BRITISH STANDARD AEROSPACE SERIES

BS EN
3155-012:2006

Electrical contacts used in elements of connection —

Part 012: Contacts, electrical, triaxial, size 8, male, type D, solder, class R — Product standard

The European Standard EN 3155-012:2006 has the status of a British Standard

ICS 49.060

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 3155-012:2006.

The UK participation in its preparation was entrusted by Technical Committee ACE/6, Aerospace avionic electrical and fibre optic technology, to Subcommittee ACE/6/-/3, Aerospace — Connectors, which has the responsibility to:

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— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

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EN 3155-012

July 2006

ICS 49.060

English Version

Aerospace series - Electrical contacts used in elements of connection - Part 012: Contacts, electrical, triaxial, size 8, male, type D, solder, class R - Product standard

Série aérospatiale - Contacts électriques utilisés dans les organes de connexion - Partie 012 : Contacts électriques, triaxiaus, taille 8, mâles, type D, à souder, classe R - Norme de produit

Luft- und Raumfahrt - Elektrische Kontakte zur Verwendung in Verbindungselementen - Teil 012: Elektrische triaxiale Stiftkontakte, Größe 8, Typ D, zum Löten, Klasse R - Produktnorm

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Foreword

This European Standard (EN 3155-012:2006) has been prepared by the AeroSpace and Defense 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of an identical text or by endorsement, at the latest by January 2007, and conflicting national standards shall be withdrawn at the latest by January 2007.

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0 Introduction

The contacts defined by this standard are derived from and interchangeable with those of MIL-C-39029/90A. They are also interchangeable with those of standard EN 3155-010.

1 Scope

This standard specifies the required characteristics and tests applicable to size 8, male triaxial electrical contacts 012, type D, solder, class R, used in elements of connection according to EN 3155-002.

It shall be used together with EN 3155-001.

The associated female contacts are defined in EN 3155-011 and EN 3155-013.

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 2591 (series), *Aerospace series — Elements of electrical and optical connection — Test methods*

EN 3155-001, *Aerospace series — Electrical contacts used in elements of connection — Part 001: Technical specification*

EN 3155-002, *Aerospace series — Electrical contacts used in elements of connection — Part 002: List and utilization of contacts*

EN 3155-010, *Aerospace series — Electrical contacts used in elements of connection — Part 010: Contacts, electrical, triaxial, size 08, male, type D, crimp, class R — Product standard*

EN 3155-011, *Aerospace series — Electrical contacts used in elements of connection — Part 011: Contacts, electrical, triaxial, size 8, female, type D, crimp, class R — Product standard*[1)]

EN 3155-013, *Aerospace series — Electrical contacts used in elements of connection — Part 013: Contacts, electrical, triaxial, size 8, female, type D, solder, class R — Product standard*

EN 3375-003, *Aerospace series — Cables, electrical, for signal data transmissions — Part 003: Cables, bifilar, single braid — Product standard*

EN 3375-004, *Aerospace series — Cables, electrical, for signal data transmissions — Part 004: Cables, bifilar, double braid — Product standard*

EN 3375-005, *Aerospace series — Cables, electrical, for signal data transmissions — Part 005: Cables, bifilar, double braid, high immunity — Product standard*

MIL-A-8243D, *Anti-icing and deicing-defrosting fluids*[2)]

MIL-C-25769J, *Cleaning compound, aircraft surface, alkaline water base*[2)]

MIL-C-39029/90A; *Contact, electrical connector, concentric twinax, pin, size 8*[2)]

MIL-H-5606E, *Hydraulic fluid, petroleum base, aircraft, missile and ordnance*[2)]

MIL-I-81969/14, *Installing and removal tools, connector electrical contact, type III, class 2, composition B*[2)]

MIL-L-7808J, *Lubricating oil, aircraft turbine engine, synthetic base, NATO code number 0-148*[2)]

MIL-L-7870A, *Lubricating oil, general purpose, low temperature*[2)]

MIL-L-23699C, *Lubricating oil, aircraft turbine engines, synthetic base*[2)]

SAE AS 1241A, *Fire resistant phosphate ester hydraulic fluid for aircraft (March 83)*[3)]

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1) In preparation at the date of publication of this standard.
2) Published by: Department of Defense (DOD), the Pentagon, Washington DC 20301 USA.
3) Published by Society of Automotive Engineers, Inc. (SAE), 400 Commonwealth Drive Warrendale, PA 15096-0001.

3 Definitions

For the purposes of this standard, the definitions given in EN 3155-001 apply.

4 Required characteristics

4.1 Specific characteristics

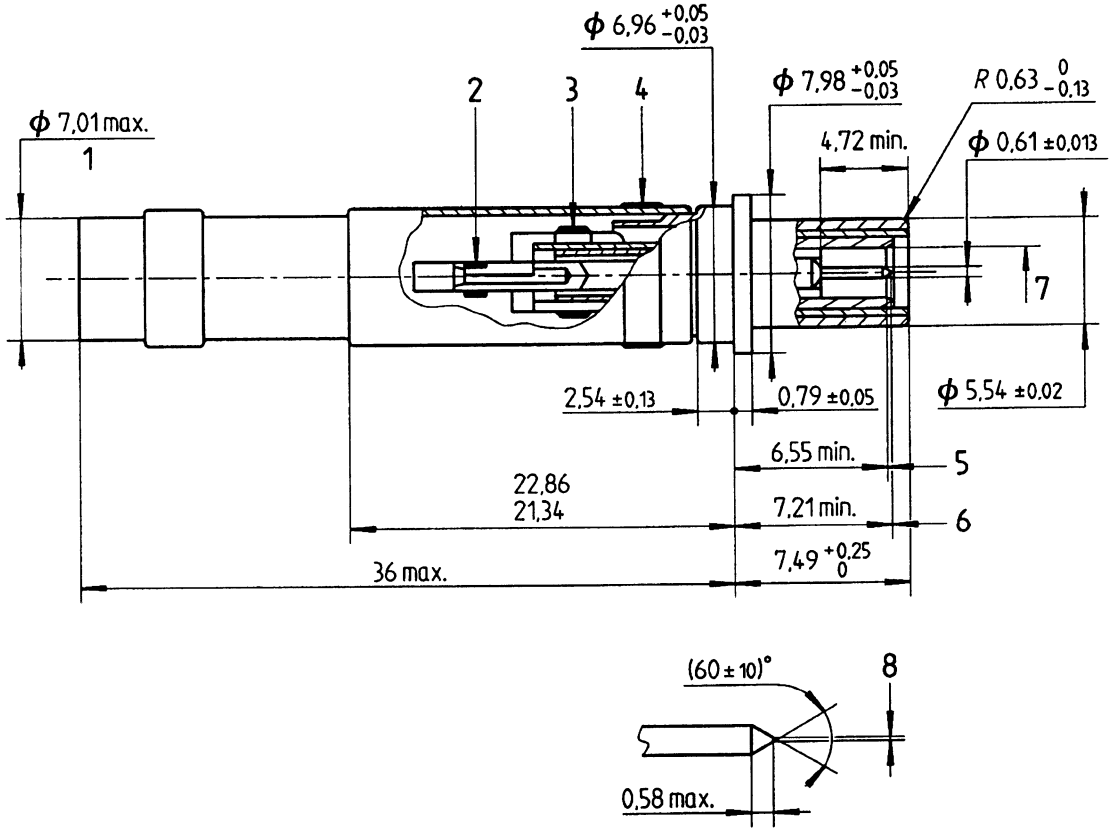
Type D contacts are contacts with screening feature, class R corresponds to an operating temperature range from – 65 °C to 150 °C. They may be delivered in different conditions defined in Table 9 of EN 3155-001.

4.2 Dimensions and mass

See Figure 1 for dimensions.

Dimensions and tolerances are given in millimetres.

Contact mass: 3,50 g max.



Key
1 Diameter of outside after wiring
2 Core/centre contact solder zone
3 Core/intermediate contact solder zone
4 Braid/outer contact solder zone
5 Point of contact with a flat ended gauge pin of diameter 2,870 ± 0,005
6 End of contact centre pin
7 Diameter compatible with intermediate pin diameter 2,870 ± 0,025
8 Permitted flat ∅ 0,2 max.

Figure 1

4.3 Material, surface treatment

4.3.1 Material

Body: copper alloy

4.3.2 Protective coating

Gold on appropriate undercoat for copper alloy parts.

Thickness not specified.

4.3.3 Dielectric

ETFE Fluoropolymer

4.3.4 Heat-shrinkable tubing

Radiation cross-linked polyvinylidene fluoride.

4.4 Permissible cables

See Table 1.

Table 1

Permissible cable group codes	Cable reference
A	EN 3375-003
B	EN 3375-004
C	EN 3375-005

4.5 Stripping of cables and wiring method

See Figure 2 to Figure 17.

Pre-position the screening feature ferrule on the cable

Dimensions in millimetres

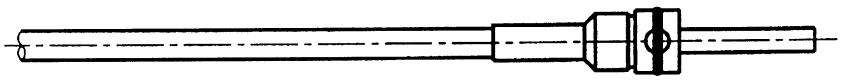


Figure 2

Expose the braid by stripping the insulation

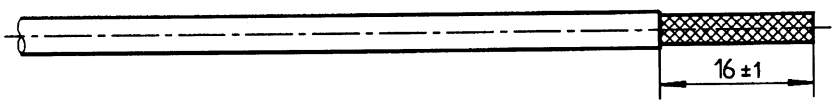


Figure 3

Pick up and roll back the braid. Pick up and roll back the first braid.

Single braid
EN 3375-003

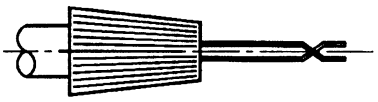


Figure 4

Double braid
EN 3375-004

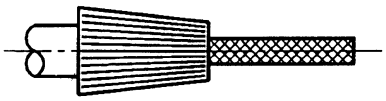


Figure 5

Double braid — Mu metal
EN 3375-005

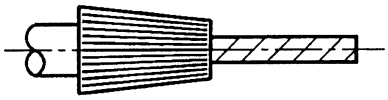


Figure 6

Cut the Mu metal strip

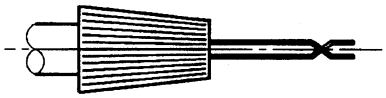


Figure 7

Pick up and roll back the second braid

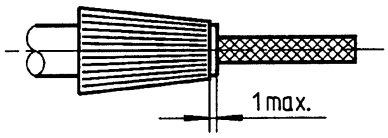


Figure 8

Align the two wires of the pair
Cut the filler
Strip the conductors

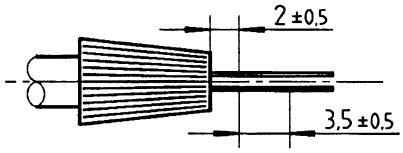
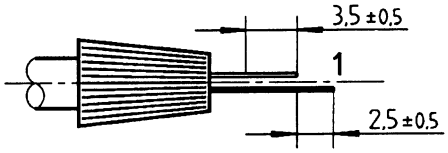


Figure 9

Flux (RMA flux) and tin plate the conductors with Sn63 Pb37
Re-cut the conductors to the lengths indicated (white and coloured wires of the pair).

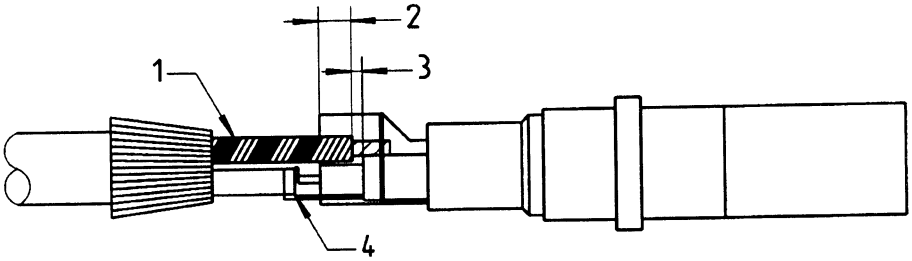


Key
1 White colour

Figure 10

Insert the conductors in the contacts:

— white conductor: centre contact;
— colour conductor: intermediate contact;
— introduce the cable to butt into the contact (centre conductor);
— check the position of the colour conductor and the position of the sleeve as indicated.



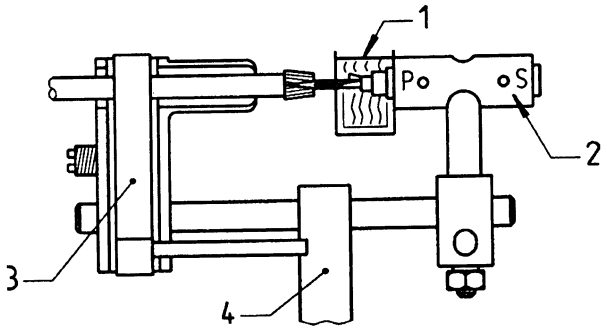
Key
1 Colour conductor
2 The sleeve covers the jacket of the colour conductor
3 0 to 1 max.
4 Cable/contact butt

Figure 11

After having checked the alignment of the V of the cable clamp with the positioner; insert the contact/cable assembly in the positioner. See Figure 12.

Turn on the heating tool for at least 30 s before set-up.

Position the contact in the heating zone using the holding fixture.



Key
1 Reflector
2 Positioner
3 Clamp
4 Holding tool

Figure 12

Heat until the two solder preforms have completely melted.

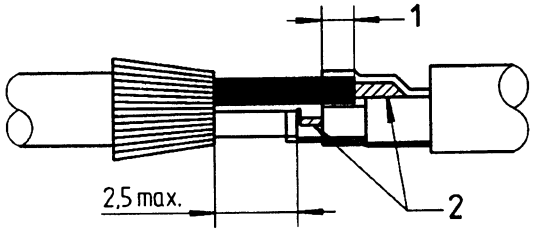
Leave the assembly to cool for a minimum of 15 s before withdrawing the contact from the fixture.

Checking the contact set-up. See Figure 13.

The contact can only be correctly set-up if all of the following conditions are visually observed:

— the two solder preforms have disappeared;

— respecting the overlap of the colour conductor.



Key
1 Overlap
2 Melted solder rings

NOTE A slight browning of the kynar sleeve is acceptable given that the performance of the product used is not affected.

Figure 13

Bring back the braid(s) over the body of the contact. See Figure 14.

Cut the braid according to the dimension indicated.

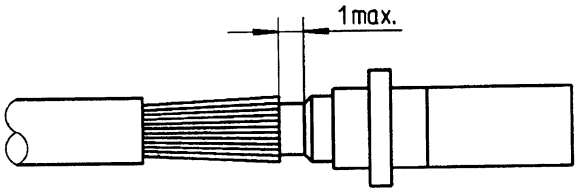


Figure 14

Introduce the screening feature ferrule to butt into the contact shoulder. See Figure 15.

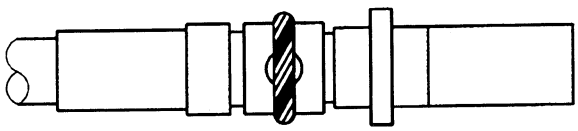


Figure 15

Heat the screening feature ferrule until solder has completely melted through the holes. See Figure 16.

Hold the ferrule with a tool while heating. Leave the assembly to cool for a minimum of 15 s before withdrawing the contact from the tool.

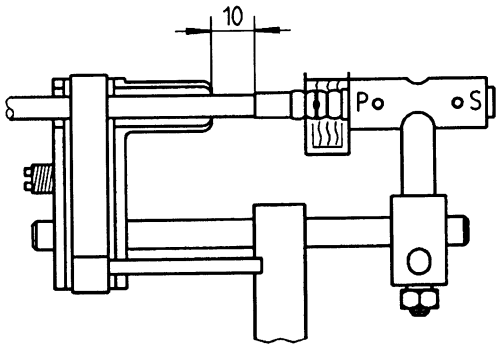


Figure 16

Checking the ferrule set-up

The braid shall be correctly wetted by the solder and shall be visible through at least 2 holes in the screening feature ferrule.

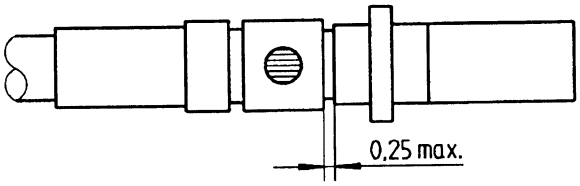


Figure 17

4.6 Tooling

Conform to MIL-I-81969/14

Insertion: not necessary

Extraction: M-81969/14-06

Contact termination: the hot air generator is of a minimum usable capacity of 800 W and the temperature in the heating zone shall be (420 ± 20) °C. The drawing of the tool is given for information purposes: the positioner has an interface for the male contact on side P and the female contact on side S (see Figure 12); the function of the cable clamp is to hold the parts in place during the heating and cooling phases.

4.7 Tests

See Table 2.

Table 2

<table>
<tr><th rowspan="2">EN 2591-</th><th rowspan="2">Test</th><th rowspan="2">Not applicable</th><th colspan="2">Applicable</th></tr>
<tr><th>According to EN 3155-001</th><th>Remarks</th></tr>
<tr><td>101</td><td>Visual examination</td><td></td><td>X</td><td></td></tr>
<tr><td>102</td><td>Examination of dimensions and mass</td><td></td><td>X</td><td></td></tr>
<tr><td>201</td><td>Contact resistance — low level</td><td></td><td>X</td><td>Cable as per Table 1—
Probe distance:
(150 ± 2) mm
Test temperature:
ambient
<table><tr><th rowspan="2">Contact</th><th colspan="2">Maximum contact resistance
mΩ</th></tr><tr><th>Initial</th><th>After tests</th></tr><tr><td>Centre</td><td rowspan="2">55</td><td rowspan="2">66</td></tr><tr><td>Intermediate</td></tr><tr><td>Outer</td><td colspan="2">Not applicable</td></tr></table></td></tr>
<tr><td>202</td><td>Contact resistance at rated current</td><td></td><td>X</td><td>Cable as per Table 1—
Probe distance:
(150 ± 2) mm
<table><tr><th rowspan="2">Contact</th><th colspan="3">Maximum contact resistance
mΩ</th><th rowspan="2">Rated current
A</th></tr><tr><th colspan="2">(25 +3 0) °C</th><th>(150 +3 0) °C</th></tr><tr><th>Initial</th><th>After tests</th><th>After tests</th></tr><tr><td>Centre</td><td rowspan="2">55</td><td rowspan="2">66</td><td rowspan="2">94</td><td rowspan="2">1</td></tr><tr><td>Intermediate</td></tr><tr><td>Outer</td><td>6,3</td><td>7,5</td><td>10,7</td><td>12</td></tr></table></td></tr>
<tr><td>204</td><td>Discontinuity of contacts in the microsecond range</td><td></td><td>X</td><td>Method B
Duration of discontinuity: < 100 ns
Test duration: throughout the duration of tests 402 and 403</td></tr>
<tr><td>206</td><td>Measurement of insulation resistance</td><td></td><td>X</td><td>Method C
Mated contacts
At ambient > 5 GΩ
At 150 °C > 2 GΩ</td></tr>
<tr><td>207</td><td>Voltage proof test</td><td></td><td>X</td><td>Method C
Proof test voltage at sea level:
1 000 V r.m.s. between centre contact and intermediate contact and 500 V r.m.s. between intermediate contact and outer contact.
Proof test voltage at altitude:
125 V r.m.s. at 1,1 kPa pressure (33 000 m).
Leakage current: 2 mA</td></tr>
<tr><td>210</td><td>Electrical overload</td><td>X</td><td></td><td></td></tr>
</table>

Table 2 (*continued*)

<table>
<tr><th rowspan="2">EN 2591-</th><th rowspan="2">Test</th><th rowspan="2">Not applicable</th><th colspan="2">Applicable</th></tr>
<tr><th>According to EN 3155-001</th><th>Remarks</th></tr>
<tr><td>211</td><td>Capacity measurement</td><td>X</td><td></td><td></td></tr>
<tr><td>212</td><td>Transfer impedance</td><td>X</td><td></td><td>Under investigation</td></tr>
<tr><td>213</td><td>Shielding effectiveness from 100 MHz to 1 GHz</td><td>X</td><td></td><td></td></tr>
<tr><td>301</td><td>Endurance at temperature</td><td></td><td>X</td><td>Method B
Duration: 1 000 h</td></tr>
<tr><td>305</td><td>Rapid change of temperature</td><td></td><td>X</td><td>T_A = (– 65 ± 2) °C
T_B (150 ± 2) °C</td></tr>
<tr><td>307</td><td>Salt mist</td><td></td><td>X</td><td></td></tr>
<tr><td>315</td><td>Fluid resistance</td><td></td><td>X</td><td>See Table 3.</td></tr>
<tr><td>402</td><td>Shock</td><td></td><td>X</td><td>Method A, severity 300.
The contacts shall be connected with a cable as per EN 3375, then fitted in connectors.
The connectors fitted with appropriate cable clamps shall be mated and mounted on the shock apparatus using appropriate mounting systems.
Discontinuity: ≤ 100 ns</td></tr>
<tr><td>403</td><td>Sinusoidal and random vibrations</td><td></td><td>X</td><td>The contacts shall be connected to a cable which complies with EN 3375 then fitted in the connectors.
The connectors fitted with appropriate cable clamps shall be mated and mounted on the fixture using appropriate mounting systems.
The cables are clamped a minimum of 200 mm from the rear of the contacts at a fixed point of the assembly.
Discontinuity: ≤ 100 ns
Test at (23 ± 5) °C</td></tr>
<tr><td>406</td><td>Mechanical endurance</td><td></td><td>X</td><td></td></tr>
<tr><td>415</td><td>Test probe damage (female contact)</td><td>X</td><td></td><td></td></tr>
<tr><td>416</td><td>Contact bending strength</td><td>X</td><td></td><td></td></tr>
<tr><td>417</td><td>Tensile strength (crimped connection)</td><td>X</td><td></td><td></td></tr>
<tr><td>418</td><td>Gauge insertion/extraction forces (female contacts)</td><td>X</td><td>X</td><td>Intermediate contact Gauge see 4.8.</td></tr>
</table>

Gauge	Minimum extraction force N		Maximum insertion force N	
	Initial	After tests	Initial	After tests
Maximum	NA	NA	5	6,12
Minimum	0,14	0,11	NA	NA

Table 2 (*concluded*)

EN 2591-	Test	Not applicable	Applicable	
			According to EN 3155-001	Remarks
501	Soft solderability	X		
502	Restricted entry	X		
503	Contact deformation after crimping	X		
507	Plating porosity		X	
508	Measurement of thickness of coating on contacts		X	The measured thickness shall be recorded.
509	Adhesion of coating on contacts		X	
513	Magnetic permeability		X	
514	Solderability of contacts with self-contained solder and flux		X	

Table 3 — List of fluids

Fluid			Immersion		Stoving	Number of cycle
Category	References		Duration min	Temp. °C	Temp. °C	
Fuel	JP5	NATO F-44	$5\ ^{+2}_{0}$	25	85	7
Mineral hydraulic fluid	MIL-H-5606E	NATO F-515	$15\ ^{+5}_{0}$	85	100	5
Synthetic hydraulic fluid	SAE AS 1241A	Skydrol 500 B4 Skydrol LD 4	$15\ ^{+5}_{0}$	85	100	5
Mineral lubricant	MIL-L-7870A	NATO O-142	$15\ ^{+5}_{0}$	120	125	5
Synthetic lubricant	MIL-L-23699C	NATO O-156	$15\ ^{+5}_{0}$	150	125	5
	MIL-L-7808J	—				
Cleaning products	MIL-C-25769J, diluted	—	$15\ ^{+5}_{0}$	25	25	5
	25 % Propanol + 75 % White Spirit					
	Azetrope R113AzM (R113 + Methanol)	—	$5\ ^{+5}_{0}$			2
De-icing fluid	MIL-A-8243D	NATO S-742	$15\ ^{+5}_{0}$	50	100	5
Extinguishing fluid	Chlorbromethan (less than 0,1 MPa of overpressure)	—	$15\ ^{+5}_{0}$	– 15	25	5
Cooling fluid	Coolanol	—	$15\ ^{+5}_{0}$	50	25	5

4.8 Gauge

The gauges used for test EN 2591-418 are defined by Figure 18 and Table 4.

Dimensions in millimetres

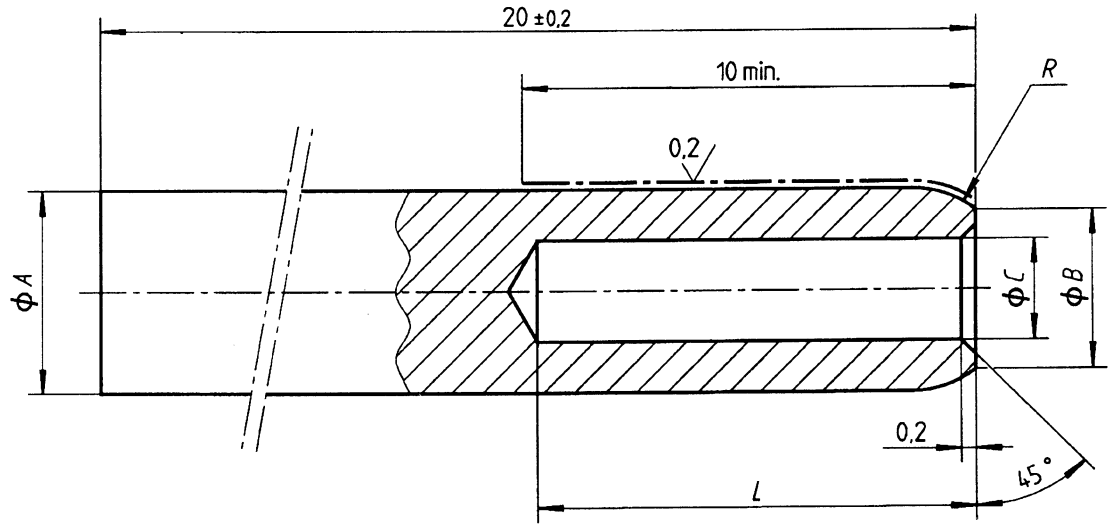


Figure 18

Table 4

Gauge	*A*	*B*	*C*	*R*	*L*
Maximum	2,896 2,893	2,3 2,2	1,5 1,2	0,71 0,58	7,5 7
Minimum	2,847 2,844	2,3 2,2	1,5 1,2	0,71 0,58	7,5 7

Material: tool steel or carbide steel

5 Designation

EXAMPLE

	Description block	**Identity block**
	CONTACT, ELECTRICAL	EN3155-012 M 08 A B

Number of this standard

Type of contact: M: male

Contact size code (see EN 3155-001, Table 8)

Permissible cable code (see Table 1)

Code for delivery conditions (see EN 3155-001, Table 10)

NOTE If necessary, the code I9005 shall be placed between the description block and the identity block.

6 Marking

See EN 3155-001.

7 Conditioning

The contacts are packaged and identified individually. Conditioning shall provide protection of the contacts against any eventual damage.

Packaging shall include:

— the manufacturer's name;

— the designation defined in Clause 5;

— the manufacturer's reference;

— the manufacturing date code (year-week).

8 Technical specification

See EN 3155-001.

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