



# SLOVENSKI STANDARD

## SIST EN 4694:2017

01-december-2017

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**Aeronavtika - Zglobna ročica z vgrajenim sornikom - Montažne kode D, E in F**

Aerospace series - Tie rod with integrated bolts - Assembly code D, E and F

Luft- und Raumfahrt - Zug-Druck Stange mit integrierten Bolzen - Zusammenbaucode D, E und F

Série aérospatiale - Bielle avec axes intégrés - Code assemblage D, E et F

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**Ta slovenski standard je istoveten z: EN 4694:2017**

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**ICS:**

49.035	Sestavni deli za letalsko in vesoljsko gradnjo	Components for aerospace construction
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**SIST EN 4694:2017**

**en,fr,de**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 4694**

October 2017

ICS 49.035

English Version

**Aerospace series - Tie rod with integrated bolts - Assembly  
code D, E and F**

Série aérospatiale - Bielle avec axes intégrés - Code  
assemblage D, E et F

Luft- und Raumfahrt - Zug-Druck Stange mit  
integrierten Bolzen - Zusammenbaucode D, E und F

This European Standard was approved by CEN on 25 June 2016.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## European foreword

This document (EN 4694:2017) has been prepared by the Aerospace and Defence Industries Association of Europe - Standardization (ASD-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 ASD, 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of an identical text or by endorsement, at the latest by April 2018, and conflicting national standards shall be withdrawn at the latest by April 2018.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN 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, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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**EN 4694:2017 (E)****Introduction**

Aerospace and Defence Standardization (ASD-STAN) draws attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

USA: US 8371767

China: CN 10104431

Japan: JP 4885140

Russia: RU 2389914

South Africa: ZA 2007/03913

Canada: 2584387

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ASD-STAN takes no position concerning the evidence, validity and scope of this patent right.

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Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those identified above. ASD-STAN shall not be held responsible for identifying any or all such patent rights.

## 1 Scope

This standard specifies the dimensions and tolerances of rod assemblies for aerospace applications with two adjustable ends with integrated bolts for interior and sub structure in the temperature range – 55 °C to 85 °C. The rod ends should not be screwed completely apart.

## 2 Normative references

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

DIN 6799, *Retaining washers for shafts*<sup>1)</sup>

DIN 65038-1, *Aerospace — Steel, nickel- and cobalt-alloy bars — Technical specification*<sup>1)</sup>

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

EN 3311, *Aerospace series — Titanium alloy Ti-P64001 (Ti-6Al-4V) — Annealed — Bar for machining — D < 110 mm*

EN 4614, *Aerospace series — Spherical plain bearings in corrosion resisting steel with self-lubricating liner wide series — Dimensions and loads — Inch series*

EN 4691-1, *Aerospace series — Tie rod with integrated bolts — Part 1: Technical specification*

EN 4692, *Aerospace series — Tie rod with integrated bolts — Locking clip*

EN 10088-3, *Stainless steels — Part 3: Technical delivery conditions for semi-finished products, bars, rods, wire, sections and bright products of corrosion resisting steels for general purposes*

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

ISO 2768-2, *General tolerances — Part 2: Geometrical tolerances for features without individual tolerance indications*

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

LN 9368-4, *Aerospace — Designation of surface treatments — Part 4: Code numbers for methods of anodic treatment*<sup>1)</sup>

LN 9368-7, *Aerospace — Designation of surface treatments — Part 7: Code numbers for methods of organic coating*<sup>1)</sup>

WL 1.4548 (all parts), *Aerospace — Precipitation-hardening stainless chromium-nickel-copper steel with approx. 0,05C-16Cr-4Cu-4Ni*<sup>1)</sup>

WL 3.1354 (all parts), *Aerospace — Wrought aluminium alloy with approx. 4,4Cu-1,5Mg-0,6Mn*<sup>1)</sup>

FAR/JAR/CS 25.853, *Compartment Interiors*<sup>2)</sup>

<sup>1)</sup> Published by: Beuth Verlag GmbH. [www.beuth.de](http://www.beuth.de)

<sup>2)</sup> Published by: European Aviation Safety Agency, Postfach 101253, D-50452 Koeln, Germany

### 3 Requirements

#### 3.1 Configuration, dimensions, tolerances and mass

##### 3.1.1 Configuration

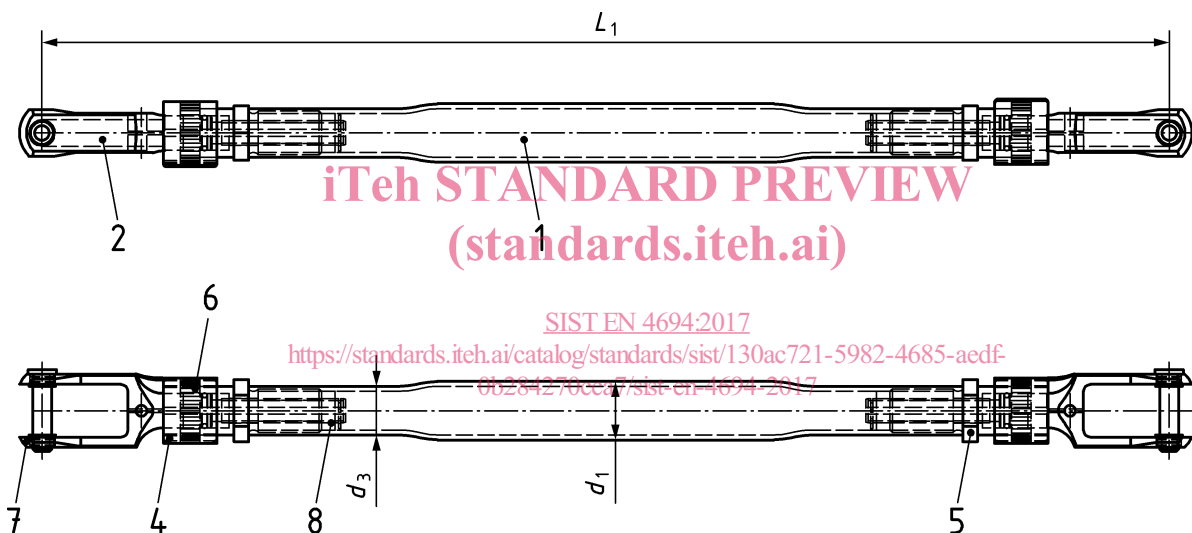
The configuration shall be in accordance with Figure 1, Figure 2 and Figure 3.

##### 3.1.2 Dimensions, tolerances and mass

Dimensions are in millimetres, tolerances and masses in accordance to Table 4, Table 5, Table 6, Table 7 and Table 8. General tolerances shall be in accordance to ISO 2768-mK. Missing dimensions are manufacturing options.

#### 4 Assembly code definitions

Assembly code D, E and F are shown in Figure 1, Figure 2 and Figure 3. For assembly code D, E and F:  $d_1 = 25,4$  mm,  $d_3 = 22,2$  mm and adjustable range for  $L_1 = \pm 12,7$  mm. For  $L_1$  less than 330 mm outer diameter of the rod body  $d_3 = 22,2$  mm (no swaging).

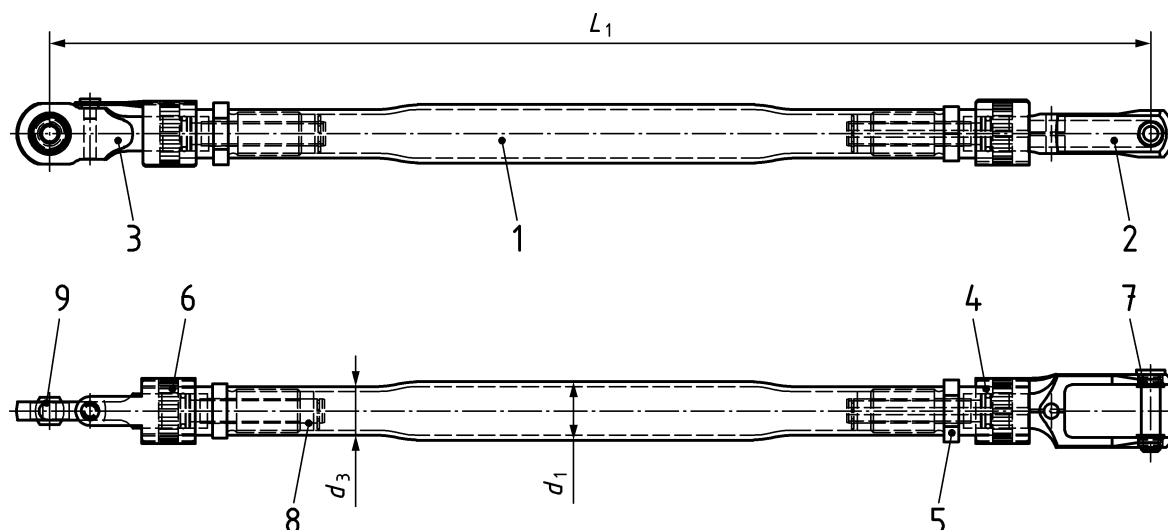


#### Key

1 - 2 - 4 - 5 - 6 - 7 and 8 The position numbers and the materials are shown in Table 1 and Table 2.

**Figure 1 — Assembly code D**

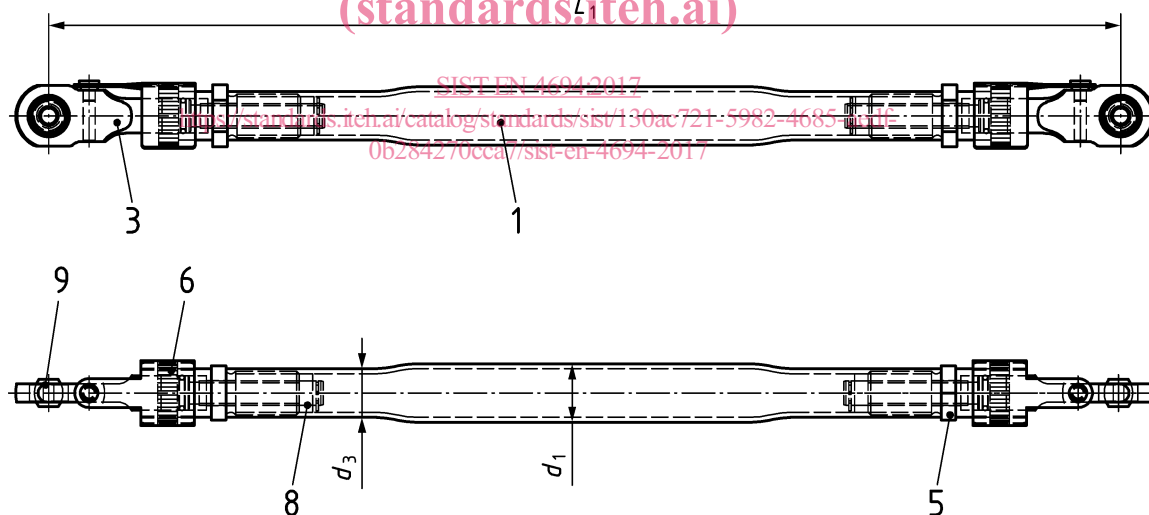


**Key**

1 - 2 - 3 - 4 - 5 - 6 - 7 - 8 and 9 The position numbers and the materials are shown in Table 1 and Table 2.

**Figure 2 — Assembly code E**

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**Key**

1 - 3 - 5 - 6 - 8 and 9 The position numbers and the materials are shown in Table 1 and Table 2.

**Figure 3 — Assembly code F**

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## 5 Materials

See Table 1 and Table 2.

Table 1 — Material code A

Position	Description	Material	Surface treatment
1	Rod body	For diameter $d_1$ aluminium alloy according to WL 3.1354 T351 for diameter $d_3$ aluminium alloy according to WL 3.1354 T351 cold worked by reduction	Anodized according to LN 9368-4-2000 and coating according to LN 9368-7-5023 and according to LN 9368-7-5106
2	Fork end	Aluminium alloy according to WL 3.1354 T4 / T3511	Anodized according to LN 9368-4-2001
3	Eye end		
4	Locking clip	According to EN 4692	
5	Insert	PPS Polyphenylene sulfide (see EN 4691-1)	
6	Washer	Silicon rubber <sup>a</sup> (see EN 4691-1)	
7	Bushes	Titanium alloy 3.7165 according to EN 3311	—
8	Snap ring	According to DIN 6799, material 1.4122 per EN 10088-3	—
9	Bearing	According to EN 4614	
10	Anaerobic adhesive for Locking + Activator (Position 1 with position 2 and position 3 M18×1,5)	See EN 4691-1 Adhesive for example Methacrylate ester loctite 2701 Activator loctite 7649	—

<sup>a</sup> Approved per FAR/JAR/CS 25.853.

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Table 2 — Material code B

Position	Description	Material	Surface treatment
1	Rod body	For diameter $d_1$ aluminium alloy according to WL 3.1354 T351 for diameter $d_3$ aluminium alloy according to WL 3.1354 T351 cold worked by reduction	Anodized according to LN 9368-4-2000 and coating according to LN 9368-7-5023 and according to LN 9368-7-5106
2	Fork end	Stainless steel according to WL 1.4548.4 DIN 65038-1	Passivated according to ISO 8075
3	Eye end		
4	Locking clip	According to EN 4692	
5	Insert	PPS Polyphenylene sulfide (see EN 4691-1)	
6	Washer	Silicon rubber <sup>a</sup> (see EN 4691-1)	
7	Bushes	Titanium alloy 3.7165 according to EN 3311	—
8	Snap ring	According to DIN 6799, material 1.4122 per EN 10088-3	—
9	Bearing	According to EN 4614	
10	Anaerobic adhesive for Locking + Activator (Position 1 with position 2 and position 3 M18×1,5)	See EN 4691-1 Adhesive for example Methacrylate ester loctite 2701 Activator loctite 7649	—

<sup>a</sup> Approved per FAR/JAR/CS 25.853.

## 6 Locking clips

Locking clip according EN 4692.

Description: For the fork ends there are two different types of safety clip.

For the eye end only one locking clip type A is available.

Type A has only the function to fix the fork end, eye end against rotation, see Figure 4 and Figure 5.

Type B also has the function to fix the fork end against rotation, see Figure 6 and Figure 7. The second function is the load transmission of tension and compression forces. No separate pin required.

The locking clip B is available in right hand (RH) and left hand (LH) version.

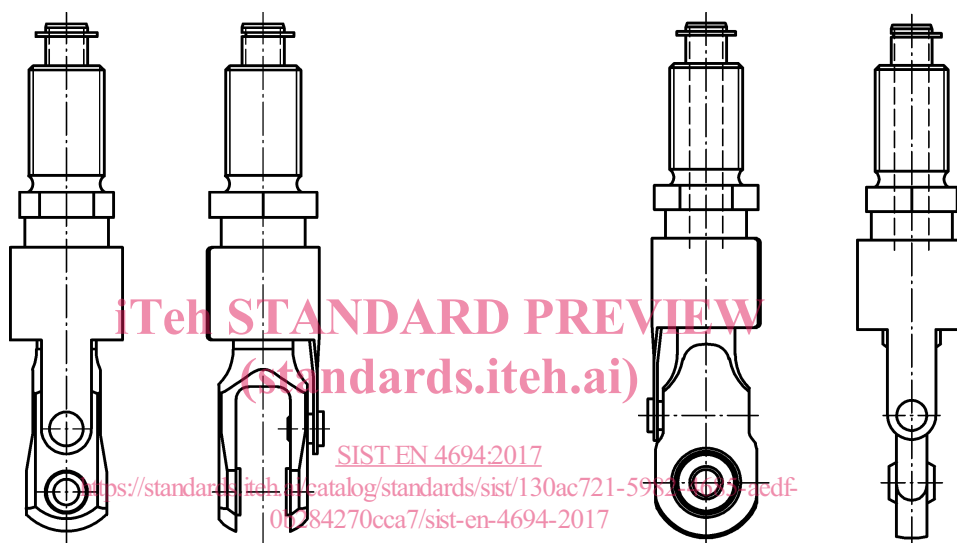


Figure 4 — Clip A

Figure 5 — Clip A

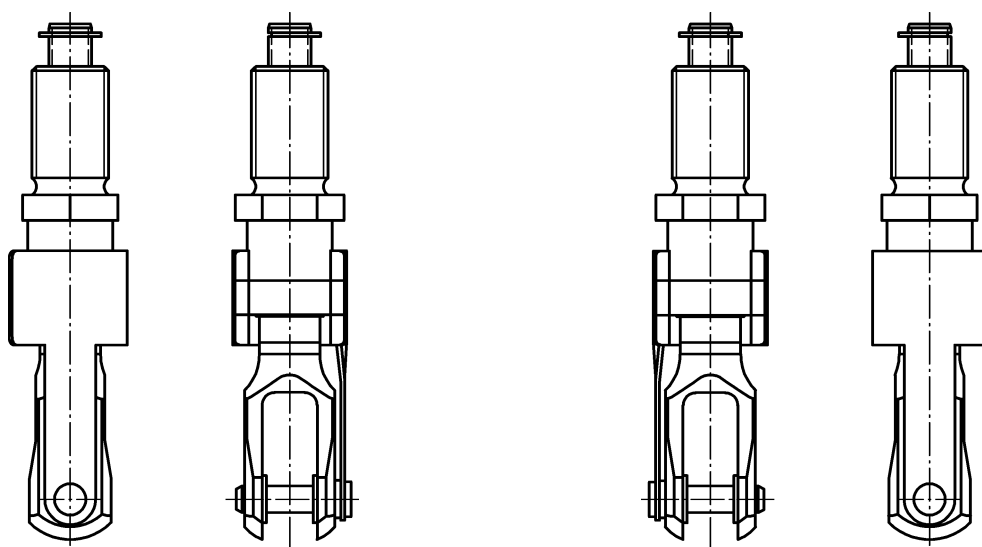


Figure 6 — Clip B (R)ight

Figure 7 — Clip B (L)eft