

DIN EN 3155-001



ICS 49.060

Entwurf

Einsprüche bis 2023-09-14
Vorgesehen als Ersatz für
DIN EN 3155-001:2016-11

**Luft- und Raumfahrt –
Elektrische Kontakte zur Verwendung in Verbindungselementen –
Teil 001: Technische Lieferbedingungen;
Englische Fassung prEN 3155-001:2023**

Aerospace series –
Electrical contacts used in elements of connection –
Part 001: Technical Specification;
English version prEN 3155-001:2023

Série aérospatiale –
Contacts électriques utilisés dans les organes de connexion –
Partie 001: Spécification technique;
Version anglaise prEN 3155-001:2023

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2023-07-14 wird der Öffentlichkeit zur Prüfung und Stellungnahme vorgelegt.

Weil die beabsichtigte Norm von der vorliegenden Fassung abweichen kann, ist die Anwendung dieses Entwurfs besonders zu vereinbaren.

Stellungnahmen werden erbeten

- vorzugsweise online im Norm-Entwurfs-Portal von DIN unter www.din.de/go/entwuerfe bzw. für Norm-Entwürfe der DKE auch im Norm-Entwurfs-Portal der DKE unter www.entwuerfe.normenbibliothek.de, sofern dort wiedergegeben;
- oder als Datei per E-Mail an nl@din.de möglichst in Form einer Tabelle. Die Vorlage dieser Tabelle kann im Internet unter www.din.de/go/stellungnahmen-norm-entwuerfe oder für Stellungnahmen zu Norm-Entwürfen der DKE unter www.dke.de/stellungnahme abgerufen werden;
- oder in Papierform an den DIN-Normenausschuss Luft- und Raumfahrt (NL), 10772 Berlin oder Am DIN-Platz, Burggrafenstr. 6, 10787 Berlin.

Die Empfänger dieses Norm-Entwurfs werden gebeten, mit ihren Kommentaren jegliche relevanten Patentrechte, die sie kennen, mitzuteilen und unterstützende Dokumentationen zur Verfügung zu stellen.

Gesamtumfang 55 Seiten

DIN-Normenausschuss Luft- und Raumfahrt (NL)

Nationales Vorwort

Der Verband der Europäischen Luft-, Raumfahrt- und Verteidigungsindustrie – Normung (ASD-STAN) ist vom Europäischen Komitee für Normung (CEN) für zuständig erklärt worden, Europäische Normen (EN) für das Gebiet der Luft- und Raumfahrt auszuarbeiten. Durch die Vereinbarung vom 3. Oktober 1986 wurde ASD Assoziierte Organisation (ASB) des CEN.

Das vorliegende Dokument (prEN 3155-001:2023) wurde von ASD-STAN, Fachbereich Elektrotechnik, unter Mitwirkung deutscher Experten des DIN-Normenausschusses Luft- und Raumfahrt (NL) erarbeitet.

Das zuständige deutsche Normungsgremium ist der Arbeitsausschuss NA 131-04-03 AA „Elektrische Verbindungselemente“ im DIN-Normenausschuss Luft- und Raumfahrt (NL).

Der vorliegende Norm-Entwurf enthält zur technischen Kommentierung einen Europäischen Norm-Entwurf (prEN) ausschließlich in Englischer Fassung aus der parallelen Umfrage von ASD-STAN und CEN.

Ein zweiter Norm-Entwurf wird nur die Deutsche Fassung der veröffentlichten ASD-STAN prEN enthalten. Es wird darauf hingewiesen, dass auf Grund der Verfahrensweise zur Normenerstellung bei ASD-STAN der zweite Norm-Entwurf ausschließlich der redaktionellen Prüfung der deutschen Sprachfassung dienen wird.

Entsprechend Beschluss 57/9 des Technischen Ausschusses des Beirats des DIN-Normenausschusses Luft- und Raumfahrt (NL) sind die europäischen Luft- und Raumfahrt-Normungsergebnisse zweisprachig, in Deutsch und Englisch, in das Deutsche Normenwerk zu überführen. Aus diesem Grund wird die Norm beide Sprachfassungen enthalten.

Für die in diesem Dokument zitierten Dokumente wird im Folgenden auf die entsprechenden deutschen Dokumente hingewiesen:

IEC 60352-1 siehe DIN EN 60352-1
ISO 2859-1 siehe DIN ISO 2859-1

Aktuelle Informationen zu diesem Dokument können über die Internetseiten von DIN (www.din.de) durch eine Suche nach der Dokumentennummer aufgerufen werden.

Änderungen

Gegenüber DIN EN 3155-001:2016-11 wurden folgende Änderungen vorgenommen:

- a) Normative Verweisungen aktualisiert;
- b) Kontaktgröße 23 mit Hülsengröße 22 hinzugefügt;
- c) Prüfungen 101 und 417 in Tabelle 2 überarbeitet;
- d) Anmerkungen in Tabelle 5, Tabelle 6 und Tabelle 7 gestrichen;
- e) Prüfung 418 vor der Prüfung 201 in Gruppe 2 der Tabelle 8 eingefügt;
- f) Prüfungen 221, 222 und 223 gestrichen und Prüfung 508 in Gruppe 2 der Tabelle 11 hinzugefügt;
- g) Dokument redaktionell überarbeitet.

Nationaler Anhang NA (informativ)

Literaturhinweise

DIN EN 60352-1, *Lötfreie Verbindungen — Teil 1: Wickelverbindungen; Allgemeine Anforderungen; Prüfverfahren und Anwendungshinweise*

DIN ISO 2859-1, *Annahmestichprobenprüfung anhand der Anzahl fehlerhafter Einheiten oder Fehler (Attributprüfung) — Teil 1: Nach der annehmbaren Qualitätsgrenzlage (AQL) geordnete Stichprobenpläne für die Prüfung einer Serie von Losen*

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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

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee ASD-STAN.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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-CENELEC Management Centre has the same status as the official versions.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (prEN 3155-001:2023) 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 document has received the approval of the National Associations and the Official Services of the member countries of ASD-STAN, prior to its presentation to CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 3155-001:2016.

The main changes compared to the previous edition are as follows:

- Update of normative references;
- Introduction of contact size 23 with barrel 22;
- Revision of test 101 and 417 in Table 2;
- Removal of remarks in Table 5, Table 6 and Table 7;
- Introduction of test 418 prior to test 201 in Group 2 of Table 8;
- Removal of tests 221, 222 and 223 and introduction of test 508 in group 2 of Table 11;
- Editorial revision of the document.

1 Scope

This document 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 takes precedence.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 2083, *Aerospace series - Copper and copper alloys 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 (all parts), *Aerospace series — Elements of electrical and optical connection — Test methods*

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 Products*

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 27874:2008)*

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

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

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

TR 3198,² *Aerospace series — Manufacturers' identification monograms and marks for EN aerospace products*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

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

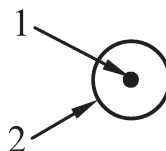
coaxial contact male or female

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

Note 1 to entry: See Figure 1.

Note 2 to entry: Male coaxial contact where the outer contact is male; the central contact(s) may be male or female.

Note 3 to entry: Female coaxial contact where the outer contact is female; the central contact(s) may be male or female.



Key

- 1 Centre contact
- 2 Outer contact

Figure 1 — Coupling face of coaxial contact male or female

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

3.6

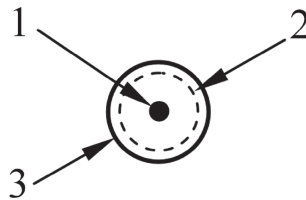
triaxial contacts male or female

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

Note 1 to entry: See Figure 2.

Note 2 to entry: Male triaxial contact where the outer contact is male; the central contact(s) may be male or female.

Note 3 to entry: 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 — Coupling face of triaxial contacts male or female

3.7

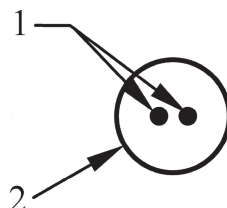
bifilar contact (twinax)

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

Note 1 to entry: See Figure 3.

Note 2 to entry: Male twinax contact where the outer contact is male; the central contacts may be male or female.

Note 3 to entry: 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 — Coupling face of bifilar contact (twinax)

3.8

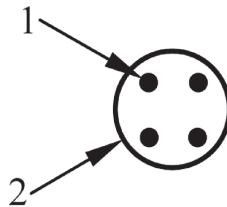
quadrax contact

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

Note 1 to entry: See Figure 4.

Note 2 to entry: Male quadrax contact where the outer contact is male; the central contacts may be male or female.

Note 3 to entry: 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 — Coupling face of quadrax contact

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 specified 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 document 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 ^a	0,394 0,368	0,19 max.	14	2,01 1,96	0,99 0,61
26 ^a	0,521 0,495	0,25 max.	12	2,41 2,36	1,57 1,19
24 ^a	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	—	—	—
^a 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 21920-1)

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

5.3.1 General

Except contact type C contact.

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 specified with their minimum gold plating thickness requirements as follows:

- Crimping area;
- Transition area;
- Active area;
- See description in paragraph from 5.3.2 to 5.3.4.

5.3.2 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.

5.3.3 Transition area

Transition area are specified 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).

5.3.4 Active area

Active areas are specified 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 [see Figure 5b), key 4, male active area] and X [see Figure 5c), key 6, female active area].

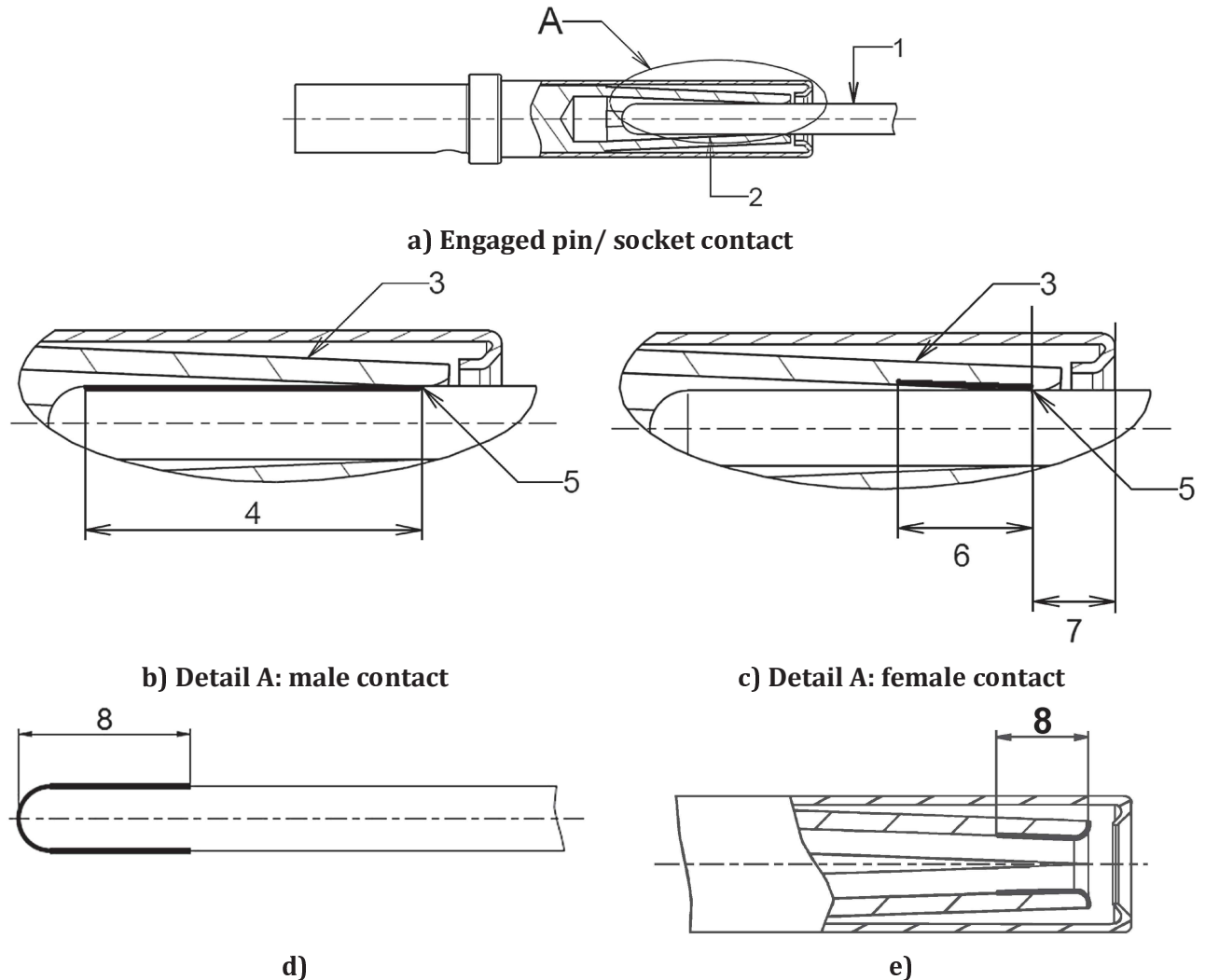
The gold plating thickness shall be sufficient to fulfil the performances required in this specification. However, and unless otherwise specified in the product standard, it shall never be lower than 0,8 µm.

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.

5.3.5 All other areas

All other areas shall be protected as follows:

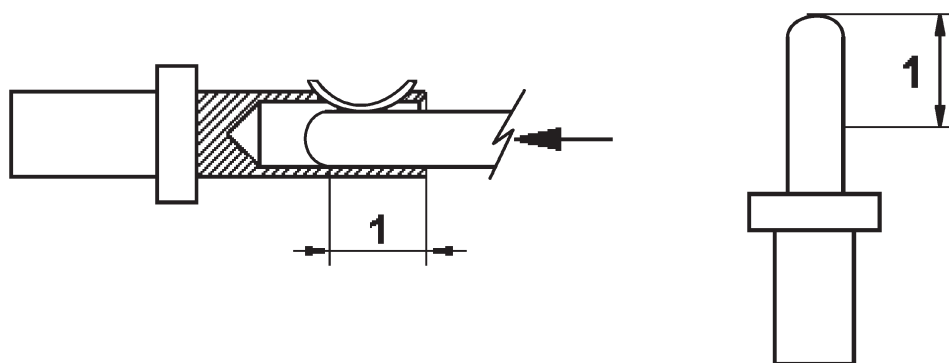
EN ISO 27874 Ni 0,76 µm min./Au(99,0) 0,1 µm minimum.



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 specified 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

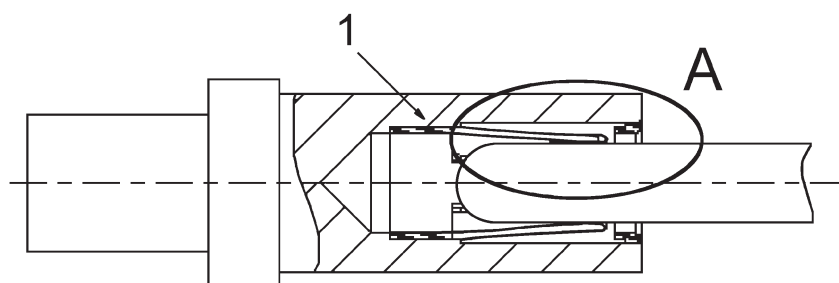
Figure 5 — Contact with integrated pressure element



Key

1 Contact active area X = contact active area Y

Figure 6 — Female contact with separate pressure elements



Key

1 Electrical contact transition area

NOTE See Figure 5 for Detail A.

Figure 7 — Contact with separate pressure element

For contact types D and E.

Inner contact and outer contact bodies according to Figure 5, Figure 6 and applicable standard products.

6 Dimensions and mass

The dimensions of the contacts and their mass are specified in the product standard.

7 Operation

The tools for connecting and installing the contacts are specified in the product standard.

8 Tests

Tests shall be in accordance with Table 2.

Table 2 — Qualification tests

EN 2591-	Test	Details																				
101	Visual examination	Initial examination: before and after wiring Details to be examined and documented: — identification of materials in accordance with definition document; — identification; — aspect before and after wiring (No breaking strand at the rear of the barrel); — marking; — surface roughness in accordance with 5.1.7. For crimped terminations, after wiring, the crimp joint shall be examined (10 times magnification) for cracking exposing the base metal, except type C contact. Intermediate and final examination: Details to be examined and documented: — gold plating shall be present at electrical contact point and transition area. There shall be no crack, burr, peeling or blister. No breaking strand at the rear of the barrel. No displacement (rotation is accepted without disassembly) of the hood on body socket contact.																				
102	Examination of dimensions and mass	In accordance with the product standard.																				
201	Contact resistance - low level — Types A, D and E contacts	Applicable to type A contacts of size 20 and smaller and to types D and E contacts. Unless otherwise specified in the product standard, the contact resistance shall not exceed the maximum values given below (in mΩ).																				
		<table border="1"> <thead> <tr> <th rowspan="2">Contact size</th><th colspan="2">Type A</th></tr> <tr> <th>Initially</th><th>After tests</th></tr> </thead> <tbody> <tr> <td>≤ 24</td><td>— a</td><td>— a</td></tr> <tr> <td>23</td><td>8</td><td>11</td></tr> <tr> <td>22</td><td>8</td><td>11</td></tr> <tr> <td>20</td><td>5</td><td>7</td></tr> <tr> <td colspan="3">a To be specified in the product standard.</td></tr> </tbody> </table>	Contact size	Type A		Initially	After tests	≤ 24	— a	— a	23	8	11	22	8	11	20	5	7	a To be specified in the product standard.		
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