Product Specification

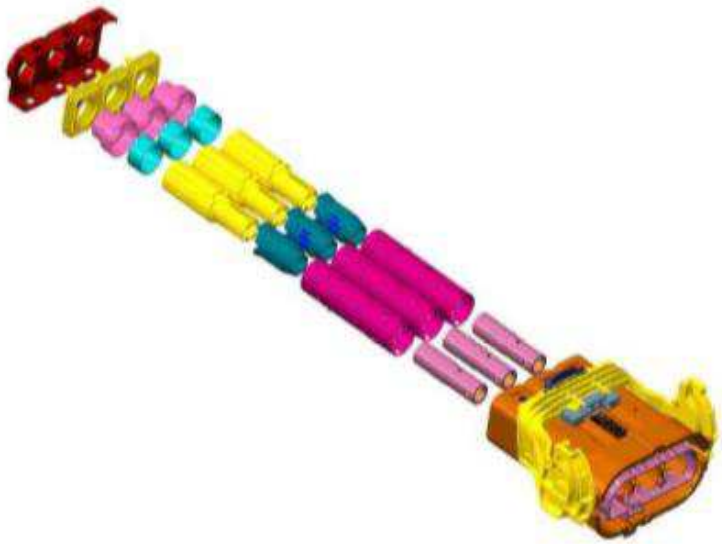
108-32234

2019-04-22 Rev A

HVP800 2PHI AND 3PHI 180°

AMP+ High Current Connectors and Headers

SPECIFICATION



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1. SCOPE

1.1 Introducing

TE Connectivity's touch-proof 2-3 position high current connector HVP800 and header are designed to meet WG 4.3.3, LV215-1 specifications , for a metric wire size range from 25mm² up to 50mm² acc. to LV216-2.
With a 180° cable outlet incorporates the sealed connector system two or three (2-3pos) 8mm power contacts and an integrated High Voltage Interlock (HVIL) System. The HVP800 connector is available for four different keying or polarizing configurations and incorporates 360° conductive EMI shields to reduce radiated emissions in the application. Assembly is simplified with a lever assist for low insertion force and the housings are molded in orange to denote a high voltage system.

1.2 Content

This specification covers performance, test and quality requirements for the TE Connectivity 2-3 position high current connector HVP800 with 180° Plug assembly.
However, this specification covers no requirements or tests to the contact systems, for more detailed information see corresponding TE-Specifications in chapter 2.1.3.

1.3 Qualification

When tests are performed the following specifications and standards shall be used. All inspections shall be performed using the applicable inspection plan and customer drawing.

2. APPLICABLE DOCUMENTS

The following mentioned documents are part of this specification. Unless otherwise specified, the latest edition of the documents applies. In the event of conflict between the requirements of this specification and the information contained in the referenced documents, this specification shall take precedence.

2.1 TE Connectivity Documents

2.1.1 General Requirements

Table 1: General Requirements

Requirements	Description
TEC-109-1 Rev. J	General Requirements for Test Specifications

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2.1.2 Customer Drawings

Table 2: Customer Drawings

2pos Receptacle housing	
2310923	2 Pos, 8mm HV, REC HSG 180°, Assy
3pos Receptacle housing	
2327025	3 Pos, 8mm HV, REC HSG 180°, Assy
2pos Pinheader	
2322122	2 Pos. Dia 8mm Pin housing, Assy
3pos Pinheader	
2325013	3 Pos. Dia 8mm Pin housing, Assy

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Single Components used at 2 and 3 pos. HV-CLASS 4, 180º Connector	
2141155 2310488	Cover, Seal
2141156	Single Wire Seal
2177090	Outer Shield Crimp Ferrule
2177061 2307013	Inner Shield Crimp Ferrule
2177060 2319655	Shielding Sleeve (2177060 Ag Plating over Tin, 2319655 Tin Plating)
2177058 2302636	Insulation Insert
2177059 2302639	Finger Protection Cap
2177473 2328075	Turned contact, 25 mm^2 , 180º, Assy
2177590 2328075	Turned contact, 35 mm^2 , 180º, Assy
2177592 2328075	Turned contact, 50 mm^2 , 180º, Assy
Interface drawings	
114-94032	Interface aggregate cut-out for 2/3 pos. HVP 800 90º/180º Pin housing

* Others TE China HVP800 series part number also suitable for this specification.

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2.1.3 Specifications

Table 3: TE-Specifications

Specifications	Description
108-94255	Product Specification HV 8mm 180° turned Contact
108-18782	Product Specification MCON-1.2 Contact System
114-94125	Application Specification for 8mm Round turned Contact System
114-18464	Application Specification MCON-1.2 Contact System
114-32212	Application Specification HVP800 180°
108-94451	Product Specification HV 8mm 180° stamped Contact
114-94325	Application Specification for 8mm Round stamped Contact System

2.2 Other Documents

Table 4: References

Document number	Edition	Standard: Title, Author
DIN EN 60664-1	2008-01	Isolation coordination for equipment within low-voltage systems - Part 1: Principles, requirements and tests
DIN 40050-9	1993-05	Degrees of protection (IP-Code) - Protection of electrical equipment against foreign objects, water and access
ISO 20653	2006-08	Road vehicles - Degrees of protection (IP-Code) - Protection of electrical equipment against foreign objects, water and access
ISO 6469-3	2001-1	Electric road vehicles - Safety specifications. Part 3: Protection of person against electric hazards
SAE J 1742	1998-03 (2005-12)	Connections for High Voltage On-Board Road Vehicle, Electrical Wiring Harnesses Test Methods and General Performance Requirements
LV 214-1	2010-03	Test specification for motor vehicle connectors
LV 215-1	2009-02	Electrical / Electronic Requirements of HV Connectors
LV 216		HV cables, unshielded/shielded

3. REQUIREMENTS

3.1 Design and Construction

The product design, construction and physical dimensions shall correspondent to the latest customer drawings.
However, prototype parts or pre-serial parts can be differing slightly in dimensioning, form- and position tolerances to the interface drawings.

3.2 Material

Descriptions for material see latest valid customer drawings.

3.3 Ratings

Table 5: Product Ratings

Description	**Range**
Max working voltage at 5500m above see level	≤ 850VDC
Voltage class acc. ISO 6469-3	B
Class 1 equipment acc. ISO 6469-3	1
Dielectric withstand voltage acc. ISO 6469-3	2700V
Insulation resistance acc. ISO 6469-3, SAE J 1742	> 200MΩ
Isolation Group I acc. DIN EN 60664-1	600 ≤ CTI

Pollution degree acc. DIN EN 60664-1	2
Clearance distance at 5500m above see level acc. DIN EN 60664-1	> 2.89mm
Creepage distance acc. DIN EN 60664-1	> 4.25mm
Ambient temperature	-40°C to 125°C
Degrees of protection (IP-Code) against access acc. ISO 20653, unmated situation	IPX2B
Degrees of protection (IP-Code) against foreign objects and water acc. ISO 20653, mated situation	IP6K9K, IP6K7
Color of plastic housing	Orange similar RAL 2003

3.4 Performance and Test Description

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in table 6 and table 7. Unless otherwise specified, all tests shall be performed at ambient environmental conditions according to TE-TEC 109-1.

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3.5 Test Requirements and Procedures Summary

Not shown test-details see LV 214 (release 2010-03) and LV215-2 (release 2013-03)

Table 6: Test Requirements and Procedures Summary

Test Description	Requirement	Procedure
PG 0 RECEIVING INSPECTION		
E 0.1 Visual inspection	Basic function proven	LV215-2 DIN EN 60512-1-1
E 0.2 Contact resistance	Contact ≤0.36mΩ (50mm^2); ≤0.39mΩ (35mm^2); ≤0.40mΩ (25mm^2) HVIL-contact ≤15mΩ Shielding cable - Header < 7mΩ	LV215-2 DIN EN 60512-2-1
E 0.3 Insulation resistance	Insulation resistance at 1kVDC: > 200MΩ	LV215-2 DIN EN 60512-3-1
PG 4 CONTACT OVERLAPPING		
E 4.1 Contact engagement length	Values see appendix 5.3	Theoretical study
PG 6 INTERACTION BETWEEN CONTACT AND HOUSING		
E 6.1 Deflection of contacts in the housing cavity	No damage during joining	Theoretical study

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B 6.1 Drop test	Drop test from 1m height; No damages or impairments of function	LV215-2 DIN EN 60068-2-31
PG 7 HANDING AND FUNCTIONAL RELIABILITY OF THE HOUSINGS		
E 7.1 Error-proof design of housings	Coding/Polarization Test load: 80N	LV214 DIN EN 60512-13-5
E 7.2 Retention force of the housing latch/lock	Retention force of the housing latch mechanism/housing interlock: >250N	LV215-2 DIN EN 60512-15-6
E 7.3 Functionality of CPA	Actuation force to close: 5-30N CPA Efficiency: ＞80N	DIN EN 60512-15-6
E 7.4 Insertion force or actuation force for insertion with removal aids	Insertion and actuation force: ≤ 75N	DIN EN 60512-15-6
PG 8 MATING AND RETENTION FORCE OF CONTACT PARTS		
E 8.1 Contact insertion forces	Cable assy with 8mm-Contact: Insertion force ≤50N	LV214
E 8.2 Contact removal force from the housing	Primary lock and Secondary lock measured separately Cable assy with 8mm-contact ≥ 180N HVIL-contact ≥ 55N	LV214

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PG 9 SKEWED INSERTION ANGLE		
E 9.2 Max. possible insertion inclination	Max. possible insertion inclination warrants the contacting without damage	Theoretical study
E 9.3 Examination of housing for scoop-proofing	Live parts must only touch its counter-part while mounting (including insertion chamfers). In case of incorrect insertion of the plug no live parts must be touched	Theoretical study
PG 11 MATING CYCLES		
B 11.1 Mating cycles	Connector with HVIL-Contacts 50 Cycles	LV214
PG 13 HOUSING INFLUENCE ON THE DERATING		
E 13.2 Derating with housing	Dependent on application and cable type different values are possible Max. temperature at contacts 180°C Derating see appendix 5.1	LV215-2 DIN EN 60512-5-1/2
PG 17 DYNAMIC LOAD		

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B 17.2 Dynamic Load Broad-band random	Severity 2: “Body” sealed; Details see appendix 5.2 Slight wear, surface ok. Resistances after testing ● Contact ≤0.72mΩ ● HVIL-Contact ≤15mΩ ● Shielding cable – aggregate <7mΩ	LV214 DIN EN 60068-2-64
B 17.3 Endurance shock test	30g; T=6ms; N=6000 Slight wear, surface ok. Resistances after testing ● Contact ≤0.72mΩ ● HVIL-Contact ≤15mΩ ● Shielding cable – aggregate <7mΩ	LV214 DIN EN 60068-2-27
In the event of particularly critical installation conditions, special agreements shall be made between the manufacturer and the user		
PG 18C DICING SALT LOAD		
B 18.3 Salt spray, cyclic	Resistances after Salt spray test, not sealed ● Contact ≤0.72mΩ ● HVIL-Contact ≤15mΩ ● Shielding cable – aggregate <7mΩ	LV215-2 DIN EN 60068-2-52 (SG3)
PG 20 CLIMATIC LOAD OF HOUSINGS		
B 20.1 Dry heat	Dry heat 120h / 125°C	LV214

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B 20.2 Damp heat	Damp heat 10 days / 40°C / 95% rel. humidity Insulation resistance at 1kVDC: >200MΩ	LV214
B 20.3 Climatic cold	Climatic cold 48h / -40°C Plugging / unmating possible at -20°C	LV214
B 20.1 Dry heat	Dry heat 48h / 80°C	LV214
B 6.1 Drop test after aging	Drop test from 1m height; No damages or impairments of function	LV215-2 DIN EN 60068-2-31
PG 21 LONG-TERM AGING		
B 21.1 Long-term aging in dry heat	1000h at 125°C; Resistances after aging: ● Contact ≤0.72mΩ ● HVIL-Contact ≤15mΩ ● Shielding cable – aggregate <7mΩ Functionality; Contact Removal forces acc. E8.2	LV215-2 DIN EN 60068-2-2
PG 22B CHEMICAL RESISTANCE		
B 22.1B Chemical Resistance (water-tight design)	Application of media for 48h at specified temperature; only tested at single parts No textural or dimensional change, no impairments of function Insulation resistance >100MΩ	LV214

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PG 23 WATER - TIGHTNESS		
B 19.3 Aging in dry heat	120h at 125°C	DIN EN 60068-2-2
B 19.1 Temperature shock	Period: 144 cycles -40°C / +125°C each 15min	DIN EN 60068-2-14
B 23.1 Immersion with pressure difference	Low pressure: -100mbar, holding time 5min. -500mbar, holding time 5min.	LV214 DIN EN 60512-14-5
B 23.2 Immersion with pressure difference	Movement of cable at low pressure: -100mbar, holding time 5min. -500mbar, holding time 5min.	LV214 DIN EN 60512-14-5
B 23.3 Thermal shock test	30min. in 120°C air; 15min in 0°C Water: 5 cycles	LV214
B 23.4 Degree of protection test / pressure washer test	Severity: IP X9K Test duration per side: 15s Distance to nozzle: 10-15cm Pressure: 80 bar Temperature: 80°C	LV214 DIN 40050-9
E 0.3 Insulation resistance	Insulation resistance at 1000VDC: >200MΩ	LV215-2 DIN EN 60512-3-1
PG 28 LOCKING NOISE		
E 28.1 Locking noise	Locking noise ≥70dB(A)	LV214

<table>
<tr><td colspan="3">PG 50
EMC – ELECTROMAGNETIC COMPATIBILITY</td></tr>
<tr><td>PG 50
EMC- Electromagnetic compatibility</td><td><table><tr><th>Frequency</th><th>Delta-Transferimpedance</th></tr><tr><td>2MHz</td><td><10mΩ</td></tr><tr><td>30MHz</td><td><60mΩ</td></tr></table></td><td>VG 95214-11
LV 215-1
LV215-2</td></tr>
<tr><td colspan="3">PG 51
IP PROTECTION OPEN CONNECTOR</td></tr>
<tr><td>PG51
Protection open connector</td><td>IP-Protection IPXXB, un-mated (VDE test finger ø12mm)
IP-Protection IPXXD, mated</td><td>ISO 20653</td></tr>
</table>

3.6 Additional Test Procedures and Test Results

Table 7: Additional test requirements

Test Description	Requirement	Procedure
A1 Crimp validation PG1	Pull out force of shield crimp: >150N Cross section examination: crimp sleeves are well formed	TE-Spec. 109-18212
A2 Crimp validation PG2	Shield resistance <3mΩ	TE-Spec. 109-18212
Cable used for crimp validation Coroplast-No.: 9-2611 / 25mm^2 , 35mm^2 and 50mm^2 , version A4		

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Test Description	Requirement	Procedure
A3 Retention force further connector parts	Protection cover for single wire seal: >500N Finger protection cap (2177059 /2302639): >100N	DIN IEC 60512-8
A4 Insertion force further connector parts	Insertion force Protection cover for single wire seal: <50N Finger protection cap (2177059 /2302639): <100N	DIN IEC 60512-8

4. QUALITY ASSURANCE PROVISIONS

4.1 Qualification Testing

The samples shall be prepared in accordance with product drawings. They shall be selected at random from current production.

4.2 Requalification Testing

If changes significantly affecting from, fit, or function depending on the product or manufacturing process, product engineering shall coordinate requalification testing, consisting of all or part of the original testing sequence as determined by development/product, quality, and reliability engineering.

4.2.1 Acceptance

Acceptance is based on verification that the product meets the requirements of chapter 4. Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.2.2 Quality Conformance Inspection

The applicable quality inspection plan will specify the sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with the applicable product drawing and this specification.

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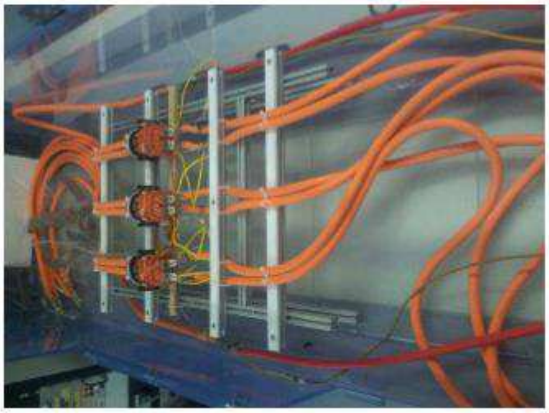
5. APPENDIX

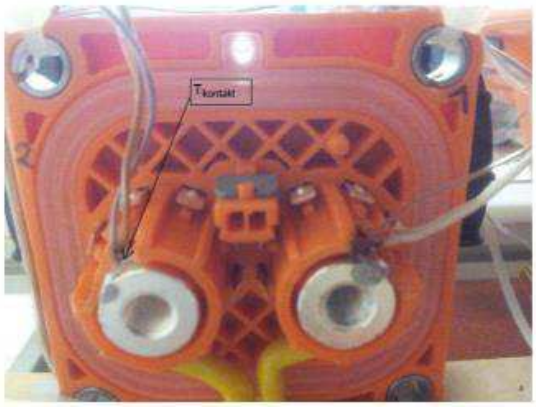
5.1 Housing influence on derating: 2pos. connector

Derating inside housing: Current at contact with load at shield

Cable length according to DIN EN 60512-5-2

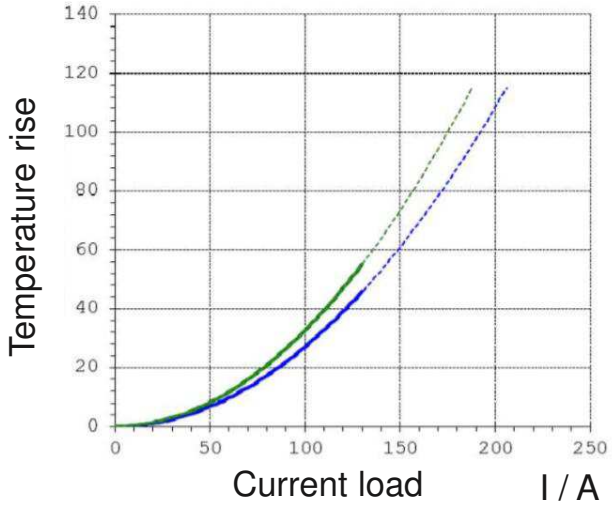
Test setup





Derating Shield 10A — Derating Shield 25A ▪▪▪▪ Extrapolated

T / K Temperature rise



I / A Derating Curve

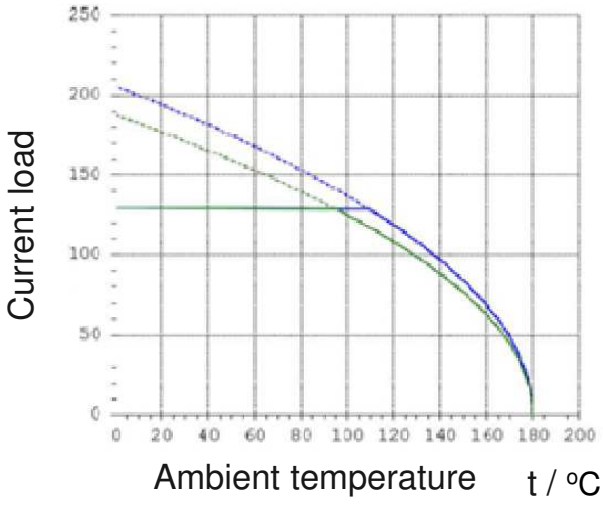


Figure 1: 2pos, 25 mm² (Coroplast-No. 9-2611) Derating and temperature rise – current at contact

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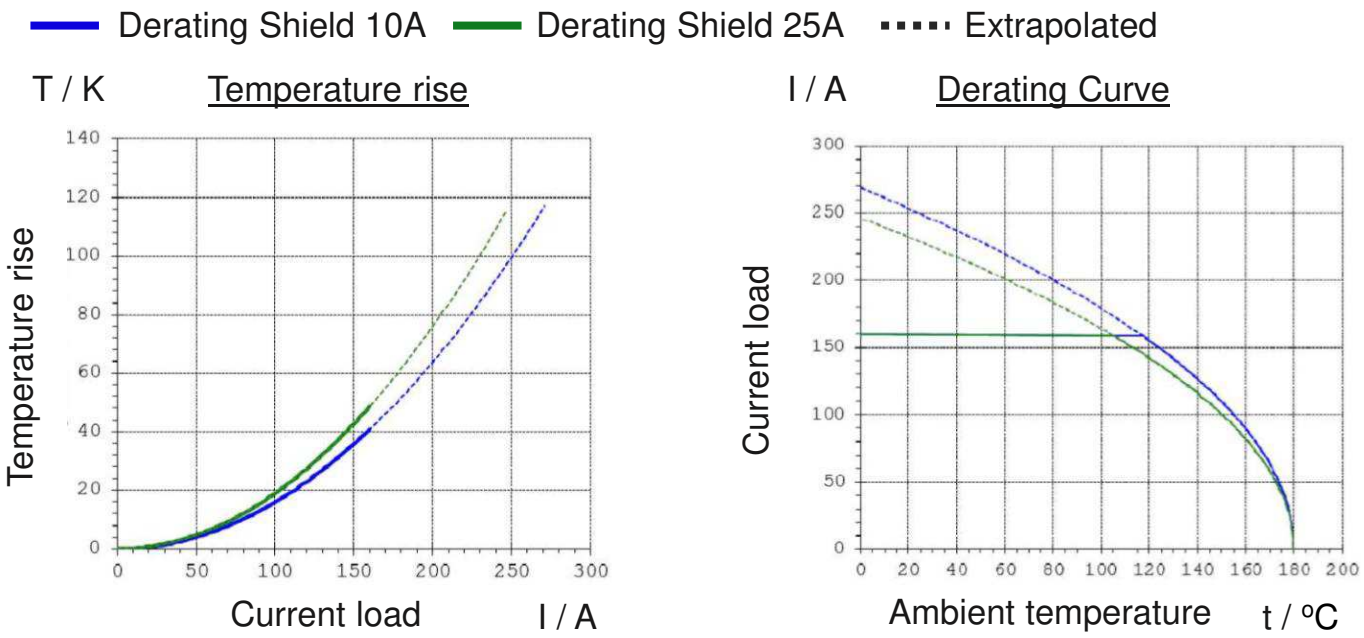

Figure 2: 2pos, 35 mm² (Coroplast-No. 9-2611) Derating and temperature rise – current at contact

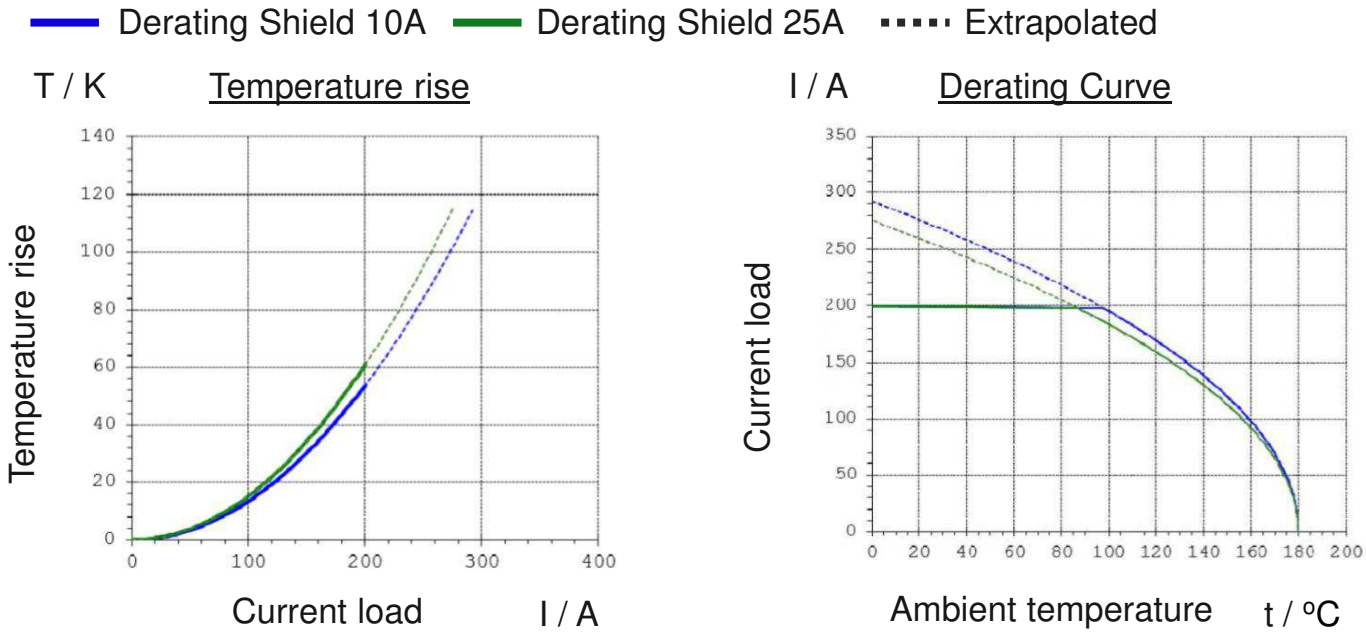

Figure 3: 2pos, 50 mm² (Coroplast-No. 9-2611) Derating and temperature rise – current at shield

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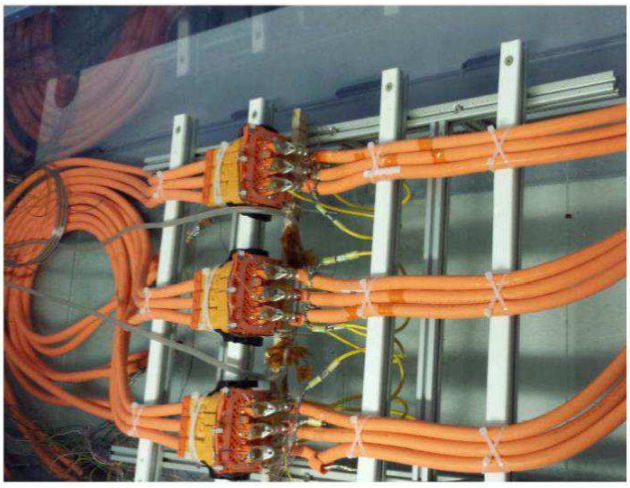
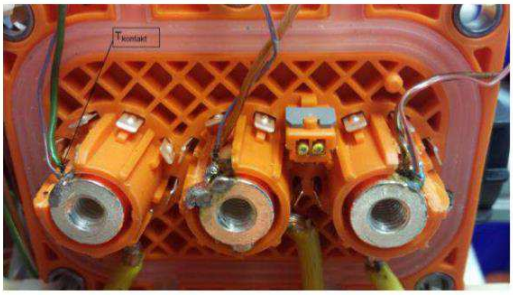
5.2 Housing influence on derating: 3pos. connector
Derating inside housing: Current at contact with load at shield
Cable length according to DIN EN 60512-5-2

Test setup





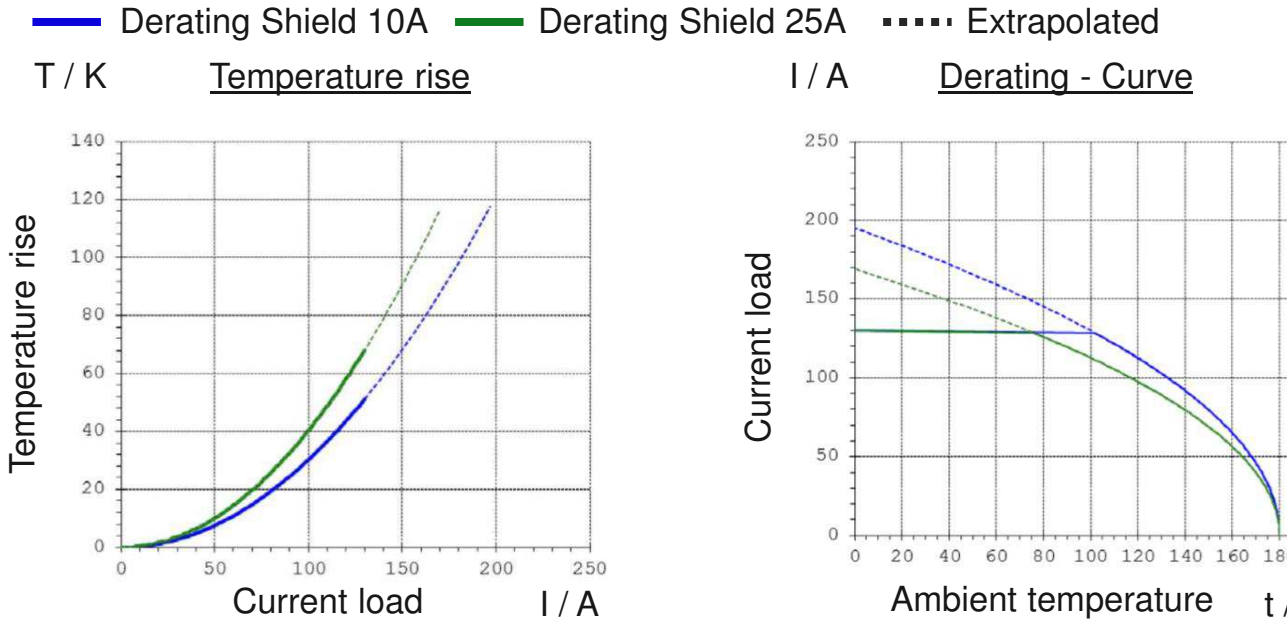


Figure 4: 3pos, 25 mm² (Coroplast-No. 9-2611) Derating and temperature rise – current at contact

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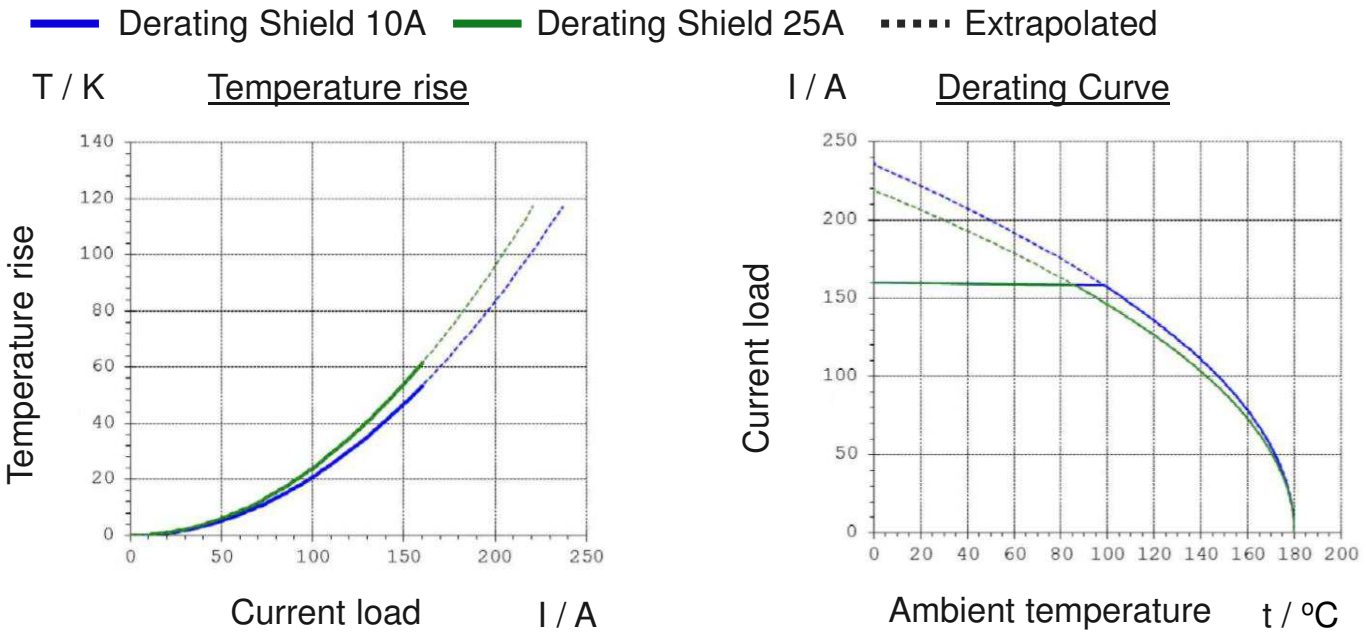

Figure 5: 3pos, 35 mm² (Coroplast-No. 9-2611) Derating and temperature rise – current at contact

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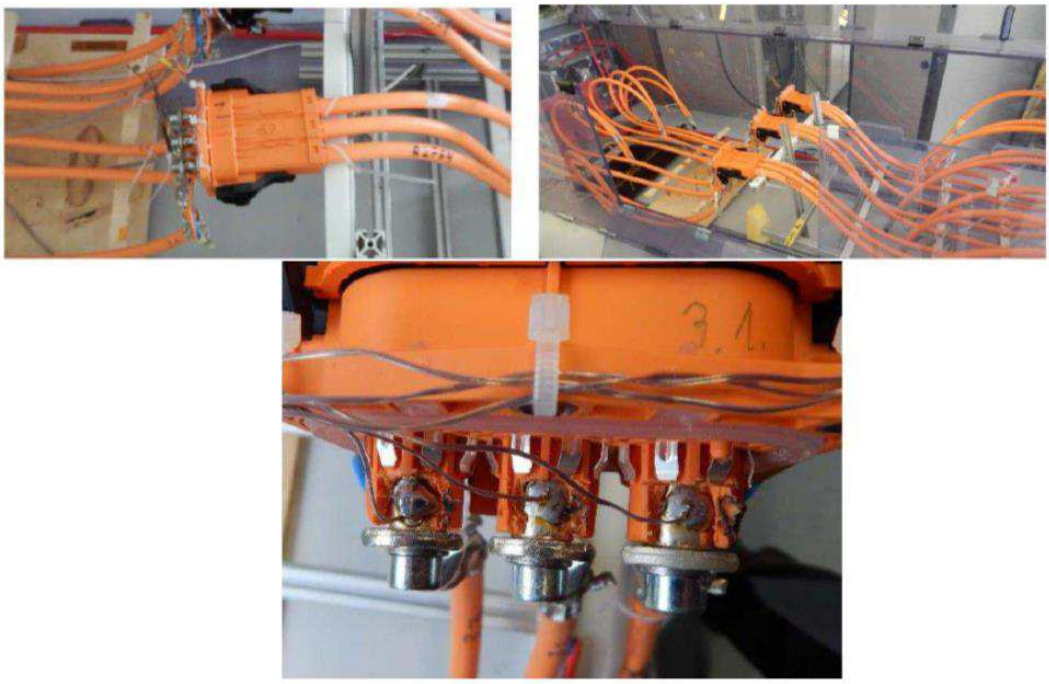
Test setup



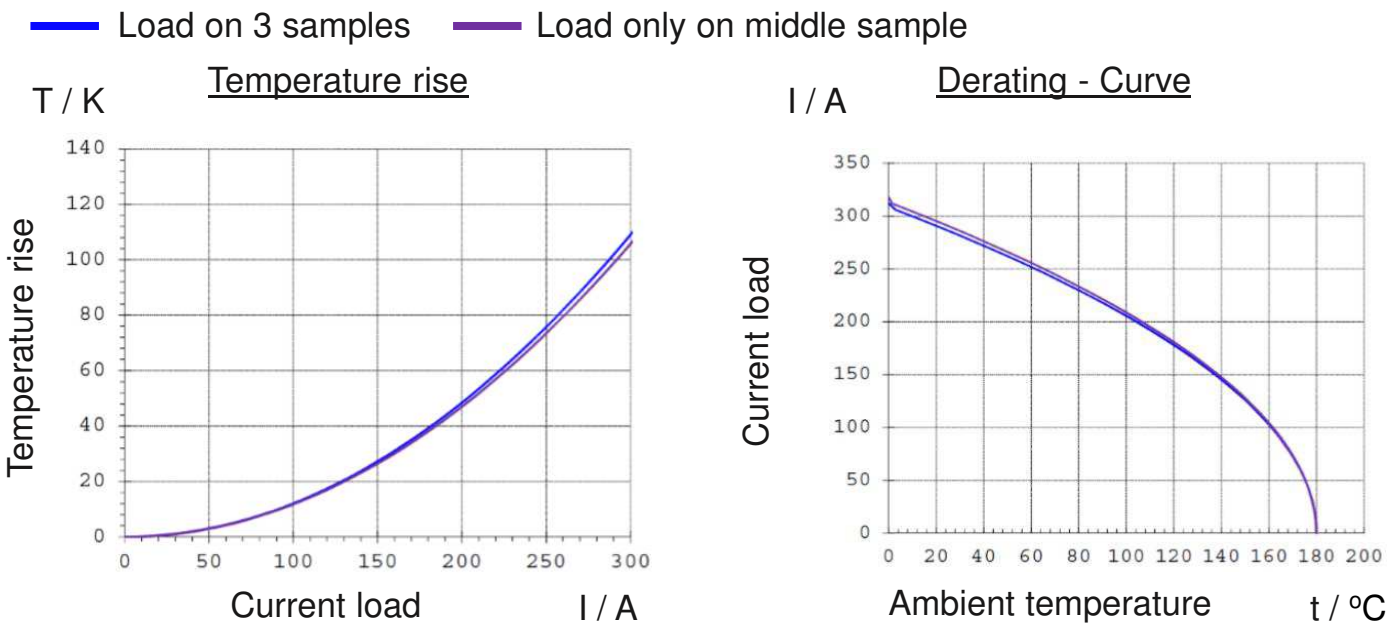


Figure 6: 3pos, 50 mm² (Coroplast-No. 9-2611) Derating and temperature rise – current at contact

5.3 Dynamic load

Dynamic load acc. LV214 (release 03.2010)

Design of vibration device (see picture 7)

2 and 3pos. connector

Coroplast 50mm² acc. To Coroplast-No.: 9-2611 / 50mm², Version A4

Cable fixed after Dimensioning

A=100mm

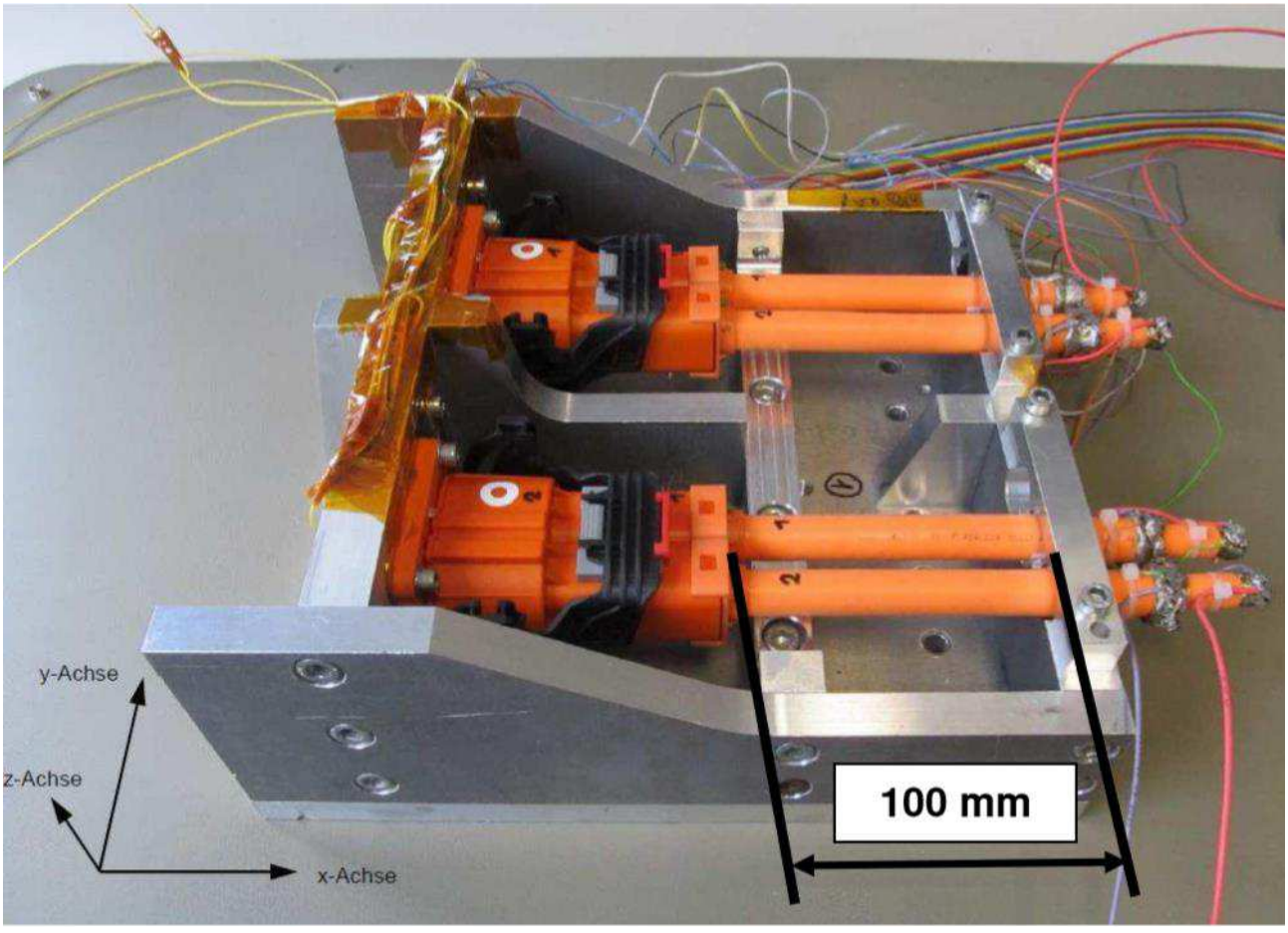


Figure 7: Vibration device (exemplary view at 2pos. connector)

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5.4 Contact engagement length

A	Contact overlap – power contact	≥ 1mm
B	Contact overlap – HVIL contact	≥ 1mm
C	Interlock Disconnected advanced by pull-out process	≥ 1mm

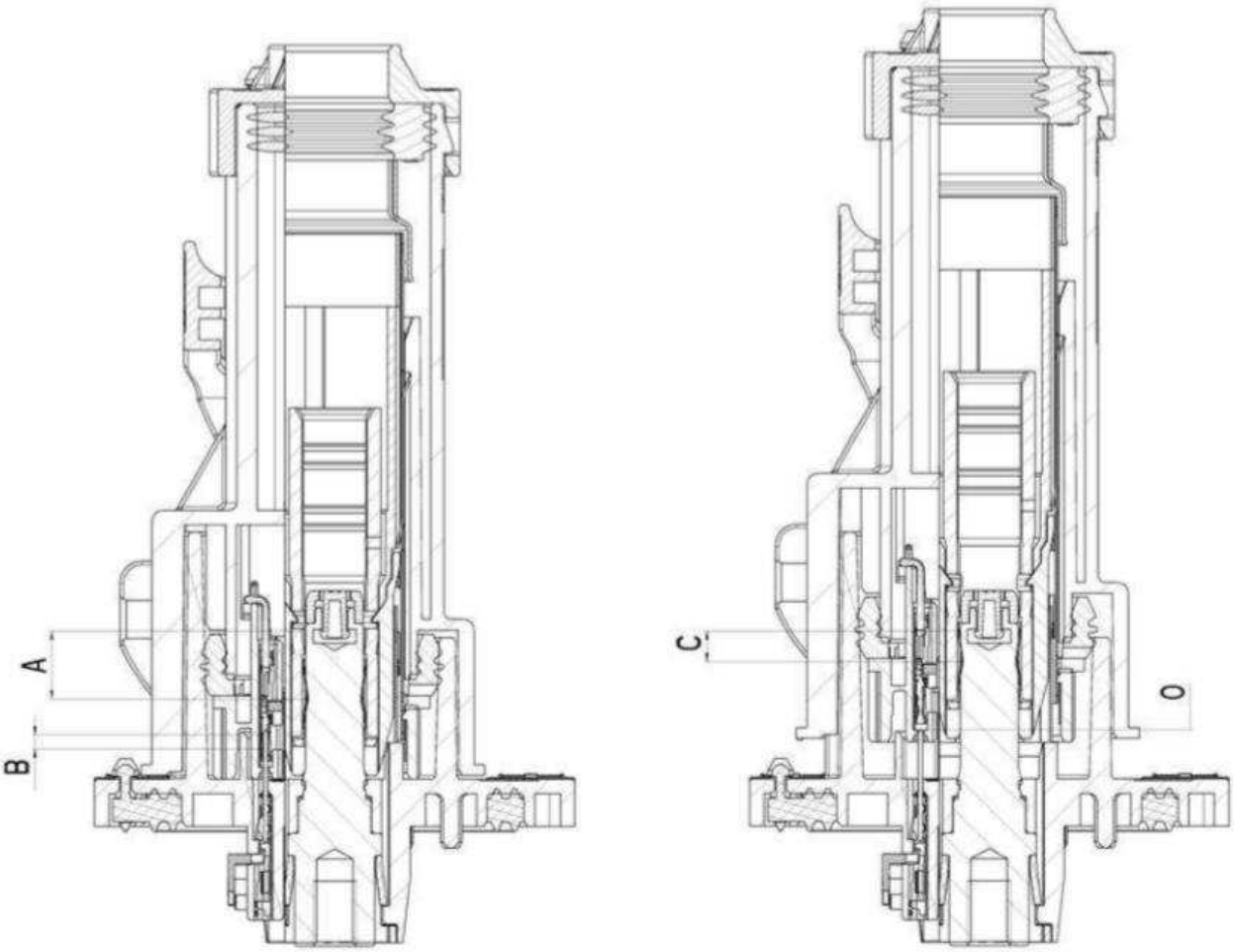

Figure 8: Contact engagement length

5.5 Strain Relief

System is validated with strain relief at 100mm. Each application has to be evaluated independently with regards to the external influences on the system. Having strain relief, which moves with the connector body, close to the end of the connector will have a positive influence on the performance of the connector. Have strain relief further from the end of the connector or that moves independent of the connector body will have a negative influence on the performance of the connectors.

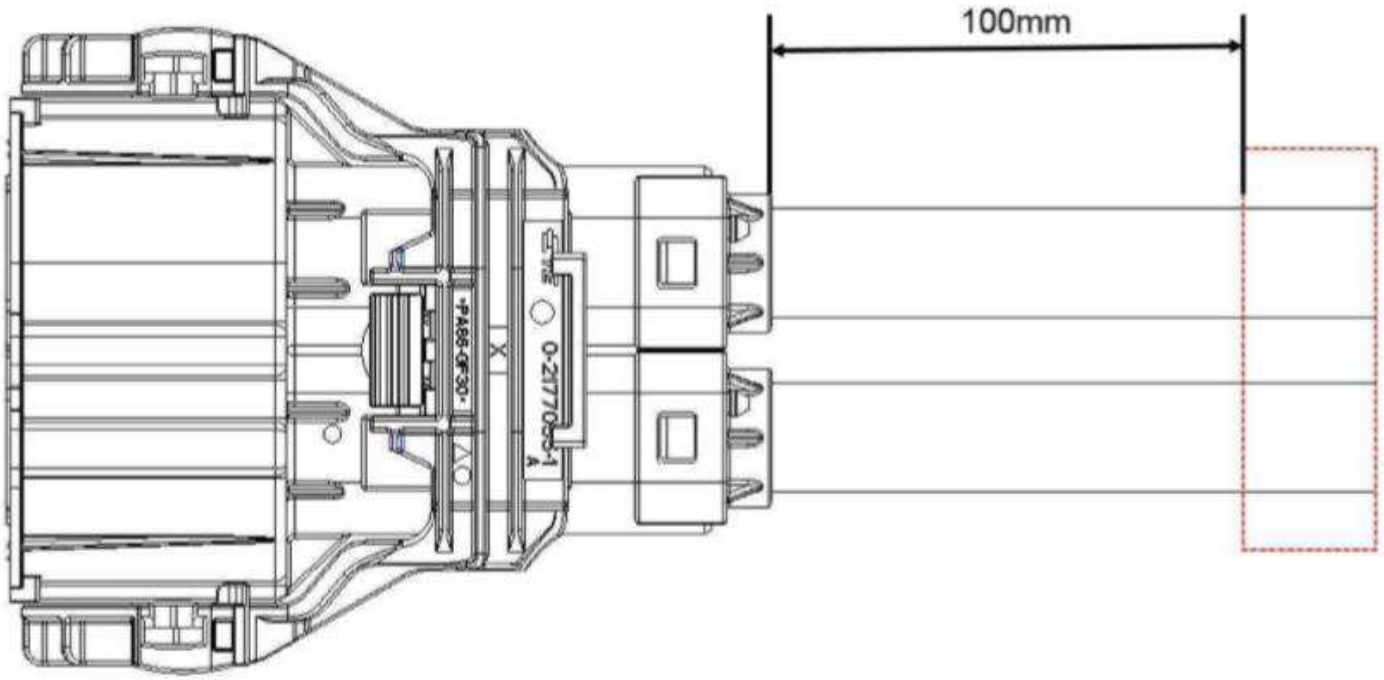

Figure 9: Recommended requirement for strain relief