. They are mounted in a flanged alignment housing with mounting bolt holes.

4.2 Shielded bearing

A bearing of which the rolling elements and raceways are protected with shields attached to one of the rings and separated from the other by a small space.

4.3 Sealed bearing

A bearing of which the rolling elements and raceways are completely enclosed by seals attached to one of the rings while sliding on the other one.

5 Requirements

See Table 1.

Table 1 — Technical requirements and test methods

Clause	Characteristic	Requirement	Inspection and test method	Q [a]	A [b]
5.1	**Material**	In accordance with the product standard or design documentation	Chemical analysis or certificate 2.1 according to EN 10204 issued by the semi-finished product manufacturer	X	X
5.2	**Dimensions, tolerances**	In accordance with the product standard 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. **Measurement of the pitch circle diameter of the mounting holes:** – Measurement of holes with a tightly secured gauge, so that the flange can be verified in any position – Measurement of flatness of flange	X	X
5.3	**Masses**	In accordance with the product standard or design documentation	Suitable methods	X	
5.4	**Marking**	In accordance with the product standard or design documentation It shall be legible and shall not adversely affect the material or the operation of the airframe bearing.	Visual examination	X	X
5.5	**Surface appearance**	The bearings shall be free of surface discontinuities liable to have an adverse effect on their characteristics and endurance.			
5.5.1	**Assembled bearings**		Visual inspection of the mounted airframe bearings using suitable methods	X	X
5.5.2	**Unassembled rings and balls**		Magnetic or dye penetrant inspection of rings and balls and of the flanged housing	X	X

continued

Table 1 (*continued*)

Clause	Characteristic	Requirement	Inspection and test method	Q [a]	A [b]
5.6	**Hardness**	In accordance with the product standard or design documentation	Suitable processes and measuring instruments [c]	X	X
5.7	**Surface roughness**	In accordance with the product standard or design documentation	Suitable measuring instruments or visual-tactile samples [c]	X	X
5.8	**Surface treatment**	In accordance with the product standard or design documentation	Visual inspection In accordance with the standard on surface treatment	X	X
5.9	**Lubrication**	At least 80 % of the free space in the airframe bearing shall be filled with the grease specified in the product standards or design documentation (see Annex F).	Visual examination after removal of seals and shields Visual inspection during manufacture	X	X
5.10	**Seals (for sealed bearings) and shields (for shielded bearings)**				
5.10.1	**Retention**	The seals and shields shall be fitted correctly on the outer ring, in such a way that operation of the bearing is not affected.	Visual inspection	X	X
5.10.2	**Sealing**				
5.10.2.1	**against grease leakage**	The seals shall slide on the inner ring and retain the grease.	Visual inspection after the rings have been manually turned in relation to each other		
5.10.2.2	**against penetration of foreign bodies**	The seals prevent the penetration of foreign bodies. After the test, the running behaviour of the bearings shall conform with 5.10.1.	According to Annex A	X	
5.10.3	**Temperature test**	After the test, the behaviour shall conform with 5.10.1	According to Annex B	X	
5.11	**Runout**				
5.11.1	**Radial**: K_{ia}, K_{ea} **Axial**: S_{ia}, S_{ea}	In accordance with the product standard or design documentation	According to Annex C	X	X
5.11.2	**Radial runout of flange hole circle**	In accordance with the product standard or design documentation	According to Annex H	X	X

continued

Table 1 (*concluded*)

Clause	Characteristic	Requirement	Inspection and test method	Q [a]	A [b]
5.12	**Internal clearances** – radial: G_r – axial: G_a	In accordance with the product standard or design documentation	According to Annex D	X	X
5.13	**Behaviour in rotation**				
5.13.1	**At ambient temperature**	No tight spots, e.g. rolling elements catching in the filling slots	According to Annex E Figures E.2 and E.4	X	X
5.13.2	**At extreme temperatures**	After the test, the mean starting torque shall not exceed 1,5 times the mean value recorded before the test. No tight spots	According to Annex B According to Figures E.2 and E.4	X	
5.14	**Starting torques without load**	In accordance with the product standard or design documentation	Suitable measuring instruments and procedures – Rotate one of the two rings at least four times to distribute the lubricant uniformly; – Measure the torque gradually applied to the inner ring, at least five times with the flange of the housing held in place; – The highest value shall be taken into account.	X	X
5.15	**Permissible static loads**: – radial: C_s – axial: $F_{a\ max.}$	In accordance with the product standard or design documentation After removing the loads, there shall be no permanent deformations.	According to Annex E	X	
5.16	**Ultimate static loads**				
5.16.1	**Radial**	After the removal of the loads, no cracks or deterioration of the airframe bearing	According to Annex E	X	
5.16.2	**Axial**	When this load is applied, the ball bearing shall not be pushed out of the flange.	According to Annex E	X	
5.17	**Tilting torque**	In accordance with the product standard or design documentation	According to Annex G	X	X

[a] Q: Qualification test

[b] A: Acceptance test

[c] This inspection shall be made in the absence of surface treatment which, for the purpose of qualification, may be removed by a chemical process.

6 Quality assurance

6.1 Product qualification

See EN 9133 and Tables 2 and 3 and Annex I.

Qualification shall be obtained for each bearing.

However, qualification:

— for a cadmium plated bearing applies to a non cadmium plated bearing with the same dimensions and of the same type, made of the same material;

— 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.

To qualify a bearing of a given range, the manufacturer shall provide:

— nine bearings in the case of the first qualification in this range;

— seven bearings for all the other qualifications.

6.2 Acceptance conditions

6.2.1 Inspection and tests to be carried out by the manufacturer

The acceptance of a delivery batch shall be in accordance with Table 4.

6.2.2 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.

7 Packaging

The bearings shall be packaged individually 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 these bearings shall provide this protection and be grease-resistant.

The following indications shall figure on each individual package:

— manufacturer's name and address;

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

— packaging date;

— lubrication date.

At least the following indications 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.

8 Certificate of compliance

All bearings supplied in accordance with this standard shall be accompanied by a certificate of compliance according to EN 10204 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	6	7	8	9
Materials	5.1	X	X	X	X	X	X	X	X	
Dimensions and tolerances	5.2	X	X	X	X	X	X	X		
Masses	5.3	X	X	X	X	X	X	X		
Marking	5.4	X	X	X	X	X	X	X	X	X
Surface appearance (Assembled bearings)	5.5.1	X	X	X	X	X	X	X	X	X
Surface treatment (if required)	5.8	X	X	X	X	X	X	X	X	X
Retention of seals and shields	5.10.1						X	X		
Runout radial K_{ia}, K_{ea}; axial S_{ia}, S_{ea}	5.11.1	X	X	X	X	X	X	X		
Radial runout of flange hole circle	5.11.2	X	X	X	X	X	X	X		
Internal clearances (G_r, G_a)	5.12	X	X	X	X	X	X			
Behaviour in rotation at ambient temperature	5.13.1	X	X	X	X	X	X	X	X	X
Starting torques without load	5.14	X	X	X	X	X	X	X	X	X
Tilting torque	5.17	X	X	X	X	X	X	X		

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