INTERNATIONAL STANDARD

ISO
8092-2
First edition
1988-11-15

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION
ORGANISATION INTERNATIONALE DE NORMALISATION
МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ

Road vehicles — Flat, quick-connect terminations —

Part 2:
Tests and performance requirements for single pole connections

Véhicules routiers — Connexions rapides à languette plate —

Partie 2: Essais et exigences de performance des connexions pour raccordements unipolaires

Reference number
ISO 8092-2 : 1988 (E)

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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 8092-2 was prepared by Technical Committee ISO/TC 22, *Road vehicles.*

ISO 8092 consists of the following parts, under the general title *Road vehicles — Flat, quick-connect terminations*:

— *Part 1: Tabs for single pole connections*

— *Part 2: Tests and performance requirements for single pole connections*

Road vehicles — Flat, quick-connect terminations —

Part 2: Tests and performance requirements for single pole connections

1 Scope

This part of ISO 8092 lays down test methods and performance requirements for flat, quick-connect terminations for single pole connections specified in ISO 8092-1, which are used in the on-board electrical harness of road vehicles with a nominal voltage of 6 V, 12 V or 24 V.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8092. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8092 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3768 : 1976, *Metallic coatings — Neutral salt spray test (NSS test)*.

ISO 6722-1 : 1984, *Road vehicles — Unscreened low-tension cables — Part 1: General requirements and test methods*.

ISO 6722-2 : 1985, *Road vehicles — Unscreened low-tension cables — Part 2: Cable classes, applicable tests and special requirements*.

ISO 6722-3 : 1984, *Road vehicles — Unscreened low-tension cables — Part 3: Conductor sizes and dimensions*.

ISO 8092-1 : —[1], *Road vehicles — Flat, quick-connect terminations — Part 1: Tabs for single pole connections*.

3 Definitions

For the purposes of this part of ISO 8092, the definitions given in ISO 8092-1 and the following apply.

3.1 test tab: Male tab manufactured to conform to the dimensions specified in ISO 8092-1, for the purpose of conducting tests with production female connectors.

NOTE — In most cases, a production tab may be suitable.

3.2 positive locking female connector: Female connector with automatic positive locking and manual unlocking device engaging the male tab hole.

3.3 reference point: Specially marked point used when making electrical test measurements.

4 Test conditions

Female connectors which have a locking device shall be tested with male tabs with a hole to permit locking.

Crimped terminations shall be fixed to the wire with a crimping tool used in accordance with the manufacturer's recommendations.

The tests shall be performed with unused samples, and at an ambient temperature of (23 ± 5) °C unless otherwise stated.

1) To be published.

5 Tests

5.1 Visual examination

The visual examination shall be carried out with the naked eye (normal strength of vision, good colour perception) at the most favourable viewing distance, and with suitable illumination.

5.2 Insertion and withdrawal tests

Tests for insertion and withdrawal forces shall be carried out using suitable test apparatus. The rate for insertion and withdrawal shall be a constant speed not exceeding 100 mm/min.

The connection shall be subjected to test 5.2.1 or 5.2.2 as appropriate.

5.2.1 Female connector (without positive locking) test

Ten cycles of insertions and withdrawals shall be performed, using a test tab. The force necessary shall be measured at:

- first insertion;
- first withdrawal;
- tenth withdrawal.

5.2.2 Positive locking female connector test

Eleven cycles of insertions and withdrawals shall be performed as follows.

- The first nine cycles shall be performed using a test tab and operating the locking device of the female connector at each cycle in accordance with the manufacturer's instructions and normal use.
- The tenth cycle shall be performed to measure the withdrawal force after the locking detent is released. After release, the locking device is not operated for the remainder of the withdrawal test.
- The eleventh cycle shall be performed with the positive locking device engaged.

Forces shall be measured at

- first insertion;
- first withdrawal;
- tenth withdrawal;
- eleventh withdrawal.

5.3 Tensile strength of crimped termination test

The tensile strength of the crimped termination shall be carried out by using suitable test apparatus at a constant speed within the range of 25 mm/min to 50 mm/min.

Each test specimen shall be crimped to the corresponding wire(s) as specified by the connector manufacturer. If the connector has a wire insulation support, it shall be rendered mechanically ineffective.

Where more than one conductor is crimped in a terminal, the individual conductors shall be tested using separate samples.

5.4 Voltage drop measurements

The voltage drop of the connection shall be determined from measurements at the reference points as shown in figures 1 and 2 with the voltage drop of the wire(s) subtracted.

The measurements shall be taken at the test current specified in table 1, depending on the cross-sectional area of the crimped cable.

Table 1 — Test specifications for temperature rise and voltage drop test

Recommended conductor nominal size[1] mm²	Test current[2] A	Tab nominal size
0,5	3	2,8/4,8/6,3
0,75	4,5	2,8/4,8/6,3
1	6	2,8/4,8/6,3
1,5	9	4,8/6,3
2,5	15	4,8/6,3
4	20	6,3/9,5
6	25	6,3/9,5
10	32	9,5

1) Standard dimensions according to ISO 6722-3.

2) For information only: for cable sizes not included in the table, test currents should be determined by interpolation.

5.5 Temperature rise test

The temperature rise test shall be carried out using in-line connectors only (see figure 1).

A male tab and a female connector of the same nominal size shall be crimped on each end of a conductor of 200 mm length and with cross-sectional area up to and including 2,5 mm². Thicker cables shall be of 500 mm length (cables in accordance with ISO 6722).

The cable size used shall be as agreed between the terminal and vehicle manufacturers respectively.

Care shall be taken to protect the samples under test from draughts and artificial cooling.

Each test sample (male tab and female connector) shall be equipped with a thermocouple placed as shown in figure 3.

Each of the thermocouple junction wires shall not exceed 0,22 mm² and shall be attached to the terminals by suitable means.

The test samples shall be placed at least 50 mm apart.

Dimensions in millimetres

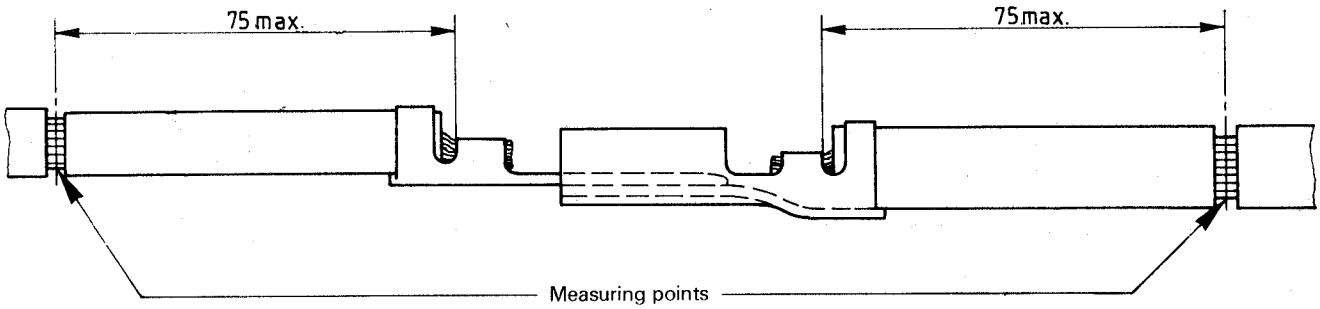

Figure 1 — In-line connnection

Dimensions in millimetres

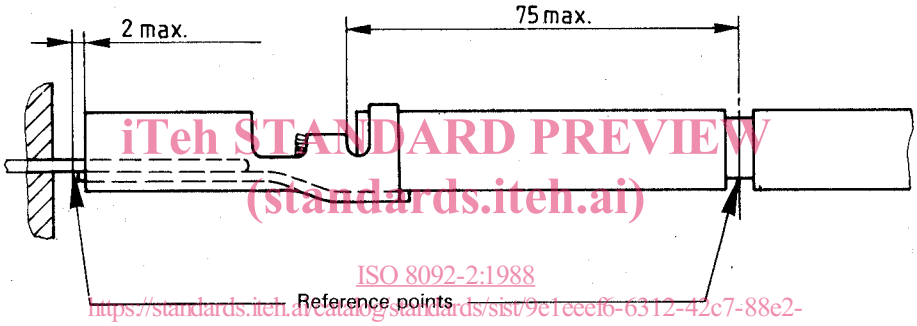

Figure 2 — Connection to apparatus

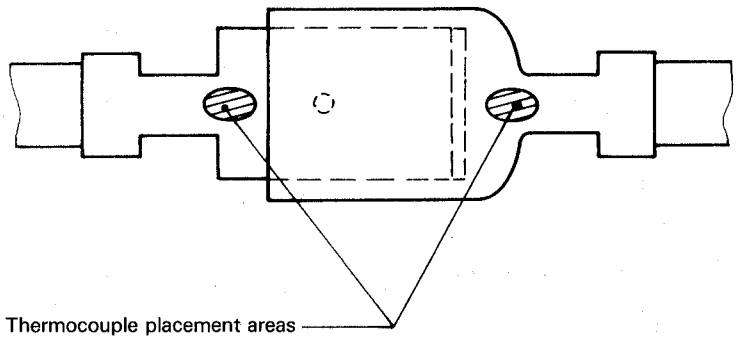

Figure 3 — Test samples for temperature rise test

The test current passing through the terminations shall be as shown in table 1. Measure the temperature of the connectors and the room temperature and record them after thermal equilibrium has been established.

5.6 Current cycling test

The current cycling test shall be carried out using the same test arrangement as specified for the temperature rise test (see 5.5), using the cross-sectional areas specified in table 2 for the conductors.

The test samples shall be subjected to 500 cycles as specified in figure 4 and table 2.

Table 2 — Current cycling test

Tab nominal size	Cable cross-section mm²	Test current A
2,8	1	10
4,8	1,5	22
6,3	2,5	30
9,5	6	50

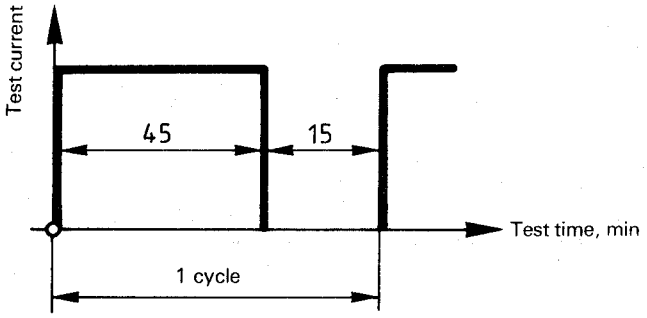

Figure 4 — Current cycling test

5.7 Temperature humidity cycling test

The temperature humidity cycling test shall be carried out using in-line connections (see figure 1). This test shall also be carried out with connections to the apparatus, if required by the user (see figure 2).

The cable size used shall be as agreed between the terminal and vehicle manufacturers respectively.

The samples shall be subjected to five cycles with the following test sequence (see the graphic cycle in figure 5):

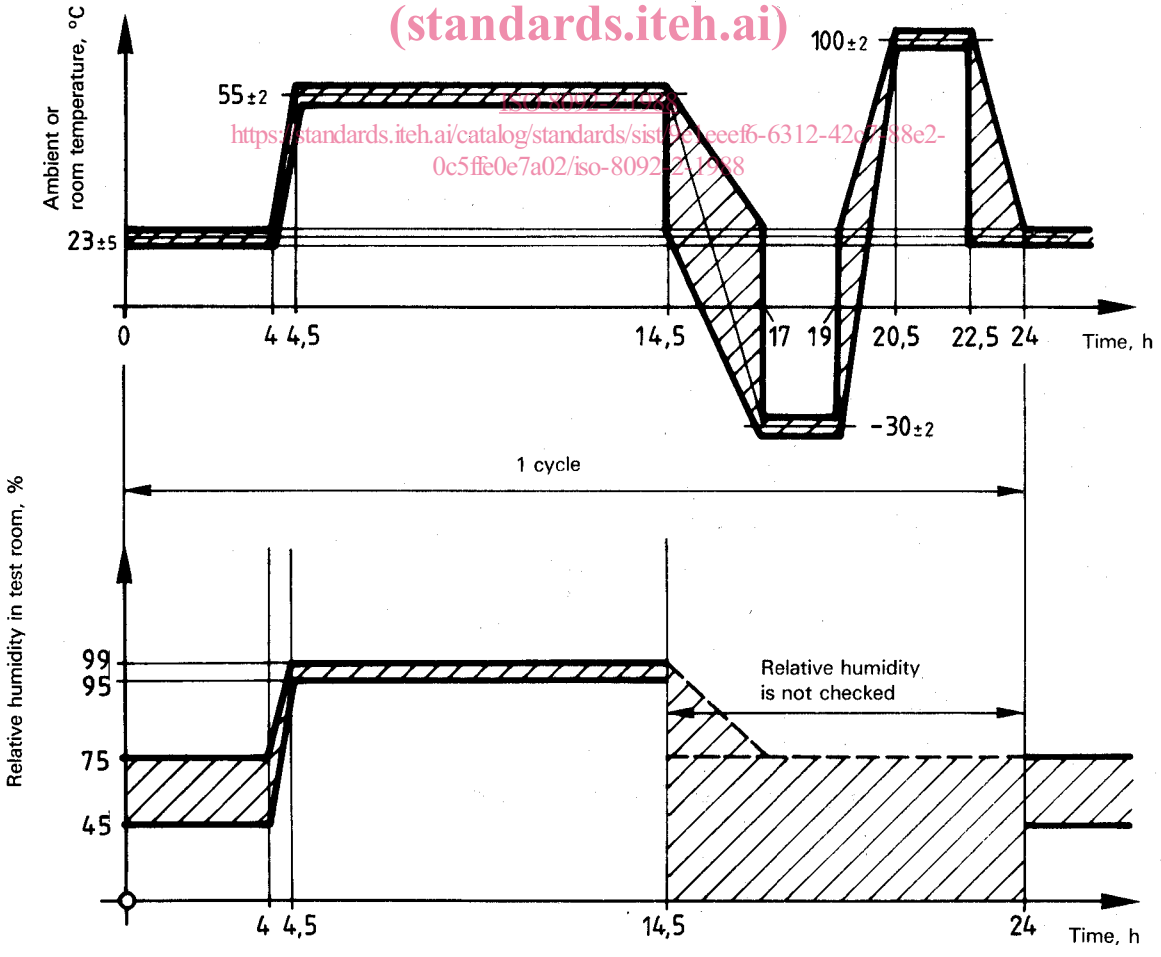

Figure 5 — Temperature and relative humidity cycling test

a) hold at (23 ± 5) °C for 4 h at 45 % to 75 % relative humidity (r.h.);

b) raise room temperature, t_c, to (55 ± 2) °C and r.h. to 95 % to 99 % within 0,5 h;

c) hold t_c at (55 ± 2) °C and r.h. at 95 % to 99 % for 10 h;

d) lower t_c to (−30 ± 2) °C within 2,5 h;

e) hold t_c at (−30 ± 2) °C for 2 h;

f) raise t_c to (100 ± 2) °C within 1,5 h;

g) hold t_c at (100 ± 2) °C for 2 h;

h) return to (23 ± 5) °C within 1,5 h.

NOTE — During periods d) to h), the r.h. is not checked.

Voltage drop measurements shall be taken after the 5th cycle as specified in 5.4.

During a weekend, test samples shall remain at (23 ± 5) °C.

5.8 Salt spray test

The salt spray test shall be carried out as specified in ISO 3768; it shall apply to plated connectors only. The duration of the test shall be 48 h and shall be conducted with male tab and female connector mated.

After having cleaned and dried the samples as specified in ISO 3768, they shall be subjected to the voltage drop test in 5.4.

NOTE — This test can also be used for unplated terminals, with the voltage drop values being mutually agreed between manufacturer and user.

5.9 Vibration test

The vibration test shall be carried out with mated connections suitably mounted on a vibration table, for example as shown in figure 6. All connectors shall be wired in series, and connected to a d.c. source allowing a current flow of 100 mA to monitor during the entire test phase for electrical discontinuity greater than 1 µs.

Dimensions in millimetres

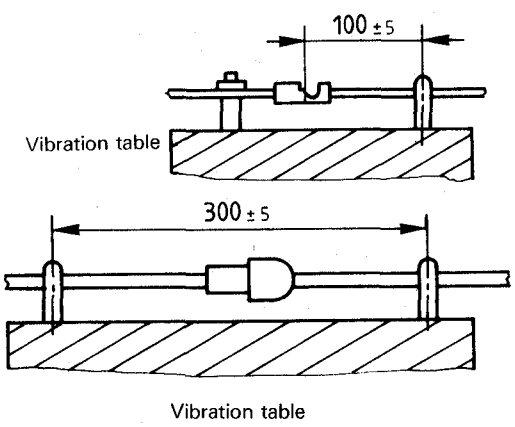

Figure 6 — Vibration table

While being monitored, all connectors shall be subjected to a simple harmonic motion having an amplitude of 0,75 mm (1,5 mm from peak to peak). The frequency shall be varied uniformly between the limits of 10 Hz to 55 Hz. The entire range of 10 Hz — 55 Hz — 10 Hz shall be covered in 1 min. The motion shall be applied for a period of 16 h in each of the three mutually perpendicular directions (total test time 48 h).

NOTE — Additional or alternative test requirements may be mutually agreed between the manufacturer and user.

6 Performance requirements

6.1 Requirements for visual examination

Visual examination, as detailed in 5.1 shall allow identification, appearance, workmanship and finish of the item to be checked against the relevant specification. If the connector has a wire insulation support, the insulation crimp shall not cut through the insulation and shall firmly enclose the cable. Both the insulation and the cable conductor shall be visible between the conductor crimp and the insulation support on the male tab and the female connector (see figure 7).

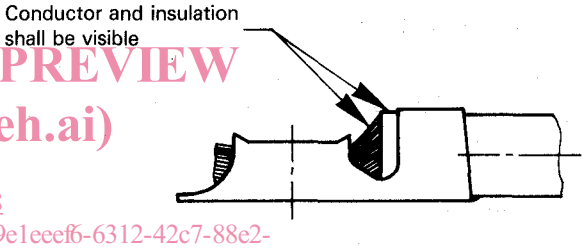

Figure 7 — Conductor and insulation crimp

Conductors shall protrude from the crimp barrel but shall not interfere with the mating part. All wire strands shall be enclosed by the wire crimping barrel.

6.2 Insertion and withdrawal forces

The connection tested as specified in 5.2 shall conform to the requirements in table 3.

Table 3 — Performance requirements for insertion and withdrawal forces

Insertion and withdrawal	Forces, N						
	Connector nominal size						
	2,8		4,8		6,3		9,5
	P[1]	F[2]	P	F	P	F	P
1st insertion force, max.	27	53	30	67	45	80	100
1st withdrawal force, max.	27	53	30	67	45	80	100
10th withdrawal force, min.	4	6	7	15	9	18	30
11th withdrawal force, min. for positive locking female connectors with locking device engaged	45	—	60	—	80	—	—

1) P refers to a positive locking female connector.

2) F refers to a female connector (without positive locking).

6.3 Tensile strength

The tensile strength of the crimped termination under test as specified in 5.3 shall withstand the minimum values specified in table 4.

Table 4 — Performance requirements for tensile strength of crimped terminations

Cross-sectional area of crimped cable[1)] mm²	Minimum tensile strength, N			
	Tab nominal size			
	2,8	4,8	6,3	9,5
0,5	60	70		
0,75	70	90		
1	80	115		
1,5	—	155		
2,5	—	235		
4	—	320		
6	—	400		
10	—	600		

1) For information only: for cable sizes not included in the table, the minimum tensile strength should be determined by interpolation.

6.4 Initial voltage drop

The voltage drop of a male tab and a female connector under test after first insertion as specified in 5.4 shall be in accordance with the maximum admissible voltage drop specified in table 5.

6.5 Temperature rise

The temperature rise of the male tab and female connector shall be calculated as follows and shall not exceed 45 °C when tested as specified in 5.5.

$$\text{Temperature rise} = \text{Temperature of connector} - \text{Room temperature}$$

6.6 Current cycling

The voltage drop measured after the current cycling test as specified in 5.6 shall not exceed 3 times the initial measured value, nor 1,5 times the values in table 5.

6.7 Temperature humidity cycling

The voltage drop measured after the temperature humidity cycling test specified in 5.7 shall not exceed 3 times the initial measured value, nor 1,5 times the values in table 5.

6.8 Salt spray

The voltage drop measured after the salt spray test as specified in 5.8 shall not exceed 3 times the initial measured value, nor 1,5 times the values in table 5.

6.9 Vibration

When vibration-tested as specified in 5.9, there shall be no cracking, breaking or loosening of parts, nor loss of electricity continuity greater than 1 µs.

The voltage drop measured after the vibration test specified in 5.9 shall not exceed 3 times the initial measured value, nor 1,5 times the values in table 5.

The measuring points of voltage drop shall be beyond the support positions. Measurements shall be made with the test samples in position on vibration equipment before and after test.

Table 5 — Maximum admissible voltage drop

Cross-sectional area of crimped cable[1)] mm²	Maximum admissible initial voltage drop, mV/A	
	In-line connection (see figure 1)	Connection to apparatus (see figure 2)
0,5	3,6	2,9
0,75	3	2,3
1	2,6	2,0
1,5	2,4	1,8
2,5	2,2	1,7
4	2	1,6
6	1,6	1,3
10	1,2	1,1

1) Cables as specified in ISO 6722-3.