BRITISH STANDARD

BS EN
3155-059:2006

Aerospace series — Electrical contacts used in elements of connection —

Part 059: Contacts, electrical, coaxial, size 16, female, type D, solder, class R — Product standard

The European Standard EN 3155-059:2006 has the status of a British Standard

ICS 49.060

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National foreword

This British Standard was published by BSI. It is the UK implementation of EN 3155-059:2006.

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.

A list of organizations represented on ACE/6/-/3 can be obtained on request to its secretary.

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2007

ISBN 978-0-580-49942-5

Amendments issued since publication

Amd. No.	Date	Comments

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 3155-059

December 2006

ICS 49.060

English Version

Aerospace series - Electrical contacts used in elements of connection - Part 059: Contacts, electrical, coaxial, size 16, female, type D, solder, class R - Product standard

Série aérospatiale - Contacts électriques utilisés dans les organes de connexion - Partie 059 : Contacts, électriques, coaxiaux, taille 16, femelle, type D, à souder, class R - Norme de produit

Luft- und Raumfahrt - Elektrische Kontakte zur Verwendung in Verbindungselementen - Teil 059: Elektrische Koaxial Buchsenkontakte Größe 16, Typ D, zum Löten, Klasse R - Produktnorm

This European Standard was approved by CEN on 26 July 2006.

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Ref. No. EN 3155-059:2006: E

Contents

Page

Foreword

This document (EN 3155-059:2006) 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of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

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Introduction

The contacts defined by this standard are derived from those of MIL-C-39029/77 and are intermateable with those of MIL-C-39029/76.

1 Scope

This standard specifies the required characteristics, tests and tooling applicable to size 16, female coaxial, electrical contacts, 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 male contacts are defined in EN 3155-058.

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 (all parts), *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* [1)]

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

EN 3155-058, *Electrical contacts used in elements of connection – Part 058: Contacts, electrical, coaxial, size 16, male, type D, solder, class R – 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-39029/76, *Contacts, electrical connector, pin, crimp, removable, shielded, size 16, (for MIL-C-38999 Series I, II, III, IV and MIL-C-24308 connectors)* [2)]

MIL-C-39029/77, *Contacts, electrical connector, socket, crimp, removable, shielded, size 16, (for MIL-C-38999 Series I, III, IV connectors)* [2)]

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

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

MIL-I-81969/08B, *Installing and removal tools, connector electrical contact, types I and II, class 2, composition A* [2)]

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

2) Published by: Department of Defense (DOD), the Pentagon, Washington D.C. 20301 USA.

MIL-I-81969/14C, *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 O-148* [2)]

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

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

MS3197, *Gage pin for socket contact engagement test* [2)]

QQ-S-571F*, Solder, electronic (96 to 485 °C)* [2)]

SAE AS 1241A, *Fire Resistant Phosphate Ester Hydraulic Fluid for Aircraft (March 83)* [3)]

TR 6058, *Aerospace series – Cable code identification list* [4)]

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.

4.2 Dimensions and mass

See Figure 1 for dimensions.

Contact mass: 0,7 g max.

4.3 Marking by colour code

Not applicable

4.4 Material, surface treatment

4.4.1 Material

Body: copper alloy

4.4.2 Protective coating

Gold on appropriate undercoat for copper alloy parts

Thickness not specified.

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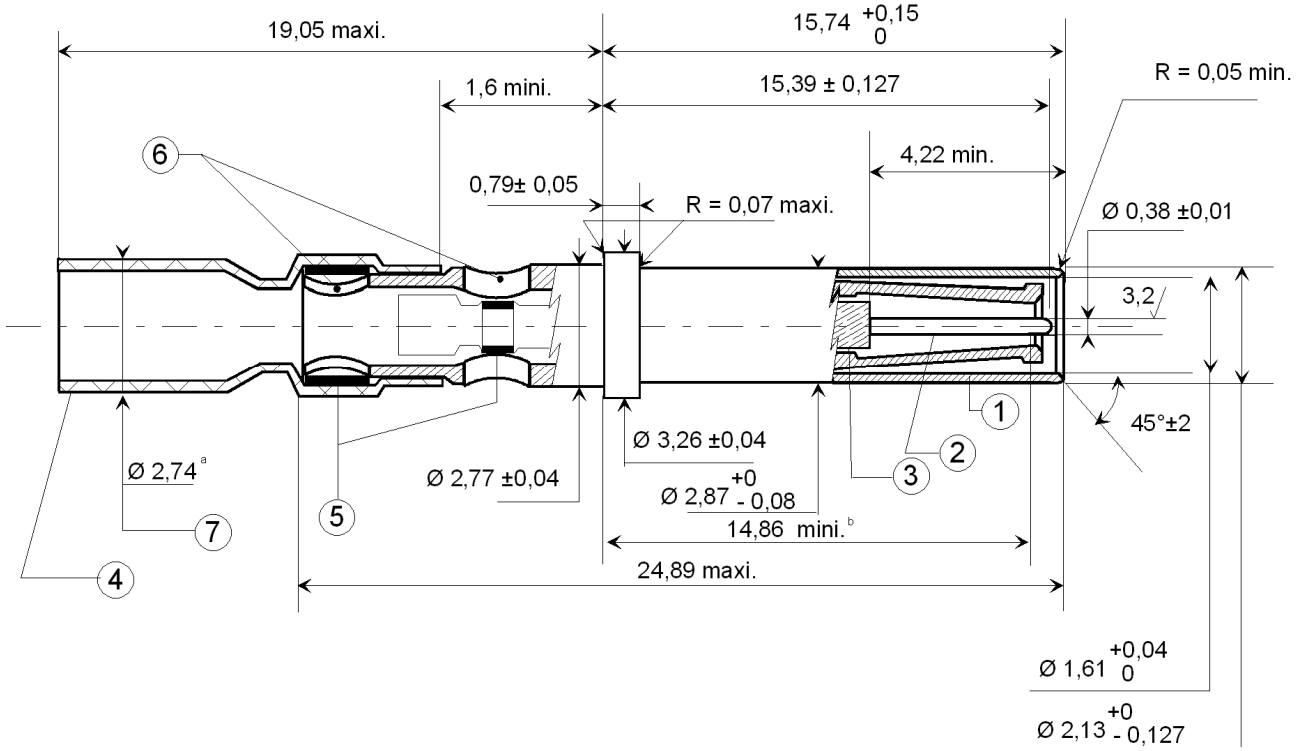
2) Published by: Department of Defense (DOD), the Pentagon, Washington D.C. 20301 USA.
3) Published by: Society of Automotive Engineers, Inc. (SAE) 400, Commonwealth Drive, Warrendale, PA 15096-0001.
4) Published as ASD Technical Report at the date of publication of this standard.

4.4.3 Dielectric

ETFE fluoropolymer

Dimensions in millimetres



Key

① Female external contact body
② Male central contact body
③ Dielectric
④ Heat shrinkable tubing
⑤ Solder rings
⑥ Inspection windows
⑦ Diameter after shrinking

[a] After termination
[b] See notes 1 & 2

NOTE 1 Point at which a square ended gauge pin of the same basic diameter as the mating contact first engages the female contact spring member. Provision for clearance hole shall be provided.

NOTE 2 Outer contact mates with 1,61/1,57 male contact diameter

Figure 1

4.4.4 Heatshrinkable tubing

Radiation crosslinked polyvinylidene fluoride.

4.4.5 Solder rings

Sn63 as per QQ-S-571

4.5 Permissible cables

The cables should have dimensions within the values specified in Table 1.

4.6 Stripping of cables and wiring method

Dimensions are in millimetres. See Figures 2, 3 and 4.

4.6.1 Assembly instructions

Strip cable as shown on Figures 2 or 3 or 4.

Insert cable into contact until it is fully seated.

Heat contact with appropriate tools as shown on Figure 5 until solder melts and flows and strain relief tubing conforms to cable

Table 1

Dimensions in millimetres

Cable diameter		min.	max.
Jacket	A	–	2,62
Shield	B	1,67	2,13
Dielectric	C	0,91	1,72
Conductor	D	0,22	0,58
Permissible cable code according to TR 6058		XE, XY, WL	

4.6.2 Preparation of coaxial cable

Depending upon dielectric diameter value there are three possibilities

4.6.2.1 Cable preparation for straight shield

When all diameters conform to Table 1.

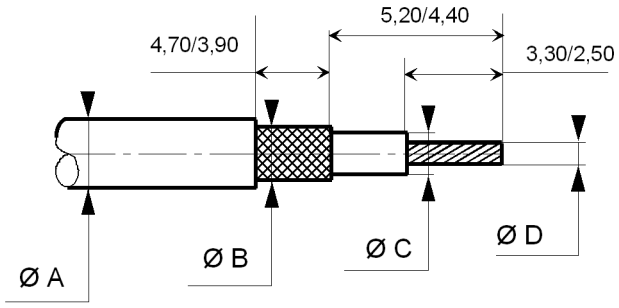


Figure 2

4.6.2.2 Cable preparation for fold back shield

When shield diameter is smaller than Ø B min. of Table 1.

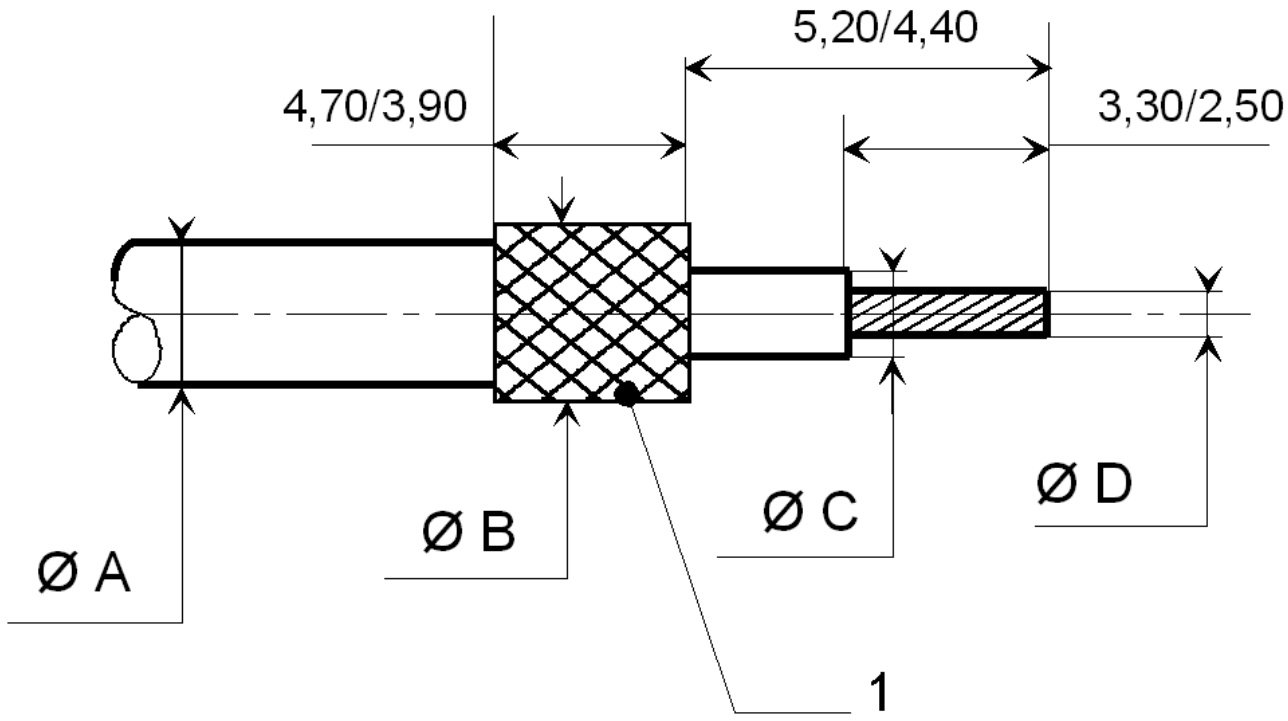
Restriction: if diameter of shield becomes = Ø B max. (2,13 mm).

4.6.2.3 Preparation for coaxial cable with small dielectric diameter

4.6.2.4 When dielectric diameter is = Ø C min. Table 1 (0,91 mm):

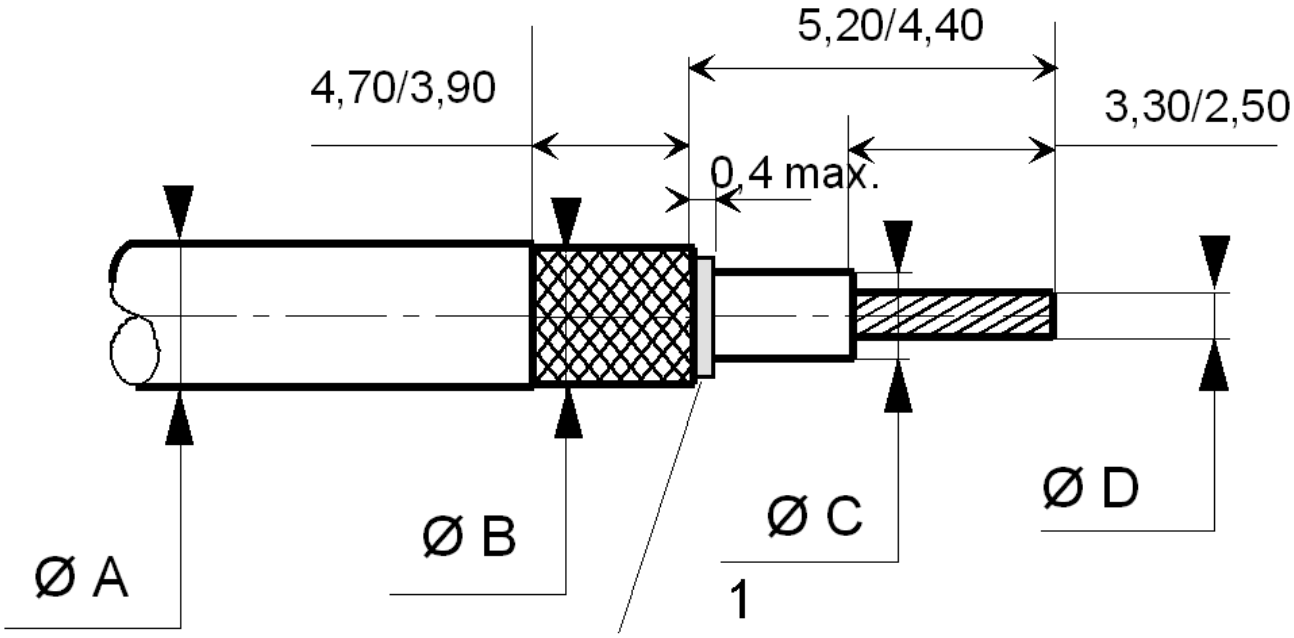
— strip the cable as shown on Figure 4;

— slip a dielectric barrier between the shield braid and the cable dielectric to bring the diameter within the value specified in Table 1.



Key
1 Fold shield back over cable jacket

Figure 3



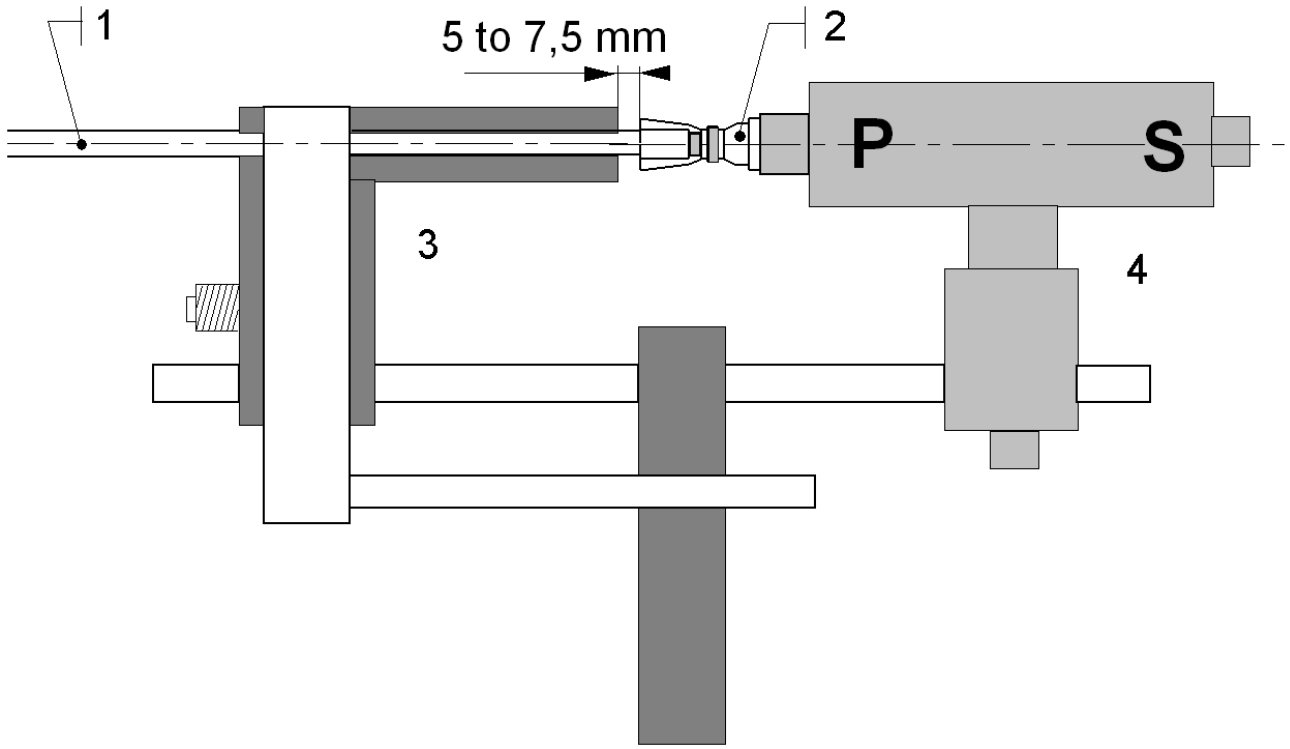
Key
1 Dielectric barrier

Figure 4

4.7 Tooling

4.7.1 Contact termination tooling

The hot air generator shall have 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 5); the function of the cable clamp is to hold the parts in place during the heating and cooling phases.



Key

1	Coaxial cable	4	Cable clamp
2	Contact	5	Positioning device

Figure 5

4.7.2 Insertion/extraction tooling

Insertion: MIL-I-81969/14-03 or MIL-I-81969/08-07

Extraction: MIL-I-81969/14-03 or MIL-I-81969/08-08

4.8 Tests

See Table 2.

Table 2

<table>
<tr><th>EN 2591-</th><th>Test</th><th>Not applicable</th><th colspan="2">Applicable</th></tr>
<tr><th></th><th></th><th></th><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>See § 4.2.</td></tr>
<tr><td>201</td><td>Contact resistance - Low level</td><td></td><td>X</td><td>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>10</td><td>15</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>
<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>(25 +3 0) °C</th><th>(150 +3 0) °C</th></tr>
<tr><th></th><th>Initial</th><th>After tests</th><th>After tests</th></tr>
<tr><td>Centre</td><td>10</td><td>15</td><td>20</td><td>1</td></tr>
<tr><td>Outer</td><td>1,5</td><td>2</td><td>3</td><td>7,5</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:
500 V r.m.s. between centre 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>
</table>

Table 2 *(continued)*

EN 2591-	Test	Not applicable	Applicable	
			According to EN 3155-001	Remarks
210	Electrical overload	X		
211	Capacitance measurement	X		
212	Surface transfer impedance	X		
213	Shielding effectiveness from 100 MHz to 1 GHz	X		
301	Endurance at temperature		X	Method B – 150 °C Duration: 1 000 h
305	Rapid change of temperature		X	$T_A = (-65 \pm 2)$ °C $T_B = (150 \pm 2)$ °C
306	Mould growth	X		
307	Salt mist		X	
315	Fluid resistance		X	See Table 3.
402	Shock		X	Method A, severity 300. The contacts shall be connected with a cable as per Table 1, 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
403	Sinusoidal and random vibrations		X	The contacts shall be connected to a cable as per Table 1 then fitted in the connectors. The connectors fitted with appropriate cable clamps shall be mated and mounted on the vibration apparatus 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
406	Mechanical endurance		X	
415	Test probe damage (female contact)	X		
416	Contact bending strength	X		
41[a]	Tensile strength (crimped connection)	X		

Table 2 *(concluded)*

<table>
<tr><th>EN 2591-</th><th>Test</th><th>Not applicable</th><th colspan="2">Applicable</th></tr>
<tr><th></th><th></th><th></th><th>According to EN 3155-001</th><th>Remarks</th></tr>
<tr><td>418</td><td>Gauge insertion and extraction forces in and out of a female contact</td><td></td><td>X</td><td></td></tr>
<tr><td></td><td colspan="4"><table>
<tr><th rowspan="2">Gauge</th><th colspan="2">Minimum extraction force N</th><th colspan="2">Maximum insertion force N</th></tr>
<tr><th>Initial</th><th>After tests</th><th>Initial</th><th>After tests</th></tr>
<tr><td>Maximum</td><td>NA</td><td>NA</td><td>8,40</td><td>10,08</td></tr>
<tr><td>Minimum</td><td>0,56</td><td>0,42</td><td>NA</td><td>NA</td></tr>
</table></td></tr>
<tr><td>501</td><td>Soft soldering</td><td>X</td><td></td><td></td></tr>
<tr><td>502</td><td>Restricted entry</td><td>X</td><td></td><td></td></tr>
<tr><td>503</td><td>Contact deformation after crimping</td><td>X</td><td></td><td></td></tr>
<tr><td>508</td><td>Measurement of thickness of coating on contacts</td><td></td><td>X</td><td>The measured thickness shall be recorded</td></tr>
<tr><td>509</td><td>Adhesion of coating on contacts</td><td></td><td>X</td><td></td></tr>
<tr><td>513</td><td>Magnetic permeability</td><td></td><td>X</td><td></td></tr>
<tr><td>514</td><td>Solderability of contacts with self-contained solder and flux</td><td></td><td>X</td><td></td></tr>
</table>

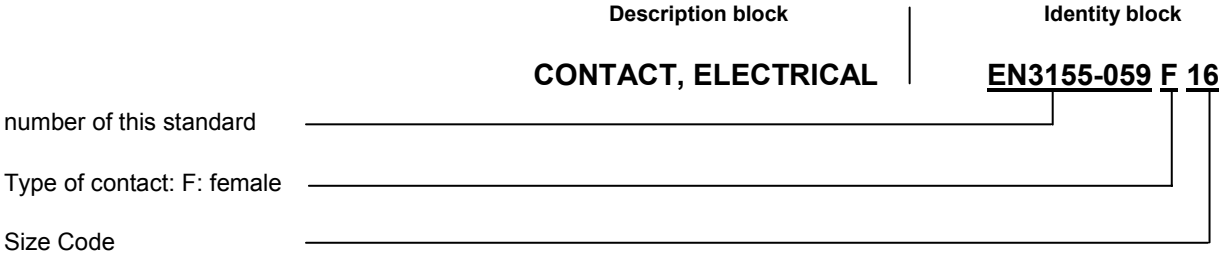
4.9 Gauge

The gauges used for test EN 2591-418 (outer contact only) shall be in accordance with MS3197, except the diameters shall be as specified in Table 4. Provision for a clearance hole shall be provided.

Material: tool steel or carbide steel

5 Designation

EXAMPLE



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

Table 3

Category	Fluid References		Immersion Duration min	Immersion Temp. °C	Stoving Temp. °C	Number of cycles
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					
	Azeotrope R113AzM (R113 + Methanol)	–	5 $^{+2}_{0}$			2
De-icing fluid	MIL-A-8243D	NATO S-742	15 $^{+5}_{0}$	50	100	5
Extinguishing fluid	Chlorobromethane (less than 0,1 MPa of overpressure)	–	15 $^{+5}_{0}$	– 15	25	5
Cooling fluid	Coolanol	–	15 $^{+5}_{0}$	50	25	5

Table 4

Dimensions in millimetres

Gauge diameter	
maximum	1,618
	1,613
minimum	1,562
	1,557

6 Marking

See EN 3155-001.

7 Technical specification

See EN 3155-001.

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