

DIN EN ISO 8092-2



ICS 01.040.43; 43.040.10

EntwurfEinsprüche bis 2023-05-10
Vorgesehen als Ersatz für
DIN EN ISO 8092-2:2006-10

**Straßenfahrzeuge –
Steckverbindungen für das elektrische Fahrzeug-Bordnetz –
Teil 2: Begriffe, Prüfungen und allgemeine Anforderungen
(ISO/DIS 8092-2:2022);
Englische Fassung prEN ISO 8092-2:2022**

Road vehicles –

Connections for on-board electrical wiring harnesses –

Part 2: Definitions, test methods and general performance requirements
(ISO/DIS 8092-2:2022);

English version prEN ISO 8092-2:2022

Véhicules routiers –

Connexions pour faisceaux de câblage électrique embarqués –

Partie 2: Définitions, méthodes d'essai et exigences de performances générales
(ISO/DIS 8092-2:2022);

Version anglaise prEN ISO 8092-2:2022

Anwendungswarnvermerk

Dieser Norm-Entwurf mit Erscheinungsdatum 2023-03-10 wird der Öffentlichkeit zur Prüfung und
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DIN-Normenausschuss Automobiltechnik (NAAutomobil)

Gesamtumfang 53 Seiten

Nationales Vorwort

Dieses Dokument (prEN ISO 8092-2:2023) wurde vom Technischen Komitee ISO/TC 22 „Road vehicles“ in Zusammenarbeit mit dem Technischen Komitee CEN/TC 301 „Straßenfahrzeuge“ (Sekretariat AFNOR, France) erarbeitet.

Das zuständige deutsche/nationale Normungsgremium ist der Arbeitsausschuss NA 052-00-32 AA „E/E-Komponenten und allgemeine Systemanforderungen“ im DIN-Normenausschuss Automobiltechnik (NAAutomobil).

Dieses Dokument enthält unter Berücksichtigung des DIN-Präsidialbeschlusses 1/2004 nur die Englische Fassung von prEN ISO 8092-2:2023.

Aktuelle Informationen zu diesem Dokument können über die Internetseiten von DIN (www.din.de) durch eine Suche nach der Dokumentennummer aufgerufen werden.

Änderungen

Gegenüber DIN EN ISO 8092-2:2006-10 wurden folgende Änderungen vorgenommen:

- a) Anpassung der Inhalte an neue technische Anforderungen;
- b) Übernahme der Inhalte gemäß der neuen Version der ISO-Richtlinien;
- c) Berichtigung von Tippfehlern und Fehlern im Text;
- d) inhaltliche Anpassung an die referenzierten Normen;
- e) Unterabschnitt 4.24 „Korrosionsbeständigkeit gegen fließende Gase“ wurde wegen technischer Irrelevanz entfernt;
- f) Anhang A (normativ) „Zusätzliche Kabelabmessungen“ wurden als informativer Teil unter 4.1.2 übernommen;
- g) Anhang B (informativ) „Leistungsanschluss mit Schneidklemm-Verbindung – Prüfung der Zugbelastbarkeit“ wurde wegen technischer Irrelevanz entfernt.

Nationaler Anhang NA (informativ)

Begriffe

Reihenfolge und Inhalt der folgenden Begriffe sind identisch mit denen im Abschnitt Begriffe der Englischen Fassung.

Für die Anwendung dieses Dokuments gelten die folgenden Begriffe.

ISO und IEC stellen terminologische Datenbanken für die Verwendung in der Normung unter den folgenden Adressen bereit:

- ISO Online Browsing Platform: verfügbar unter <https://www.iso.org/obp>
- IEC Electropedia: verfügbar unter <https://www.electropedia.org/>

3.1

Spannungsklasse A

Klassifizierung einer elektrischen Komponente oder eines Stromkreises nach seiner maximalen Arbeitsspannung von ≤ 30 V AC (rms) oder ≤ 60 V DC

[QUELLE: ISO 21498-1:2021]

[QUELLE: ISO 6469-3:2021]

3.2

Gehäuse

Gehäuse zum Einsetzen des Anschlusses und Bereitstellen einer Isolierung zwischen den Anschlüssen

3.3

Kabelbefestigung

jede dauerhafte Verbindung von Kabel zur Klemme

Anmerkung 1 zum Begriff: Crimpen und Schweißen sind typische Verfahren.

Anmerkung 2 zum Begriff: Begriffe in Bezug auf Kabel ISO 19642-1.

3.4

Steckverbinder

Einheit bestehend aus Kontakten und Gehäuse, zum Anschluss von Leitern, für den Zweck eine Verbindung mit einem passenden Steckverbinder herzustellen und zu lösen

3.5

Steckverbinder-Kodierung

mechanisches Merkmal zur Bereitstellung von Unterscheidungsmerkmalen, die das Zusammenstecken von Steckverbindern verhindern, die nicht dazu bestimmt sind, gesteckt zu werden

3.6

Stecker-Polarisierung

Verfahren oder Konstruktionsmerkmal, welches verhindert, dass Steckverbinder in einer unbeabsichtigten Ausrichtung, Drehung oder Winkelposition zusammengesteckt werden, während sie das Zusammenstecken in der beabsichtigten Weise ermöglichen

3.7

Steckerpositionssicherung

CPA

Vorrichtung, die ein unbeabsichtigtes Lösen der Steckerverriegelung verhindert und als Anzeige für das vollständige Stecken des Steckers dient

3.8

Terminalpositionssicherung

TPA

Funktion, die installiert oder eingesetzt wird, nachdem die Terminals in ihr Gehäuse eingesetzt wurden, um sicherzustellen, dass die Terminals richtig positioniert sind, und die den primären Terminalverriegelungsmechanismus verstärkt oder eine separate, redundante Terminalverriegelung bereitstellt

3.9

Buchse und Buchsenklemme

Klemme, einschließlich Vorrichtung zur Kabelbefestigung, die für die elektrische Verbindung an ihrer Innenfläche ausgelegt ist und die Aufnahme eines Stift- oder Flachsteckers ermöglicht, wodurch eine elektrische Verbindung hergestellt wird. Siehe Bild 1

Anmerkung 1 zum Begriff: Buchsen- und Buchsenklemmen werden manchmal auch als weibliche Anschlüsse bezeichnet.



Bild 1 — Beispiel für Buchse und Buchsenklemme

3.10

Stift- und Flachstecker

Stecker, einschließlich Vorrichtung zur Kabelbefestigung, die für die elektrische Verbindung an ihrer Außenfläche und zum Einführen in eine Buchse oder einer Buchsenklemme bestimmt ist, wodurch eine elektrische Verbindung hergestellt wird. Siehe Bild 2

Anmerkung 1 zum Begriff: Stift- und Flachstecker werden manchmal als „männliche Anschlüsse“ bezeichnet.

Anmerkung 2 zum Begriff: Flachstecker werden manchmal auch als Klingenstecker bezeichnet.



Bild 2 — Beispiel von einem Stift- und Flachstecker

3.11

Mehrfach-Steckverbindung

zwei gesteckte Steckverbinder mit mehr als einem Kontaktpaar (zum Beispiel eine Buchse und ein Flachstecker)

Contents

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Test conditions and requirements	4
4.1 General	4
4.2 Visual Examination	11
5 Mechanical tests	12
5.1 Connection and disconnection	12
5.2 Mating force - measurement and classification	13
5.3 Unlocking force - measurement and classification	13
5.4 Unmating force - measurement and classification	13
5.5 Locking device strength	13
5.6 Unintentional lever release force	14
5.7 Locking force for CPA function	14
5.8 Disengage force for CPA function	17
5.9 Locking force for TPA	17
5.10 Disengage force for TPA	18
5.11 Effectiveness of connector coding and polarization	18
5.12 Connector engagement sound	19
5.13 Terminal insertion force (TPA disengaged)	19
5.14 Terminal insertion force (TPA engaged)	20
5.15 Terminal insertion force with incorrect orientation	21
5.16 Terminal extraction force	22
5.17 Tensile strength of connection between terminal and wire	23
6 Electrical tests	25
6.1 Connection resistance (voltage drop)	25
6.2 Temperature rise	27
6.3 Current cycling at ambient temperature	29
6.4 Insulation resistance	29
6.5 Withstand voltage	30
7 Environmental tests	31
7.1 Thermal shock	31
7.2 Thermal aging	32
7.3 Temperature and humidity cycle	32
7.4 Vibration with thermal cycling	35
7.5 Mechanical shock	37
7.6 Drop	37
7.7 Water tightness	38
7.8 Water tightness, dynamic	40
7.9 High-pressure/steam-jet cleaning	42
7.10 Salt spray	44
7.11 Dust resistance	44
7.12 Chemical loads	45
7.13 Fretting corrosion	45
7.14 Friction corrosion	46
Bibliography	47

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, Road vehicles, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

This fifth edition cancels and replaces the fourth edition (ISO 8092-2:2005), which has been technically revised.

The main changes compared to the previous edition are as follows:

- adoption of the content according to new technical requirements,
- adoption of the content according to the new version of the ISO guidelines,
- correction of the typos and mistakes in the text,
- alignment of the content regarding to the referred standards,
- section 4.24 Flowing gas corrosion test has been removed due to its technical irrelevance,
- Annex A (normative) Additional cable dimensions is adopted as an informative part under section 4.1.2,
- Annex B (informative) Cable attachment by insulation-displacement connection (IDC) — Bending test has been removed due to its technical irrelevance.

A list of all parts in the ISO 8092 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Road vehicles — Connections for on-board electrical wiring harnesses — Part 2: Definitions, test methods, and general performance requirements

1 Scope

This document defines terms and specifies test methods for general performance requirements of voltage class A connectors used in electrical wiring harnesses on road vehicles.

This document applies to connectors which, after mounting in the vehicle, are designed to only be disconnected in connection with repair and maintenance.

This part of ISO 8092 does not apply to internal connections for electronic devices.

This part of ISO 8092 does not apply to signal communication quality or data integrity.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO DIS 8092-5, *Road vehicles — Connections for on-board electrical wiring harnesses – Part 5: Automotive parts – Test methods and general performance requirements for wiring harness connector operation*

ISO 16750-3, *Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 3: Mechanical loads*

ISO 16750-4, *Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 4: Climatic loads*

ISO 16750-5, *Road vehicles - Environmental conditions and testing for electrical and electronic equipment - Part 5: Chemical loads*

ISO 19642 (all parts), *Road vehicles — Automotive Cables*

ISO 20653, *Degrees of protection (IP-code) — Protection against foreign objects, water and access – Electrical equipment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1

voltage class A

classification of an electric component or circuit with a maximum working voltage of ≤ 30 V AC (rms) or ≤ 60 V DC, respectively

[SOURCE: ISO 21498-1:2021]

[SOURCE: ISO 6469-3:2021]

3.2

housing

housing for inserting the terminal and providing insulation between terminals

3.3

cable attachment

any permanent junction of cable to terminal

Note 1 to entry: Crimp and weld are typical methods

Note 2 to entry: Terms related to cables ISO 19642-1

3.4

connector

assembly of terminal, housing and related parts that terminate cable for the purpose of providing connection and disconnection to a suitable mating connector

3.5

connector coding

mechanical feature to provide differentiation, preventing mating of connectors not intended to be mated

3.6

connector polarization

method or design feature, which prevents connectors that are intended to mate from mating in an unintended orientation, rotation, or angular position, whilst allowing mating in the intended manner

3.7

connector position assurance, CPA

device that prevents accidental release of the connector lock and serves as an indicator of full connector mating

3.8

terminal position assurance, TPA

a feature installed or seated after the terminals are inserted into their housing to assure that the terminals are properly positioned, and which reinforces the primary terminal locking mechanism or provides a separate, redundant terminal lock

3.9

socket and receptacle terminal

terminal, including means for cable attachment, designed for electrical engagement on its inner surface, and to accept entry of a pin or tab terminal, thus forming an electrical connection. See Figure 1 for example.

Note 1 to entry: Socket and receptacle terminals are sometimes referred to as female terminals.



Figure 1— Example of a socket and a receptacle terminal

3.10

pin and tab terminal

terminal, including means for cable attachment, designed for electrical engagement on its outer surface and to enter a socket or a receptacle terminal, thus forming an electrical connection. See Figure 2 for example.

Note 1 to entry: Pin and tab terminals are sometimes referred to as male terminals”

Note 2 to entry: Tab terminals are sometimes referred to as blade terminals



Figure 2— Example of a pin and a tab terminal

3.11

multi-pole connection

two mated connector halves with more than one terminal pair (for example one receptacle and one tab terminal)

4 Test conditions and requirements

4.1 General

4.1.1 Preconditioning for environmental and mechanical durability test

All test samples shall be preconditioned at a standard ambient temperature of $(23 \pm 5) ^\circ\text{C}$, and $(25-75) \%$ relative humidity for 24 h before the start of any test sequence.

[SOURCE: ISO 16750-1]

4.1.2 Test conditions

All tests shall be carried out at a standard ambient temperature of $(23 \pm 5) ^\circ\text{C}$ and $(25-75) \%$ relative humidity unless otherwise stated in the test procedure. This is referred to as room temperature (RT).

Cable in compliance with applicable part of ISO 19642 is recommended. The cable or cables used shall be specified in the test report.

The cross-sectional area of the wire mentioned in this specification refers to wires with a copper conductor.

When the wire conductor is of a material other than copper, the cross-sectional area of the wire shall be specified by agreement between customer and supplier.

Cable attachment shall be performed in accordance with the terminal manufacturer's specifications, or as agreed between customer and supplier.

Care shall be taken so that test samples do not influence each other (e.g., in a heat chamber).

Each connector shall have the full complement of terminals fitted unless otherwise specified.

The terminals and connectors used in the test shall be fully assembled unless otherwise specified.

Connectors shall be tested in mated condition unless stated otherwise. In the case of a connector connecting directly to a device, a mating dummy may be used to carry out tests. This dummy must represent the intended device's interface and electrical properties.

For connector mechanical tests, unless otherwise specified, fix the pin or tab housing of the unmated or mated connector in the appropriate fixture on the tension or force tester. Secure the other side in the appropriate fixture and insert or pull the socket or receptacle housing straight in/out. Straight-in or straight-out engagement is critical to avoid side loads and binding which can affect force measurements.

For terminal mechanical tests, unless otherwise specified, fix the pin or tab terminal of the unmated or mated terminal in the appropriate fixture on the tension or force tester. Secure the other side in the appropriate fixture and insert/pull the socket receptacle terminal straight in/out. Straight-in or straight-out engagement is critical to avoid side loads and binding which can affect force measurements

Measurements shall be taken on all terminals regardless of the number of poles per connector, unless otherwise specified in the test methods or by agreement between customer and supplier.

Lubrication or other means of attaining better test results shall not be added to any surface unless representative of assembly conditions. Production-related remains of lubricants on the terminals are permitted.

Unless otherwise specified, all forces shall be applied at a constant speed of (50 ± 10) mm/min.

Unless otherwise specified, when a temperature of $T_{\max}$ is specified in a test, the applicable “Highest value” temperature as per Table 1 shall be used. When a temperature of $T_{\min}$ is specified in a test, the applicable “Lowest value” temperature as per Table 1 shall be used.

Table 1 — Environmental and test temperatures

Class	Typical application	Environmental temperature range °C		Test temperature Short term thermal ageing °C ± 2 °C
		Lowest value Use for $T_{\min}$ of chamber ± 2 °C	Highest value Use for $T_{\max}$ of chamber ± 2 °C	
		-40		
T1 (G)	interior		85	100
T2 (J)	passenger compartment		100	125
T3 (O)	engine compartment		125	150
T4 (R)	engine applications used near hot components		150	175
T5 (N/A)	for use as needed		175	200 *
() value aligned with ISO 16750-4:2010, Table 1				
* or agreed between customer and supplier				

NOTE $T_{\min}$ and $T_{\max}$ apply to all environmental chamber temperatures where $T_{\min}$ and $T_{\max}$ are specified as using the applicable environmental temperature range except 7.2.2.1 Short term Thermal aging

4.1.3 Test sequences and sample quantities

Table 2,

Table 3, Table 4 and Table 5 list the test sequences. The test groups in the tables apply to sealed and unsealed connectors as noted. New samples shall be used for each test group. The test sequence for each test group shall be performed in accordance with the sequence number defined in the table's rows for each sequence. For each test group, the complete test sequence for the group on each sample shall be performed.

Table 2—Mechanical test sequences groups A through H

Test group identification		A	B	C	D	E	F	G	H
u=apply test if samples are unsealed		u	u	u	u	u	u	u	u
s=apply test if samples are sealed		s	s	s	s	s	s	s	s
Minimum test quantity of terminals/connectors		10	10	10	10	10	10	10	10
Sample cable length (mm)		-	-	-	-	-	-	-	-
Sample cable size	Maximum	-	-	-	-	-	-	-	-
	Minimum	-	-	-	-	-	-	-	-
4.2 Visual Examination		1, 3	1, 3	1,3	1, 3	1, 3	1, 3	1,3	1,4
5.1 Connection and disconnection		2 ^g							
5.2 Mating force – measurement and classification			2						
5.3 Unlocking force – measurement and classification				2					
5.4 Unmating force – measurement and classification					2				
5.5 Locking device strength						2			
5.6 Unintentional lever release force							2		
5.7 Locking force for CPA function								2	2
5.8 Disengage force for CPA function									3
^g Perform force measurement for first mate and first unmate with part held in force tester. Remaining mate and unmate cycles can be either hand mated or using the mechanized force test machine. - Cells containing "-" to be defined between supplier and customer. Selection typically does not matter to test result.									

Table 3—Mechanical test sequences groups I through P

Test group identification		I	J	K	L	M	N	O	P
u=apply test if samples are un-sealed		u	u	u	u	u	u	u	u
s=apply test if samples are sealed		s	s	s	s	s	s	s	s
Minimum test quantity of terminals/connectors		10 ^f	10 ^f	10	10	20 ^f	10 ^f	10 ^f	10 ^k
Sample cable length (mm)		-	-	-	-	-	-	-	>50
Sample cables size	Maximum	-	-	-	-	10	10	10	See "l"
	Minimum	-	-	-	-	10	-	-	See "l"
4.2_Visual Examination		1, 3	1, 4	1, 3	1, 3	1, 4	1, 3	1, 3	1, 3
5.9 Locking force for TPA		2	2						
5.10 Disengage force for TPA			3						
5.11 Effectiveness of connector coding and polarization				2					
5.12 Connector engagement sound					2				
5.13 Terminal insertion force (TPA disengaged)						2			
5.14 Terminal insertion force (TPA engaged)							2		
5.15 Terminal insertion force with incorrect orientation								2	
5.16 Terminal extraction force						3			
5.17 Tensile strength of connection between terminal and wire									2
^f Use unmated wire harness connector; the mating (header) connector is not used in the test. ^k Sample is made from terminal and cable only. ^l Test quantity is per terminal/cable combination; each combination shall be validated with a 10-piece sample, minimum. - Cells containing "-" to be defined between supplier and customer. Selection typically does not matter to test result.									

Table 4— Environmental and electrical test sequence groups Q through W

Test group identification		Q	R	S	T	U	V	W
u=apply test if samples are unsealed		u	u	u	u	u	u	
s=apply test if samples are sealed		s	s	s	s ^q	s	s	s ^q
Minimum test quantity of connectors		5 ⁱ	10	5 ⁱ	5	5	5	5
Sample cable length (mm)		500	-	min 500	min 150	-	1 250	Min 150
Sample cable size	Maximum	See "p"	all	all		all		
	Minimum				all		all	all
4.2 Visual Examination		1	1, 6	1, 8, 10	1, 10, 14	1, 8	1, 3	1, 7
5.1 Connection and disconnection		2	2	2	2	2		
5.3 Unlocking force – measurement and classification					12 ^c			
5.6 Unintentional lever release force					12 ^c			
5.8 Disengage force for CPA function					11			
5.16 Terminal extraction force				9				
6.1 Connection resistance (voltage drop)			3, 5	3, 6	3, 7, 13	3, 5, 7		2, 5
6.2 Temperature rise		3 ^j		(4), 7				
6.4 Insulation resistance					4, 8			
6.5 Withstand voltage					5, 9			3, 6
7.1 Thermal shock			4					
7.2 Thermal aging				5				
7.3 Temperature / humidity					6 ⁿ			
7.4 Vibration with thermal cycling						6 ^d		
7.5 Mechanical shock						4 ^d		
7.6 Drop							2	
7.10 Salt spray								4
c Perform either 5.3 or 5.6 as applicable. d It is allowed to apply each shock/vibration direction directly before the vibration test for this direction. Take intermediate resistance measurements between testing for each axis. i Samples require thermocouples to measure or monitor temperature rise. j This test is to estimate initial current in test part. n Perform insulation resistance during condensation phase. p Test all cable sizes that are applicable. q Seal cable on far end. () It is possible to omit this step by agreement between customer and supplier. - Cells containing "-" to be defined between supplier and customer. Selection typically does not matter.								

Table 5— Environmental and electrical test sequence groups Y through AG

Test group identification		X	Y	Z	AA	AB	AC	AD	AE	AF
u=apply test if samples are unsealed		u				u	u	u	u	U
s=apply test if samples are sealed		s	s ^q	s	s	s	s	s ^q	s	s
Minimum test quantity of connectors		5 ⁱ	5	5	5	5	5	-	5	5
Sample cable length (mm)		500	max 1 000	max 1 000	Min 150	-	-	-	-	-
Sample cable size	Maximum	all		all	-		-		-	-
	Minimum		all		-	all	-	all	-	-
4.2 Visual Examination		1, 7	1, 9	1, 6	1, 7	1, 10, 12	1, 6	1, 10, 14	1, 3	1, 3
5.1 Connection and disconnection		2	2	2				2		
5.5 Locking device strength						11				
5.16 Terminal extraction force		6								
6.1 Connection resistance (voltage drop)		3, 5	3, 6		2, 5		2, 4	13		
6.3 Current cycling at ambient temperature		4 ^e		4			3			
6.4 Insulation resistance			8		3, 6	2, 5, 8		3, 7, 11		
6.5 Withstand voltage						3, 6, 9		4, 8, 12		
7.2 Thermal aging			5			4				
7.7 Water tightness ^a			4, 7	3, 5				5 ^b , 9 ^b		
7.8 Water tightness, dynamic					4					
7.9 High-pressure/steam-jet cleaning						7 ^b				
7.11 Dust resistance							5			
7.12 Oil and liquid resistance								6		
7.13 Fretting corrosion									2	
7.14 Friction corrosion										2

^a Aside from test sequence, test to failure can be performed using additional samples ($n=5$) for test 7.7 until the upper limit pressure is reached.

^b Sealed connectors only

^e Monitor temperature rise during step.

^q Seal cable on far end.

- Cells containing "-" to be defined between supplier and customer. Selection typically does not matter.