



Product Change Notification

Current Date: 03-Dec-2020

TE Connectivity

Product Change Notification: P-20-020138

PCN Date: 02-DEC-20

Customer: TTI, Inc. (1305175)

Location: Maisach-gernlinden

Agreement: Agreement Unknown

TE would like to inform you of the following change(s) to the listed TE Connectivity Product. In case of any further questions about this change(s), please contact your TE Connectivity Sales Engineer. Affected part, drawing and/or specification numbers are listed on the attached sheet(s).

General Product Description:

EN2997 - 983 connector improvment

Description of Changes

1-The hard epoxy resin used to glue the inserts in the shells of the engine connectors EN2997 is changed for an elastomeric glue 2- the contact retaining clip sed in the EN 2997 type 15 (Integrated cable outlet version) will replace the one used on other types (plugs -6 , receptacles -0, 7) NOTE : the change has been submitted to the qualifying authority (ASD-CERT). The change has been approved by the authority

Other attachments:

[DDP 699-133](#)
[SE 697-026 VA](#)
[PVE 697-265 VA](#)

Reason for Changes:

Product improvement.1- TE Connectivity , Evreux has been facing client rejections caused by dielectric withstanding issues , specifically on little sizes connectors (08,10 and 12) 2- rationalisation : actually , two insert part numbers exists because of the type of clips used. With the proposed modification , we'll have only one type (reducing number of parts,)

Estimated Dates:

Last Order Date (Obsolete Parts Only):

First Date To Ship (Changed Parts Only):

08-MAR-2021

Last Ship Date (Obsolete Parts Only):

Last Date for Mixed Shipments: (Changed Parts Only):

01-NOV-2023

Part Number(s) being Modified:

Part Number	Part Discontinued per PCN	Customer Drawing	Customer Part Number	Alias Part Number(s)	Substitute Part Number	Substitute Alias Part Number(s)	Description Of Difference
ZPF000000000007313	NO		983-0S08-03SN	983-0S08-03SN, 983-0S 08-03 SN			
ZPF000000000007358	NO			983-0S12-12PN, 983-0S 12-12 PN			
ZPF000000000007467	NO			983-0SE08-03PN-L, 983-0SE 08-03 PN-L			
ZPF000000000007520	NO			983-0SE12-03PN-L, 983-0SE 12-03 PN-L			
ZPF000000000007538	NO		983-0SE12-12PN	983-0SE12-12PN, 983-0SE 12-12 PN			
ZPF000000000007539	NO			983-0SE12-12PN-L, 983-0SE 12-12 PN-L			
ZPF000000000007909	NO			983-15KE7-08-03SN-L, 983-15 KE 7-08-03 SN-L			
ZPF000000000007912	NO			983-15KE7-10-05SN-L, 983-15 KE 7-10-05 SN-L			
ZPF000000000007980	NO			983-15SE7-12-12S6L, 983-15 SE 7-12-12 S6 L			
ZPF000000000008063	NO			983-6K08-03S7, 983-6K 08-03 S7			
ZPF000000000008064	NO			983-6K08-03S8, 983-6K 08-03 S8			
ZPF000000000008070	NO			983-6K10-05S6, 983-6K 10-05 S6			
ZPF000000000008072	NO			983-6K10-05S7, 983-6K 10-05 S7			
ZPF000000000008074	NO			983-6K10-05S8, 983-6K 10-05 S8			
ZPF000000000008076	NO		983-6K10-05SN, EN2997K61005FN	983-6K10-05SN, 983-6K 10-05 SN			
ZPF000000000008095	NO		983-6K12-12S6	983-6K12-12S6, 983-6K 12-12 S6			
ZPF000000000008098	NO			983-6K12-12S7, 983-6K 12-12 S7			
ZPF000000000008099	NO			983-6K12-12SN, 983-6K 12-12 SN			

Part Number	Part Discontinued per PCN	Customer Drawing	Customer Part Number	Alias Part Number(s)	Substitute Part Number	Substitute Alias Part Number(s)	Description Of Difference
ZPF000000000008186	NO			983-6KE08-03S6, 983-6KE 08-03 S6			
ZPF000000000008190	NO			983-6KE08-03S8, 983-6KE 08-03 S8			
ZPF000000000008197	NO			983-6KE10-05PN-L, 983-6KE 10-05 PN-L			
ZPF000000000008217	NO			983-6KE12-03P7L, 983-6KE 12-03 P7 L			
ZPF000000000008513	NO			983-6S08-03P6, 983-6S 08-03 P6			
ZPF000000000008523	NO			983-6S08-03S8, 983-6S 08-03 S8			
ZPF000000000008526	NO		983-6S08-03SN	983-6S08-03SN, 983-6S 08-03 SN			
ZPF000000000008542	NO			983-6S10-05S7, 983-6S 10-05 S7			
ZPF000000000008590	NO			983-6S12-12S8L, 983-6S 12-12 S8 L			
ZPF000000000008722	NO		983-6SE08-03SN, 983-6SE-08-03-SN	983-6SE08-03SN, 983-6SE 08-03 SN			
ZPF000000000008752	NO			983-6SE10-05S9, 983-6SE 10-05 S9			
ZPF000000000008794	NO			983-6SE12-12P6, 983-6SE 12-12 P6			
ZPF000000000008796	NO			983-6SE12-12P7, 983-6SE 12-12 P7			
ZPF000000000008799	NO			983-6SE12-12P8, 983-6SE 12-12 P8			
ZPF000000000008814	NO		983-6SE-12-12SN, DEU983-6SE12-12SN, 983-6SE12-12SN	983-6SE12-12SN, EL8864-000, DE-983-6SE-12-12SN, 983-6SE 12-12 SN			
ZPF000000000009123	NO			983-7S08-03S6, 983-7S 08-03 S6			
ZPF0000000000033162	NO			983-0S08-98PN-L, 983-0S 08-98 PN-L			
ZPF0000000000033585	NO			983-0SE08-98S6L, 983-0SE 08-98 S6 L			
ZPF0000000000033613	NO			983-0SE10-06S9L, 983-0SE 10-06 S9 L			
ZPF0000000000121052	NO			983-0S08-06PN-L, 983-0S 08-06 PN-L			
ZPF0000000000145920	NO			983-0S08-06PN, 983-0S 08-06 PN			
ZPF0000000000148819	NO			983-6S10-12SN, 983-6S 10-12 SN			
ZPF0000000000149241	NO			983-6S10-12S6, 983-6S 10-12 S6			
ZPF0000000000200286	NO			983-6SE08-06SN, 983-6SE 08-06 SN			



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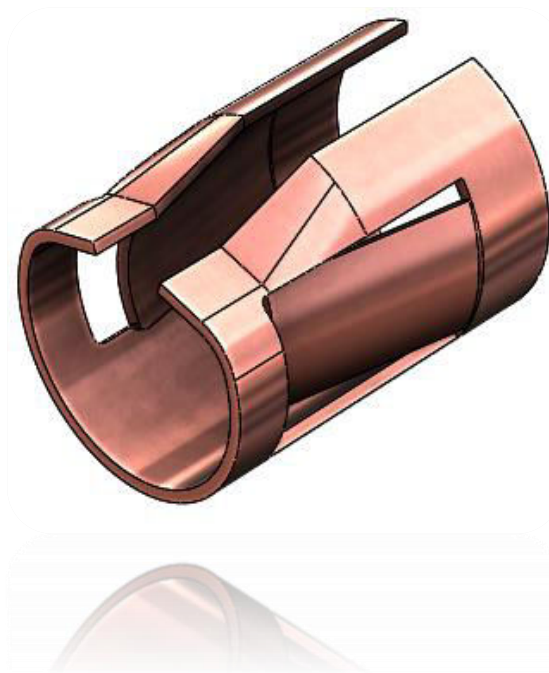
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ZPF000000000008063	NO			983-6K08-03S7, 983-6K 08-03 S7			
ZPF000000000008064	NO			983-6K08-03S8, 983-6K 08-03 S8			
ZPF000000000008070	NO			983-6K10-05S6, 983-6K 10-05 S6			
ZPF000000000008072	NO			983-6K10-05S7, 983-6K 10-05 S7			
ZPF000000000008074	NO			983-6K10-05S8, 983-6K 10-05 S8			
ZPF000000000008076	NO		983-6K10-05SN, EN2997K61005FN	983-6K10-05SN, 983-6K 10-05 SN			
ZPF000000000008095	NO		983-6K12-12S6	983-6K12-12S6, 983-6K 12-12 S6			
ZPF000000000008098	NO			983-6K12-12S7, 983-6K 12-12 S7			
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ZPF0000000000200286	NO			983-6SE08-06SN, 983-6SE 08-06 SN			

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**DECLARATION DESIGN PERFORMANCES****DDP 699-133****983 #20 layouts 08-03
class S/SE****New contact retention clip & RTV 106 usage for Insert to shell
bonding****Connecteurs Electriques Deutsch**
17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCERéférence du support
Form Reference**204-64-G/I01**

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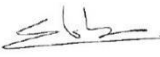
Objet / Subject :

**AEROSPACE SERIES – CONNECTORS, ELECTRICAL, CIRCULAR,
COUPLED BY THREADED RING, FIRE-RESISTANT OR NON-FIRE-
RESISTANT, OPERATING TEMPERATURES -65°C TO 200°C
CONTINUOUS, 260°C PEAK,
LAYOUTS 08-03**

Auteur / Author : S.QUEVA

Date de création / Date of creation : 05-09-2019

Approbations / Approvals (Dernier indice / Last issue)

Fonction / Position	Nom / Name	Date	Visa / Signature
New Product Development Manager	M. BRUNET	29/11/2019	
Quality development	C. LOBERT	29/11/2019	

Evolutions / Revisions

Indice/ Issue	Nature des évolutions / Description of evolution	Page	Date	Auteur / Author
A	Creation of document	1 to 31/31	05/09/2019	S.QUEVA
B	Addition of the N° of SE and PVE references. Correction of the number of pages (34 => 28) and correction of DDP number on the horizontal pages. (132 => 133)	All	29/11/2019	S.QUEVA



Connecteurs Electriques Deutsch
17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE

Référence du support
Form Reference**204-64-G/I01**

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I. GENERAL INFORMATION

II. COMPLIANCE MATRIX

II.1 - Introduction

II.2 - Requirements according to EN2997-001 : 2017-06

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**Connecteurs Electriques Deutsch**
17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCERéférence du support
Form Reference**204-64-G/I01**

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PERFORMANCES****DDP 699-133**Indice/Issue : B
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I. General Information**I.1. Manufacturer :**Name : Connecteurs Electriques DEUTSCH
Address : 17, rue Lavoisier – Zone Industrielle n° 2
27000 EVREUX**I.2. Equipment :**- Connector electrical, circular, coupled by threaded ring,
fire-resistant, operating temperatures 200 °C continuous,
260 °C peak, layouts 08-03, 20-41**I.3. Purchaser specification :**
catalogue

- EN2997, ESC10, BACC63, 983 series connectors

I.4. Standard :

- EN 2997-001 : 2017-06E Technical specification
- EN 2997-002 : 2016-12P Specification of performance and contact arrangements
- EN 2997-003 : 2012-08F Square flange receptacle, Product standard.
- EN 2997-008 : 2007-08 Plug, Product standard.
- EN 2997-014 : 2014-09P2 Square flange receptacle with integrated accessory
- prEN 2997-016 : 2009-12P1 Plug with integrated accessory
- prEN 2591-100: 2016-07 Test methods, General.
- TR4633: 09-2007 Change in design qualification

I.5. Test report :

- PVE 697-265 VA

I.6. Tests Sequence :

- SE 697-026 VA



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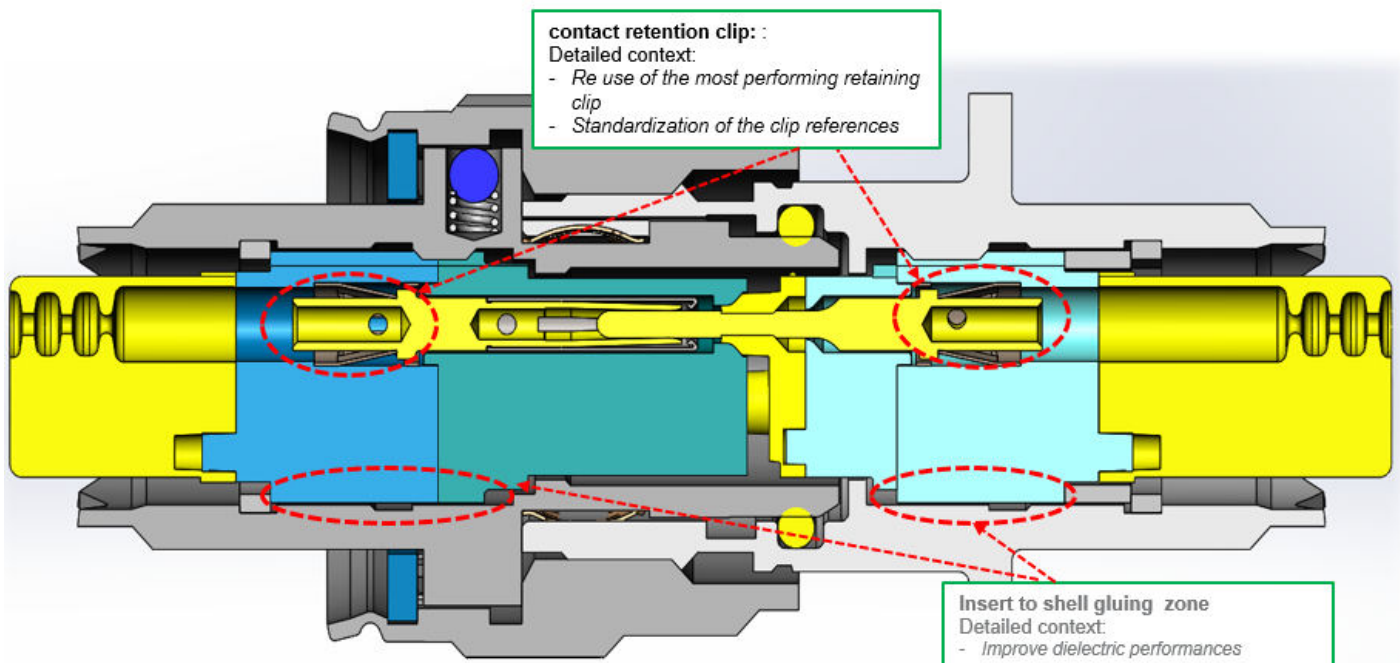
II. Compliance matrix

II.1. Introduction

In a first step, to permit the improvement of our technical margin on EN2997 products in terms of dielectric performances, we decide to substitute the Epoxy bicomponent glue (Eccobond 104; STD 350-1-02) for a Silicone Glue (RTV106; STD 350-1-45) to limit the mechanical stress on the thermoset insert induced during epoxy curing process operation.

STD : "Spécification Technique Deutsch " (Deutsch material specification)

In a second step, to standardize our products, we decide to use #20 contact retention clip 701-0023-20-00-659 (already certified for ESC15/16) in all EN2997 stainless steel class.



Insert to shell gluing : change Epoxy bicomponent glue (Eccobond 104) for a silicone glue (RTV106)

Contact retention clip : see below

All others features (materials, processes) are unchanged.

Due to a significant number of customer rejections registered for dielectric leakage on this layouts, a specific focus was made on Layout 08-03.

Other contact gages, midsize and large size connectors will be subject to a second qualification program.



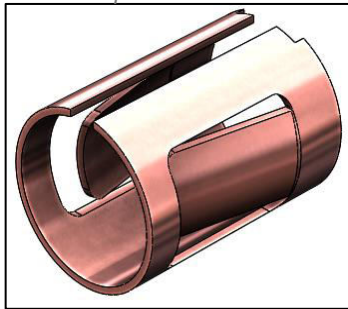
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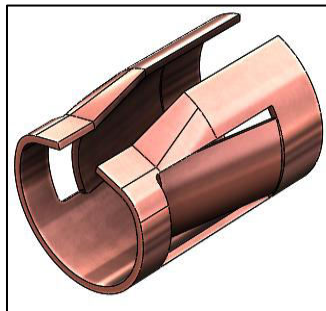
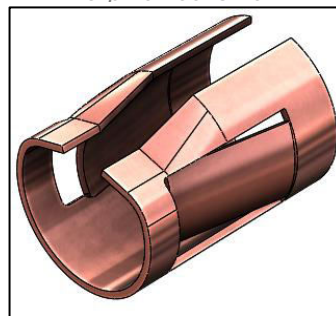
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The standardization of the contact retention clip consist in a rationalization of 2 existing references of clip (with their specific characteristics and performances) by using the clip: 701-0023-20 in all EN2997 stainless steel class. This standardization will permit to reduce the number of clip #20 references and also the number of insert subassembly references.

EN2997-6 / ESC 10 K*6
clip 624-0006-00



EN2997-15 / ESC 15
clip 701-0023-20



Standardized clip 701-0023-20

Retaining clip 701-0023-20 was developed for “ integrated accessory “ versions of the EN2997 and the ESC 15/16 , to enhance withstanding in vibrations performances , as the cables are not maintained .

To validate these improvements, we will conform to the requirements defined in the TR4633:09-2007 which indicates the tests to be performed in function of the modifications applied on the product.

All test not concerned by EN2997-001 : 2017-06 are listed as “NOT APPLICABLE”.

All tests not concerned by TR4633:09-2007 are listed as “NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED”.

All tests concerned by TR4633:09-2007 but not relevant, are listed as “NOT RELEVANT” with the adequate justification



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As the design, material and process of the class K / KE / KV and S / SE / SV / SF are equivalent, we will test connectors class S and SE to limit the number of samples.

Based on the table 15 of the EN2997-001 : 2017-06 (Extension of Qualification), we defined the following strategy:

- Connectors class S and SE will follow test sequence SE 697-026 VA,
- As the modifications performed have no influence on shells (plugs / receptacles) neither on the coupling ring, class K and KE will be qualified by equivalence with the class S and SE.
- For class SF :Group 17 and 18 of EN2997-001 : 2017-06 will be performed on connectors class SF,
- KV and SV will be qualified by equivalence.



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II.2. Requirements according to EN2997-001:2017-06

TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's Answer										
101	Visual examination	Initial examination; examination of connectors, fittings, loose parts (contacts, etc.) Details to be examined: - identification; - appearance; - marking; - surface finish. Final examination: no loosening of parts, crack, excessive wear or detached part shall be observed.	TO BE PERFORMED	SE 697-026 VA PVE 697-265 VA										
102	Examination of dimensions and mass	According to Clause 6 and product standard. The checking of inaccessible dimensions on the finished product shall be carried out on part pieces or given by the quality organization of the manufacturer concerned. For maintenance of qualification only the measurement of interchangeability dimensions are required except for subclause 6.5.	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED BUT WILL BE PERFORM	SE 697-026 VA PVE 697-265 VA										
201	Contact resistance – low level	Crimp contacts Defined by the standards for contacts specified in EN 2997-002 For solder contacts (hermetic connectors): not applicable	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	Contacts qualified as per EN3155										
202	Contact resistance at rated current	Crimp contacts. Defined by the standards for contacts specified in EN 2997-002. Solder contacts (hermetic connectors) Measuring points on the cable, nearest to the contacts <table border="1"> <thead> <tr> <th rowspan="2">Contact size</th> <th rowspan="2">Rated test current A</th> <th colspan="2">Maximum contact resistance in mΩ</th> </tr> <tr> <th>Initial</th> <th>After tests EN 2591-301 and EN 2591-307</th> </tr> </thead> <tbody> <tr> <td>20</td> <td>5</td> <td>12</td> <td>15</td> </tr> </tbody> </table>	Contact size	Rated test current A	Maximum contact resistance in mΩ		Initial	After tests EN 2591-301 and EN 2591-307	20	5	12	15	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	Contacts qualified as per EN3155
Contact size	Rated test current A	Maximum contact resistance in mΩ												
		Initial	After tests EN 2591-301 and EN 2591-307											
20	5	12	15											



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's Answer
203	Electrical continuity at microvolt level	Not applicable	NOT APPLICABLE	-
204	Discontinuity of contacts in the microsecond range	Duration of micro-discontinuity: $\leq 1 \mu\text{s}$ Method B Test time: throughout the duration of tests EN 2591-402, EN 2591-403 and EN 2591-301, method B	TO BE PERFORMED	SE 697-026 VA PVE 697-265 VA
205	Housing (shell) electrical continuity	Measuring points: On the rear end of the shells with a spherical probe. Maximum resistance: – For classes SV, S and SE, initial and after test EN 2591-307, 5,0 m Ω ; – For class RS, initial 1,0 m Ω and 2,0 m Ω after test; – For class WS, initial 2,5 m Ω and 5,0 m Ω after test; – For plug without grounding spring system: 60 m Ω .	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	Housing shell electrical continuity: The Inserts aren't influent
206	Measurement of insulation resistance	Method A Minimum insulation resistance: – Ambient temperature: 5 000 M Ω (Unmated connectors) – Maximum operating temperature: 1 000 M Ω (Unmated connectors) – After tests EN 2591-314, EN 2591-321, EN 2591-324: 1 000 M Ω (Mated connectors) – After tests EN 2591-315 and EN 2591-316: 1 000 M Ω (Unmated connectors) – During tests EN 2591-303 and EN 2591-321: 100 M Ω (Mated connectors)	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED BUT WILL BE PERFORM	SE 697-026 VA PVE 697-265 VA



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207	Voltage proof test	Method A, connectors mated and unmated except after tests EN 2591-314 and EN 2591-324, where they shall be mated. For tests at low pressure, voltage is applied after 30 min at the pressure indicated. Voltage value:			TO BE PERFORMED	SE 697-026 VA PVE 697-265 VA	
		Max. leakage current	Pressure	Connectors			
		2 mA		mated V r.m.s.			unmated V r.m.s.
			Sea level	1500			1500
			12,1 kPa (15 000 m)	1000			600
4,7 kPa (21 000 m)	1000		400				
		1,1 kPa (30 000 m)	1000	200			
208	Temperature rise due to rated current	Not applicable			NOT APPLICABLE	-	
209	Current temperature derating	Not applicable for qualification			NOT APPLICABLE	-	
210	Electrical overload	Crimp contacts, defined by the standards for contacts specified in EN 2997-002. Fixed solder contacts (hermetic connectors) Measuring points on the cable, nearest to the contacts			NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	-	
		Contact size	Current A	Duration s			
		20	10/50	40/0,6			



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211	Capacitance	Not applicable	NOT APPLICABLE	-																							
212	Surface transfer impedance	Not applicable	NOT APPLICABLE	-																							
213	Shielding effectiveness from 100 MHz to 1 GHz	Receptacle and plug with grounding spring system fitted with screening connection <table border="1"> <thead> <tr> <th rowspan="2">Frequency (MHz)</th> <th colspan="2">Minimum attenuation (dB)</th> </tr> <tr> <th>Class SV, S or SE</th> <th>Class RS or WS</th> </tr> </thead> <tbody> <tr> <td>100</td> <td>80</td> <td>90</td> </tr> <tr> <td>200</td> <td>75</td> <td>88</td> </tr> <tr> <td>300</td> <td>73</td> <td>88</td> </tr> <tr> <td>400</td> <td>71</td> <td>87</td> </tr> <tr> <td>800</td> <td>66</td> <td>85</td> </tr> <tr> <td>1000</td> <td>65</td> <td>85</td> </tr> </tbody> </table>	Frequency (MHz)	Minimum attenuation (dB)		Class SV, S or SE	Class RS or WS	100	80	90	200	75	88	300	73	88	400	71	87	800	66	85	1000	65	85	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	Shielding effectiveness from 100 MHz to 1 GHz: The Inserts aren't influent
Frequency (MHz)	Minimum attenuation (dB)																										
	Class SV, S or SE	Class RS or WS																									
100	80	90																									
200	75	88																									
300	73	88																									
400	71	87																									
800	66	85																									
1000	65	85																									
214	Lightning strike, current and voltage pulse	Not applicable	NOT APPLICABLE	-																							
216	Engagement of contacts	Not applicable	NOT APPLICABLE	-																							



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301	Endurance at temperature	Classes KE, SE, SV, KV, and YE: see 7.2.1. Other class except class Y: Method B Temperature: 175 °C or 200 °C depending on model. Duration: 1 000 h	TO BE PERFORMED	SE 697-026 VA PVE 697-265 VA



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's Answer
302	Climatic sequence	Not applicable	NOT APPLICABLE	-
303	Cold/low pressure and damp heat	Connectors mated Five cycles Temperature: $(-65 \pm 2) ^\circ\text{C}$	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	Insert Raw material are unchanged in comparison with the current 983
304	Damp heat steady state	Not applicable	NOT APPLICABLE	-
305	Rapid change of temperature	Connectors mated TA = maximum temperature of the class of connector $260^\circ\text{C} +5^\circ/0^\circ$ TB = $-65^\circ\text{C} 0^\circ/-5^\circ$	TO BE PERFORMED	SE 697-026 VA PVE 697-265 VA
306	Mould growth	Method A Duration: 28 d Growth 0 No prior washing No surface etching	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	Raw material of the grommet unchanged



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's Answer
307	Salt mist	<p>The connectors shall be suspended in the test chamber with non-metallic cords, so that no accumulation of condensed saline solution can occur.</p> <p>All classes except R and RS</p> <p>The connectors shall be:</p> <ul style="list-style-type: none"> - Subjected to 50 cycles of mating and unmating at a rate ≤ 5 cycles/min; - Exposed to the salt mist: - Mated for 452 h; - Test EN 2591-205; - Then unmated for 48 h; - Cleaning; - Test EN 2591-101. - Subjected to 450 mating and unmating cycles at the rate ≤ 5 cycles/min for classes K, KE, KV, SV, S, SE, Y and YE or 200 cycles mating / unmating for classes W and WS; - Test EN 2591-205 before cleaning and unmating. <p>classes R and RS</p> <ul style="list-style-type: none"> - The unmated connectors shall be exposed to the salt mist for 48 h. - Rear of the shell Y and YE classes shall be protected. 	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	The inserts aren't influent
308	Sand and dust	<p>The mated connectors shall be arranged so that their longitudinal axis is parallel to the wind direction, with the rear of the plug facing the wind.</p> <p>Wind velocity: (3,5\pm0,5) m/s</p> <p>Number of cycles: 1</p>	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	Measurement of this test are mating and unmating forces. The inserts aren't influent



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's Answer
309	Dry heat	Not applicable	NOT APPLICABLE	-
310	Cold	Not applicable	NOT APPLICABLE	-
311	Low air pressure	Applicable – Pressure 1,1 kPa	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	-
312	Air leakage	Test N/A to classes Y and YE 50 % of cavities shall be fitted with filler plugs (meeting the requirements of EN 4529-003) and remaining 50 % contacts and cables. Corresponding cavities shall have the same fill. Method B Differential pressure: 100 kPa Maximum leakage flow: $16 \cdot 10^{-6}$ m ³ /h	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	-



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's Answer														
313	Driving rain (artificial)	Not applicable	NOT APPLICABLE	-														
314	Immersion at low air pressure	Applicable	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	-														
315	Fluid resistance	For types of fluids, number of cycles, temperature and duration of immersion and temperature for the third phase: see Table 11.	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	-														
316	Ozone resistance	Applicable	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	-														
317	Flammability	Test applicable to classes W, WS, R and RS Connectors mated Method B	NOT APPLICABLE	-														
318	Fire-resistance	<p>Classes K, KE, KV, SV, S and SE For models with integral accessory classes KV and SV only, add additional test 7.2.2 Flame resistant cables according to EN 2346-002 (bundle without protection) or similar product and dimensionally in compliance with the requirements of EN 2997-002. Leakage current (phase 1): 2 A max. Current in the contacts (phase 1): corresponding to the size of conductor used.</p> <table border="1"> <thead> <tr> <th colspan="2">Size</th> <th colspan="2">Conductor size (fire-resistant cables)</th> <th rowspan="2">Current A</th> </tr> <tr> <th>Contact</th> <th>Barrel</th> <th>AECMA code</th> <th>AWG</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Size		Conductor size (fire-resistant cables)		Current A	Contact	Barrel	AECMA code	AWG						NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	-
Size		Conductor size (fire-resistant cables)		Current A														
Contact	Barrel	AECMA code	AWG															



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		22	22	002	24	3		
		20	20	004	22	5		
		16	16	010	18	11		
				006	20	7,5		
		12	12	020	14	17		
		20	18	004	22	5		
319	Gas-tightness of solderless wrapped connections	Not applicable					NOT APPLICABLE	-
320	Simulated solar radiation at ground level	Not applicable					NOT APPLICABLE	-
321	Damp heat, cyclic test	Connectors mated 10 cycles At the end of the 7 th cycle, with the connectors still mated and subjected to high relative humidity, the insulation resistance is measured (test EN 2591-206).					NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION APPLIED	-



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's Answer
322	Hermeticity	Classes Y and YE Test performed on both faces	NOT APPLICABLE	-
323	Thermal shock	Classes Y and YE	NOT APPLICABLE	-
324	Interfacial sealing	Pressure 2 kPa	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-
326	Fire immersion test	Fire immersion test For class SF only	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-
401	Acceleration, steady state	Not applicable	NOT APPLICABLE	-
402	Shock	The elements of connection fitted with appropriate cable clamps shall be mated and mounted on the shock apparatus using appropriate mounting systems. The cables are clamped at a minimum of 200 mm from the rear of the connectors. Method A Severity 300 Number of shocks: one each way for each of the three directions (i.e. six shocks in all)	TO BE PERFORMED	SE 697-026 VA PVE 697-265 VA



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's Answer										
403	Sinusoidal and random vibration	<p>The elements of connection fitted with appropriate cable clamps shall be mated (see coupling torque values in test EN 2591-408) and mounted on the shock apparatus using appropriate mounting systems.</p> <p>The cables are clamped at a minimum of 200 mm from the rear of the connectors.</p> <p>The contact solder cup and the outlet of the cable from the hermetic connectors are coated with a silicone rubber.</p> <p>Method B, Figure 3 and Table 2, level J Duration: 8 h in each of the three mutually perpendicular axes</p> <p>The test is performed:</p> <p>On one group of connectors:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 50 % of the time at $(- 65 \pm 2) ^\circ\text{C}$, <input type="checkbox"/> 50 % of the time at ambient temperature. <p>On a second group of connectors:</p> <ul style="list-style-type: none"> <input type="checkbox"/> 100 % of the time at the maximum temperature for the class of connectors under test. <p>Method C: For classes KV, SF and SV</p>	TO BE PERFORMED	SE 697-026 VA PVE 697-265 VA										
404	Transverse load (external bending moment)	<p>Torque moment:</p> <table border="1"> <thead> <tr> <th>Housing size</th> <th>Torque Nm</th> </tr> </thead> <tbody> <tr> <td>08</td> <td>6,7</td> </tr> <tr> <td>10</td> <td>26</td> </tr> <tr> <td>12</td> <td>32,8</td> </tr> <tr> <td>14</td> <td>39,5</td> </tr> </tbody> </table>	Housing size	Torque Nm	08	6,7	10	26	12	32,8	14	39,5	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-
Housing size	Torque Nm													
08	6,7													
10	26													
12	32,8													
14	39,5													



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		<table border="1"> <tbody> <tr><td>16</td><td>47,3</td></tr> <tr><td>18</td><td>48,9</td></tr> <tr><td>20</td><td>50,8</td></tr> <tr><td>22</td><td>53,7</td></tr> <tr><td>24</td><td>56,5</td></tr> <tr><td>28</td><td>56,5</td></tr> </tbody> </table> <p>Force is applied to the end of the coupling of the plug or the adaptor in a plane perpendicular to the axis of the connector.</p>	16	47,3	18	48,9	20	50,8	22	53,7	24	56,5	28	56,5		
16	47,3															
18	48,9															
20	50,8															
22	53,7															
24	56,5															
28	56,5															
405	Axial load	Not applicable	NOT APPLICABLE	-												
406	Mechanical endurance	Number of mating and unmating operations: – classes R, RS, W and WS: 250 – other model: 500 The rate shall not exceed 5 cycles/min.	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-												
407	Durability of contact retention system and seals (Maintenance ageing)	Applicable	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-												



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408	Mating and unmating forces	<p>Method A</p> <p>a) Mating and unmating of pairs of connectors Apply, on the coupling ring, the coupling torque indicated in the table. Then check that the connectors are at the mechanical stop. Remove the axial load then measure the uncoupling torque of the coupling ring. This torque shall be within the limits indicated in the table. Pre-couple the connectors and apply the overtightening torque indicated in the table to the coupling ring.</p> <table border="1"> <thead> <tr> <th rowspan="3">Housing size</th> <th colspan="2">Coupling torque Nm</th> <th colspan="2">Uncoupling torque Nm</th> <th colspan="2">Over tightening torque Nm</th> </tr> <tr> <th>For all test Except test</th> <th>For test</th> <th rowspan="2">min.</th> <th rowspan="2">max.</th> <th rowspan="2">R, RS, W and WS</th> <th rowspan="2">K, KE, KV, SV, S and SE</th> </tr> <tr> <th colspan="2">EN 2591-403 and 7.2.3</th> </tr> </thead> <tbody> <tr><td>08</td><td>0,35</td><td>1,70</td><td>0,20</td><td>0,50</td><td>1,70</td><td>10</td></tr> <tr><td>10</td><td>0,55</td><td>2,00</td><td>0,35</td><td>0,80</td><td>2,00</td><td>12</td></tr> <tr><td>12</td><td>1,00</td><td>2,10</td><td>0,60</td><td>1,50</td><td>2,10</td><td>14</td></tr> <tr><td>14</td><td>1,30</td><td>2,60</td><td>0,80</td><td>1,90</td><td>2,60</td><td>15</td></tr> <tr><td>16</td><td>1,45</td><td>3,20</td><td>0,90</td><td>2,20</td><td>3,20</td><td>16</td></tr> <tr><td>18</td><td>1,80</td><td>4,00</td><td>1,10</td><td>2,70</td><td>4,00</td><td>18</td></tr> <tr><td>20</td><td>2,10</td><td>4,50</td><td>1,25</td><td>3,20</td><td>4,50</td><td>20</td></tr> <tr><td>22</td><td>2,40</td><td>5,00</td><td>1,45</td><td>3,60</td><td>5,00</td><td>20</td></tr> <tr><td>24</td><td>2,75</td><td>5,10</td><td>1,65</td><td>4,10</td><td>5,10</td><td>20</td></tr> <tr><td>28</td><td>3,70</td><td>6,40</td><td>2,20</td><td>5,50</td><td>6,40</td><td>20</td></tr> </tbody> </table> <p>b) Checking the self-locking system on the plugs only. The rotation torque of the coupling ring in the uncoupling direction shall not be lower than the value indicated in the table. NOTE The maximum torque value is limited by the maximum value of uncoupling. The ratio between the torques (uncoupling direction/coupling direction) shall not be less than two.</p>	Housing size	Coupling torque Nm		Uncoupling torque Nm		Over tightening torque Nm		For all test Except test	For test	min.	max.	R, RS, W and WS	K, KE, KV, SV, S and SE	EN 2591-403 and 7.2.3		08	0,35	1,70	0,20	0,50	1,70	10	10	0,55	2,00	0,35	0,80	2,00	12	12	1,00	2,10	0,60	1,50	2,10	14	14	1,30	2,60	0,80	1,90	2,60	15	16	1,45	3,20	0,90	2,20	3,20	16	18	1,80	4,00	1,10	2,70	4,00	18	20	2,10	4,50	1,25	3,20	4,50	20	22	2,40	5,00	1,45	3,60	5,00	20	24	2,75	5,10	1,65	4,10	5,10	20	28	3,70	6,40	2,20	5,50	6,40	20	TO BE PERFORM	SE 697-026 VA PVE 697-265 VA
Housing size	Coupling torque Nm			Uncoupling torque Nm		Over tightening torque Nm																																																																																			
	For all test Except test	For test		min.	max.	R, RS, W and WS	K, KE, KV, SV, S and SE																																																																																		
	EN 2591-403 and 7.2.3																																																																																								
08	0,35	1,70	0,20	0,50	1,70	10																																																																																			
10	0,55	2,00	0,35	0,80	2,00	12																																																																																			
12	1,00	2,10	0,60	1,50	2,10	14																																																																																			
14	1,30	2,60	0,80	1,90	2,60	15																																																																																			
16	1,45	3,20	0,90	2,20	3,20	16																																																																																			
18	1,80	4,00	1,10	2,70	4,00	18																																																																																			
20	2,10	4,50	1,25	3,20	4,50	20																																																																																			
22	2,40	5,00	1,45	3,60	5,00	20																																																																																			
24	2,75	5,10	1,65	4,10	5,10	20																																																																																			
28	3,70	6,40	2,20	5,50	6,40	20																																																																																			



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408 (continued)	Mating and unmating forces (continued)	<table border="1"> <thead> <tr> <th>Housing size</th> <th>Rotation torque (uncoupling direction) Nm min.</th> </tr> </thead> <tbody> <tr><td>08</td><td>0,06</td></tr> <tr><td>10</td><td>0,08</td></tr> <tr><td>12</td><td>0,12</td></tr> <tr><td>14</td><td>0,15</td></tr> <tr><td>16</td><td>0,18</td></tr> <tr><td>18</td><td>0,21</td></tr> <tr><td>20</td><td>0,24</td></tr> <tr><td>22</td><td>0,27</td></tr> <tr><td>24</td><td>0,30</td></tr> <tr><td>28</td><td>0,36</td></tr> </tbody> </table>	Housing size	Rotation torque (uncoupling direction) Nm min.	08	0,06	10	0,08	12	0,12	14	0,15	16	0,18	18	0,21	20	0,24	22	0,27	24	0,30	28	0,36	TO BE PERFORM	SE 697-026 VA PVE 697-265 VA
Housing size	Rotation torque (uncoupling direction) Nm min.																									
08	0,06																									
10	0,08																									
12	0,12																									
14	0,15																									
16	0,18																									
18	0,21																									
20	0,24																									
22	0,27																									
24	0,30																									
28	0,36																									
409	Contact retention in insert	<p>Preload: 10N</p> <table border="1"> <thead> <tr> <th>Contact size</th> <th>Axial load N +13/0</th> </tr> </thead> <tbody> <tr><td>22</td><td>60</td></tr> <tr><td>20</td><td>90</td></tr> <tr><td>16</td><td>110</td></tr> <tr><td>12</td><td>130</td></tr> </tbody> </table> <p>The applied load is equal to 50 % of the above value: – after test EN 2591-315 for classes K, KE, KV ,SV, S and SE – after test EN 2591-317 for classes W, WS, R and RS Displacement < 0,3 mm during and after application of the load.</p>	Contact size	Axial load N +13/0	22	60	20	90	16	110	12	130	TO BE PERFORMED	SE 697-026 VA PVE 697-265 VA												
Contact size	Axial load N +13/0																									
22	60																									
20	90																									
16	110																									
12	130																									



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's answer																						
410	Insert retention in housing (axial)	Connector not fitted with contacts. Mechanical pressure applied in both directions: <table border="1"> <thead> <tr> <th>Housing size</th> <th>Pressure MPa</th> </tr> </thead> <tbody> <tr><td>08</td><td>1,0</td></tr> <tr><td>10</td><td>1,0</td></tr> <tr><td>12</td><td>1,0</td></tr> <tr><td>14</td><td>0,7</td></tr> <tr><td>16</td><td>0,7</td></tr> <tr><td>18</td><td>0,7</td></tr> <tr><td>20</td><td>0,5</td></tr> <tr><td>22</td><td>0,5</td></tr> <tr><td>24</td><td>0,4</td></tr> <tr><td>28</td><td>0,4</td></tr> </tbody> </table>	Housing size	Pressure MPa	08	1,0	10	1,0	12	1,0	14	0,7	16	0,7	18	0,7	20	0,5	22	0,5	24	0,4	28	0,4	TO BE PERFORMED	SE 697-026 VA PVE 697-265 VA
Housing size	Pressure MPa																									
08	1,0																									
10	1,0																									
12	1,0																									
14	0,7																									
16	0,7																									
18	0,7																									
20	0,5																									
22	0,5																									
24	0,4																									
28	0,4																									
411	Insert retention in housing (torsional)	Not applicable	NOT APPLICABLE	-																						
412	Contact insertion and extraction forces	<table border="1"> <thead> <tr> <th>Contact size</th> <th>Max. Insertion force in N</th> <th>Max. Extraction force in N</th> </tr> </thead> <tbody> <tr><td>22</td><td>68</td><td>45</td></tr> <tr><td>20</td><td>68</td><td>45</td></tr> <tr><td>16</td><td>68</td><td>45</td></tr> <tr><td>12</td><td>68</td><td>45</td></tr> </tbody> </table>	Contact size	Max. Insertion force in N	Max. Extraction force in N	22	68	45	20	68	45	16	68	45	12	68	45	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-							
Contact size	Max. Insertion force in N	Max. Extraction force in N																								
22	68	45																								
20	68	45																								
16	68	45																								
12	68	45																								



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TEST as per EN2591 test methods	TITLE	DETAILS			COMMENT	CED's answer
413	Holding force of grounding spring system	Sizing and measurement gauges: see Figure 47 and Table 12. Gauge retention force: Polarization N only for qualification			NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-
		Housing size	Axial force max (N)	Axial force min (N)		
		8 and 10	67	9		
		12 and 14	89	9		
	16 to 28	133	9			
414	Unmating of lanyard release connectors	Not applicable			NOT APPLICABLE	-
415	Test probe damage (female contact)	Not applicable			NOT APPLICABLE	-
416	Contact bending strength	Not applicable			NOT APPLICABLE	-
417	Tensile strength (crimped connection)	Not applicable			NOT APPLICABLE	-
418	Gauge insertion/extraction forces (female contacts)	Not applicable			NOT APPLICABLE	-



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's answer																						
419	Stability of male contacts in insert	Gauges for test: see Figure 48 and Table 13. Force applied: 13 N Permitted deflection: – Size 22 contacts: 0,8 mm. Except classes Y and YE not applicable. – Size 20 contacts: 1,0 mm – Size 16 and 12 contacts: 1,6 mm	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-																						
420	Mechanical strength of rear accessories	Not applicable	NOT APPLICABLE	-																						
421	Free fall	Not applicable	NOT APPLICABLE	-																						
422	Locking wire hole strength	F = 133 N	NOT APPLICABLE	-																						
423	Connector rear accessories thread strength	Applicable <table border="1"> <thead> <tr> <th>Housing size</th> <th>Torque values Nm</th> </tr> </thead> <tbody> <tr><td>08</td><td>8,6</td></tr> <tr><td>10</td><td>11,5</td></tr> <tr><td>12</td><td>16,1</td></tr> <tr><td>14</td><td>17,3</td></tr> <tr><td>16</td><td>17,3</td></tr> <tr><td>18</td><td>17,3</td></tr> <tr><td>20</td><td>20,7</td></tr> <tr><td>22</td><td>20,7</td></tr> <tr><td>24</td><td>20,7</td></tr> <tr><td>28</td><td>20,7</td></tr> </tbody> </table>	Housing size	Torque values Nm	08	8,6	10	11,5	12	16,1	14	17,3	16	17,3	18	17,3	20	20,7	22	20,7	24	20,7	28	20,7	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-
Housing size	Torque values Nm																									
08	8,6																									
10	11,5																									
12	16,1																									
14	17,3																									
16	17,3																									
18	17,3																									
20	20,7																									
22	20,7																									
24	20,7																									
28	20,7																									



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's answer
424	Stripping force, solderless wrapped connections	Not applicable	NOT APPLICABLE	-
425	Unwrapping capability, solderless wrapped connections	Not applicable	NOT APPLICABLE	-
426	Contact retention system effectiveness (removable contact walkout)	Multi-strand steel cable of a cross section which can fit in the contact barrel. Force applied: 13 N (all contact sizes)	TO BE PERFORMED	SE 697-026 VA PVE 697-265 VA
427	Robustness of protective cover attachment	Force applied: 22 N	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-
428	Sinusoidal vibrations with passage of current for crimped terminal lugs	Not applicable	NOT APPLICABLE	-
501	Soft solderability	Applicable to fixed solder contacts. Classes Y and YE only	NOT APPLICABLE	-
502	Restricted entry	Not applicable	NOT APPLICABLE	-
503	Contact deformation after crimping	Not applicable	NOT APPLICABLE	-



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TEST as per EN2591 test methods	TITLE	DETAILS	COMMENT	CED's answer
505	Contact protection effectiveness (scoop-proof)	Not applicable	NOT APPLICABLE	-
506	Use of tools	Force to be applied on tool: 13 N	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-
507	Plating porosity	Not applicable	NOT APPLICABLE	-
508	Measurement of thickness of coating on contacts	Applicable to non-removable contacts – Method A or B. The measured value is recorded.	NOT APPLICABLE	-
509	Adhesion of coating on contacts	Applicable to non-removable contacts – Method B	NOT APPLICABLE	-
512	Effectiveness of nonremovable fixing of hermetically sealed connector shell	Not applicable	NOT APPLICABLE	-
513	Magnetic permeability	≤ 2	NOT APPLICABLE IN TR4633 FOLLOWING MODIFICATION	-
514	Solderability of contacts with self-contained solder and flux	Not applicable	NOT APPLICABLE	-
515	Hydrolytic stability	Not applicable	NOT APPLICABLE	-



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III. CONCLUSION:

To withstand to TR4633: 09-2007 the following tests have to be performed on connectors 983 class S / SE.

EN2591-101	: Visual examination
EN2591-204	: Discontinuity of contacts in the microsecond range
EN2591-206	: Measurement of insulation resistance
EN2591-207	: Voltage proof test
EN2591-301	: Endurance at temperature
EN2591-305	: Rapid change of temperature
EN2591-402	: Shock
EN2591-403	: Sinusoidal and random vibration
EN2591-408	: Mating and un-mating forces
EN2591-409	: Contact retention in insert
EN2591-410	: Insert retention in housing (axial)
EN2591-426	: Contact retention system effectiveness (removable contact walkout)

These tests will be executed following the test sequence SE 697-026 VA and results of the test in the test report PVE 697-265 VA.



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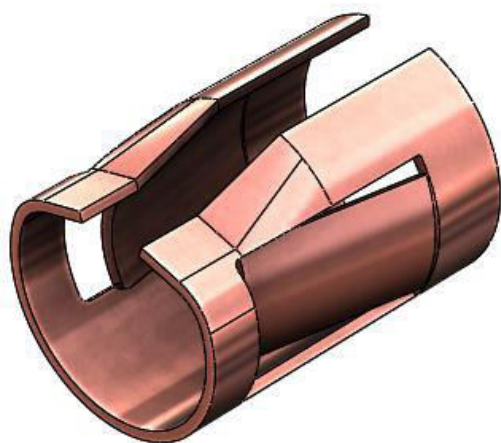
PVE 697-265 VA



983 SERIES, PLUGS AND RECEPTACLES CLASS KE/SE – Layout 08-03

New contact retention clip & RTV 106 for insert to shell bonding

QUALIFICATION ACCORDING TO TR4633 Ed.1 (October 2017) EN2997 / ESC10 / ESC15



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Objet /Subject :

983 SERIES, PLUGS AND RECEPTACLES LAYOUT 08-03 - CLASS SE/KE

New contact retention clip & RTV 106 usage for insert to shell bonding

QUALIFICATION ACCORDING TO TR4633 Ed.1 (October 2017) EN2997 / ESC10 / ESC15

Auteur / Author : A. PARENT

Date création / Date of creation : November, 29th 2019

Approbations / Approvals (dernier indice)

Fonction/Function	Nom/Name	Date	Visa
Supv R&D/Product Dvl Engineering	J. ROMANILLOS	1 December 4 th 2019	
R&D/Product Dvl Engineer	S. QUEVA	December, 4 th 2019	
Mgr R&D/Product Dvl Engineering	M. BRUNET	04/12/2019	
Sr Qlty & Reliability Engineer	C. LOBERT	04/12/2019	
ASD-CERT			
SAE-ITC			
ROLLS ROYCE			

Evolutions / Revisions

Indice/ Issue	Nature des évolutions / Description of evolution	Page	Date	Auteur / Author
a	Creation of document	All	29/11/2019	A. PARENT



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CONTENT

1 – SCOPE OF THE TESTS

2 – REFERENCE DOCUMENTS

3 – GENERAL CONDITIONS OF THE TESTS

4 – SAMPLES UNDER TEST

5 – TESTS SEQUENCE

6 – RESULTS

7 – CONCLUSION

8 – APPENDICES



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1 – SCOPE OF THE TESTS

This document defines, directs and reports the results of the qualification according to TR4633 following proposed modifications on EN2997-014 and EN2997-016 layout 08-03, class SE :

- Standardization of contact retention clip by usage of clip 701-0023-20-00-659.
- Replacement of ECCOBOND 104 by RTV 106 for insert to shell bonding.

The intent of this document is to validate the EN2997 / ESC10 / ESC15 products which are the same and with use the same processes.

The perimeter of this qualification test report is small size connectors using contacts #20.

Nota : As the ASD-STAN proposes a test sequence for change in design (TR4633), testing was based on this document for EN2997 and extended to ESC10 and ESC15.

2 – REFERENCE DOCUMENTS

- | | |
|--------------------------------|--|
| - EN 2997-001 (Jun. 2017) | : Technical specification |
| - EN 2997-002 (Dec. 2016) | : Specification of performance and contact arrangements |
| - PrEN 2997-014 (Sept. 2014) | : Square flange receptacle with integrated accessory – P.S |
| - PrEN 2997-016 (Dec. 2009) | : Plug with integrated accessory – P.S |
| - prEN 3155-004 (Dec 2016) | : Contacts, electrical, male, type A, crimp, class T |
| - prEN 3155-005 (Dec 2016) | : Contacts, electrical, female, type A, crimp, class T |
| - EN 2591-101 (Dec. 1994) | : Visual examination |
| - EN 2591-102 (Mar. 1994) | : Examination of dimension and mass |
| - EN 2591-206 (Mar. 1994) | : Measurement of insulation resistance |
| - EN 2591-207 (Mar. 1994) | : Voltage proof test |
| - EN 2591-301 (Feb. 1993) | : Endurance at temperature |
| - EN 2591-305 (Mar. 1998) | : Rapid change of temperature |
| - EN 2591-402 (Jan. 2013) | : Shock |
| - EN 2591-403 (Oct 2018) | : Random vibrations |
| - EN 2591-408 (Dec. 1998) | : Mating and un-mating forces |
| - EN 2591-409 (Jun. 1999) | : Contact retention in insert |
| - EN 2591-426 (Nov. 2002) | : Contact retention system effectiveness |
| - TR4633 Edition 1 (Oct. 2017) | : Connector, electrical, change in design qualification |
| - SE 697-026 VA : | : Test sequence |



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3 – GENERAL CONDITIONS OF THE TESTS

Unless otherwise specified, tests shall be conducted in laboratory under the following ambient conditions :

- Temperature : 23°C ± 5°C
- Relative humidity : 45 to 75%
- Air pressure : 860 to 1,060 mbar

4 – SAMPLES UNDER TEST

4-1/ DESIGNATION

4.1.1/ Square flange receptacle with integrated accessory EN2997-014:

Class SE:

- 983-15 SE 2 08-03 PN_QUALIF TR4633 equivalent to:
 - EN2997SEA0803AN (except weight, outer shell dimension and knurling)
 - ESC15KE20803PN0

4.1.2/ Plug with integrated accessory EN2997-016:

Class SE:

- 983-15 SE 7 08-03 SN_QUALIF TR4633 equivalent to:
 - EN2997SEC0803BN (except outer shell dimension and knurling)
 - ESC15SE70803SN0


4.1.3/ Contacts

Class T:

- EN 3155 : EN3155-004M2020 and EN3155-005F2020 (ESC30P20BC and ESC30S20BC)
- NRG Band : 097-0234-20 (ESC34S20BC)

4.1.4/ Wire:

Contact size	Cable size	Cable reference	Batch
20	AWG 24 (min)	DR24	F157412
	AWG 20 (max)	DR20	F409966

	<p align="center">Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support <i>Form Reference</i> 204-64-G/I01</p>
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4.2/ DISTRIBUTION OF SAMPLES


Samples shall be distributed as follow :

GROUP 1
<p>EN2997SEA0803AN / EN2997SEC0803BN (3 samples) 983-15 SE 2 08-03 PN_QUALIF TR4633 / 983-15 SE 7 08-03 SN_QUALIF TR4633</p>
GROUP 2
<p>EN2997SEA0803AN / EN2997SEC0803BN (3 samples) 983-15 SE 2 08-03 PN_QUALIF TR4633 / 983-15 SE 7 08-03 SN_QUALIF TR4633</p>
GROUP 3
<p>EN2997SEA0803AN / EN2997SEC0803BN (3 samples) 983-15 SE 2 08-03 PN_QUALIF TR4633 / 983-15 SE 7 08-03 SN_QUALIF TR4633</p>

4-3/ PREPARATION

Group 1, 2 and 3.

Connector 1	983-15 SE 7 08-03 SN_QUALIF TR4633			983-15 SE 2 08-03 PN_QUALIF TR4633		
Cavity	1	2	3	1	2	3
Wire	DR24	DR20	DR20	DR24	DR20	DR20
Contacts	097-0234-20	EN3155-005F2020		EN3155-004M2020		
Crimping tool	M22520/1-01			M22520/1-01		
Pilot stop	M22520/1-02			M22520/1-02		
Selector	4	2		4	2	

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Connector 2	983-15 SE 7 08-03 SN_QUALIF TR4633			983-15 SE 2 08-03 PN_QUALIF TR4633		
Cavity	1	2	3	1	2	3
Wire	DR20	DR24	DR24	DR20	DR24	DR24
Contacts	097-0234-20	EN3155-005F2020		EN3155-004M2020		
Crimping tool	M22520/1-01			M22520/1-01		
Pilot stop	M22520/1-02			M22520/1-02		
Selector	2	4		2	4	

Connector 3	983-15 SE 7 08-03 SN_QUALIF TR4633			983-15 SE 2 08-03 PN_QUALIF TR4633		
Cavity	1	2	3	1	2	3
Wire	DR20	DR20	DR20	DR20	DR20	DR20
Contacts	097-0234-20	EN3155-005F2020		EN3155-004M2020		
Crimping tool	M22520/1-01			M22520/1-01		
Pilot stop	M22520/1-02			M22520/1-02		
Selector	2			2		

5 – TESTS SEQUENCE

TR4633: Table 2 -Contact retention design modification

GROUP 1

EN 2591-	Description	Data sheet nr		Appendix
101	Visual examination	1	Page 10	/
206	Measurement of insulation resistance	2	Page 11	/
207	Voltage proof test	3	Page 12	/
301	Endurance at temperature	4	Page 13	/
206	Measurement of insulation resistance	5	Page 14	/
207	Voltage proof test	6	Page 15	/
409	Contact retention in insert	7	Page 16	/
101	Visual examination	8	Page 17	/



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GROUP 2

EN 2591-	Description	Data sheet nr		Appendix
101	Visual examination	9	Page 18	/
102	Examination of dimension and mass	10	Page 19	1
206	Measurement of insulation resistance	11	Page 20	/
207	Voltage proof test	12	Page 21	/
403	Sinusoidal and random vibration (at 260°C)	13	Page 22	2
206	Measurement of insulation resistance	14	Page 23	/
207	Voltage proof test	15	Page 24	/
402	Shock	16	Page 25	3
426	Contact retention system effectiveness	17	Page 26	/
409	Contact retention in insert	18	Page 27	/
101	Visual examination	19	Page 28	/

TR4633: Table 4 -Insert retention in housing**GROUP 3**

EN 2591-	Description	Data sheet nr		Appendix
101	Visual examination	20	Page 29	/
408	Mating and unmating forces	21	Page 30	/
206	Measurement of insulation resistance	22	Page 32	/
207	Voltage proof test	23	Page 33	/
305	Rapid change of temperature	24	Page 34	/
410	Insert retention in housing (axial)	25	Page 35	/
206	Measurement of insulation resistance	26	Page 36	/
207	Voltage proof test	27	Page 37	/
101	Visual examination	28	Page 38	/



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6 – RESULTS

All results are noted in data sheets nr 1 to 28 and in appendices.

7 – CONCLUSION

983-15 SE 2 08-03 PN_QUALIF TR4633 and 983-15 SE 7 08-03 SN_QUALIF TR4633 did pass successfully all tests described in paragraph 5 – Tests sequence.

8 – APPENDICES

Appendix 1 : Examination of dimensions and mass,

Appendix 2: Random vibrations,

Appendix 3: Shocks.



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DATA SHEET NR 1		
VISUAL EXAMINATION		GROUP 1
Date : September, 19th to 23rd 2019	Tested by : A. PARENT	Reference : EN2591-101

Test equipment :

Binocular nr 7501 0005 00 001

Last (next) cal dates :

N/A

Procedure :

The visual examination is carried out with naked eye under suitable conditions of viewing and lighting and under a $\times 10$ magnification.
General aspect of the connector, fittings and loose parts are examined.

Requirements :


Connector shall be free from electrical or mechanical defect that will affect life, serviceability or appearance.

Details to be examined :

- Identification,
- Appearance,
- Marking
- Surface finish.

Results :

At the end of the test, results are conformable.

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DATA SHEET NR 2		
MEASUREMENT OF INSULATION RESISTANCE		GROUP 1
Date : September, 19th to 23rd 2019	Tested by : A. PARENT	Reference : EN2591-206

Test equipment :

Megohmmeter nr 7301 0016 01 001

Last (next) cal dates :

04.2019 (04.2020)

Procedure :

Test is performed on unmated connectors.

A 500 V_{dc} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.


Requirements :

Insulation resistance shall be greater than 5 000 MΩ.

Results :

At the end of the test, results are conformable.

All cavities were measured above 200 GΩ (Maximum value measurable by the equipment used).

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DATA SHEET NR 3		
VOLTAGE PROOF TEST		GROUP 1
Date : September, 19th to 23rd 2019	Tested by : A. PARENT	Reference : EN2591-207

Test equipment :

Dielectrimeter nr 7301 0016 01 001

Last (next) cal dates :

04.2019 (04.2020)

Procedure :

Test is performed on unmated and mated connectors.

1 500 V_{rms} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.

Requirements :

None electrical breakdown or insulator by passing shall be observed.


Leakage current shall not exceed 2,0 mA.

Results :

At the end of the test, results are conformable.

No electrical breakdown has been observed.

No leakage current greater than 2.0 mA has been detected.

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DATA SHEET NR 4		
ENDURANCE AT TEMPERATURE		GROUP 1
Date : September, 23rd 2019 to November, 27th 2019	Tested by : A. PARENT	Reference : EN2591-301

Test equipment :

Hot chamber (200°C) nr 7601 0015 02 005
Hot chamber (260°C) nr 7601 0015 02 006

Last (next) cal dates :

09.2019 (09.2020)
01.2019 (01.2020)

Procedure :

Mated connectors class SE shall be subjected, without current flow, to 1 500 cycles of one hour each composed of :

- 30 minutes at 200°C (chamber N°1),
- 30 minutes at 260°C (chamber N°2)


Requirements :

Connectors shall be subjected to the following tests :

- Measurement of insulation resistance (data sheet nr 5),
- Voltage proof test (data sheet nr 6),
- Contact retention in insert (data sheet nr 7)
- Visual examination. (data sheet nr 8).

Results :

At the end of the test, results are conformable.

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference</p> <p>204-64-G/I01</p>
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LABORATORY

TEST REPORT

PVE 697-265 VA

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DATA SHEET NR 5		
MEASUREMENT OF INSULATION RESISTANCE		GROUP 1
Date : November, 27th 2019	Tested by : A. PARENT	Reference : EN2591-206

Test equipment :

Megohmmeter nr 7301 0016 01 002

Last (next) cal dates :

11.2019 (11.2020)

Procedure :

Test is performed on unmated connectors.

A 500 V_{dc} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.


Requirements :

Insulation resistance shall be greater than 5 000 MΩ.

Results :

At the end of the test, results are conformable.

All cavities were measured above 2 TΩ. (Maximum value measurable by the equipment used).

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference</p> <p>204-64-G/I01</p>
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TEST REPORT

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DATA SHEET NR 6

VOLTAGE PROOF TEST

GROUP 1

Date : November, 27th 2019

Tested by : A. PARENT

Reference : EN2591-207

Test equipment :

Dielectrimeter nr 7301 0016 01 002

Last (next) cal dates :

11.2019 (11.2020)

Procedure :

Test is performed on unmated and mated connectors.

1 500 V_{rms} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.

Requirements :

None electrical breakdown or insulator by passing shall be observed.

Leakage current shall not exceed 2,0 mA.

Results :


At the end of the test, results are conformable.

No electrical breakdown has been observed.

No leakage current greater than 2.0 mA has been detected.

All leakage current values are in the following table. (Results are in μ A)

Cavity nr	Connector nr 1			Connector nr 2			Connector nr 3		
	1	2	3	1	2	3	1	2	3
Receptacle (μ A)	8	10	10	8	9	11	10	11	12
Plug (μ A)	10	13	8	11	8	13	13	8	9
Mated (μ A)	15	15	17	13	15	15	15	16	17

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference 204-64-G/101</p>
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LABORATORY**TEST REPORT****PVE 697-265 VA**Indice/Issue : a
Date : November, 29th 2019
Page : 16/38**DATA SHEET NR 7****CONTACT RETENTION IN INSERT****GROUP 1****Date : November, 27th 2019****Tested by : A. PARENT****Reference : EN2591-409****Test equipment :**Comparator nr 7020 0076 03 068
Dynamometer nr 7106 0043 00 001**Last (next) cal dates :**06.2019 (06.2020)
02.2019 (02.2020)**Procedure :**

Each contact is submitted to an axial preload of 10 N.
Then the force specified in the table below is applied for 10 seconds at a rate of 5 N/s.
The test is repeated in the other direction.

Contact size	20
Axial load (N)	90

Requirements :


Displacement shall not be greater than 0.30 mm during and after application of the load.
No damage shall be observed.

Results :

At the end of the test, results are conformable.
All results are in the following table :

RECEPTACLE	Connector nr 1			Connector nr 2			Connector nr 3		
	1	2	3	1	2	3	1	2	3
Cavity nr									
Displacement in mm associated to a load on the front face of the contact	0,13	0,10	0,11	0,17	0,11	0,15	0,12	0,13	0,10
Displacement in mm associated to a load on the rear of the contact	0,02	0,04	0,03	0,01	0,01	0,01	0,01	0,04	0,02

PLUG	Connector nr 1			Connector nr 2			Connector nr 3		
	1	2	3	1	2	3	1	2	3
Cavity nr									
Displacement in mm associated to a load on the front face of the contact	0,12	0,06	0,07	0,06	0,02	0,02	0,05	0,02	0,06
Displacement in mm associated to a load on the rear of the contact	0,01	0,02	0,03	0,10	0,09	0,06	0,06	0,08	0,08

	Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE	Référence du support Form Reference
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TEST REPORT

PVE 697-265 VA

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DATA SHEET NR 8		
VISUAL EXAMINATION		GROUP 1
Date : November, 28th 2019	Tested by : A. PARENT	Reference : EN2591-101

Test equipment :

Binocular nr 7501 0005 00 001

Last (next) cal dates :

N/A

Procedure :


The visual examination is carried out with naked eye under suitable conditions of viewing and lighting and under a $\times 10$ magnification.
General aspect of the connector, fittings and loose parts are examined.

Requirements :

Modules shall be free from electrical or mechanical defect that will affect life, serviceability or appearance.
No loosening of parts, crack, excessive wear or detached part shall be observed.

Results :

At the end of the test, results are conformable.

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference 204-64-G/I01</p>
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LABORATORY

TEST REPORT

PVE 697-265 VA

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DATA SHEET NR 9		
VISUAL EXAMINATION		GROUP 2
Date : September, 19th to 23rd 2019	Tested by : A. PARENT	Reference : EN2591-101

Test equipment :

Binocular nr 7501 0005 00 001

Last (next) cal dates :

N/A

Procedure :

The visual examination is carried out with naked eye under suitable conditions of viewing and lighting and under a $\times 10$ magnification.
General aspect of the connector, fittings and loose parts are examined.

Requirements :


Modules shall be free from electrical or mechanical defect that will affect life, serviceability or appearance.

Details to be examined :

- Identification,
- Appearance,
- Marking
- Surface finish.

Results :

At the end of the test, results are conformable.

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference 204-64-G/I01</p>
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LABORATORY**TEST REPORT****PVE 697-265 VA**Indice/Issue : a
Date : November, 29th 2019
Page : 19/38**DATA SHEET NR 10****EXAMINATION OF DIMENSION AND MASS****GROUP 2****Date : September, 19th to 23rd 2019****Tested by : A. PARENT****Reference : EN2591-102****Test equipment :**Comparator nr 7024 0001 01 032
Caliper nr 7011 0013 02 346
Scales nr 7182 0017 01 001
Pin gauge box nr 7032 6082 00 001**Last (next) cal date :**04.2019 (04.2020)
02.2019 (02.2020)
06.2019 (06.2020)
09.2019 (09.2020)**Procedure :****Dimensions** : Dimensions shall be measured on each plug and each receptacle.**Mass** : Each connector part shall be weighted without contact or accessory and the mass recorded.**Requirements :**

Dimensions and mass shall be conform with ESC15 issue 5, similar to EN2997-014 and EN2997-016, except weight, outer shell dimension and knurling.

Results :

A the end of the test, results are conformable.

Complete results are in appendix 1.

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DATA SHEET NR 11		
MEASUREMENT OF INSULATION RESISTANCE		GROUP 2
Date : September, 19th to 23rd 2019	Tested by : A. PARENT	Reference : EN2591-206

Test equipment :

Megohmmeter nr 7301 0016 01 001

Last (next) cal dates :

04.2019 (04.2020)

Procedure :

Test is performed on unmated connectors.

A 500 V_{dc} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.


Requirements :

Insulation resistance shall be greater than 5 000 MΩ.

Results :

At the end of the test, results are conformable.

All cavities were measured above 200 GΩ. (Maximum value measurable by the equipment used).

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference 204-64-G/I01</p>
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PVE 697-265 VA

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DATA SHEET NR 12		
VOLTAGE PROOF TEST		GROUP 2
Date : September, 19th to 23rd 2019	Tested by : A. PARENT	Reference : EN2591-207

Test equipment :

Dielectrimeter nr 7301 0016 01 001

Last (next) cal dates :

04.2019 (04.2020)

Procedure :

Test is performed on unmated and mated connectors.

1 500 V_{rms} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.

Requirements :

None electrical breakdown or insulator by passing shall be observed.


Leakage current shall not exceed 2,0 mA.

Results :

At the end of the test, results are conformable.

No electrical breakdown has been observed.

No leakage current greater than 2.0 mA has been detected.

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference 204-64-G/I01</p>
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DATA SHEET NR 13		
RANDOM AND SINUSOIDAL VIBRATIONS		GROUP 2
Date : October, 8th to 11th 2019	Tested by : A. PARENT	Reference : EN2591-403

Test equipment :

Vibration pilot nr 7161 0003 03 001
Charge amplifier nr 7161 0001 04 005
Accelerometer nr 7161 0001 23 001
Accelerometer nr 7161 0001 27 001
Accelerometer nr 7161 0001 28 001
Discontinuity detector nr 7344 0003 00 001
Hot chamber nr 7601 0026 00 001

Last (next) cal dates :

05.2019 (05.2020)
06.2019 (06.2020)
06.2019 (06.2020)
10.2018 (10.2019)
10.2018 (10.2019)
05.2019 (05.2021)
07.2019 (07.2020)

Procedure :

The receptacle is mounted on the sample mounting panel. Then the plug is mated to the receptacle. Contacts are connected in series with a 0.1 A maximum current flowing through the contacts to monitor the electrical discontinuity, if any.
The wires are fixed at 200 mm from the rear of the shell.

Vibration characteristics :

- Random vibration (method B)
- 50 to 2,000 Hz
- Figure 3, table 2, level J
- 8 hour per axis (3 axis), at 260°C.


Requirements :

There shall be no electrical discontinuity in excess of 1 μ s.

Results :

At the end of the test, results are conformable.

Pictures and curves are in appendix 2.

	Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE	Référence du support <i>Form Reference</i> 204-64-G/I01
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LABORATORY**TEST REPORT****PVE 697-265 VA**Indice/Issue : a
Date : November, 29th 2019
Page : 23/38**DATA SHEET NR 14****MEASUREMENT OF INSULATION RESISTANCE****GROUP 2****Date : October, 14th 2019****Tested by : A. PARENT****Reference : EN2591-206****Test equipment :**

Megohmmeter nr 7301 0014 01 001

Last (next) cal dates :

04.2019 (04.2020)

Procedure :

Test is performed on unmated connectors.

A 500 V_{dc} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.**Requirements :**

Insulation resistance shall be greater than 5 000 MΩ.

Results :

At the end of the test, results are conformable.

Complete results are in the following table.

Receptacle		
Connector nr	Cavity nr	Insulation (GΩ)
1	1	>200
	2	>200
	3	>200
2	1	145,9
	2	165,5
	3	>200
3	1	190
	2	>200
	3	>200

Plug		
Connector nr	Cavity nr	Insulation (GΩ)
1	1	158,2
	2	>200
	3	>200
2	1	139,3
	2	152,6
	3	>200
3	1	146,2
	2	>200
	3	153,4



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DATA SHEET NR 15		
VOLTAGE PROOF TEST		GROUP 2
Date : October, 14th 2019	Tested by : A. PARENT	Reference : EN2591-207

Test equipment :

Dielectrimeter nr 7301 0016 01 001

Last (next) cal dates :

04.2019 (04.2020)

Procedure :

Test is performed on unmated and mated connectors.

1 500 V_{rms} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.

Requirements :

None electrical breakdown or insulator by passing shall be observed.


Leakage current shall not exceed 2,0 mA.

Results :

At the end of the test, results are conformable.

No electrical breakdown has been observed.

No leakage current greater than 2.0 mA has been detected.

	Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE	Référence du support <i>Form Reference</i> 204-64-G/I01
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DATA SHEET NR 16		
SHOCK		GROUP 2
Date : October, 15th 2019	Tested by : A. PARENT	Reference : EN2591-402

Test equipment :

Oscilloscope nr 7346 0003 00 001
Charge amplifier nr 7142 0010 10 001
Accelerometer nr 7161 0001 28 001
Electrical continuity detector nr 7344 0001 03 001
Electrical continuity detector nr 7344 0001 03 002

Last cal dates :

03.2019 (03.2021)
03.2018 (03.2020)
10.2018 (10.2019)
07.2019 (07.2021)
11.2018 (11.2020)

Procedure :

Test shall be conducted on mated connectors with contacts wired in series.

Shocks characteristics :

- half sine wave,
- 300 g,
- 3 ms,
- 3 axis,
- 2 shocks in each axis (1 in each direction) : total 6 shocks.

A direct current of 100 mA shall flow through the contacts to monitor electrical discontinuity throughout the test.

Requirements :

There shall be no electrical discontinuity in excess of 1 μ s.


There shall be no electrical or mechanical defect that will affect life, appearance or serviceability.

Results :

At the end of the test, results are conformable.

No electrical discontinuity in excess of 1 μ s was detected.

See curves in appendix 3.

	Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE	Référence du support <i>Form Reference</i> 204-64-G/101
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TEST REPORT

PVE 697-265 VA

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DATA SHEET NR 17

CONTACT RETENTION SYSTEM EFFECTIVENESS

GROUP 2

Date : October, 16th 2019

Tested by : A. PARENT

Reference : EN2591-426

Test equipment :

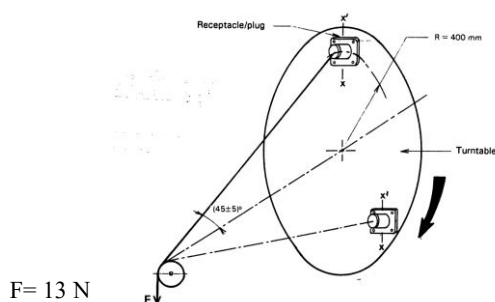
Rotating apparatus nr 9200 0000 00 002
Weight of 13N nr 7181 0005 00 001

Last (next) cal dates :

None
04.2016 (04.2021)

Procedure :

Two contacts in each insert shall be tested. (Cavities 1 and 3 for all 3 connectors).
The receptacle and the plug shall be mounted as shown in the figure below :



The connector shall be subjected to 100 rotations in one direction at a rate of 10 rotations per minute.
The orientation of x-x' axis shall remain unchanged during rotations.

Requirements :

During test, the contact shall not become dislodged from its cavity.

Results :

At the end of the test, results are conformable.



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LABORATORY**TEST REPORT****PVE 697-265 VA**Indice/Issue : a
Date : November, 29th 2019
Page : 27/38**DATA SHEET NR 18****CONTACT RETENTION IN INSERT****GROUP 2****Date : October, 17th 2019****Tested by : A. PARENT****Reference : EN2591-409****Test equipment :**Comparator nr 7020 0076 03 068
Dynamometer nr 7106 0043 00 001**Last (next) cal dates :**06.2019 (06.2020)
02.2019 (02.2020)**Procedure :**

Each contact is submitted to an axial preload of 10 N.
Then the force specified in the table below is applied for 10 seconds at a rate of 5 N/s.
The test is repeated in the other direction.

Contact size	20
Axial load (N)	90

Requirements :


Displacement shall not be greater than 0.30 mm during and after application of the load.
No damage shall be observed.

Results :

At the end of the test, results are conformable.
All results are in the following table :

RECEPTACLE	Connector nr 1			Connector nr 2			Connector nr 3		
	1	2	3	1	2	3	1	2	3
Cavity nr									
Displacement in mm associated to a load on the front face of the contact	0,08	0,11	0,12	0,17	0,15	0,13	0,11	0,18	0,10
Displacement in mm associated to a load on the rear of the contact	0,11	0,20	0,19	0,20	0,18	0,22	0,19	0,14	0,15

PLUG	Connector nr 1			Connector nr 2			Connector nr 3		
	1	2	3	1	2	3	1	2	3
Cavity nr									
Displacement in mm associated to a load on the front face of the contact	0,05	0,04	0,03	0,02	0,04	0,03	0,02	0,03	0,03
Displacement in mm associated to a load on the rear of the contact	0,04	0,03	0,04	0,02	0,03	0,04	0,03	0,04	0,03

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DATA SHEET NR 19		
VISUAL EXAMINATION		GROUP 2
Date : October, 17th 2019	Tested by : A. PARENT	Reference : EN2591-101

Test equipment :

Binocular nr 7501 0005 00 001

Last (next) cal dates :

N/A

Procedure :


The visual examination is carried out with naked eye under suitable conditions of viewing and lighting and under a $\times 10$ magnification.
General aspect of the connector, fittings and loose parts are examined.

Requirements :

Modules shall be free from electrical or mechanical defect that will affect life, serviceability or appearance.
No loosening of parts, crack, excessive wear or detached part shall be observed.

Results :

At the end of the test, results are conformable.

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference 204-64-G/101</p>
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DATA SHEET NR 20		
VISUAL EXAMINATION		GROUP 3
Date : September, 19th 2019	Tested by : A. PARENT	Reference : EN2591-101

Test equipment :

Binocular nr 7501 0005 00 001

Last (next) cal dates :

N/A

Procedure :

The visual examination is carried out with naked eye under suitable conditions of viewing and lighting and under a $\times 10$ magnification.
General aspect of the connector, fittings and loose parts are examined.

Requirements :


Connector shall be free from electrical or mechanical defect that will affect life, serviceability or appearance.

Details to be examined :

- Identification,
- Appearance,
- Marking
- Surface finish.

Results :

At the end of the test, results are conformable.

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference</p> <p>204-64-G/101</p>
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LABORATORY**TEST REPORT****PVE 697-265 VA**Indice/Issue : a
Date : November, 29th 2019
Page : 30/38**DATA SHEET NR 21(1/2)****MATING AND UNMATING FORCES****GROUP 3****Date : September, 19th 2019****Tested by : A. PARENT****Reference : EN2591-408****Test equipment :**

Torquemeter nr 7142 0010 10 002

Last (next) cal dates :

05.2018 (05.2020)

Procedure :

1/ Connectors shall be in no way deformed or damaged by the application of the following torque loads to the coupling ring :

Table 1:

Shell size	Torque			Overtightening Maximum torque (N.m)
	Coupling (N.m)	Uncoupling (N.m)		
	Maximum	Minimum	Maximum	
08	0.35	0.20	0.50	10

The coupling torque max. shall enable the mechanical stop to be reached.

2/ The rotation torque of the coupling ring in the uncoupling direction shall not be lower than the value indicated in the table 2 hereafter.

Table 2 :

Shell size	Rotation torque minimum (unmating direction) (N.m)
08	0.06

Note :

The maximum torque is limited by the maximum value of uncoupling torque in table 1.
The ratio between the torques (uncoupling direction / coupling direction) shall not be less than 2.



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LABORATORY**TEST REPORT****PVE 697-265 VA**Indice/Issue : a
Date : November, 29th 2019
Page : 31/38**DATA SHEET NR 21(2/2)****MATING AND UNMATING FORCES****GROUP 3****Date : September, 19th 2019****Tested by : A. PARENT****Reference : EN2591-408****Requirements :**

See tables 1 and 2.

Results :

At the end of the test, results are conformable.

Results are in the following table:

		Class SE '08-03'		
		Sample 1	Sample 2	Sample 3
Unmating after application of the coupling torque maximum		0,38 N.m	0,24 N.m	0,28 N.m
Application of the overtightening coupling torque		No damage was observed		
Coupling ring	Unmating direction	0,14 N.m	0,14 N.m	0,13 N.m
	Mating direction	0,04 N.m	0,04 N.m	0,04 N.m
	Ratio	3,5	3,5	3,25



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PVE 697-265 VA

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DATA SHEET NR 22		
MEASUREMENT OF INSULATION RESISTANCE		GROUP 3
Date : September, 19th to 23rd 2019	Tested by : A. PARENT	Reference : EN2591-206

Test equipment :

Megohmmeter nr 7301 0016 01 001

Last (next) cal dates :

04.2019 (04.2020)

Procedure :

Test is performed on unmated connectors.

A 500 V_{dc} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.


Requirements :

Insulation resistance shall be greater than 5 000 MΩ.

Results :

At the end of the test, results are conformable.

All cavities were measured above 200 GΩ. (Maximum value measurable by the equipment used).

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference 204-64-G/I01</p>
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DATA SHEET NR 23		
VOLTAGE PROOF TEST		GROUP 3
Date : September, 19th to 23rd 2019	Tested by : A. PARENT	Reference : EN2591-207

Test equipment :

Dielectrimeter nr 7301 0016 01 001

Last (next) cal dates :

04.2019 (04.2020)

Procedure :

Test is performed on unmated and mated connectors.

1 500 V_{rms} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.

Requirements :

None electrical breakdown or insulator by passing shall be observed.


Leakage current shall not exceed 2,0 mA.

Results :

At the end of the test, results are conformable.

No electrical breakdown has been observed.

No leakage current greater than 2.0 mA has been detected.

	<p>Connecteurs Electriques Deutsch 17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE</p>	<p>Référence du support Form Reference 204-64-G/I01</p>
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DATA SHEET NR 24

RAPID CHANGE OF TEMPERATURE

GROUP 3

Date : September, 25th to 26th 2019

Tested by : A. PARENT

Reference : EN2591-305

Test equipment :

Cold chamber nr 7601 0015 02 004

Hot chamber nr 7601 0023 00 001

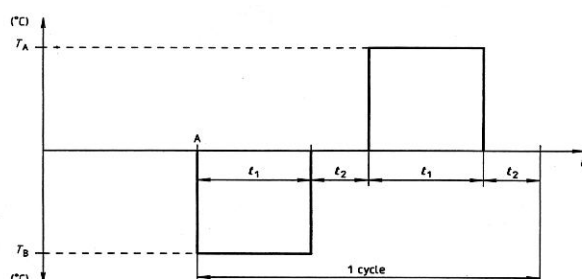
Last (next) cal dates :

09.2019 (09.2020)

09.2019 (09.2020)

Procedure :

Mated connectors shall perform 10 times the following cycle :



T_a : 260°C

T_b : -65°C

t_1 : 30 min.

A lift transfers connectors from one chamber to the other within 8 seconds (t_2).

Requirements :

Connectors shall be free from electrical or mechanical defect that will affect life, serviceability or appearance.

Results :

At the end of the test, results are conformable.



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LABORATORY**TEST REPORT****PVE 697-265 VA**Indice/Issue : a
Date : November, 29th 2019
Page : 35/38**DATA SHEET NR 25****INSERT RETENTION IN HOUSING (AXIAL)****GROUP 3****Date : September, 27th 2019****Tested by : A. PARENT****Reference : EN2591-410****Test equipment :**Comparator nr 7020 0076 03 068
Dynamometer nr 7106 0043 00 001**Last (next) cal dates :**06.2019 (06.2020)
02.2019 (02.2020)**Procedure :**

Connectors without elastomer shall be submitted in turn to an axial pressure applied to its front face.

The pressure shall be increased at a rate of 70 kPa/s (7 N/cm² per second) until the final pressure is reached (see table below) :

Shell size	08
Pressure (N/cm ²)	100

The maximum pressure shall be maintained for at least 5 seconds.

Requirements :

Displacement of the insert during and after the application of the pressure is recorded.

Results :

At the end of the test, results are recorded.

Results are in the following table:

	Connector nr 1	Connector nr 2	Connector nr 3
Displacement during test (mm)	0,05	0,04	0,03
Displacement after test (mm)	0	0	0,01



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DATA SHEET NR 26		
MEASUREMENT OF INSULATION RESISTANCE		GROUP 3
Date : October, 1st 2019	Tested by : A. PARENT	Reference : EN2591-206

Test equipment :

Megohmmeter nr 7301 0008 00 001

Last (next) cal dates :

04.2019 (04.2020)

Procedure :

Test is performed on unmated connectors.

A 500 V_{dc} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.


Requirements :

Insulation resistance shall be greater than 5 000 MΩ.

Results :

At the end of the test, results are conformable.

All cavities were measured above 2 TΩ. (Maximum value measurable by the equipment used).

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DATA SHEET NR 27		
VOLTAGE PROOF TEST		GROUP 3
Date : October, 1st 2019	Tested by : A. PARENT	Reference : EN2591-207

Test equipment :

Dielectrimeter nr 7301 0016 01 001

Last (next) cal dates :

04.2019 (04.2020)

Procedure :

Test is performed on unmated and mated connectors.

1 500 V_{rms} voltage is applied for 1 minute successively between each contact and all others are connected together and to the shell.

Requirements :

None electrical breakdown or insulator by passing shall be observed.


Leakage current shall not exceed 2,0 mA.

Results :

At the end of the test, results are conformable.

No electrical breakdown has been observed.

No leakage current greater than 2.0 mA has been detected.

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DATA SHEET NR 28

VISUAL EXAMINATION

GROUP 3

Date : October, 1st 2019

Tested by : A. PARENT

Reference : EN2591-101

Test equipment :

Binocular nr 7501 0005 00 001

Last (next) cal dates :

N/A

Procedure :

The visual examination is carried out with naked eye under suitable conditions of viewing and lighting and under a $\times 10$ magnification.
General aspect of the connector, fittings and loose parts are examined.

Requirements :

Modules shall be free from electrical or mechanical defect that will affect life, serviceability or appearance.
No loosening of parts, crack, excessive wear or detached part shall be observed.

Results :

At the end of the test, results are conformable.



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Service émetteur / Issuing service

Type document / Document Model

Référence document/Document reference

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Appendices

APPENDICES

Appendix 1 :

Examination of dimensions and mass

Appendix 2 :

Random vibrations

Appendix 3 :

Shock



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Appendix 1

Appendix 1 : Examination of dimensions and mass (DS nr 10)

ESC15 style 2

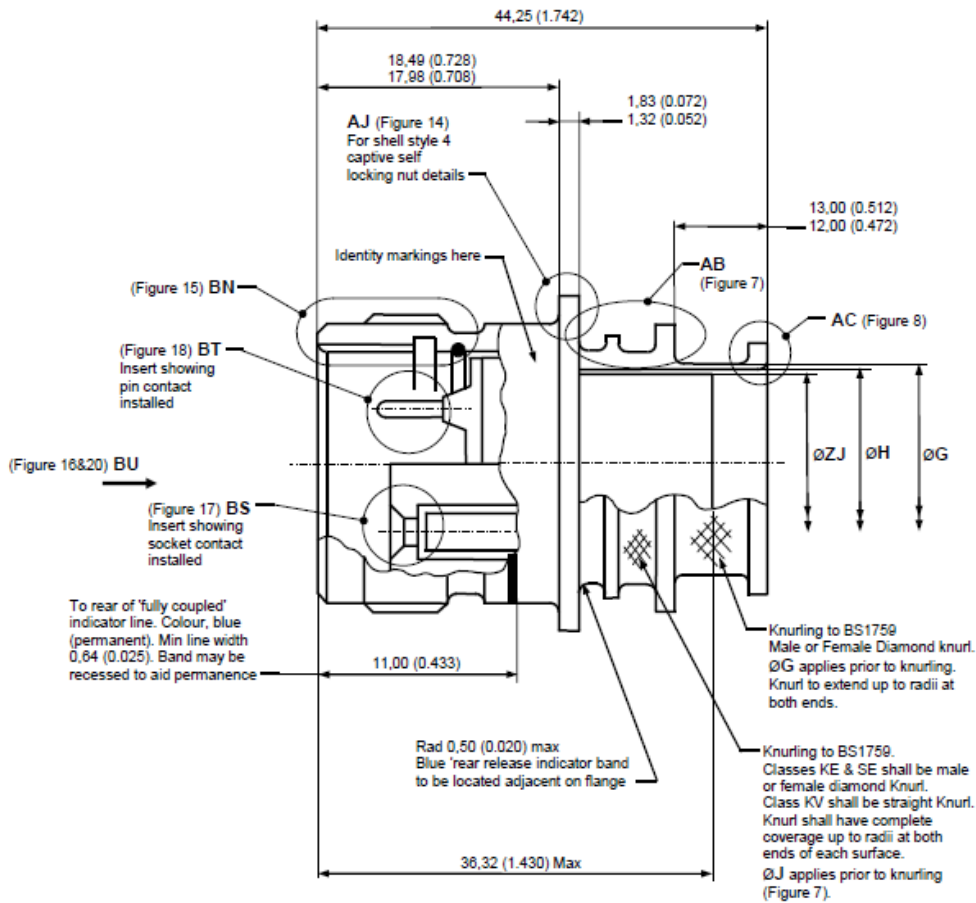


Figure 12 - Receptacle styles 2 and 4. (Style 4 captive self locking nut detail, Ref table 6 and Figure 14).

Group 2	Requirements	Mass	44,25 max	ØY	ØG	ØZ	ØZJ	ØH	1,82 1,32	18,49 17,98	4 holes ØZB			
		33 g max		max	max	Typical	Max	min			3,18 2,92			
				14,27	15,09	20,49 20,75	7,75	9,40						
	Sample1	27,22	44,22	14,22	11,68	20,62	7,23	9,67	1,75	18,14	3,15	3,15	3,15	3,15
	Sample 2	27,23	44,23	14,21	11,67	20,63	7,22	9,64	1,76	18,14	3,16	3,15	3,15	3,16
	Sample 3	27,24	44,23	14,23	11,69	20,62	7,22	9,67	1,75	18,14	3,15	3,15	3,15	3,15



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Appendix 1 : Examination of dimensions and mass (follow up) (DS nr 10)

ESC-15 style 7- KE/SE

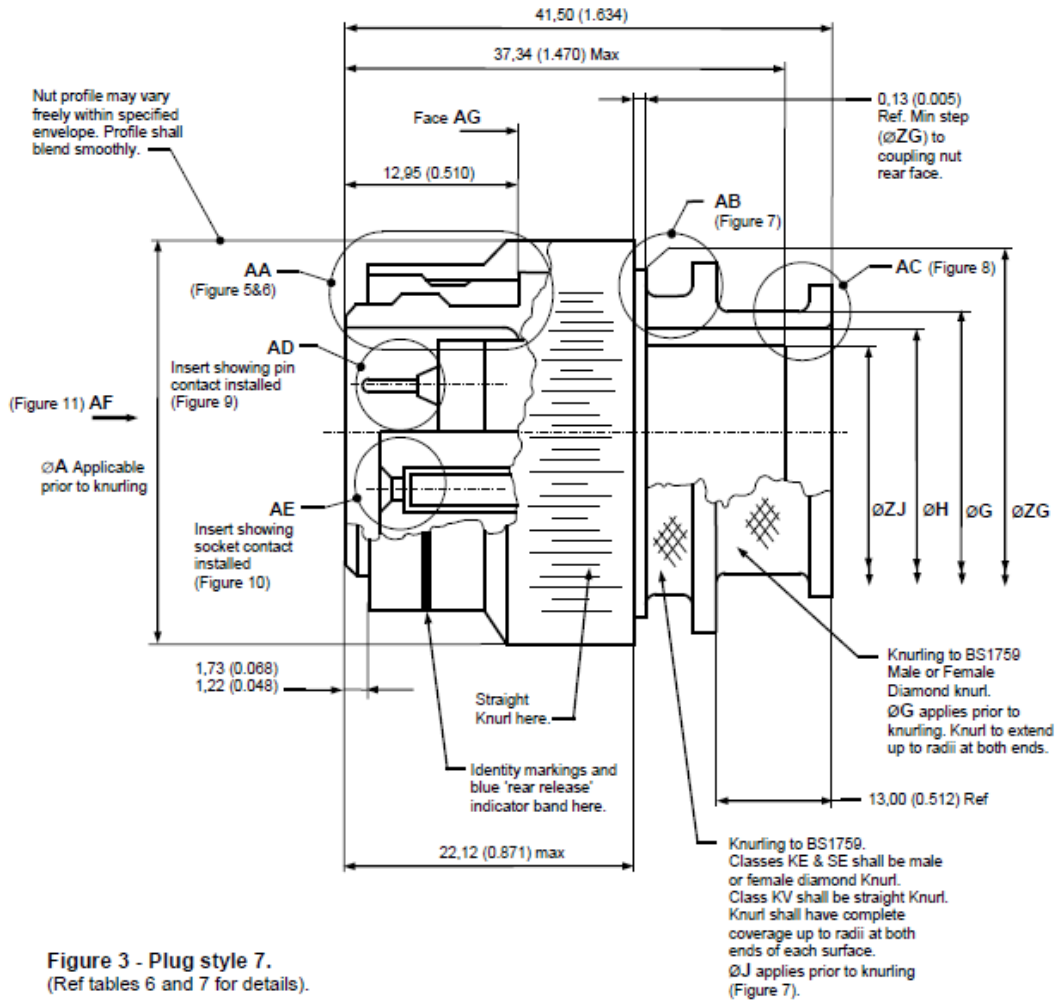


Figure 3 - Plug style 7.
(Ref tables 6 and 7 for details).

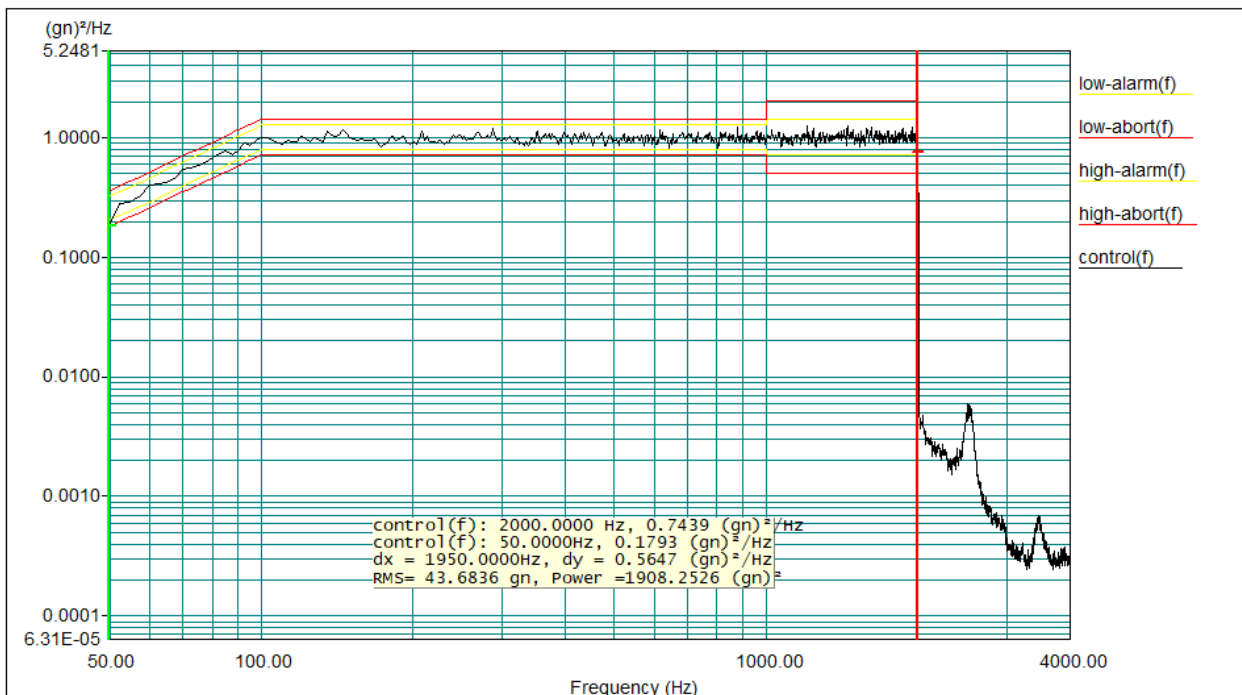
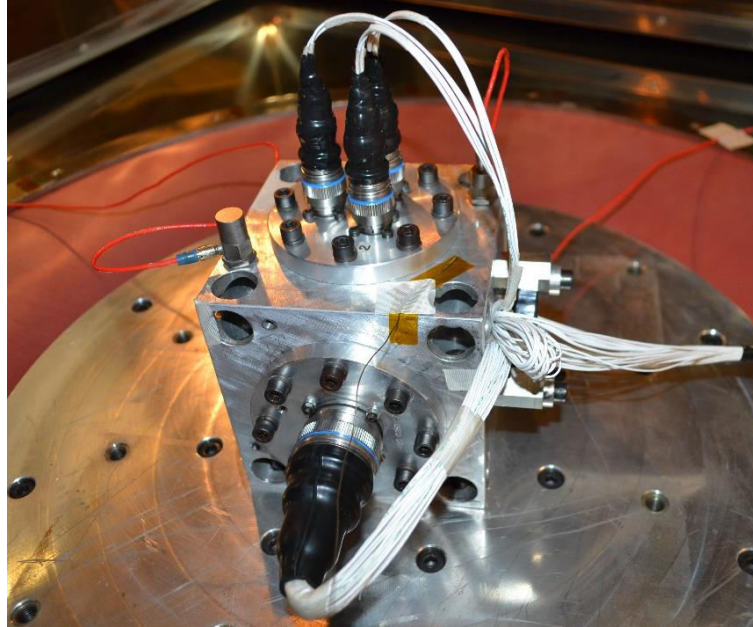
Group 2	Requirements	Mass	41,50	$\varnothing A$	12,95	37,34	22,12	$\varnothing ZG$	$\varnothing G$	$\varnothing H$	$\varnothing ZJ$
		45 g max	max	21,30 max	max	max	max	17,45 17,95	11,60 11,80	min	Max
	Sample 1	40,18	41,50	20,57	12,80	33,33	20,71	17,69	11,64	9,51	7,25
	Sample 2	40,23	41,50	20,56	12,82	33,32	20,71	17,67	11,63	9,62	7,28
	Sample 3	40,16	41,50	20,56	12,81	33,36	20,70	17,66	11,63	9,55	7,27



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Appendix 2**Appendix 2 : Sinusoidal and random vibrations (DS nr 13)**

Level: 100 %

Control RMS: 43.721600 gn Full Level Elapsed Time:08:00:00

Lines: 1600 Frame Time: 0.400000 Seconds

Demand RMS: 43.932468 gn Remaining Time:

00:00:00

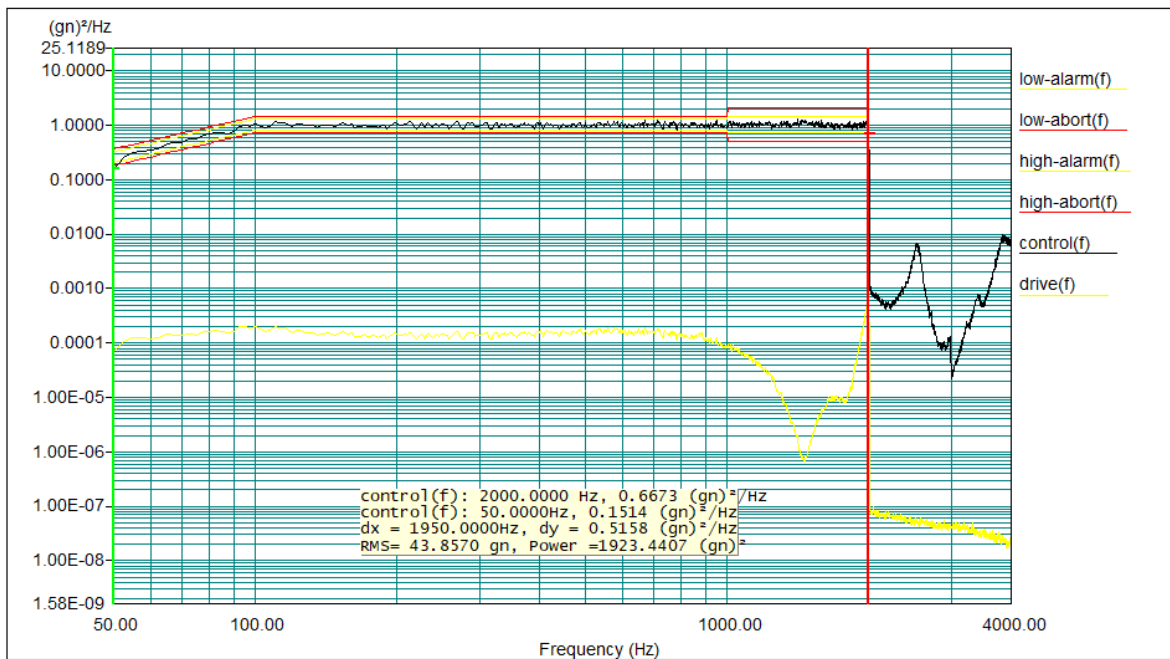
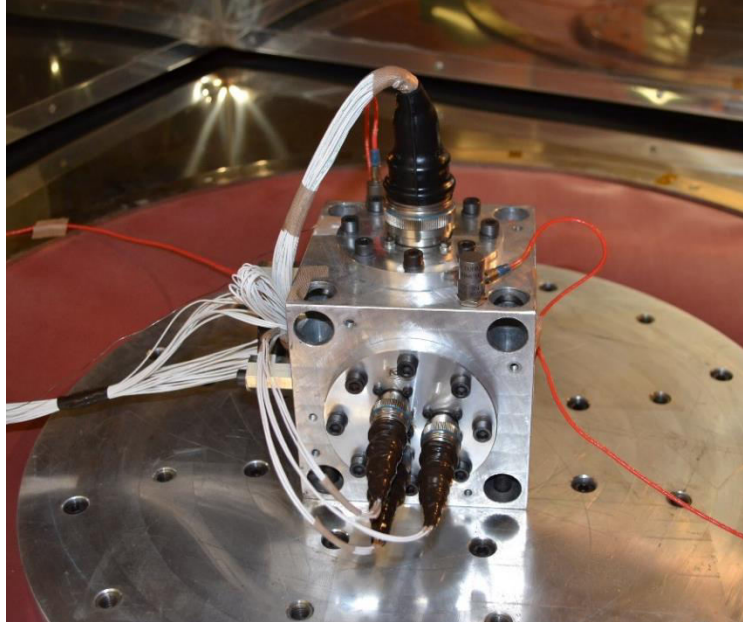
DOF: 154 dF:

2.500000 Hz



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Appendix 2**Appendix 2 : Sinusoidal and random vibrations (follow up) (DS nr 13)**

Level: 100 %

Control RMS: 43.929165 gn Full Level Elapsed Time:08:00:00

Lines: 1600 Frame Time: 0.400000 Seconds

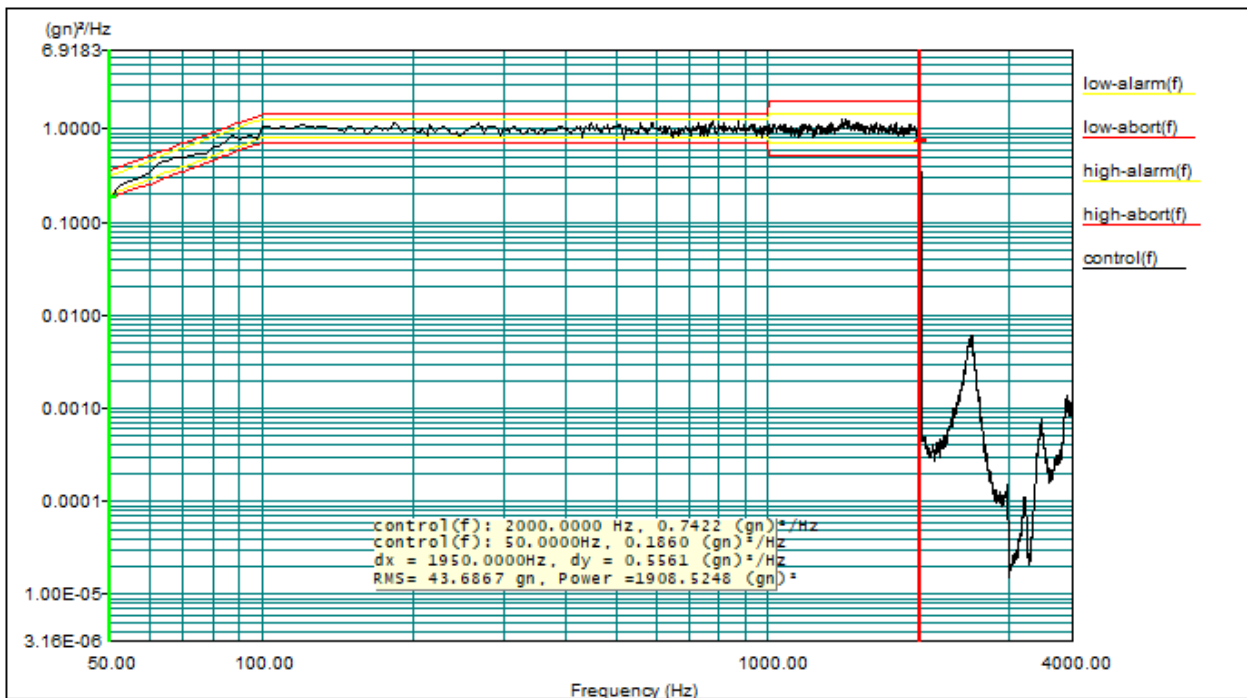
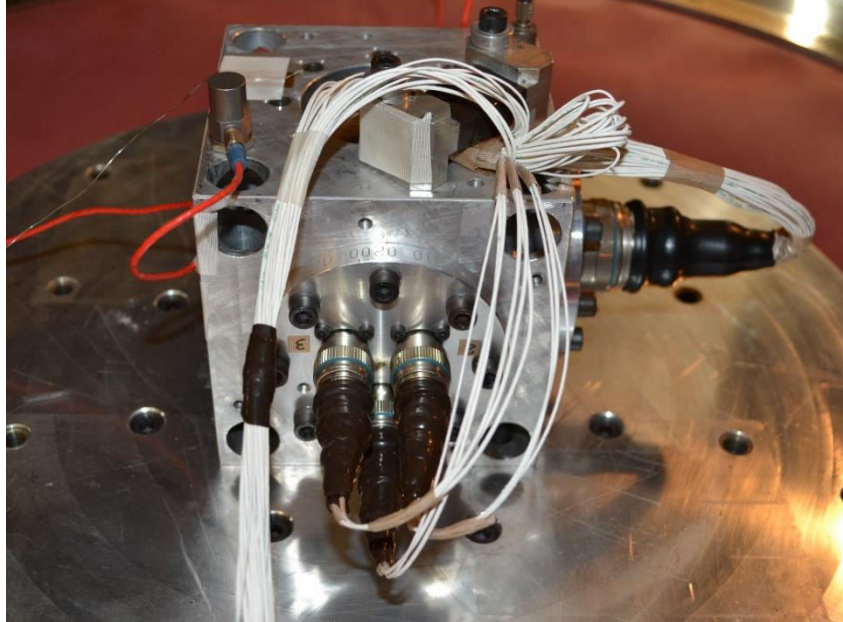
Demand RMS: 43.932468 gn Remaining Time:

00:00:00

DOF: 154

dF: 2.500000 Hz

**Connecteurs Electriques Deutsch**
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LABORATORY**TEST REPORT****PVE 697-265 VA**Indice/Issue : a
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Appendix 2**Appendix 2 : Sinusoidal and random vibrations (follow up) (DS nr 13)**

Level: 100 %

Control RMS: 43.708939 gn Full Level Elapsed Time:08:00:00

Lines: 1600 Frame Time: 0.400000 Seconds

Demand RMS: 43.932468 gn Remaining Time:

00:00:00

DOF: 154 dF:

2.500000 Hz



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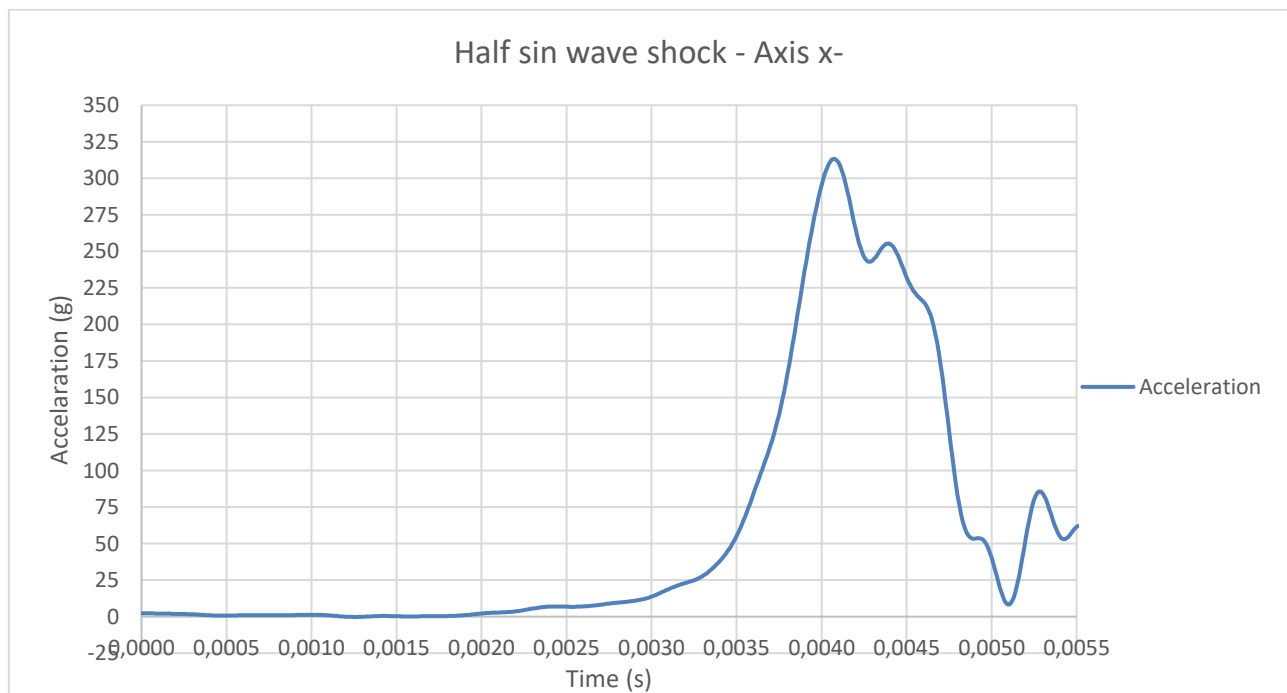
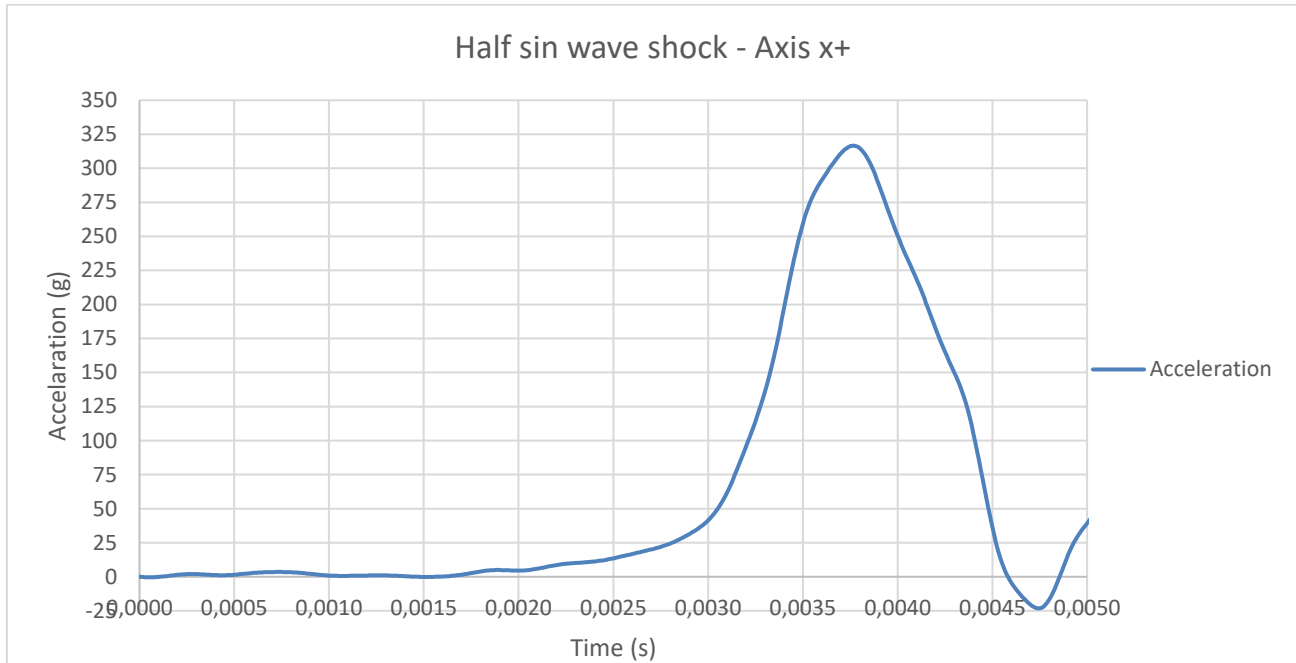
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Appendix 3 : Shock (DS nr16)

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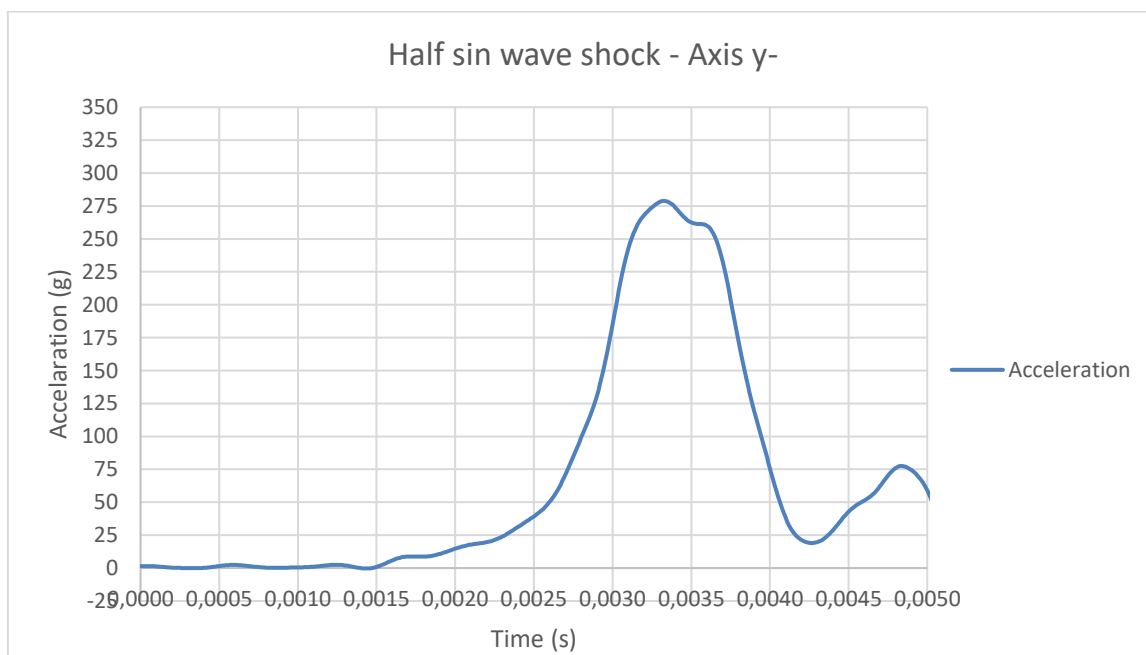
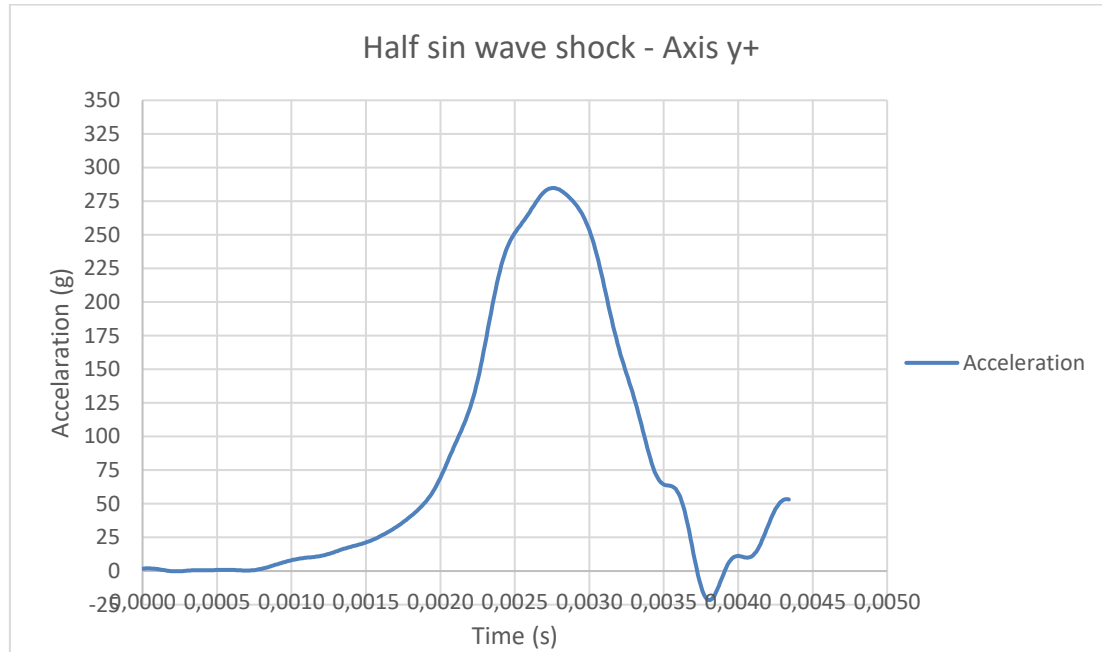
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Appendix 3 : Shock (follow up) (DS nr16)

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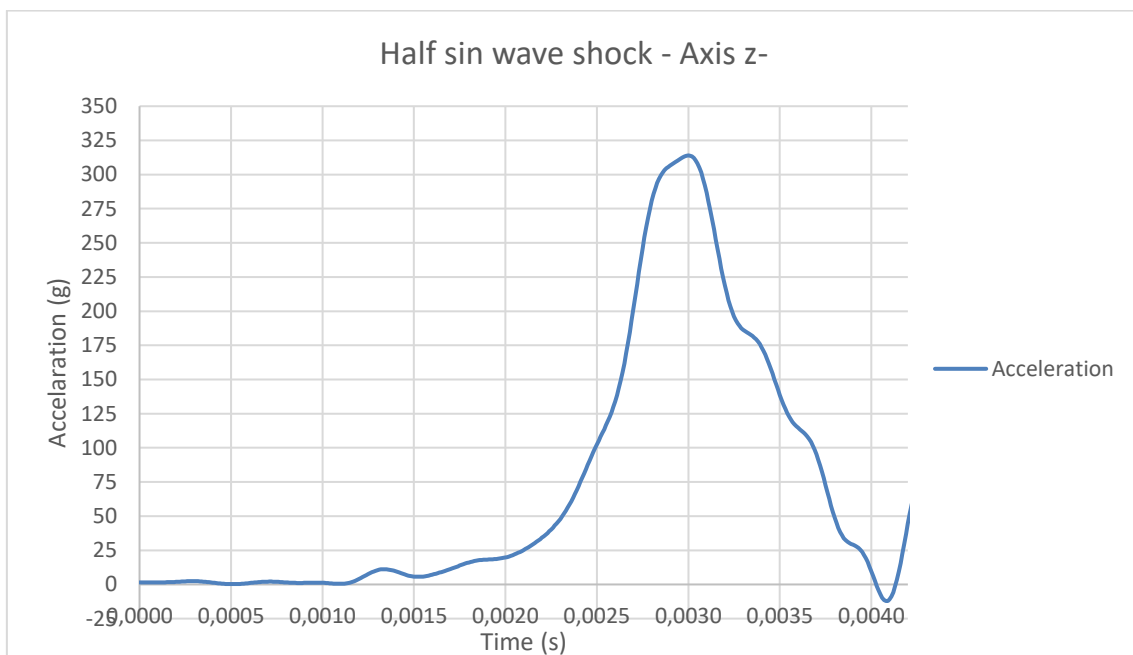
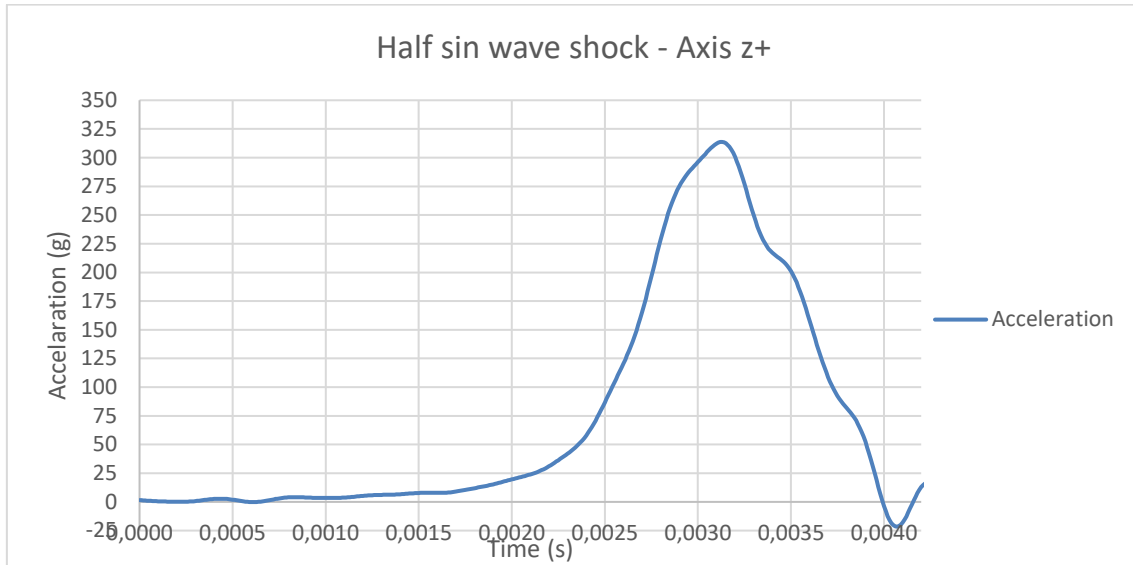
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Appendix 3 : Shock (follow up) (DS nr16)

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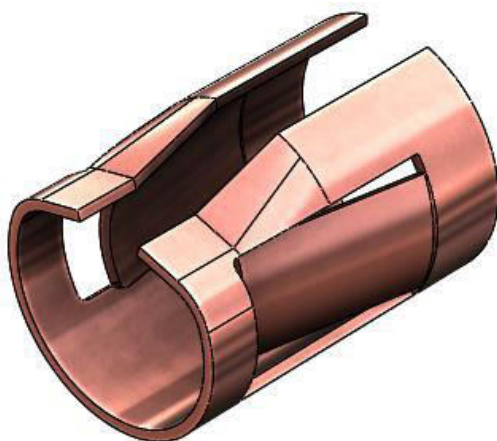
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EN2997-014 / EN2997-016

CLASS KE/SE – Layout 08-03

New contact retention clip & RTV 106 for insert to shell bonding

QUALIFICATION ACCORDING TO TR4633 Ed.1 (October 2017)



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Objet /Subject :

**EN2997-014 / EN2997-016
LAYOUT 08-03 - CLASS SE**

New contact retention clip & RTV 106 usage for insert to shell bonding

**QUALIFICATION
ACCORDING TO TR4633 Ed.1 (October 2017)**

Auteur / Author : A. PARENT

Date création / Date of creation : September, 17th 2019**Approbations / Approvals** (dernier indice)

Fonction/Function	Nom/Name	Date	Visa
Supv R&D/Product Dvl Engineering	J. ROMANILLOS	18/09/2019	
R&D/Product Dvl Engineer	S.QUEVA	18/09/2019	
Mgr R&D/Product Dvl Engineering	M. BRUNET	18/09/2019	
Sr Qlty & Reliability Engineer	C. LOBERT	19/09/19	
ASD-CERT			

Evolutions / Revisions

Indice/ Issue	Nature des évolutions / Description of evolution	Page	Date	Auteur / Author
a	Creation of document	all	09-17-2019	A. PARENT



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CONTENT

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2. REFERENCE DOCUMENTS

3. GENERAL CONDITIONS

4. SAMPLES UNDER TEST

4.1/ Designation of samples

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4.3/ Sample preparation

5. TEST SEQUENCE



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1 - SCOPE OF THE TEST

This document defines the test sequence for the qualification of the modifications applied on all EN2997 classes,

- Standardization of contact retention by usage of clip 701-0023-20-00-659
- Replacement of ECCOBOND 104 by RTV 106 for insert to shell bonding.

The qualification samples for this qualification are:

- Square flange receptacle with integrated accessory EN2997-014 classes SE,
- Plug with integrated accessory EN2997-016 classes SE,

2 - REFERENCE DOCUMENTS

- | | |
|---------------------------------|---|
| - EN 2997-001 (Jun. 2017) | : Technical specification |
| - EN 2997-002 (Dec. 2016) | : Specification of performance and contact arrangements |
| - PrEN 2997-014 (Sept. 2014) | : Square flange receptacle with integrated accessory – P.S |
| - PrEN 2997-016 (Dec. 2009) | : Plug with integrated accessory – Product standard |
| - EN 3155-004 (Aug. 2007) | : Contacts, electrical, male, type A, crimp, class T |
| - EN 3155-005 (Oct. 2006) | : Contacts, electrical, female, type A, crimp, class T |
| - PrEN 3660-003 P4 (Mar. 2017) | : Grommet nut, style A – Product standard |
| - PrEN 3660-004 P4 (Mar. 2017) | : Cable outlet, style A, straight, unsealed with clamp strain relief – Product standard |
| - EN 2591-101 (Dec. 1994) | : Visual examination |
| - EN 2591-206 (Mar. 1994) | : Measurement of insulation resistance |
| - EN 2591-207 (Mar. 1994) | : Voltage proof test |
| - EN 2591-301 (Feb. 1993) | : Endurance at temperature |
| - EN 2591-305 (Mar. 1998) | : Rapid change of temperature |
| - EN 2591-402 (Jan. 2013) | : Shock |
| - PrEN 2591-403 P3 (Jul. 2016) | : Random vibrations |
| - EN 2591-408 (Dec. 1998) | : Mating and un-mating forces |
| - EN 2591-409 (Jun. 1999) | : Contact retention in insert |
| - EN 2591-410 (Dec. 1998) | : Insert retention in housing (axial) |
| - EN 2591-426 (Nov. 2002) | : Contact retention system effectiveness |
| - TR4633 Edition 1 (Oct. 2017)) | : Change in design qualification |
| - DDP 699-133 iss. A (May.2019) | : Declaration Design Performances |



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3 - GENERAL CONDITIONS

Unless otherwise specified, tests shall be conducted in laboratory under the following ambient conditions :

- Temperature : 23°C ± 5°C
- Relative humidity : 45 to 75%
- Air pressure : 860 to 1,060 mbar

4 - SAMPLES UNDER TEST

4.1/ Designation of samples

4.1.1/ Square flange receptacle with integrated accessory EN2997-014:

Class SE:

- 983-15 SE 2 08-03 PN_QUALIF TR4633 equivalent to:
 - ESC15SE00803PN
 - EN2997SEA0803AN (except outer shell dimension and knurling)

4.1.2/ Plug with integrated accessory EN2997-016:

Class SE:

- 983-15 SE 7 08-03 SN_QUALIF TR4633 equivalent to:
 - ESC15SE60803SN
 - EN2997SEC0803BN (except outer shell dimension and knurling)

4.1.3/ Contacts

Class T:

EN 3155 : EN3155-004M2020
NRG Band : 097-0234-20-00-357

4.1.4/ Wire:

Contact size	Cable size	Cable reference	Batch
20	AWG 24 (min)	DR24	F157412
	AWG 20 (max)	DR20	F409966



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4.2/ Distribution of samples

Samples shall be distributed as follow :

GROUP 1[EN2997SEA0803AN / EN2997SEC0803BN \(3 samples\)](#)

983-15 SE 2 08-03 PN_QUALIF TR4633 / 983-15 SE 7 08-03 SN_QUALIF TR4633

GROUP 2[EN2997SEA0803AN / EN2997SEC0803BN \(3 samples\)](#)

983-15 SE 2 08-03 PN_QUALIF TR4633 / 983-15 SE 7 08-03 SN_QUALIF TR4633

GROUP 3[EN2997SEA0803AN / EN2997SEC0803BN \(3 samples\)](#)

983-15 SE 2 08-03 PN_QUALIF TR4633 / 983-15 SE 7 08-03 SN_QUALIF TR4633

For extension of qualification class KE, see EN2997-001 Table 15, three complete specimens as defined in 8.2.2 shall be tested for test EN 2591-408

Extension of qualification class K/KE[EN2997KEA0803AN / EN2997KEC0803BN \(3 samples\)](#)

983-15 KE 2 08-03 PN_QUALIF TR4633 / 983-15 KE 7 08-03 SN_QUALIF TR4633



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4.3/ Sample preparationGroup 1, 2 and 3.

Connector 1	983-15 SE 7 08-03 SN_QUALIF TR4633			983-15 SE 2 08-03 PN_QUALIF TR4633		
Cavity	1	2	3	1	2	3
Wire	DR24	DR20	DR20	DR24	DR20	DR20
Wire length	3000 mm	3000mm	3000m	3000 mm	500 mm	
Contacts	097-0234-20	EN3155-005F2020		EN3155-004M2020		
Crimping tool	M22520/1-01			M22520/1-01		
Pilot stop	M22520/1-02			M22520/1-02		
Selector	4	2		4	2	

Connector 2	983-15 SE 7 08-03 SN_QUALIF TR4633			983-15 SE 2 08-03 PN_QUALIF TR4633		
Cavity	1	2	3	1	2	3
Wire	DR20	DR24	DR24	DR20	DR24	DR24
Wire length	3000 mm	3000mm	3000m	3000 mm	500 mm	
Contacts	097-0234-20	EN3155-005F2020		EN3155-004M2020		
Crimping tool	M22520/1-01			M22520/1-01		
Pilot stop	M22520/1-02			M22520/1-02		
Selector	2	4		2	4	

Connector 3	983-15 SE 7 08-03 SN_QUALIF TR4633			983-15 SE 2 08-03 PN_QUALIF TR4633		
Cavity	1	2	3	1	2	3
Wire	DR20	DR20	DR20	DR20	DR20	DR20
Wire length	3000 mm	3000mm	3000m	3000 mm	500 mm	
Contacts	097-0234-20	EN3155-005F2020		EN3155-004M2020		
Crimping tool	M22520/1-01			M22520/1-01		
Pilot stop	M22520/1-02			M22520/1-02		
Selector	4	2		4	2	



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5 - TEST SEQUENCES**TR4633: Table 2 -Contact retention design modification****GROUP 1**

TEST reference EN 2591	TEST DESCRIPTION	COMMENTS		
101	Visual examination	Initial examination : examination of connectors. Details to be examined : -Identification, appearance, -Marking,-surface finish.		
206	Measurement of insulation resistance	Unmated connector 5 Gohm		
207	Voltage proof test	Method A, connectors mated and unmated. Voltage: 1 500 Vrms		
301	Endurance at temperature (Method B)	<table border="1"> <thead> <tr> <th>Details</th> </tr> </thead> <tbody> <tr> <td> <p>The connector samples shall be subjected, without current flow, to 1 500 cycles of 1 h, each consisting of:</p> <ul style="list-style-type: none"> — 30 min at (200 ± 5) °C; — 30 min at (260 ± 5) °C. <p>This cycle shall be completed by means of two chambers, one being held at 200 °C and the other at 260 °C.</p> <p>The time of the transfer from one chamber to the other shall not exceed 10 s. This transfer shall take place directly with no change to laboratory temperature.</p> </td> </tr> </tbody> </table>	Details	<p>The connector samples shall be subjected, without current flow, to 1 500 cycles of 1 h, each consisting of:</p> <ul style="list-style-type: none"> — 30 min at (200 ± 5) °C; — 30 min at (260 ± 5) °C. <p>This cycle shall be completed by means of two chambers, one being held at 200 °C and the other at 260 °C.</p> <p>The time of the transfer from one chamber to the other shall not exceed 10 s. This transfer shall take place directly with no change to laboratory temperature.</p>
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206	Measurement of insulation resistance	Unmated connector 5 Gohm		
207	Voltage proof test	Method A, connectors mated and unmated. Voltage: 1 500 Vrms		
409	Contact retention in insert	Preload : 10N Axial load = 90N Displacement <0,3mm during and after application of the load.		
101	Visual examination	Final examination : no loosening of parts, crack, excessive wear or detached part shall be observed.		



Connecteurs Electriques Deutsch
17, Rue Lavoisier – BP 117 – 27091 EVREUX CEDEX 9 - FRANCE

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GROUP 2

TEST reference EN 2591	TEST DESCRIPTION	COMMENTS						
101	Visual examination	Initial examination : examination of connectors. Details to be examined : -Identification, appearance, -Marking,-surface finish.						
102	Examination of dimension and mass	According to product standard.						
206	Measurement of insulation resistance	Unmated connector 5 Gohm						
207	Voltage proof test	Method A, connectors mated and unmated. Voltage: 1 500 Vrms						
403	Sinusoidal and random vibration (Max temperature)	The elements of connection fitted with appropriate cable clamps shall be mated (see coupling torque values in test EN 2591-408) and mounted on the shock apparatus using appropriate mounting systems. The cables are clamped at a minimum of 200 mm from the rear of the connectors. The contact solder cup and the outlet of the cable from the hermetic connectors are coated with a silicone rubber. Method B, Figure 3 and Table 2, level J Duration: 8 h in each of the three mutually perpendicular axes The test is performed: On one group of connectors: — 50 % of the time at (- 65 ± 2) °C, — 50 % of the time at ambient temperature. On a second group of connectors: — 100 % of the time at the maximum temperature for the class of connectors under test. Method C: For classes KV, SF and SV						
206	Measurement of insulation resistance	Unmated connector 5 Gohm						
207	Voltage proof test	Method A, connectors mated and unmated. Voltage: 1 500 Vrms						
402	Shock	The elements of connection fitted with appropriate cable clamps shall be mated and mounted on the shock apparatus using appropriate mounting systems. The cables are clamped at a minimum of 200 mm from the rear of the connectors. Method A Severity 300 Number of shocks: one each way for each of the three directions (i.e. six shocks in all)						
426	Contact retention system effectiveness (removable contact walkout)	Multi-strand steel cable of a cross section which can fit in the contact barrel. Force applied: 13 N (all contact sizes) Preload: 10 N						
409	Contact retention in insert	<table border="1"> <thead> <tr> <th>Contact size</th> <th>Axial load N + 13 0</th> </tr> </thead> <tbody> <tr> <td>22</td> <td>80</td> </tr> <tr> <td>20</td> <td>90</td> </tr> </tbody> </table>	Contact size	Axial load N + 13 0	22	80	20	90
Contact size	Axial load N + 13 0							
22	80							
20	90							
101	Visual examination	Final examination : no loosening of parts, crack, excessive wear or detached part shall be observed.						



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TR4633: Table 4 -Insert retention in housing**GROUP 3**

TEST reference EN 2591	TEST DESCRIPTION	COMMENTS																																																																																			
101	Visual examination	Initial examination : examination of connectors. Details to be examined : -Identification, appearance, -Marking,-surface finish.																																																																																			
408	Mating and unmating forces	<table border="1"> <thead> <tr> <th rowspan="2">Housing size</th> <th colspan="2">Coupling torque Nm</th> <th colspan="2">Uncoupling torque Nm</th> <th colspan="2">Over tightening torque Nm</th> </tr> <tr> <th>For all test except test EN 2591-403</th> <th>For test</th> <th>min.</th> <th>max.</th> <th>R, RS, W and WS</th> <th>K, KE, KV, SV S, SF and SE</th> </tr> </thead> <tbody> <tr><td>08</td><td>0,35</td><td>1,70</td><td>0,20</td><td>0,50</td><td>1,70</td><td>10</td></tr> <tr><td>10</td><td>0,55</td><td>2,00</td><td>0,35</td><td>0,80</td><td>2,00</td><td>12</td></tr> <tr><td>12</td><td>1,00</td><td>2,10</td><td>0,60</td><td>1,50</td><td>2,10</td><td>14</td></tr> <tr><td>14</td><td>1,30</td><td>2,60</td><td>0,80</td><td>1,90</td><td>2,60</td><td>15</td></tr> <tr><td>16</td><td>1,45</td><td>3,20</td><td>0,90</td><td>2,20</td><td>3,20</td><td>16</td></tr> <tr><td>18</td><td>1,80</td><td>4,00</td><td>1,10</td><td>2,70</td><td>4,00</td><td>18</td></tr> <tr><td>20</td><td>2,10</td><td>4,50</td><td>1,25</td><td>3,20</td><td>4,50</td><td>20</td></tr> <tr><td>22</td><td>2,40</td><td>5,00</td><td>1,45</td><td>3,60</td><td>5,00</td><td>20</td></tr> <tr><td>24</td><td>2,75</td><td>5,10</td><td>1,65</td><td>4,10</td><td>5,10</td><td>20</td></tr> <tr><td>28</td><td>3,70</td><td>6,4</td><td>2,20</td><td>5,50</td><td>6,4</td><td>20</td></tr> </tbody> </table>	Housing size	Coupling torque Nm		Uncoupling torque Nm		Over tightening torque Nm		For all test except test EN 2591-403	For test	min.	max.	R, RS, W and WS	K, KE, KV, SV S, SF and SE	08	0,35	1,70	0,20	0,50	1,70	10	10	0,55	2,00	0,35	0,80	2,00	12	12	1,00	2,10	0,60	1,50	2,10	14	14	1,30	2,60	0,80	1,90	2,60	15	16	1,45	3,20	0,90	2,20	3,20	16	18	1,80	4,00	1,10	2,70	4,00	18	20	2,10	4,50	1,25	3,20	4,50	20	22	2,40	5,00	1,45	3,60	5,00	20	24	2,75	5,10	1,65	4,10	5,10	20	28	3,70	6,4	2,20	5,50	6,4	20
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305	Rapid change of temperature	Connectors mated $T_A = \text{maximum temperature of the class of connector} + 5 \text{ } ^\circ\text{C}$ $T_B = \left(-65 \begin{smallmatrix} 0 \\ -5 \end{smallmatrix} \right) \text{ } ^\circ\text{C}$																																																																																			
410	Insert retention in housing (axial)	Connector not fitted with contacts. Mechanical pressure applied in both directions: <table border="1"> <thead> <tr> <th>Housing size</th> <th>Pressure MPa</th> </tr> </thead> <tbody> <tr><td>08</td><td>1,0</td></tr> <tr><td>10</td><td>1,0</td></tr> <tr><td>12</td><td>1,0</td></tr> <tr><td>14</td><td>0,7</td></tr> <tr><td>16</td><td>0,7</td></tr> <tr><td>18</td><td>0,7</td></tr> <tr><td>20</td><td>0,5</td></tr> <tr><td>22</td><td>0,5</td></tr> <tr><td>24</td><td>0,4</td></tr> <tr><td>28</td><td>0,4</td></tr> </tbody> </table>	Housing size	Pressure MPa	08	1,0	10	1,0	12	1,0	14	0,7	16	0,7	18	0,7	20	0,5	22	0,5	24	0,4	28	0,4																																																													
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Extension of Qualification classes KE

TEST reference EN 2591	TEST DESCRIPTION	COMMENTS
408	Mating and un-mating forces	Method A See table 10 of EN2997-001



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