




**Electrical heavy-duty connector
 2-4 pos, with DIA 2.5mm pins and twist lock
 5-7pos, with DIA 1.5mm pins and twist lock
 (sealed) acc. to DIN 72585 / ISO 15170**

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1 SCOPE

1.1 Content

This specification covers the performance, tests and quality requirements for an electrical heavy-duty connector, 2-4pos with DIA 2.5mm pins and twist lock, 5-7pos, with DIA 1.5mm pins and twist lock. This connector is mounted directly to the combustion engine or to the gear box and by that exposed high thermal and mechanical stress.

This specification applies but is not limited to the following part numbers, X =1, 2, 3...,9 refers to different colors and keys.

本规范适用但不仅限于以下零件号, X =1, 2, 3...,9 表示不同的颜色或键位.

X-1813099-X	2.5mm SOCKET CONNECTOR. 2 – 4POS WITH SECONDARY
X-18134244-X	1.5mm SOCKET CONNECTOR. 5 – 7POS

1.2 Qualification

The tests of the mentioned products were done in accordance with DIN 72585 / ISO 15170.

2. APPLICABLE DOCUMENTS

The following documents form a part of this specification to the extent specified herein. In the events of conflict between the requirements of this specification and the product drawing or of conflict between the requirements of this specification and the referenced documents, this specification shall take precedence.

2.1 TE Connectivity (TE) Documents

- 109-1: General Requirements for Test Specifications
- 114-18020-1: Circular contact system Ø2,5mm
- 114-18040-1: Circular contact system Ø1,5mm
- 114-18255: Electrical heavy-duty connector, 2-4pos. and 5-7pos.

2.2 General Documents

- ISO 15170 Road vehicles; Electrical heavy-duty connector
2 to 4 poles with pins and twist lock
Ausgabe / draft 03-1998
- DIN 72585 Road vehicles; Electrical heavy-duty connector
2 to 4 poles with pins and twist lock
Edition 03-1996
- DIN EN 28092-2 Der Norm: ISO 8092/2:
Road Vehicles-Connections for on-board electrical wiring harnesses,
Edition 02-1996
- DIN 50016 Testing of materials, structural componenets and equipment
Method of test in dTE alternating atmosphere
Edition 12-1962
- DIN 50021 Salt spray testing
Edition 06-1988
- DIN EN ISO 6988 Metallic and other non-organic coatings
Sulfur dioxide test with general condensation of misture
Edition 01-1995
- DIN 40050 Teil 9 Edition 05-1993
- DIN IEC 68-2-11 Electrical engineering, basic environmental testing procedu
Edition 08-1991
- IEC 352-2 Solderless Connections; Part 2: Solderless crimped connections
General requirements, test methods and practical guidance
Edition 04-1990
- KDIN IEC 512 Electromechanical components for electronic equipment,
Basic testing procedures and measuring methods
Edition 05-1994

3 REQUIREMENTS

3.1 Design and Construction

Product shall be of the design, construction and physical dimensions specified on the applicable production drawing.

3.2 Materials

Descriptions for material see relevant product drawings.

3.3 Ratings

Electrical and mechanical characteristics of the circular contact system see product specification (item 2.1 C).

Operating Voltage (VDC): 48

Nominal Voltages (V): 12, 24, 42, 48

3.4 Performance and Test Description

The product is designed to meet the electrical, mechanical and environmental performance requirements specified in para. 3.5. All tests are performed at ambient environmental conditions per IEC 512 unless otherwise specified.

3.5 Test Requirements and Procedures

Test Description	Requirement	Procedure
3.5.1 OPTICAL INSPECTIONS		
Visual and dimensional examination	Meets requirements of product drawing	Acc. to ISO 8092-2
3.5.2 MECHANICAL INSPECTIONS		
Visual examination	No damage noticed	Acc. to ISO 8092-2
Contact retention	Contact retention pro contact: in mounting direction: 100 N opposite direction: 60 N	Acc. to DIN 72585-2 (item 4.2) and ISO 15170
Cable retention	Crimp extraction force is depending on cable nominal cross section	Acc. to ISO 8092-2
Operating torque for panel mounting twist lock	Open: 0.8-1.5 Nm Close: 0.6-1.0 Nm	
Operating torque for the twist lock	Operating torque has to cover the limits - max. 1,2 Nm for locking - 0,5-1,2 Nm for unlocking (in class K1 and K2 at 1st and at 10th locking; in class K3 at 1st and at 20th locking)	Acc. to DIN 72585-2 (item 4.4) and ISO 15170
Static load resistance of the coupled connection	Following force requirements about a time of 10 sec. must be fulfilled - 250 N (axial direction) - 150 N (acting in an angle of 90 degrees to the connecting axis)	Acc. to DIN 72585-2 (item 4.5) and ISO 15170
Static load resistance of the free connection and the connectors	Following force requirements about a time of 10 sec. must be fulfilled - 350 N (lying, stable position)	Acc. to DIN 72585-2 (item 4.6) and ISO 15170
Vibration resistance / Micro interruptions	After the test, the subsequently performed tests shall be fulfilled (see 3.6). The standard fixation with a fixing ring limits the acceleration in application class K3 on 200 m/s².	Acc. to DIN 72585-2 (item 4.7) and ISO 15170.
Resistance against shock	No functional restrictions or cracks allowed	Acc. to DIN 72585-2 (item 4.8) and ISO 15170

Test Description	Requirement	Procedure
3.5.3 ELECTRICAL INSPECTIONS		
Current carrying capacity	Contact temperature rise < 40°C after 1h test duration; current-temperature capability is depending on crimp size and cable nominal cross section	Acc. to DIN 72585-2 (item 5.1) and ISO 15170
Contact resistance	Proof voltage < 20 mV $R_{init} < 5 \text{ m}\Omega$ (after 1. test) $R_{aft. Test} < 10 \text{ m}\Omega$ (after therm. or chem. stress)	Acc. to DIN 72585-2 (item 5.2) and ISO 15170
Short time resistance rise	The resistance shall not exceed 7 Ω for periods of more than 1 μs during the whole test duration of 300 h	Acc. to DIN 72585-2 (item 5.4) and ISO 15170
Voltage proof / Insulation resistance	Value and nature of the test voltage: $U_{eff} = 1000\text{V (AC)}$ frequency: 50 or 60 Hz time: 1 minute minimum: $R_{iso} > 10^7 \Omega$ No flash over or breakdown between every two contacts or between every contact and outer contour of the housing	Acc. to DIN 72585-2 (item 5.3) and ISO 15170
Electric tests and characteristics of the individual circular contacts (e.g. contact resistance) are described in the specifications named under point 2.1 C and 2.1 D.	Elektrische Prüfungen und Eigenschaften der einzelnen Rundkontakte (z. B. Kontaktdurchgangswiderstand) sind in den Spezifikationen unter Punkt 2.1 C und 2.1 D beschrieben.	

Test Description	Requirement	Procedure																													
3.5.4 ENVIRONMENTAL INSPECTIONS																															
Salt fog	No visible corrosion: light changes of colour will be left out of consideration	Acc. to DIN 50021-SS/IEC 68-2-11 DIN 72585-2 and ISO 15170 Test sample group G: 90h Test sample group K: 24h																													
Industrial atmosphere	No visible corrosion: light changes of colour will be left out of consideration	Acc. to. DIN EN ISO 6988, DIN 72585-2 and ISO 15170 3 cycles Start: 0,67% SO ₂ -Vol-Konz. Volume: 2,0l per cycle																													
Temperature- / humidity cycling	No visible corrosion: light changes of colour will be left out of consideration	Acc. to. DIN 50016, DIN 72585-2 and ISO 15170 Test sample gr. J: 21d FW 24 Test sample gr. K: 7d FW 24																													
Temperature cycling	No visible corrosion: light changes of colour will be left out of consideration. Reduction of insulation resistance max. up to factor 10 refer. to the before measured value.	Acc. to DIN 72585-2 (item 4.6) and ISO 15170 Test sample group C: Number of cycles 50 Test sample group K: Number of cycles 25																													
Resistance against liquids	The application of various liquids to the test samples (i.e. fuel, lubrication oil, brake fluid) may not cause a reduction of functionality. The connector is not designed to be used in diesel fuel.	Acc. to DIN 72585-2 (item 6.5) Spraying of test samples Time: 5s Storage: 24h at 80°C <table border="1" data-bbox="1002 1227 1465 1585"> <thead> <tr> <th colspan="2">Chemical fluid</th> <th>Test liquid</th> </tr> </thead> <tbody> <tr> <td colspan="2">Lubrication oil</td> <td>Oil No. 1 in accordance with ISO 1817</td> </tr> <tr> <td colspan="2">Automatic transmission fluid</td> <td>In accordance with SAE J311</td> </tr> <tr> <td colspan="2">Mineral hydraulic oil</td> <td>In accordance with ISO 7309</td> </tr> <tr> <td colspan="2">Brake fluid</td> <td>In accordance with ISO 4925</td> </tr> <tr> <td colspan="2">Antifreeze fluid</td> <td>Not yet specified</td> </tr> <tr> <td colspan="2">Window washer fluid</td> <td>Ethyl alcohol: 27ml Isopropylen: 10ml Ethylen glycol: 3ml Water: 60ml</td> </tr> <tr> <td colspan="2">Degreasing fluid</td> <td>Solvent white spirit with approx. 17 % aromatic content</td> </tr> <tr> <td rowspan="2">Fuel</td> <td>Gasoline</td> <td>Fluid B according ISO 1817</td> </tr> <tr> <td>Diesel</td> <td>ASTM D 975</td> </tr> </tbody> </table>	Chemical fluid		Test liquid	Lubrication oil		Oil No. 1 in accordance with ISO 1817	Automatic transmission fluid		In accordance with SAE J311	Mineral hydraulic oil		In accordance with ISO 7309	Brake fluid		In accordance with ISO 4925	Antifreeze fluid		Not yet specified	Window washer fluid		Ethyl alcohol: 27ml Isopropylen: 10ml Ethylen glycol: 3ml Water: 60ml	Degreasing fluid		Solvent white spirit with approx. 17 % aromatic content	Fuel	Gasoline	Fluid B according ISO 1817	Diesel	ASTM D 975
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Resistance against ingress of dust	No ingress of dust is allowed	Acc. to DIN 40050-9 IP 6X DIN 40050-9 IP 6X																													
Resistance against ingress of water	No ingress of water is allowed	Acc. to DIN 40050-9 IPX7, IPX9K (Note: PN 1394277-1 and -2 will not meet the IPX9K Requirement.)																													

3.6 Test Sequence

Test / Prüfung	Test Group ¹⁾											
	A	B	C	D	E	F	G	H	J	K	L	
	Test Sequence ²⁾											
Visual- and dimensional examination	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled
Contact resistance	X fulfilled		X fulfilled							X fulfilled		
Contact retention	X fulfilled											
Cable retention		X fulfilled										
Operating torque for the twist lock			X fulfilled									X fulfilled
Stadic load resistande of the coupled connector												X fulfilled
Stadic load resistande of the free connector				X fulfilled								
Resistance against ingress of dust			X fulfilled									
Resistance against ingress of water			X fulfilled									
Dielectric withstand voltage, Insulation resistance			X fulfilled				X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled
Temperature change			X fulfilled							X fulfilled		
Vibration resistance, Micro-interruptions			X fulfilled									
Resistance against shock					X fulfilled							
Current-carrying capacity						X fulfilled						
Industrial climate								X fulfilled				
Temp. humidity cycling									X fulfilled	X fulfilled		
Salt fog							X fulfilled			X fulfilled		
Thermal cycling										X fulfilled		
Resistance against liquids												X fulfilled
Resistance against ingress of dust		X fulfilled										
Resistance against ingress of water												X fulfilled
Contact resistance	X fulfilled	X fulfilled									X fulfilled	
Dielectric withstand voltage, Insulation resistance	X fulfilled		X R _s >10 ⁹ Ω U=1000 V (D.C.)				X R _s >10 ⁹ Ω U=1000 V (D.C.)	X R _s >10 ⁹ Ω U=1000 V (D.C.)	X R _s >10 ⁹ Ω U=1000 V (D.C.)	X R _s >10 ⁹ Ω U=1000 V (D.C.)	X fulfilled	X R _s >10 ⁹ Ω U=1000 V (D.C.)
Operating torque for the twist lock			X fulfilled									X fulfilled
Stadic load resistande of the coupled connector												X fulfilled
Visual- and dimensional examination	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled	X fulfilled

1) See Paragraph 4.1 A

2) ↓ Subsequent tests shall follow immediately without a pause.

4 QUALITY ASSURANCE PROVISIONS

4.1 Qualification Testing

A Sample Selection

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

Test Groups shall consist of:

- Test Group A : 6 connectors
- Test Group B : 6 connectors
- Test Group C : 6 connectors
- Test Group D : 6 connectors
- Test Group E : 3 connectors
- Test Group F : 3 connectors
- Test Group G : 6 connectors
- Test Group H : 6 connectors
- Test Group J : 6 connectors
- Test Group K : 6 connectors
- Test Group L : 6 connectors

B Test Sequence

Qualification inspection shall be verified by testing samples as specified in Para. 3.6.

4.2 Requalification Testing

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

4.3 Acceptance

Acceptance is based on verification that the product meets the requirements of Para. 3.5. Failures attributed to equipment, test setup, or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken, and sTEles resubmitted for qualification. Testing to confirm corrective action is required before resubmittal.

4.4 Quality Conformance Inspection

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