



# SLOVENSKI STANDARD SIST EN 3155-001:2016

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**Aeronavtika - Električni kontakti za uporabo v veznih elementih - 001. del:  
Tehnična specifikacija**

Aerospace series - Electrical contacts used in elements of connection - Part 001:  
Technical Specification

Luft- und Raumfahrt - Elektrische Kontakte zur Verwendung in Verbindungselementen -  
Teil 001: Technische Lieferbedingungen

Série aérospatiale - Contacts électriques utilisés dans les organes de connexion - Partie  
001 : Spécification technique

**Ta slovenski standard je istoveten z: EN 3155-001:2016**

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**ICS:**

49.060	Letalska in vesoljska električna oprema in sistemi	Aerospace electric equipment and systems
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EUROPEAN STANDARD

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## Aerospace series - Electrical contacts used in elements of connection - Part 001: Technical Specification

Série aérospatiale - Contacts électriques utilisés dans les organes de connexion - Partie 001 : Spécification technique

Luft- und Raumfahrt - Elektrische Kontakte zur Verwendung in Verbindungselementen - Teil 001: Technische Lieferbedingungen

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

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## European foreword

This document (EN 3155-001:2016) 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of an identical text or by endorsement, at the latest by March 2017, and conflicting national standards shall be withdrawn at the latest by March 2017.

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**EN 3155-001:2016 (E)****1 Scope**

This European Standard specifies:

- the electrical, mechanical, environmental and dimensional characteristics of electrical contacts used in elements of connection, including coaxial, triaxial and quadrax contacts;
- the conditions for qualification, acceptance testing and quality assurance;
- the test programs and groups.

It is applicable to removable crimp contacts, wrap contacts, solder contacts used in connectors or in other elements of electrical connection.

In case of conflict or missing information between the EN 3155-001 and the product standards, the product standard shall govern.

**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.

EN 2083, *Aerospace series — Copper or copper alloy conductors for electrical cables — Product standard*

EN 2242, *Aerospace series — Crimping of electric cables with conductors defined by EN 2083, EN 4434 and EN 2346*

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

EN 2591-100\*, *Aerospace series — Elements of electrical and optical connection — Test methods — Part 100: General*

EN 3197, *Aerospace Series — Design and installation of aircraft electrical and optical interconnection systems*

EN 4434, *Aerospace series — Copper or copper alloy lightweight conductors for electrical cables — Product standard (Normal and tight tolerances)*

EN 9133, *Aerospace series — Quality management systems — Qualification procedure for aerospace standard parts*

EN ISO 1302, *Geometrical Product Specifications (GPS) — Indication of surface texture in technical product documentation (ISO 1302)*

EN ISO 27874, *Metallic and other inorganic coatings — Electrodeposited gold and gold alloy coatings for electrical, electronic and engineering purposes — Specification and test methods (ISO 27874)*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling plans indexed by acceptance quality level (AQL) for lot-by-lot inspection*

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\* All parts quoted in this European Standard.

ISO 8843, *Aircraft — Crimp-removable contacts for electrical connectors — Identification system*

IEC 60352-1, *Solderless connections — Part 1: Wrapped connections — General requirements, test methods and practical guidance* <sup>1)</sup>

TR 3198, *Aerospace series — Manufacturers' identification monograms and marks for EN aerospace products* <sup>2)</sup>

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 2591-100 and the following apply.

#### 3.1

##### LSP

Length of Selective Protection

#### 3.2

##### point of electrical contact

position of point of application of the force which provides contact pressure

#### 3.3

##### contact active area

part of the contact which allows current to pass between the contact male and female

#### 3.4

##### contact transition area

all mechanical liaisons that contribute to electrical performance and which are different from contact active area defined in 3.3

#### 3.5

##### coaxial contact male or female

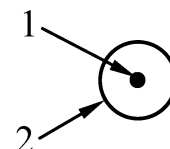
assembly of two contacts arranged coaxially enabling the connection of coaxial, shielded or bifilar cables

See Figure 1.

NOTE 1 Male coaxial contact where the outer contact is male; the central contact(s) may be male or female.

NOTE 2 Female coaxial contact where the outer contact is female; the central contact(s) may be male or female.

#### Coupling face



#### Key

- 1 Centre contact
- 2 Outer contact

**Figure 1**

1) Published by: IEC International Electrotechnical Commission. <http://www.iec.ch/>

2) Published as ASD-STAN Technical Report at the date of publication of this European Standard. <http://www.asd-stan.org/>

## EN 3155-001:2016 (E)

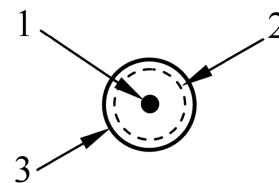
**3.6****triaxial contacts male or female**

assembly of three contacts arranged coaxially, enabling the connection of shielded triaxial or bifilar cables

See Figure 2.

NOTE 1 Male triaxial contact where the outer contact is male; the central contact(s) may be male or female.

NOTE 2 Female triaxial contact where the outer contact is female; the central contact(s) may be male or female.

**Key**

- 1 Centre contact
- 2 Intermediate contact
- 3 Outer contact

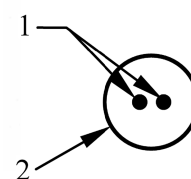
**Figure 2****3.7****bifilar contact (twinax)**

assembly of three contacts, two of which are parallel, the third being peripheral to these, enabling the connection of shielded bifilar cables

See Figure 3.

NOTE 1 Male twinax contact where the outer contact is male; the central contacts may be male or female.

NOTE 2 Female twinax contact where the outer contact is female; the central contacts may be male or female.

**Key**

- 1 Twin parallel contacts
- 2 Outer contact

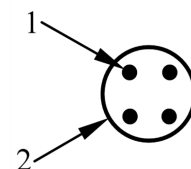
**Figure 3****3.8****quadrax contact**

assembly of five contacts, four of which are parallel, the fifth being peripheral to these, enabling the connection of shielded quadrax cables

See Figure 4.

NOTE 1 Male quadrax contact where the outer contact is male; the central contacts may be male or female.

NOTE 2 Female quadrax contact where the outer contact is female; the central contacts may be male or female.

**Key**

- 1 Four parallel contacts
- 2 Outer contact

**Figure 4**



## 4 Conditions of use

### 4.1 Types of contact

The contact specified shall be one of the following types:

- Type A: Removable contact for general application;
- Type B: Non-removable contact, See Note;
- Type C: Removable contact for thermocouple;
- Type D: Removable contact with screening feature (including the coaxial contacts, triaxial contacts and bifilar contacts). These have no characteristic impedance and are therefore not recommended for use at high frequency.
- Type E: Removable contact with screening feature, including coaxial, triaxial, bifilar and quadrax contacts. These have matched impedance.

NOTE Type B contacts are defined in the connector specifications.

### 4.2 Temperature classes

The contacts specified shall be from one of the classes specified below:

- class P: maximum operating temperature 125 °C;
- class R: maximum operating temperature 150 °C;
- class S: maximum operating temperature 200 °C;
- class T: maximum operating temperature 260 °C;
- class U: maximum operating temperature 350 °C.

The minimum operating temperature shall be – 65 °C, unless otherwise specified in the product standard.

### 4.3 Permissible wires and cables

**4.3.1** The conductors which are acceptable in the crimping barrels and the coding by means of colour bands are specified in ISO 8843. The contact detail specification shall state the acceptable conductors for each size of contact.

**4.3.2** The type of cable, coaxial, triaxial, etc. shall be specified in the product standard.

## 5 Design and description

### 5.1 Design

#### 5.1.1 General

This standard covers male and female contacts of all types and technologies: cylindrical or rectangular entry contacts, flat contacts of the blade type, etc., stamped, formed or machined contacts.

Stamped and formed technology for body contact are not allowed.

#### 5.1.2 Mating end of female contact, cylindrical contacts

Unless otherwise stated in the product standard, the mating end of female contacts from size 08 to 24, shall be of the restricted entry type and shall not permit the introduction of a gauge which has a diameter 0,13 mm greater than the maximum diameter of the male contact.

#### 5.1.3 Mating end of male contacts, cylindrical contacts

Unless otherwise stated in the product standard, the mating end of the male contacts shall be approximately spherical. A flat is permitted at the end; its dimensions are given in Table 1.

**Table 1 — Gauge dimensions for male contact**

Contact size	Pin active area contact diameter mm	Diameter of flat at the mating end mm	Contact size	Pin active area Contact diameter mm	Diameter of flat at the mating end mm
28 <sup>a</sup>	0,394 0,368	0,19 max.	14	2,01 1,96	0,99 0,61
26 <sup>a</sup>	0,521 0,495	0,25 max.	12	2,41 2,36	1,57 1,19
24 <sup>a</sup>	0,65 0,62	0,30 max.	10	3,20 3,15	2,08 1,57
23	0,705 0,659	0,30 max.	8	3,63 3,58	2,18 1,68
22	0,775 0,750	0,35 max.	6	4,55 4,50	2,44 1,93
20	1,04 0,99	0,51 0,13	4	5,74 5,69	2,79 2,29
16	1,61 1,56	0,81 0,43	—	—	—

<sup>a</sup> Inner contact of type D or type E.

#### 5.1.4 Solder buckets

The buckets shall be designed so that during soft soldering operations, the liquid solder cannot run towards the end of the contact.

### 5.1.5 Crimp barrels

Barrels shall be designed to accept the range of permissible conductors according to ISO 8843, EN 2083 and EN 4434.

The use of a reducing sleeve is not recommended; this remains the responsibility of the user and shall be subject to acceptance by the relevant OEMs.

### 5.1.6 Terminations for wrapped connections

The terminations for wrapped connections shall comply with IEC 60352-1.

### 5.1.7 Surface roughness (see EN ISO 1302)

The surface roughness after coating in the male contact zone shall not exceed  $R_a = 0,8 \mu\text{m}$  (or N6); in the other zones, it shall not exceed  $R_a = 1,6 \mu\text{m}$  (or N7).

### 5.1.8 Engagement sequence

The engagement sequence for coaxial and quadrax contacts shall be outer contact, then inner contacts. Unless otherwise specified in the product standard, the engagement sequence for triaxial contacts shall be: outer contact, intermediate contact, centre contact.

## 5.2 Materials

The materials used in the manufacture of contacts shall be consistent with those indicated in the definition document. When dissimilar metals are in close contact, the electromotive force of the galvanic couple shall not exceed 0,25 V, see EN 3197.

## 5.3 Metallic protective plating

Except contact type C contact.

### 5.3.1 General

The protective coating may be either uniform over the entire surface of the contact, or it may be selective. The entire contact shall have a nickel undercoat and gold overcoat, with the exception of fittings or retaining features such as springs or spring clips which shall be made of a corrosion resisting material.

Three functional areas are defined with their minimum gold plating thickness requirements as follows:

- Crimping area,
- Transition area,
- Active area,
- See description in paragraph from 5.3.1.1 to 5.3.1.3.

**EN 3155-001:2016 (E)****5.3.1.1 Crimping area**

Crimping area shall be protected as follows:

Inside barrel: EN ISO 27874 Ni 0,76 µm min./Au(99,0) 0,1 µm minimum in crimping area (from the extremity of the crimp barrel to the inspection hole).

Inside barrel: EN ISO 27874 Ni 0,76 µm min./Au(99,0) 0,05 µm minimum after inspection hole up to the bottom of the drilled barrel.

Outside barrel: EN ISO 27874 Ni 0,76 µm min./Au(99,0) 0,1 µm minimum in crimping area.

**5.3.1.2 Transition area**

Transition area are defined in 3.4 and Figure 7 and shall be protected as follows:

EN ISO 27874 Ni 1,25 µm min./Au(99,0) 0,2 µm minimum (or 0,1 µm on each side of interfaces).

**5.3.1.3 Active area**

Active areas are defined in 3.3 and Figure 5, Figure 6 and shall be protected as follows:

EN ISO 27874 Ni 1,25 µm min./Au(99,0) 0,8 µm minimum.

As specified in the product standards, the gold plating on contact for the LSP areas shall be in accordance with the above requirements. In the other zones, the thickness of the protections is generally not specified, but the minimum shall be as per 5.3.1.1 and 5.3.1.2.

A change in colour of the gold plating is not a reason for rejection excepted in active areas Y [see Figure 5b), key 4, male active area] and X [see Figure 5c), key 6, female active area].

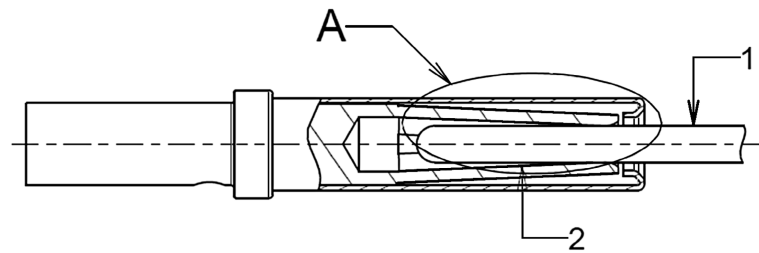
The gold plating thickness shall be sufficient to fulfil the performances required in this specification. However, and unless otherwise specified in the product standard, it shall never be lower than 0,8 µm.

It is a supplier responsibility to define the right gold thickness to meet the performances tests required in this technical specification if the 0,8 µm minimum are not sufficient to pass the expected requirements.

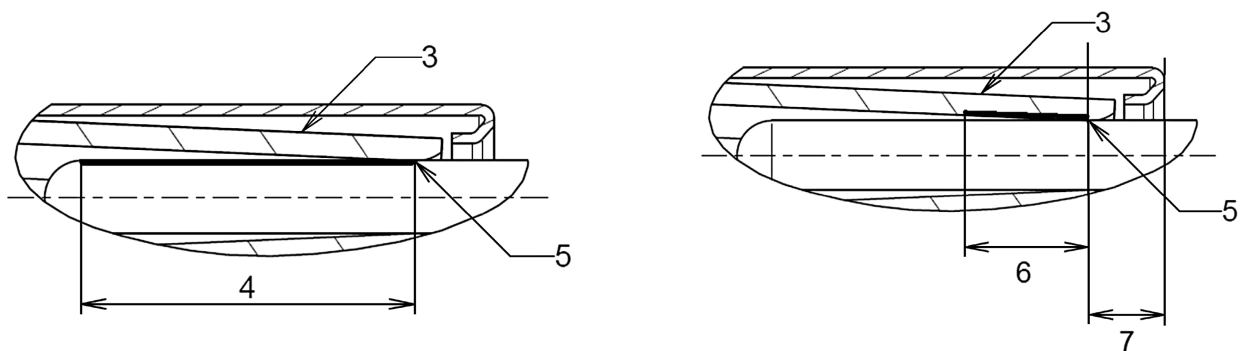
**5.3.1.4 All other areas**

All other areas shall be protected as follows:

EN ISO 27874 Ni 0,76 µm min./Au(99,0) 0,1 µm minimum.



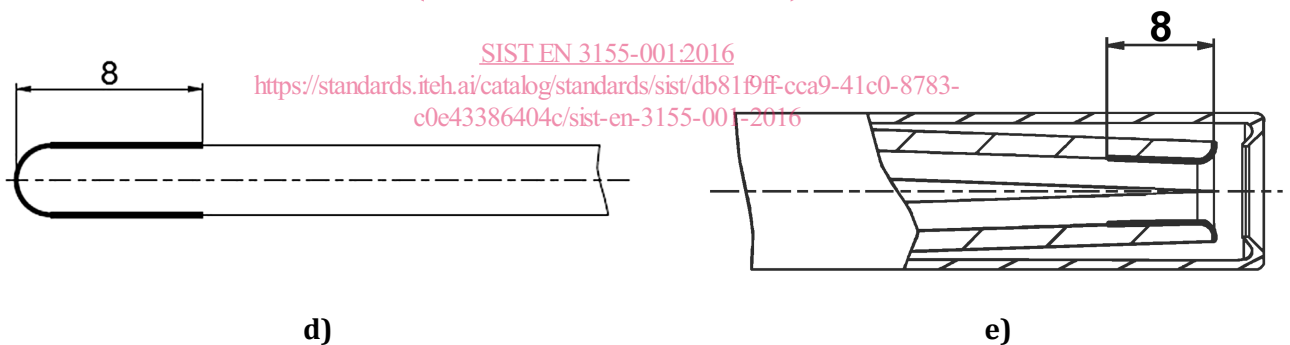
a) Engaged pin / socket contact



b) Detail A: male contact

c) Detail A: female contact

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d)

e)

### Key

- 1 Male contact with maximum diameter
- 2 Pressure element
- 3 Engagement of contacts (given in connector technical specification)
- 4 Male active area (Y) see product standard
- 5 First point of electrical contact (Point at which a square ended minimum gauge pin of the same basic diameter as the mating contact first engages the female contact spring member).
- 6 Female active area (X = 1 mm length min. of gold plating)
- 7 Position of the first point and the maximum length of electrical contact (Point at which a square ended minimum gauge pin of the same basic diameter as the mating contact first engages the female contact spring member as defined in the contact product standard)
- 8 Length of Selective Protection "LSP" which shall include the length of the Key 4 (for male) or 6 (for female) and the radius/chamfer at the extremity.

Figure 5 — Contact with integrated pressure element