BS EN 3155-077:2012

BSI Standards Publication

Aerospace series — Electrical contacts used in elements of connection

Part 077: Contacts, electrical, female, type A, crimp, class R — Product standard

National foreword

This British Standard is the UK implementation of EN 3155-077:2012.

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A list of organizations represented on this committee can be obtained on request to its secretary.

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Luft- und Raumfahrt - Elektrische Kontakte zur Verwendung in Verbindungselementen - Teil 077: Elektrische Buchsenkontakte, Typ A, crimpbar, Klasse R - Produktnorm

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Foreword

This document (EN 3155-077:2012) 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of an identical text or by endorsement, at the latest by July 2012, and conflicting national standards shall be withdrawn at the latest by July 2012.

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Introduction

The contacts defined by this standard are to be used in connectors defined by EN 4644-001.

The contact #22 defined by this standard are derived from those of SAE AS 39029-12 and are intermateable with those of SAE AS 39029-11.

1 Scope

This European Standard specifies the required characteristics, tests and tooling applicable to female contacts size 22, 20, 16, 12, 8 and 5, type A, crimp, class R, used in elements of connection according to EN 3155-002.

It should be used together with EN 3155-001.

The associated male contacts are defined in EN 3155-076.

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 2083, *Aerospace series — Copper and copper alloys conductors for electrical cables — Product standard*

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*

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

EN 3155-076, *Aerospace series — Electrical contacts used in elements of connection — Part 076: Contacts, electrical, male, type A, crimp, class R — Product standard*

EN 4644-001, *Aerospace series — Connector, electrical and optical, rectangular, modular, rectangular inserts, operating temperature 175 °C (or 125 °C) continuous — Part 001: Technical specification*

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

MIL-DTL-22520, *Crimping tools, terminal, hand or power actuated, wire termination, and tool kits general specification for* [1)]

MIL-I-81969, *Installing and removal tools, connector electrical contact, general specification for* [1)]

SAE AS 39029, *Contacts, electrical connector, general specification for* [2)]

1) Published by: DoD National (US) Mil. Department of Defense http://www.defenselink.mil/.

2) Published by: SAE National (US) Society of Automotive Engineers http://www.sae.org/

3 Terms, definitions and abbreviations

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

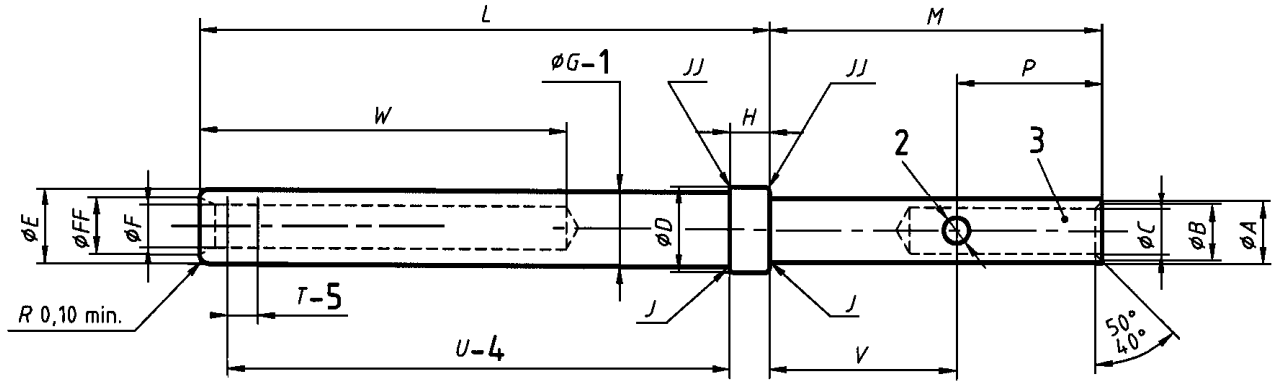
4 Requirements

4.1 Specific characteristics

Type A contacts are for general application and class R corresponds to an operating temperature range from – 65 °C to 175 °C.

4.2 Dimensions and mass

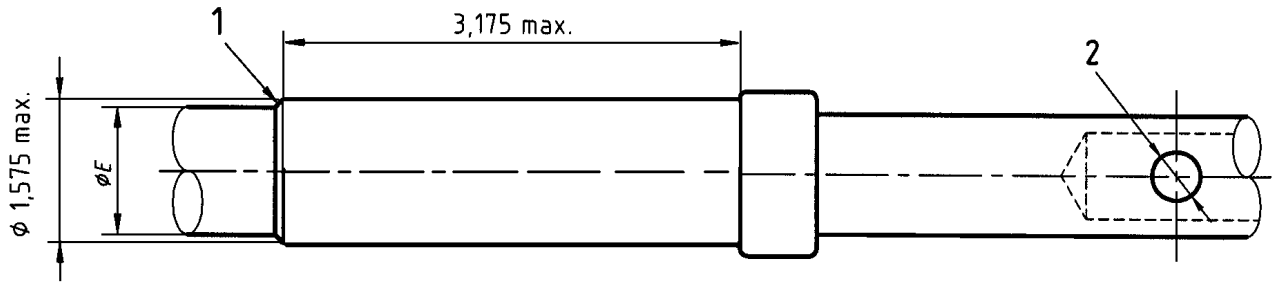
See Figures 1 to 3 and Table 1.



Key

1 Beginning at the interface where the sleeve meets the barrel of the contact.
2 One hole Ø N
3 Area for colour band marking (see Table 2).
4 Distance from contact shoulder to socket contact extremity.
5 Distance between socket contact extremely and contact electrical point.

Figure 1



Key

1 Chamfer or radius
2 One hole Ø N

Figure 2 — Size 16, 12 and 8 crimp barrel

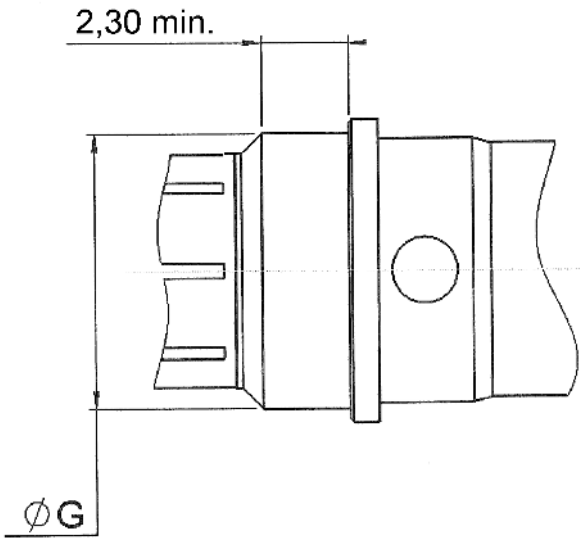
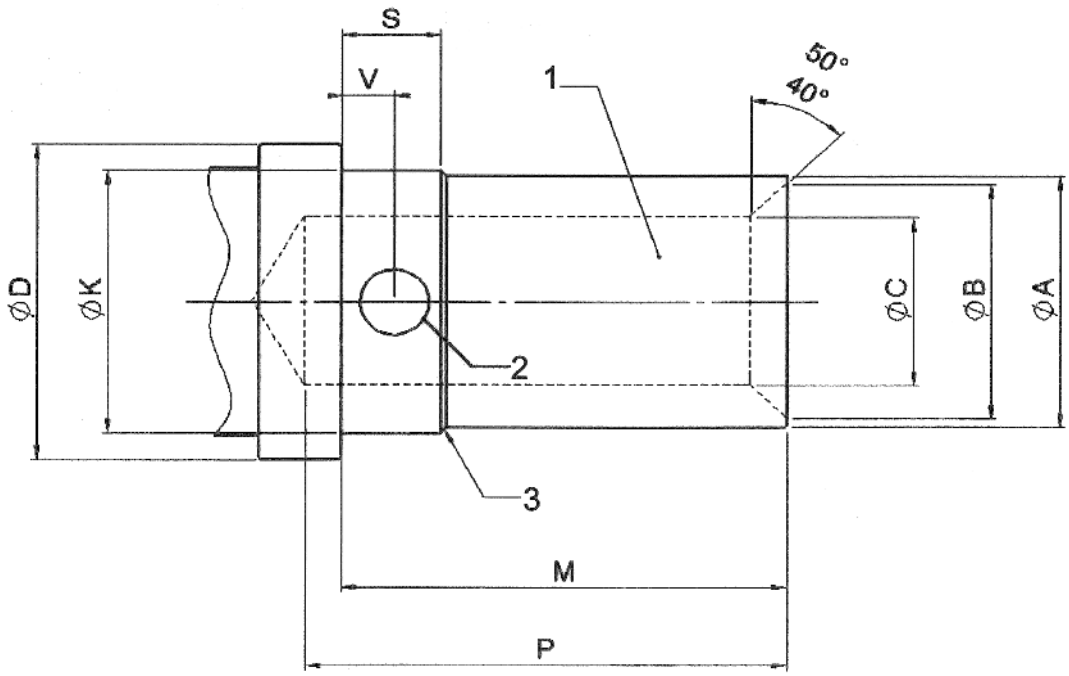


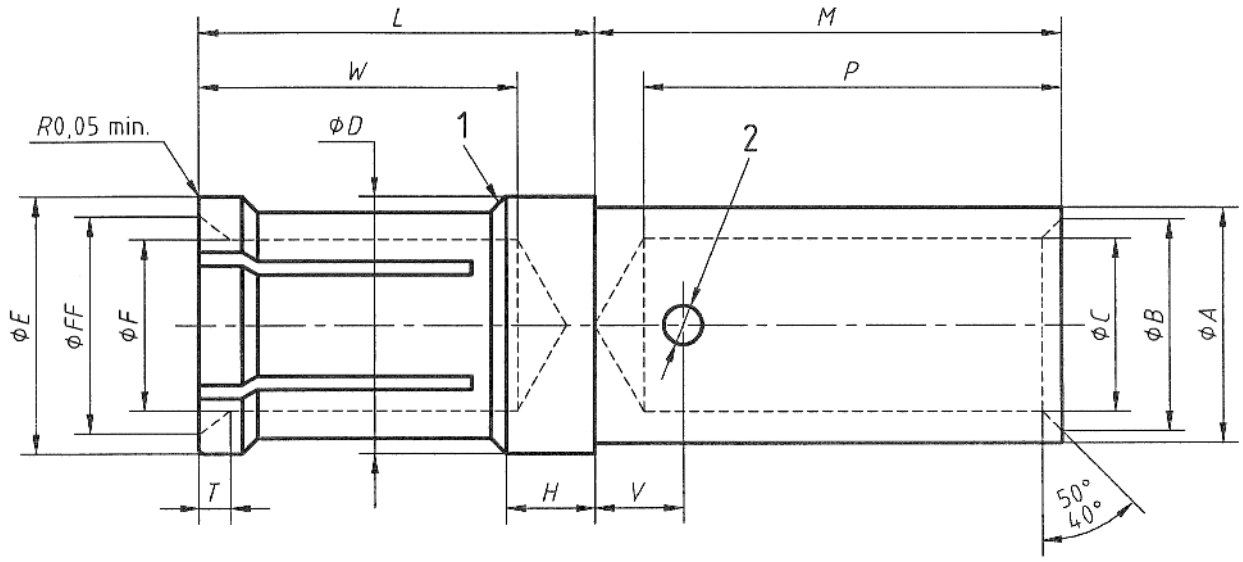
Figure 3 — Contact 8-8 mating side detail



Key

1 Area for colour band marking (see Table 2)
2 One hole Ø N
3 Chamfer or radius

Figure 4 — Contact 16-16, 12-12, 8-8 crimp barrel detail



Key

1 Chamfer J
2 One hole Ø N

Figure 5 — Contact 5-5

Table 1

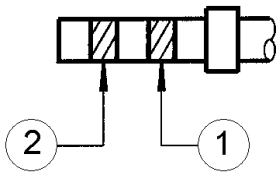
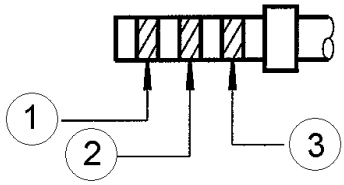
Size		∅ *A*	∅ *B*	∅ *C*	∅ *D*	∅ *E*	∅ *F*	∅ *FF*	∅ *G*	*H*	*J* rad.	*JJ* rad. max.	∅ *K*
Contact	**Barrel**												
22	22	1,32 1,27	1,17 1,04	0,94 0,89	1,78 1,73	1,52 1,50	0,89 0,84	1,22 1,16	1,55 1,52	0,86 0,81	0,05	0,08	–
20	20	1,73 1,68	1,45 1,35	1,17 1,12	2,13 2,08	1,88 1,83	1,12 1,07	1,60 1,40	–	0,86 0,81	0,05	0,08	–
16	16	2,62 2,57	2,26 2,06	1,73 1,68	3,35 3,30	2,87 2,79	1,73 1,65	2,40 2,20	–	1,22 1,17	0,08	0,13	2,77 2,72
12	12	3,84 3,79	3,63 3,43	2,59 2,49	4,78 4,72	4,09 4,01	2,51 2,44	3,20 3,00	–	1,22 1,17	0,08	0,13	4,01 3,94
8	8	6,71 6,65	6,30 6,09	4.70 4.59	8,01 7,95	7,01 6.95	3,79 3,73	6,80 6,69	7,31 7,26	0,83 0,76	–	0,15	7,01 6,95
5	5	6,50 6,42	5,70 5,49	4.65 4.57	7,01 6,93	7,01 6.95	4,63 4,57	6,10 5,89	–	1,41 1,30	–	–	–

Size		*L*	*M*	∅ *N*	*P*	*S*	*T*	*U*	*V*	*W* min.	**Extraction force** min.	**Insertion force** max.	**Mass** g
Contact	**Barrel**												
22	22	10,46 10,21	5,99 5,79	0,56 0,43	4,09 3,61	–	0,51 0,30	8,84 8,76	2,95 2,69	7,11	0,30	1,30	0,17
20	20	10,46 10,34	4,10 3,89	0,79 0,69	4,70 4,19	–	0,61 0,51	9,05 8,94	0,81 0,61	6,75	0,21	1,70	0,37
16	16	10,77 10,62	6,50 6,30	1,04 0,94	7,29 6,68	1,50 1,30	0,76 0,51	8,76 8,66	0,81 0,61	7,11	0,57	3,40	0,76
12	12	10,77 10,62	6,50 6,30	1,04 0,94	7,29 6,68	1,50 1,30	0,76 0,51	8,76 8,66	0,81 0,61	7,30	0,85	4,25	1,60
8	8	–	12,23 11,96	1,86 1,75	12,96 12,45	2,60 2,40	1,60 1,40	15,21 15,10	1,34 1,07	11,50	4,50	26	4,80
5	5	–	12,12 11,88	1,10 0,89	10,62 10,39	–	1,01 0,69	10,19 10,08	2,50 2,10	8,15	3,00	26	3,90

4.3 Marking by colour code

See Table 2.

Table 2

Size		Two bands according to ISO 8843 		Three bands according to SAE AS 39029/12 		
Contact	Barrel	Band 1	Band 2	Band 1	Band 2	Band 3
22	22	Green	Green (optional)	Brown	Yellow	Grey
20	20	Red	Red (optional)	b	b	b
16	16	Blue	Blue (optional)	b	b	b
12	12	Yellow	Yellow (optional)	b	b	b
8	8	Red	Not applicable	b	b	b
5	5	a	a	b	b	b

[a] Size 5 contact is not defined in ISO 8843, therefore no colour code is defined for size 5 contacts. As soon as ISO 8843 defines a size 5 contact, Table 2 will be updated accordingly.

[b] This contact is not defined in SAE AS 39029/12.

4.4 Material, surface treatment

— Body material: copper alloy.

— Surface treatment: gold on appropriate undercoat, thickness of protection not specified, selective plating permitted.

4.5 Permissible cables

See Table 3.

Table 3

Size		Size of conductors			Rated test current A
Contact	**Barrel**	**AECMA Code**	**Section** mm^2	**AWG** [a]	
22	22	004	0,40	22	5
		002	0,25	24	3
		001	0,15	26	2
20	20	006	0,60	20	7,5
		004	0,40	22	5
		002	0,25	24	3
16	16	012	1,2	16	13
		010	1,0	18	11
		006	0,6	20	7,5
12	12	030	3	12	23
		020	2	14	17
8	8	090	12	8	46
		050	9	10	33
5	5	090	12	8	46
		050	9	10	33

[a] AWG = Closest American Wire Gage.

4.6 Tooling

4.6.1 Crimping tools

According to MIL-DTL-22520, see Table 4.

The qualification selector numbers used for crimping copper or copper alloy conductors in cables EN 2083 are indicated in Table 4. It is the user responsibility if the parameters in Table 4 are changed for service use.

Table 4

Contact		Cable size		Tools M22520/1-01		Tools M22520/2-01		Tools M22520/23-01	
Contact size	Barrel size	AECMA code	AWG [a]	Positioner/ Locator	Selector number	Positioner/ Locator	Selector number	Positioner/ Locator	Die
22	22	001	26	Not applicable	–	M22520/2-23	3	Not applicable	–
		002	24		–		3		–
		003	22		–		4		–
20	20	002	24	Not applicable	–	M22520/2-08	5	Not applicable	–
		004	22		–		6		–
		006	20		–		7		–
16	16	006	20	M22520/1-02	4	Not applicable	–	Not applicable	–
		010	18		5		–		–
		012	16		6		–		–
12	12	020	14	M22520/1-02	7	Not applicable	–	Not applicable	–
		030	12		8				
8	8	090	8	Not applicable	–	Not applicable	–	–	M22520/2-23
5	5	050	10	Not applicable	–	Not applicable	–	–	M22520/2-23
		090	8						

[a] AWG = Closest American Wire Gage.

4.6.2 Insertion / extraction tools

According to MIL-I-81969. See Table 5.

Table 5

Size		Insertion tools	Extraction tools
Contact	Barrel		
22	22	M81969/8-01	M81969/1-01
20	20	M81969/8-02	M81969/1-02
16	16	M81969/8-03	M81969/1-03
12	12	Not applicable	M81969/28-02 or M81969/14-04
8	8	Not applicable	M81969/14-06
5	5	Not applicable	M81969/28-01

4.7 Cable striping

See Table 6.

Table 6

Size		Stripped length of cable ± 0,5 mm
Contact	**Cable**	
22	22	3,5
20	20	4
16	16	6
12	12	6
8	8	10,00 / 12,30
5	5	9,60 / 10,10

4.8 Tests

Test details to be in accordance with Table 7, EN 3155-001 and EN 2591-100.

Table 7

EN 2591-	Test	Not applicable	Applicable	
			According to EN 3155-001	Remarks
101	Visual examination		X	
102	Examination of dimension and mass		X	See 4.2.
201	Contact resistance – Low level		X	
202	Contact resistance at rated current		X	
203	Electrical continuity at microvolt level	X		
204	Discontinuity of contacts in the microsecond range		X	
205	Housing (shell) electrical continuity	X		
206	Measurement of insulation resistance	X		
207	Voltage proof test	X		
208	Temperature rise due to rated current	X		
209	Current temperature derating	X		
210	Electrical overload		X	
211	Capacitance	X		
212	Surface transfert impedance	X		

continued

Table 7 *(continued)*

EN 2591-	Test	Not applicable	Applicable	
			According to EN 3155-001	Remarks
213	Shielding effectiveness from 100 MHz to 1 GHz	X		
214	Lightning strike, current and voltage pulse	X		
216	Engagement of contacts	X		
220	Contact /conductor joint ageing by current and temperature cycling	X		
221	Voltage Standing Wave Ratio (VSWR)	X		
222	Insertion Loss (I.L)	X		
223	Measurement of characteristic impedance of a coaxial connector or contact	X		
224	RF leakage	X		
226	Corona level	X		
301	Endurance at temperature		X	$T = (175\ ^{+5}_{0})$°C Duration: 1 000 h
302	Climatic sequence	X		
303	Cold / low pressure and damp heat	X		
304	Damp heat steady state	X		
305	Rapid change of temperature		X	$T_A = (175\ ^{+5}_{0})$°C $T_B = (-\ 65\ ^{+5}_{0})$°C
306	Mould growth	X		
307	Salt mist		X	
308	Sand and dust	X		
309	Dry heat	X		
310	Cold	X		
311	Low air pressure	X		
312	Air leakage	X		
313	Driving rain (artificial)	X		
314	Immersion at low air pressure	X		
315	Fluid resistance	X		
316	Ozone resistance	X		
317	Flammability	X		

continued

Table 7 *(continued)*

EN 2591-	Test	Not applicable	Applicable	
			According to EN 3155-001	Remarks
318	Fire-resistance	X		
319	Gastightness of solderless wrapped connections	X		
320	Simulated solar radiation at ground level	X		
321	Damp heat, cyclic test	X		
322	Hermeticity	X		
323	Thermal shock	X		
324	Interfacial sealing	X		
325	Ice resistance	X		
401	Acceleration steady state	X		
402	Shock		X	Method A severity 30
403	Sinusoidal and random vibration		X	Method B test curve 3 (three) level G
404	Transverse load	X		
405	Axial load	X		
406	Mechanical endurance		X	
407	Durability of contact retention system and seals (Maintenance ageing)	X		
408	Mating and unmating forces	X		
409	Contact retention in insert	X		
410	Insert retention in housing (axial)	X		
411	Insert retention in housing (torsional)	X		
412	Contact insertion and extraction forces	X		
413	Holding force of grounding spring system	X		
414	Unmating of lanyard release connectors	X		
415	Test probe damage (female contacts)		X	
416	Contact bending strength	X		
417	Tensile strength (crimped connection)		X	
418	Gauge insertion/extraction forces (female contacts)		X	
419	Stability of male contacts in insert	X		
420	Mechanical strength of rear accessories	X		

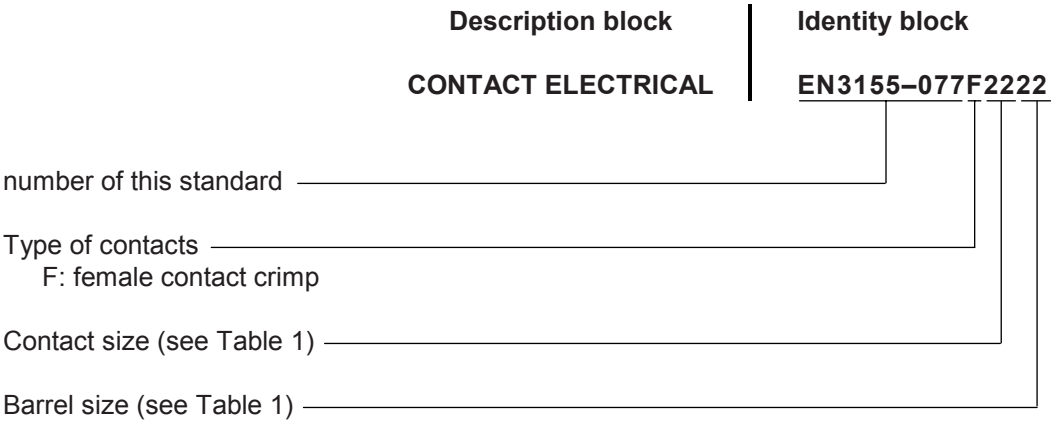
continued

Table 7 *(concluded)*

EN 2591-	Test	Not applicable	Applicable	
			According to EN 3155-001	Remarks
421	Free fall	X		
422	Locking wire hole strength	X		
424	Stripping force, solderless wrapped connections	X		
425	Unwrapping capability, solderless wrapped connections	X		
426	Contact retention system effectiveness	X		
427	Robustness of protective cover attachment	X		
501	Soft solderability	X		
502	Restricted entry		X	
503	Contact deformation after crimping		X	
505	Contact protection effectiveness (scoop-proof)	X		
506	Use of tools	X		
507	Plating porosity		X	
508	Measurement of thickness of coating on contacts		X	
509	Adhesion of coating on contacts		X	
512	Effectiveness of non removable fixing of hermetically sealed connector shell	X		
513	Magnetic permeability		X	
514	Solderability of contacts with self-contained solder and flux	X		
515	Hydrolytic stability	X		

5 Designation

EXAMPLE



NOTE If necessary the originator code I9005 should be placed between the description block and the identity block.

6 Marking

See EN 3155-001.

7 Technical specification

See EN 3155-001.

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