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**Road vehicles — Connections for  
on-board electrical wiring harnesses —**

Part 2:

**Definitions, test methods and general  
performance requirements**

iTeh STANDARD PREVIEW

*Véhicules routiers — Connexions pour faisceaux de câblage électrique  
embarqués*  
(standards.iteh.ai)

*Partie 2: Définitions, méthodes d'essai et exigences de performances  
générales*

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Reference number  
ISO 8092-2:2005(E)

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Tel. + 41 22 749 01 11  
Fax + 41 22 749 09 47  
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## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 8092-2 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

This fourth edition cancels and replaces the third edition (ISO 8092-2:2000), which has been technically revised.

ISO 8092 consists of the following parts, under the general title *Road vehicles — Connections for on-board electrical wiring harnesses*:

- *Part 1: Tabs for single-pole connections — Dimensions and specific requirements*
- *Part 2: Definitions, test methods and general performance requirements*
- *Part 3: Tabs for multi-pole connections — Dimensions and specific requirements*
- *Part 4: Pins for single- and multi-pole connections — Dimensions and specific requirements*

This corrected version of ISO 8092-2:2005 incorporates the following corrections:

- the words “Dimensions in millimetres” deleted from Figures 2 and 3 on page 3;
- in Figure 11 on page 16, the words “Dimensions in millimetres” added to the figure, and “4 ammeter” deleted from the key;
- in 4.24.2 on page 25, the reference to 4.21.1 changed to 4.24.1;
- in B.2 on page 28, the value “1 s” changes to “1  $\mu$ s”.

# Road vehicles — Connections for on-board electrical wiring harnesses —

## Part 2: Definitions, test methods and general performance requirements

### 1 Scope

This part of ISO 8092 defines terms, and specifies test methods and general performance requirements for single-pole and multi-pole connections used with on-board electrical wiring harnesses of road vehicles.

This part of ISO 8092 is applicable to connectors designed to be disconnected after mounting in the vehicle for repair and maintenance only. It does not cover one-part connections, i.e. where one part of the connection has direct contact to the pattern of the printed circuit board.

This part of ISO 8092 is not applicable to internal connections of electronic devices.

### 2 Normative references

ISO 8092-2:2005

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The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 1817; *Rubber, vulcanized — Determination of the effect of liquids*

ISO 3170; *Petroleum liquids — Manual sampling*

ISO 6722; *Road vehicles — 60 V and 600 V single core cables — Dimensions, test methods and requirements*

ISO 7309; *Road vehicles — Hydraulic braking systems — ISO reference petroleum base fluid*

ISO 9227; *Corrosion tests in artificial atmospheres — Salt spray tests*

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

IEC 60050-581; *International Electrotechnical Vocabulary — Electromechanical components for electronic equipment*

IEC 60068-2-27; *Environmental testing. Part 2: Tests. Test Ea and guidance: Shock*

IEC 60512-11-7; *Connectors for electronic equipment — Tests and measurements — Part 11-7: Climatic tests — Test 11 g: Flowing mixed gas corrosion test*

IEC 60512-11-14; *Connectors for electronic equipment — Tests and measurements — Part 11-14: Test 11p — Flowing single gas corrosion test*

SAE J311b; *Fluid for passenger car type automatic transmission*

### 3 Terms and definitions

For the purpose of this part of ISO 8092, the definitions given in IEC 60050-581 and the following apply.

#### 3.1 connection

two mated connectors or contacts

EXAMPLE See Figure 1.

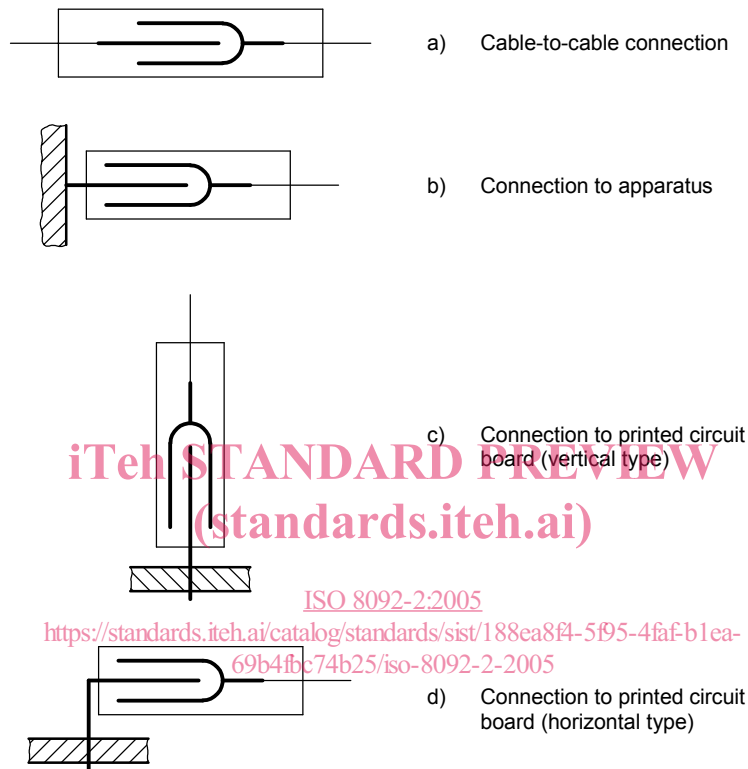


Figure 1 — Typical examples of connections

#### 3.2 connector

assembly of contact and housing that terminates conductors for the purpose of providing connection and disconnection to a suitable mating connector

#### 3.3 contact

conductive element in a connector (including means for cable attachment) that mates with a corresponding element to provide an electrical path

#### 3.4 contact area

area in contact between two mated contacts that provides an electrical path

#### 3.5 male contact

contact (including means for cable attachment) designed for electrical engagement on its outer surface and to enter a female contact, thus forming an electrical connection

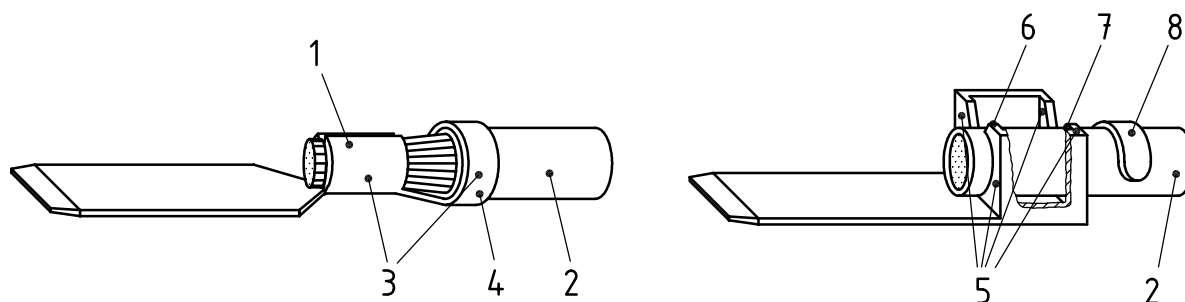
EXAMPLE See Figure 2 (tab, pin, blade).

**3.6**

**female contact**

contact (including means for cable attachment) designed for electrical engagement on its inner surface, and to accept entry of a male contact, thus forming an electrical connection

EXAMPLE See Figure 3 (receptacle, sleeve).

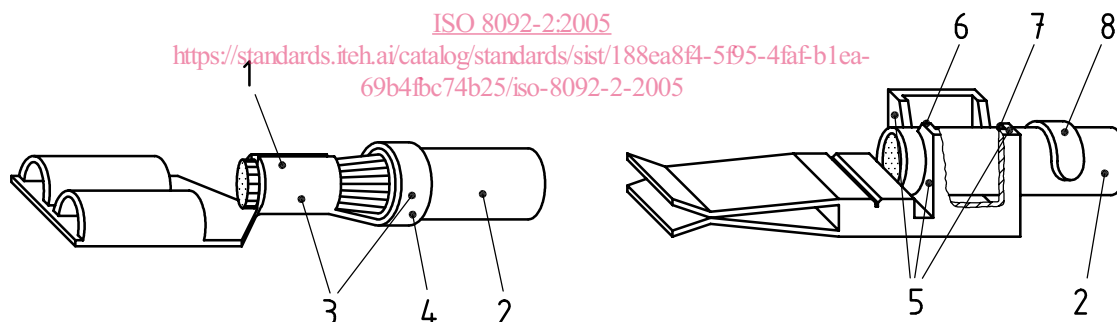


**Key**

- |                                   |   |
|-----------------------------------|---|
| 1 conductor crimp                 | 5 cable attachment by insulation displacement               |
| 2 cable                           | 6 connection slot   |
| 3 cable attachment                | 7 connection slot/insulation support, if 8 is not available |
| 4 insulation support/sealing grip | 8 insulation support  |

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**Figure 2 — Male contact**  
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**Key**

- |                                   |   |
|-----------------------------------|---|
| 1 conductor crimp                 | 5 cable attachment by insulation displacement               |
| 2 cable                           | 6 connection slot   |
| 3 cable attachment                | 7 connection slot/insulation support, if 8 is not available |
| 4 insulation support/sealing grip | 8 insulation support  |

**Figure 3 — Female contact**

**3.7**

**positive-locking female contact**

female contact with automatic positive-locking and manual unlocking device engaging a hole or dimple in the male contact

**3.8**

**cable attachment**

any permanent joining of cable to contact

EXAMPLES Include crimp, insulation, displacement, welding and screwing.

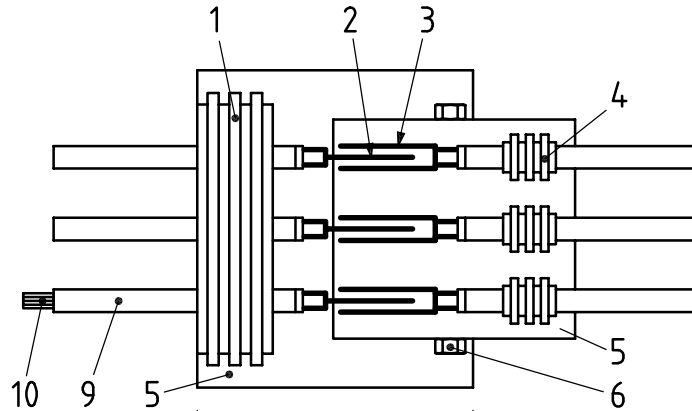
**3.9 detent**

raised portion of the female contact that engages a hole or dimple in the male contact thus providing a latch for the mated parts

**3.10 multi-pole connection**

two mated connectors with more than one contact pair

EXAMPLE See Figure 4.



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**Key**

- |                       |                |
|-----------------------|----------------|
| 1 multiple cable seal | 6 housing seal |
| 2 male contact        | 7 connector    |
| 3 female contact      | 8 connection   |
| 4 single cable seal   | 9 cable        |
| 5 housing             | 10 conductor   |

**Figure 4 — Multi-pole connectors/connection**

**3.11 connector coding**

device, either for visual, mechanical or sensitive, or combinations of these preventing connection of connectors from the same family and having the same number of contacts but with different coding

**4 Tests and requirements**

**4.1 General**

**4.1.1 Preconditioning**

All test samples shall be preconditioned at (23 ± 5) °C and 45 % to 75 % relative humidity for 24 h before the start of any test sequence.



#### 4.1.2 Test conditions

All tests shall be carried out at an ambient temperature of  $(23 \pm 5) ^\circ\text{C}$ , unless otherwise stated in the test plan.

Each test sequence (see Table 1) shall be started with unused test samples manufactured to conform to the dimensions specified in the applicable part of ISO 8092.

Contacts with a locking device shall be tested with adequate counterparts to permit locking.

Cables shall be in conformance with ISO 6722, and the cable or cables used shall be noted in the test report. Additional dimensions of the cable or cables used shall be according to Annex A.

Cable attachment shall be performed in accordance with the contact manufacturer's recommendations.

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 contacts fitted, unless otherwise specified in the test method. Measurements shall be taken on a minimum of four contacts per connector, unless otherwise specified in the test methods. For 1-, 2-, and 3-pole connectors, all contacts shall be measured.

During the entire test sequence, lubrication or other means of attaining better test results shall not be added to the test surface. However, production-related remains of lubricants on the contacts are permitted.

#### 4.1.3 Multiple-position connections

Connectors or contacts that allow connections for multiple positions shall meet the requirements of this International Standard in all intended positions.

#### 4.1.4 Test sequences

ISO 8092-2:2005

The test sequence for each sample group shall be in accordance with Table 1 (sequences are indicated by Xs, ordered from top to bottom). Also given in the same table is the applicability of test sequences to sealed or unsealed connectors. A new test sample group shall be used for each test sequence.

#### 4.1.5 Number of test samples

Each test sample group shall contain a minimum of:

- 20 test samples in the case of single-pole connectors,
- 10 test samples in the case of 2-pole connectors,
- 7 test samples in the case of 3-pole connectors,
- 5 test samples in the case of 4-pole connectors.

Moreover, not less than 20 contacts of each type shall be tested.

Unless otherwise specified, all test samples shall be used for all tests in a test sample group.

### 4.2 Visual examination

#### 4.2.1 Test

Carry out a visual examination of all connectors and contacts with the naked eye, at normal strength of vision and colour perception, at the most favourable viewing distance, and with suitable illumination.

Table 1 — Test sequences and requirements

Test		Test sample group <sup>a</sup> / sequence													Requirement
		A	B	C	D	E	F	G	H	I	K	L	M	N	
Unsealed connectors	Sub-clause	X	X	X	X	X	X	X	X	X	X	X			Sub-clause
Sealed connectors		X	X	X	X	X	X	X	X	X			X	X	
Visual examination	4.2.1	X	X	X	X	X	X	X	X	X	X	X	X	X	4.2.2
Contact insertion force	4.6.1	X													4.6.2
Contact retention in housing	4.7.1	X													4.7.2
Tensile strength for crimped connections	4.4.1							X							4.4.2
Connector coding and polarization	4.15.1		X												4.15.2
Connection and disconnection	4.3.1		X												4.3.2
Connection resistance (voltage drop)	4.8.1		X	X	X	X			X	X	X				4.8.2
First connection to 10th disconnection	4.3.1		X												4.3.2
Current cycling	4.17.1			X											4.17.2
Insulation resistance	4.12.1				X								X		4.12.2
Withstand voltage	4.13.1				X					X					4.13.2
Temperature/humidity cycling	4.10.1				X										4.10.2
Combined temperature vibration	4.11.2					X									4.11.3
Thermal ageing	4.18.1												X		4.18.2
Chemical fluids	4.23.1											X		X	4.23.2
Temperature rise	4.14.1						X								4.14.2
Mechanical shock	4.19.2								X						4.19.3
Connection resistance (voltage drop)	4.8.1		X	X		X									4.8.2
Locking device strength	4.5.2		X									X		X	4.5.3
Contact retention in housing	4.7.1											X			4.7.2
Water tightness	4.9.1.1												X <sup>b</sup>		4.9.2.1
Insulation resistance	4.12.1				X								X <sup>b</sup>	X	4.12.2
High pressure water jet	4.9.1.2									X			X <sup>b</sup>		4.9.2.2
Insulation resistance	4.12.1												X		4.12.2
Withstand voltage	4.13.1				X					X	X				4.13.2
Rapid change of temperature	4.22.1		X												4.22.2
Salt spray	4.16.1									X					4.16.2
Flowing gas corrosion	4.24.1								X						4.24.2
Connection resistance (voltage drop)	4.8.1		X		X				X	X	X				4.8.2
Drop	4.20.1											X		X	4.20.2
Dust	4.21.1			X											4.21.2
Visual examination	4.2.1	X	X	X	X	X	X	X	X	X	X	X	X	X	4.2.2

<sup>a</sup> See 4.1.4 and 4.1.5.

<sup>b</sup> The subsequent test shall be performed within 1 hour of the test indicated.

### 4.2.2 Requirement

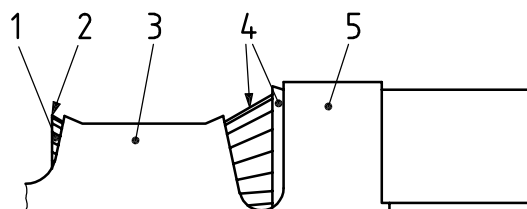
Identification, appearance, workmanship and the finish of each item shall be as specified.

Visual examination as detailed in 4.2.1 shall allow identification, appearance, workmanship and finish of the item to be checked against the relevant specification.

For crimped cable attachments, both insulation and the conductor shall be visible between the conductor crimp and the insulation support on the male and female contacts, as shown in Figure 5. Conductors shall protrude from the conductor crimp but shall not interfere with the mating part. All wire strands shall be enclosed by the conductor crimp. There shall be no damaged wire strands.

For other types of cable attachment, no visible damage is allowed.

During visual examination of the connectors, for all test sample groups, special care shall be taken to ensure, as a minimum requirement, that no cracking, discoloration, deformation or — where applicable — ingress of water is in evidence.



#### Key

- 1 conductor end (conductor end shall be visible)
- 2 wire strand
- 3 conductor crimp
- 4 conductor and insulation (conductor and insulation shall be visible)
- 5 insulation support

Figure 5 — Conductor crimp and insulation support

## 4.3 Connection and disconnection

### 4.3.1 Test

Perform connection and disconnection as specified by the connector manufacturer at a constant speed between 25 mm/min and 100 mm/min. Note the speed applied in the test report.

Subject the connector to 10 connections and disconnection. Measure the force necessary at

- first connection;
- first disconnection;
- 10th disconnection.

For positive-locking female connectors perform an eleventh cycle with the locking device engaged for the locking device strength test as in 4.5.2.2.

### 4.3.2 Requirements

The contacts, tested according to 4.3.1, shall conform to the requirements specified in the applicable part of ISO 8092. In the case of multi-pole connections, the connection and disconnection forces, determined in 4.3.1, shall be as in the particular specification.

**4.4 Tensile strength for crimped connections**

**4.4.1 Test**

Test the tensile strength of the conductor-to-contact attachment using suitable test apparatus operated at a constant speed within the range 25 mm/min to 100 mm/min. Note the speed applied in the test report.

Attach each test sample to the corresponding cable or cables as specified by the connector manufacturer.

The cable insulation support shall be rendered mechanically ineffective. Perform the test with contacts alone. When more than one cable is attached, apply the force according to Table 2 to each cable by using separate samples.

In the case of cable attachment by insulation displacement, the test may be performed with the contacts located in the housing (see Annex B).

NOTE Other types of cable attachment are under consideration [for insulation displacement connections (IDC), see Annex B].

**4.4.2 Requirements**

The tensile strength of the conductor crimp, tested according to 4.4.1, shall withstand the minimum values specified in Table 2.

**Table 2 — Minimum tensile strength of conductor crimps**

Nominal cross-sectional area of cable (mm <sup>2</sup> )	Minimum tensile strength (N)
0,22	30
0,35	50
0,5	60
0,75	90
1	100
1,5	150
2	175
2,5	200
3	260
4	310
5	355
6	360
10	380

The minimum tensile strength of conductor crimp for cables with non-specified nominal cross-sectional area shall be determined by interpolation.

NOTE For further information for crimped connection see IEC 60352-2.