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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 3155-001

February 2009

ICS 49.060

English Version

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

This European Standard was approved by CEN on 21 June 2008.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, 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 United Kingdom.

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

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Foreword

This document (EN 3155-001:2009) 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of an identical text or by endorsement, at the latest by August 2009, and conflicting national standards shall be withdrawn at the latest by August 2009.

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.

This standard was reviewed by the Domain Technical Coordinator of ASD-STAN's Electrical Domain.

After inquiries and votes carried out in accordance with the rules of ASD-STAN defined in ASD-STAN's General Process Manual, this standard has received approval for Publication.

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, 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.

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EN 3155-001:2009 (E)**1 Scope**

This 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 programmes and groups.

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

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.

EN 2242, *Aerospace series — Control of tools used for crimping of electrical cables with conductors defined by EN 2083 and EN 2346*¹⁾

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

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

IEC 60352-1, *Solderless connections — Part 1: Wrapped connections — General requirements, test methods and practical guidance*²⁾

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

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

ISO 4524-1, *Metallic coatings — Test methods for electrodeposited gold and gold alloy coatings — Part 1: Determination of coating thickness*

ISO 4524-5, *Metallic coatings — Test methods for electrodeposited gold and gold alloy coatings — Part 5: Adhesion tests*

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

* All parts quoted in Table 2.

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

2) Published by International Electrotechnical Commission (IEC), 3 rue de Varembé, 1211 Geneva 20, Switzerland.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply:

See EN 2591-100.

3.1

point of electrical contact

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

3.2

contact active area

part of the contact which allows current to pass between the contact and another element

3.3

coaxial contact male or female

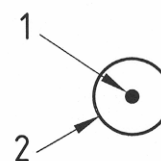
assembly of two contacts arranged coaxially enabling the connection of coaxial, shielded or bifilar cables

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

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3.4

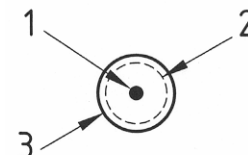
triaxial contacts male or female

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

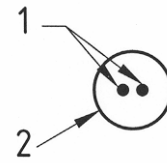
- 1 Centre contact
- 2 Intermediate contact
- 3 Outer contact

Figure 2

EN 3155-001:2009 (E)**3.5****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.

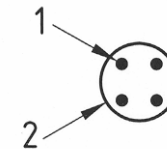
**Key**

- 1 Twin parallel contacts
- 2 Outer contact

Figure 3**3.6****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.

**Key**

- 1 Four parallel contacts
- 2 Outer contact

Figure 4

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4 Conditions of use**4.1 Types of contact**

The contact specified shall be one of the following types:

- Type A: contact for general application;
- Type C: contact for thermocouple;
- Type D: 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: contact with screening feature, including coaxial, triaxial, bifilar and quadrax contacts. These have matched impedance.

NOTE Non-removable 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.

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 12 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.

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Table 1

Contact size	Contact diameter mm	Diameter of flat at the end mm	Contact size	Contact diameter mm	Diameter of flat at the end mm
28 ^a	0,394 0,368	0,19 max.	10	3,20 3,15	2,08 1,57
26 ^a	0,521 0,495	0,25 max.	8	3,63 3,58	2,18 1,68
24 ^a	0,648 0,622	0,30 max.	6	4,55 4,50	2,44 1,93
22	0,775 0,750	0,35 max.	4	5,74 5,69	2,79 2,29
20	1,04 0,99	0,51 0,13	2	7,21 7,16	4,27 3,76
16	1,61 1,56	0,81 0,43	0	9,09 9,04	6,15 5,64
14	2,01 1,96	0,99 0,61	2/0	10,34 10,29	7,39 6,88
12	2,41 2,36	1,57 1,19	4/0	12,72 12,67	9,80 9,27

^a Inner contact of type D or type E.

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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.

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 authorities.

5.1.6 Terminations for wrapped connections

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

5.1.7 Surface roughness (see 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.

5.3 Metallic protective plating

5.3.1 General

The protective coating may be either uniform over the entire surface of the contact, or it may be selective. The protection shall be thicker in the contact active areas. The minimum thickness of protection for active areas may or may not be specified in the product standard. The entire contact shall have an appropriate undercoat (silver undercoat is prohibited), with the exception of fittings or retaining features such as springs or spring clips which may be made of a corrosion resisting material.

5.3.2 Uniform protection

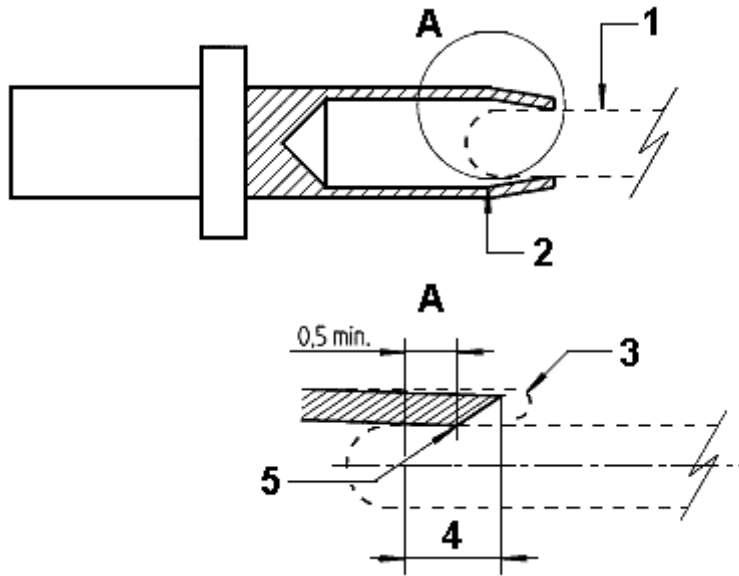
The entire surface of the contacts shall be protected in accordance with the requirements of each product standard.

5.3.3 Selective protection

If required by the product standard, selective plating shall be applied as shown in Figures 1 to 8, depending on the particular case. Protection shall be complete in contact active areas X and Y. In the other zones, the thickness of the protections is not generally specified. Outside contact active areas X and Y, a change in colour of the gold plating is not a reason for rejection.

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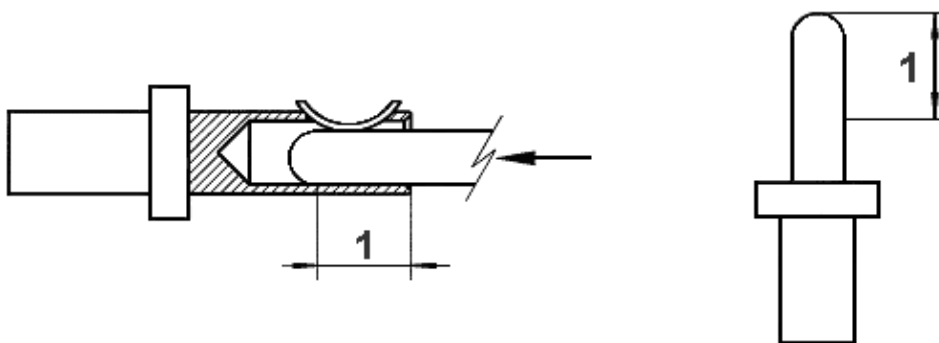
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Key

- 1 Male contact of maximum diameter
- 2 Contact active area X (internal diameter)
- 3 Clip
- 4 Contact active area X
- 5 Point of electrical contact

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Figure 5 — Female contact with integral contact pressure element



Key

- 1 Contact active area X

Figure 6 — Female contact with separate pressure elements

Key

- 1 Contact active area Y

Figure 7 — Male contact