



SLOVENSKI STANDARD SIST EN 2644:2001

01-januar-2001

Aerospace series - Rod assemblies for flight controls - Technical specification

Aerospace series - Rod assemblies for flight controls - Technical specification

Luft- und Raumfahrt - Bediengestänge für Flugsteuerungen - Technische Lieferbedingungen

Série aérospatiale - Bielles équipées pour commandes de vol - Spécification technique

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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 2644

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 1998

ICS 49.035

Descriptors: aircraft industry, flight control, connecting rods, characteristics, inspection, tests qualification, quality assurance, acceptance testing, marking, packing

English version

Aerospace series - Rod assemblies for flight controls - Technical specification

Série aérospatiale - Bielles équipées pour commandes de vol - Spécification technique

Luft- und Raumfahrt - Bediengestänge für Flugsteuerungen - Technische Lieferbedingungen

This European Standard was approved by CEN on 17 October 1997.

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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.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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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 October 1998, and conflicting national standards shall be withdrawn at the latest by October 1998.

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

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ANALISSE

.....7219
REVISED EDITION OF 1998

1 Scope

This standard specifies the required characteristics, inspections and tests, quality assurance, qualification, acceptance and delivery conditions for rod assemblies for flight controls, consisting of an aluminium alloy rod body and fixed or adjustable rod end fittings.

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.

- EN 2290-1 Aerospace series - Rod bodies for flight control, in aluminium alloys, for adjustable end fittings - Dimensions 1)
- EN 2291 Aerospace series - Rod assemblies for flight control in aluminium alloys, with one extremity for an adjustable end and one extremity fitted with a fixed single fork end fittings - Dimensions 1)
- EN 2292 Aerospace series - Rod assemblies for flight control in aluminium alloys with fixed single fork end fittings - Dimensions 1)
- EN 2327 Aerospace series - Washers, lock with radial serrations in alloy steel - Dimensions
- EN 2424 Aerospace series - Marking of aerospace products
- EN 2492 Aerospace series - Rod ends, self-aligning ball bearing with threaded shank - Dimensions and loads 2)
- EN 2515 Aerospace series - Rod ends, adjustable, single fork and threaded shank - Dimensions and loads
- EN 2546 Aerospace series - Washers, lock with radial serrations in corrosion resisting steel - Dimensions
- EN 2586 Aerospace series - Washers, lock for flight control rods - Dimensions
- EN 2587 Aerospace series - Rod ends, adjustable, double fork and threaded shank - Dimensions and loads
- EN 2594 Aerospace series - Rod assemblies for flight controls, in aluminium alloys with one end for adjustable end fitting and one end with a fixed end fitting with double fork - Dimensions 1)
- EN 2595 Aerospace series - Rod assemblies for flight controls, in aluminium alloys with one end for adjustable end fitting and one end with a fixed ball bearing end fitting - Dimensions 1)
- EN 2596 Aerospace series - Washers, lock with radial serrations - in corrosion resisting steel - cadmium plated - Dimensions
- EN 2610 Aerospace series - Rod assemblies for flight controls in aluminium alloys with ball bearing fixed end fittings - Dimensions 1)
- EN 2611 Aerospace series - Rod assemblies for flight controls in aluminium alloys with one single fork fixed end fitting and one ball bearing fixed end fitting - Dimensions 1)
- EN 2612 Aerospace series - Rod assemblies for flight controls in aluminium alloys with one double fork fixed end fitting and one ball bearing fixed end fitting - Dimensions 1)
- EN 2613 Aerospace series - Rod assemblies for flight controls in aluminium alloys with one single fork fixed end fitting and one double fork fixed end fitting - Dimensions 1)
- EN 2614 Aerospace series - Rod assemblies for flight controls in aluminium alloys with double fork fixed end fittings - Dimensions 1)
- EN 2791 Aerospace series - Rod ends, adjustable, single fork and threaded shank with engagement: $1,5 \times \text{thread } \emptyset$ - Dimensions and loads

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

2) Published as AECMA Standard at the date of publication of this standard

EN 2792	Aerospace series - Rod ends, adjustable, double fork and threaded shank with engagement: $1,5 \times \text{thread } \varnothing$ - Dimensions and loads
EN 3042	Aerospace series - Quality assurance - EN aerospace products - Qualification procedure
EN 3228	Aerospace series - Nuts, hexagon, plain, reduced height, normal across flats, in steel, cadmium plated - Classification: 900 MPa (at ambient temperature) / 235°C ¹⁾
EN 3229	Aerospace series - Nuts, hexagon, plain, reduced height, normal across flats, in steel, cadmium plated, left hand thread - Classification: 900 MPa (at ambient temperature) / 235°C ¹⁾
EN 3541	Aerospace series - Rod ends, adjustable, self-aligning ball bearing with threaded shank - Dimensions, torques, clearances and loads
EN 10204	Metallic products - Types of inspection documents

3 Description

A complete rod assembly consists of:

- a rod body;
- two end fittings, fixed or adjustable;
- associated locking and attachment system.

The possible assembly combinations of the various components are defined as follows:

3.1 Rod assemblies with one fixed end fitting and one adjustable end fitting

See figure 1 and table 1.

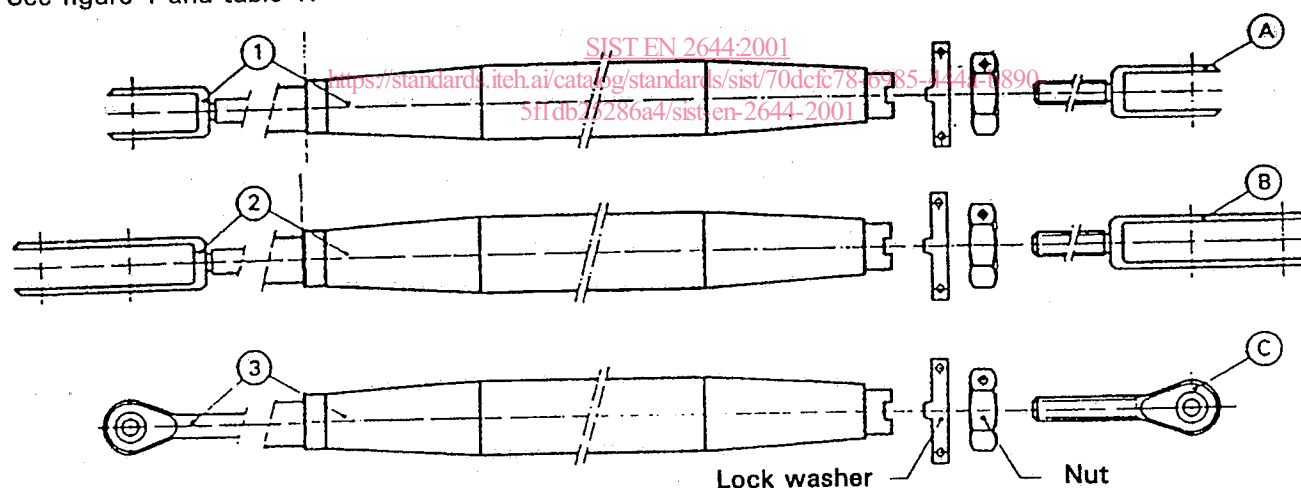


Figure 1

Table 1

Combination code	Rod assemblies with one fixed end fitting	Lock washer	Nut	Associated adjustable end fittings
A - 1	EN 2291	EN 2327 or EN 2546 or EN 2586 or EN 2596	EN 3228 or EN 3229	EN 2515 or EN 2791
B - 1				EN 2587 or EN 2792
C - 1				EN 2492 or EN 3541
A - 2	EN 2594			EN 2515 or EN 2791
B - 2				EN 2587 or EN 2792
C - 2				EN 2492 or EN 3541
A - 3	EN 2595			EN 2515 or EN 2791
B - 3				EN 2587 or EN 2792
C - 3				EN 2492 or EN 3541

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

3.2 Rod assemblies with two adjustable end fittings

See figure 2 and table 2.

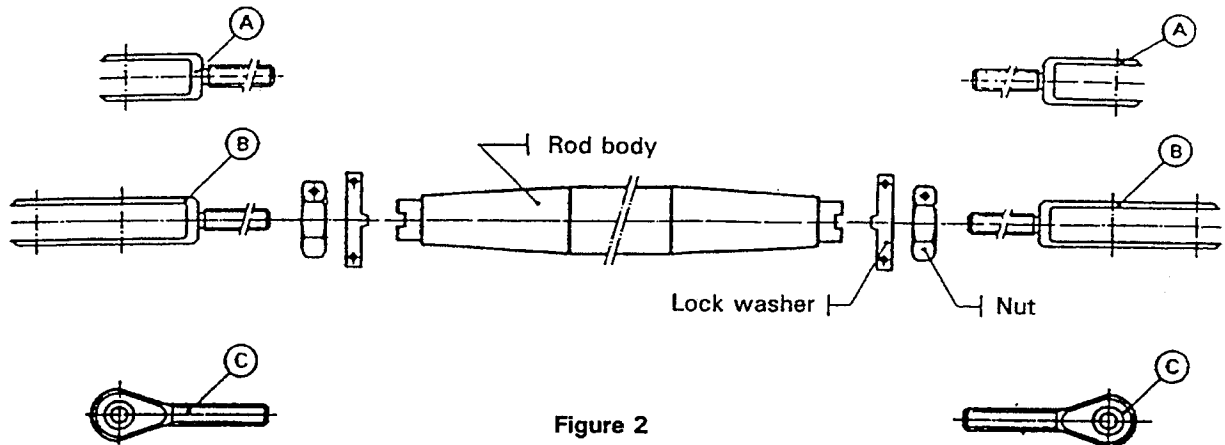


Figure 2

Table 2

Combination code	Rod body	Lock washer	Nut	Associated adjustable end fittings
A - A	iTeh STANDARD PREVIEW (standards.itech.ai) EN 2290-1 https://standards.itech.ai/catalog/standards/sist/70dcfc78-6985-444a-b890-5f1db25286a4/sist-en-2644-2001	EN 2327 or EN 2546 or EN 2586 or EN 2596	EN 3228 or EN 3229	EN 2515 or EN 2791
A - B				EN 2515 or EN 2791 EN 2587 or EN 2792
B - B				EN 2587 or EN 2792
B - C				EN 2587 or EN 2792 EN 2492 or EN 3541
C - C				EN 2492 or EN 3541
C - A				EN 2492 or EN 3541 EN 2515 or EN 2791

3.3 Rod assemblies with two fixed end fittings

See figure 3 and table 3.

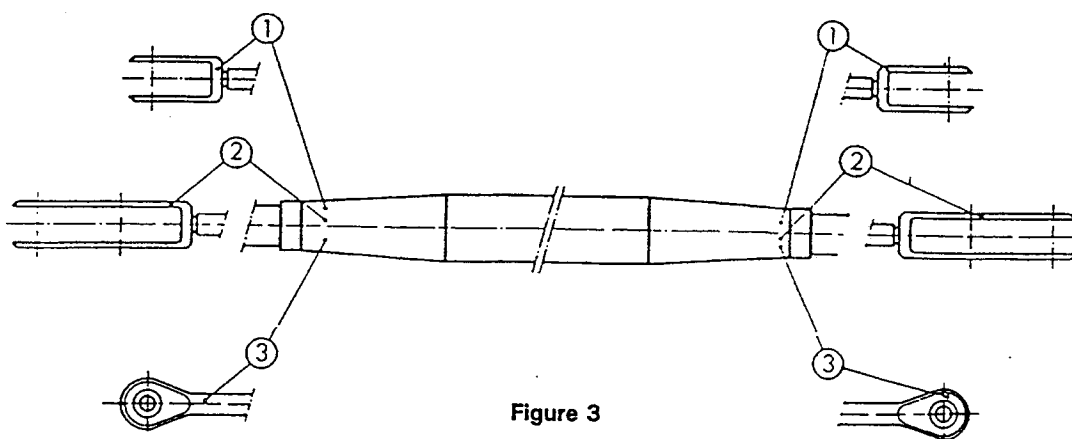


Figure 3

Table 3

Combination code	Rod assemblies
1 - 1	EN 2292
3 - 3	EN 2610
3 - 1	EN 2611
2 - 3	EN 2612
1 - 2	EN 2613
2 - 2	EN 2614

4 Required characteristics, inspection and test methods

See table 4.

Table 4

Sub-clause	Characteristics	Requirements	Inspection and test methods	Q ¹⁾	A ¹⁾
4.1	Constitution	In accordance with product standards or design documentation	Visual inspection	X	X
4.2	Assembly	Mounting: no impurity or foreign matter in rod body	Visual inspection before and during mounting	X	X
		Thread of rod body: protection as specified by the user (purchaser).	Visual inspection	X	X
4.3	Appearance	Good general appearance of rod assembly	Visual inspection	X	X
4.4	Marking	For each component, in accordance with its product standard or design documentation	Visual inspection	X	X
4.5	Mounting of an adjustable end fitting	Nut assembled as in figures 4 and 5; not locked.	Manual test and visual inspection	X	X
4.6.1	Mounting of a fixed end fitting	Correct provision of attachment system	Manual test and visual inspection	X	X
4.6.2		Orientation of the end fitting in accordance with the product standard or design documentation.	Appropriate measuring procedures and equipment	X	X
4.6.3		Torsion resistance in conformity with values shown in table 5. - At the end of inspection: no angular displacement of the end fitting	Immobilize rod body. Apply torque as in table 5 to the end fitting. Check using appropriate measuring procedures and instruments.	X	
4.7	Resistance of the attachment system rod body/fixed end fitting to ultimate static load in tension and compression	Shall be at least equal to the lower of the following two requirements: - performance in tension and compression of the most resistant end fitting (EN 2515 or EN 2791) using an ultimate compression load equal to the ultimate tensile load; - performance of the rod body in tension and compression in accordance with the product standard.	Perform the tensile and compression tests by the appropriate methods.	X	
4.8	Theoretical length	Two adjustable end fittings or one adjustable and one fixed end fitting: - theoretical length in accordance with that specified on the design documentation including the adjustment range of table 6; - adjustment range between the extreme positions in figure 5.	Position the adjustable end fitting as shown in figure 4. Appropriate measuring procedures and instruments	X	X
4.9	Nominal length	Two fixed end fittings: in accordance with product standard or design documentation	Appropriate measuring procedures and instruments	X	X
1) Q = Qualification test A = Acceptance test					

Table 5 - Torsion resistance end fitting/rod body

End fitting code	Minimum torque N.m
06	17
08	27
10	37

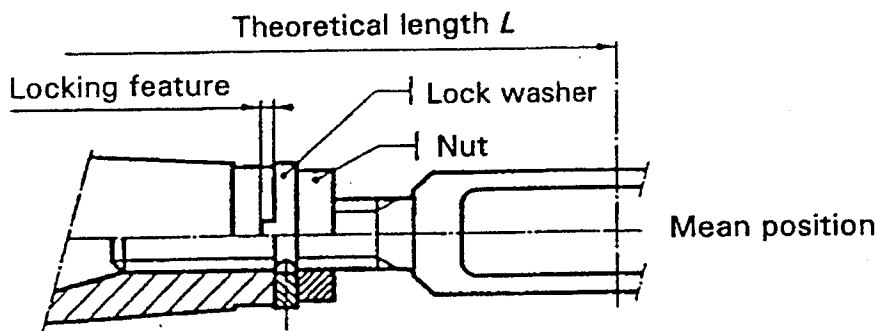


Figure 4
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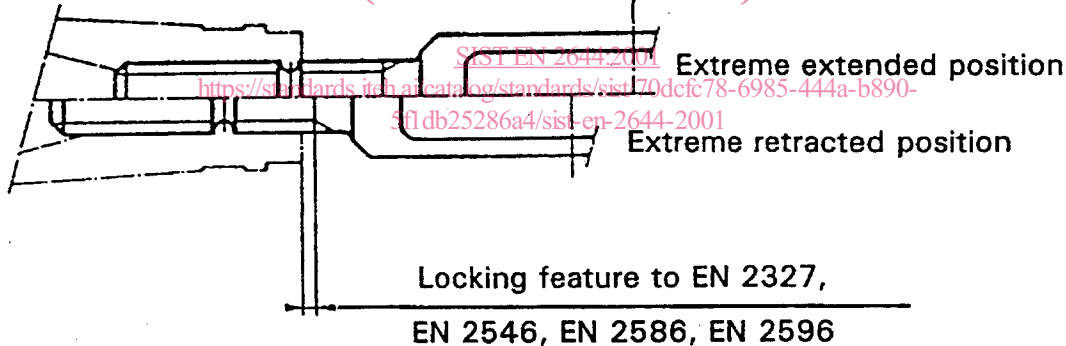


Figure 5 - Adjustment range

Table 6 - Adjustment range for length L related to theoretical length L

Dimensions in millimetres

Rods with adjustable end fittings (3.2)						Rods with fixed and adjustable end fittings (3.1)								
Combination code														
A - A	A - B	B - B	B - C	A - C	C - C	A - 1	A - 2	A - 3	B - 1	B - 2	B - 3	C - 1	C - 2	C - 3
+ 3,2		+ 3,2		+ 3,2		+ 2,1						+ 2,1		
- 2		- 2,7		- 3,4		- 1,5						- 2,2		
1) Values for one end fitting only														