
International Standard



7638

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Road vehicles — Brake anti-lock device connector

Véhicules routiers — Prise pour dispositif d'antiblocage du frein

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Foreword

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Road vehicles — Brake anti-lock device connector

1 Scope and field of application

This International Standard specifies the dimensional and electrical characteristics required for interchangeability of electrical connections for brake anti-lock devices between towing and towed vehicles of road trains. Performance requirements and test methods are also specified to ensure transmission reliability of signals and orders.

2 References

ISO 611, *Braking of automotive vehicles and their trailers — Vocabulary.*

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

IEC Publication 529, *Classification of degrees of protection provided by enclosures.*

3 Definitions

3.1 anti-lock device: (See ISO 611.)

3.2 park socket: A socket to store the plug and cable out of the way when the vehicle is disconnected.

3.3 ejector: A part of the socket (but not of the park socket) provided to disengage the plug automatically, if the locking device is not operative.

4 Dimensions

The plug, socket and park socket shall have the following dimensions. Dimensions not specified are left to the manufacturer's discretion.

NOTE — Figures 1 and 2 show positions for seven tubes and pins respectively, although the text refers to five. See note 2) to table 1.

4.1 Plug

The plug has five tubes for contacts 1 to 5.

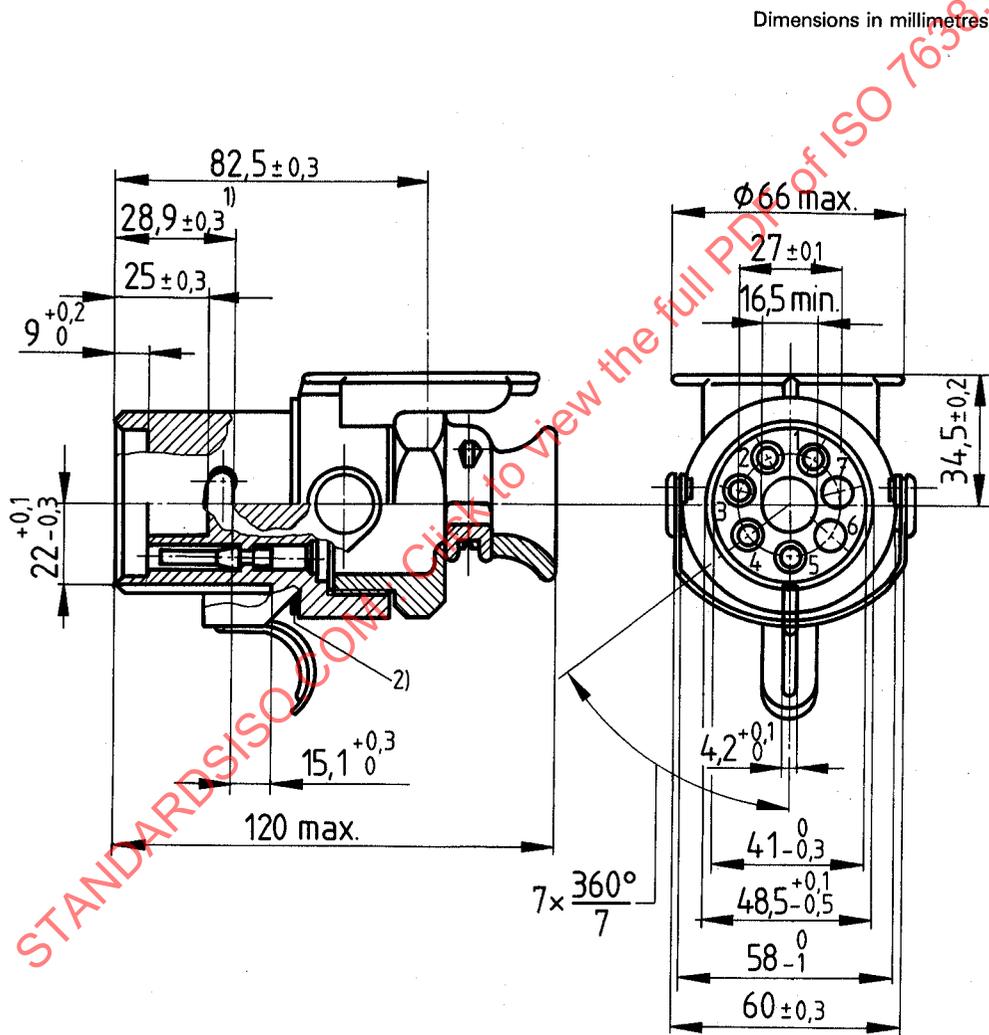


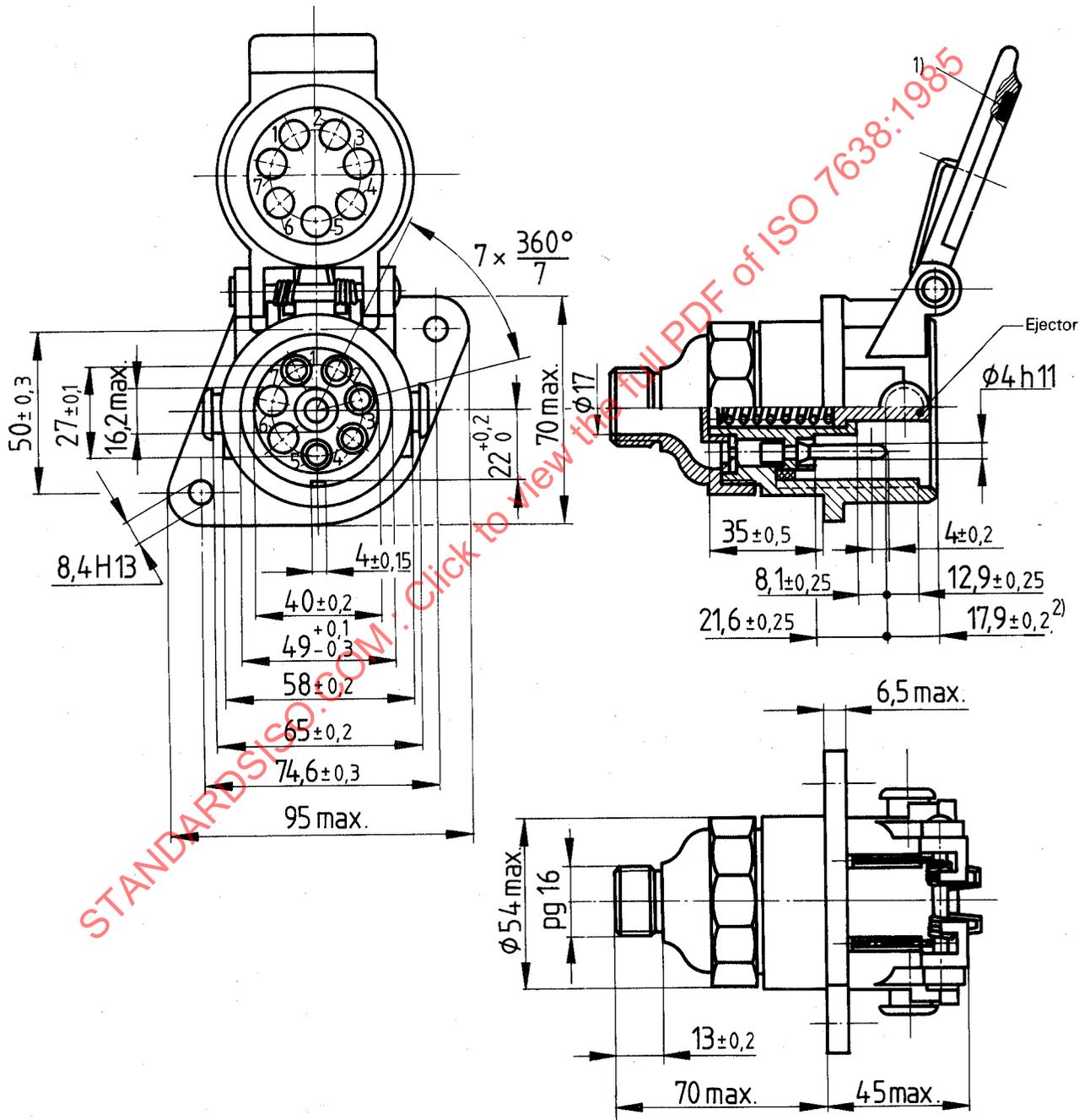
Figure 1 — Plug

4.2 Socket

The socket has five pins for contacts 1 to 5.

The cover is drawn in the open position : it shall close automatically when disconnecting the plug. Its opening angle shall be 120° min.

Dimensions in millimetres



1) The gasket shall be mounted such that it cannot become detached under normal use.

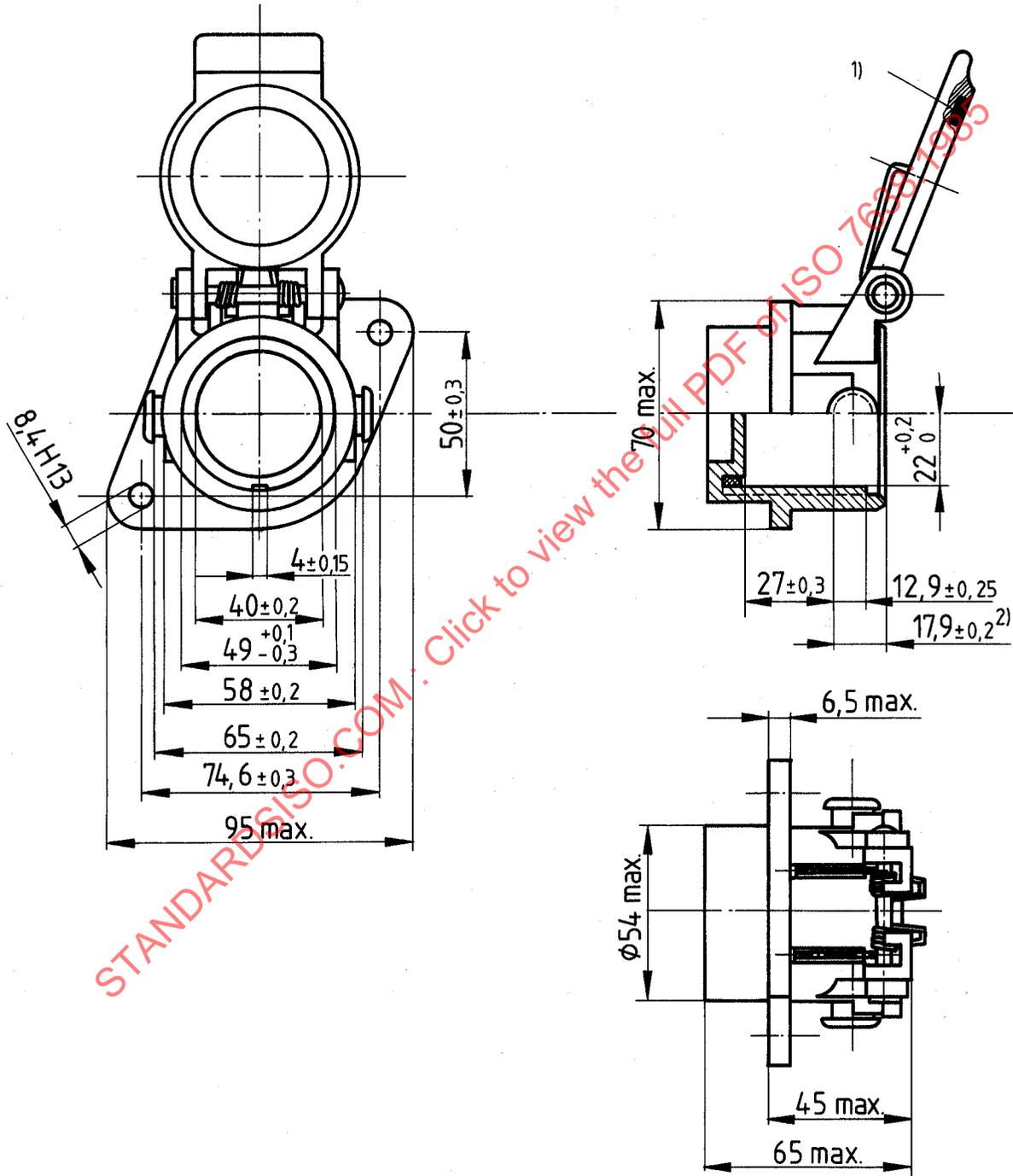
2) Critical dimension for the external gasket.

Figure 2 — Socket

4.3 Park socket

The cover is drawn in the open position : it shall close automatically when disconnecting the plug. Its opening angle shall be 120° min.

Dimensions in millimetres



- 1) The gasket shall be mounted such that it cannot become detached under normal use.
- 2) Critical dimension for the external gasket.

Figure 3 — Park socket

5 Socket and plug positions on the vehicles

The sockets and plugs shall be mounted on the vehicles as follows.

5.1 Arrangement of the connection

The plug with the tubes shall always be the movable part of the connection (see figure 4).

When the cable with the plug is linked to the towing or to the towed vehicle through an extension cable, this shall be fitted with a device to obviate accidental disconnection.

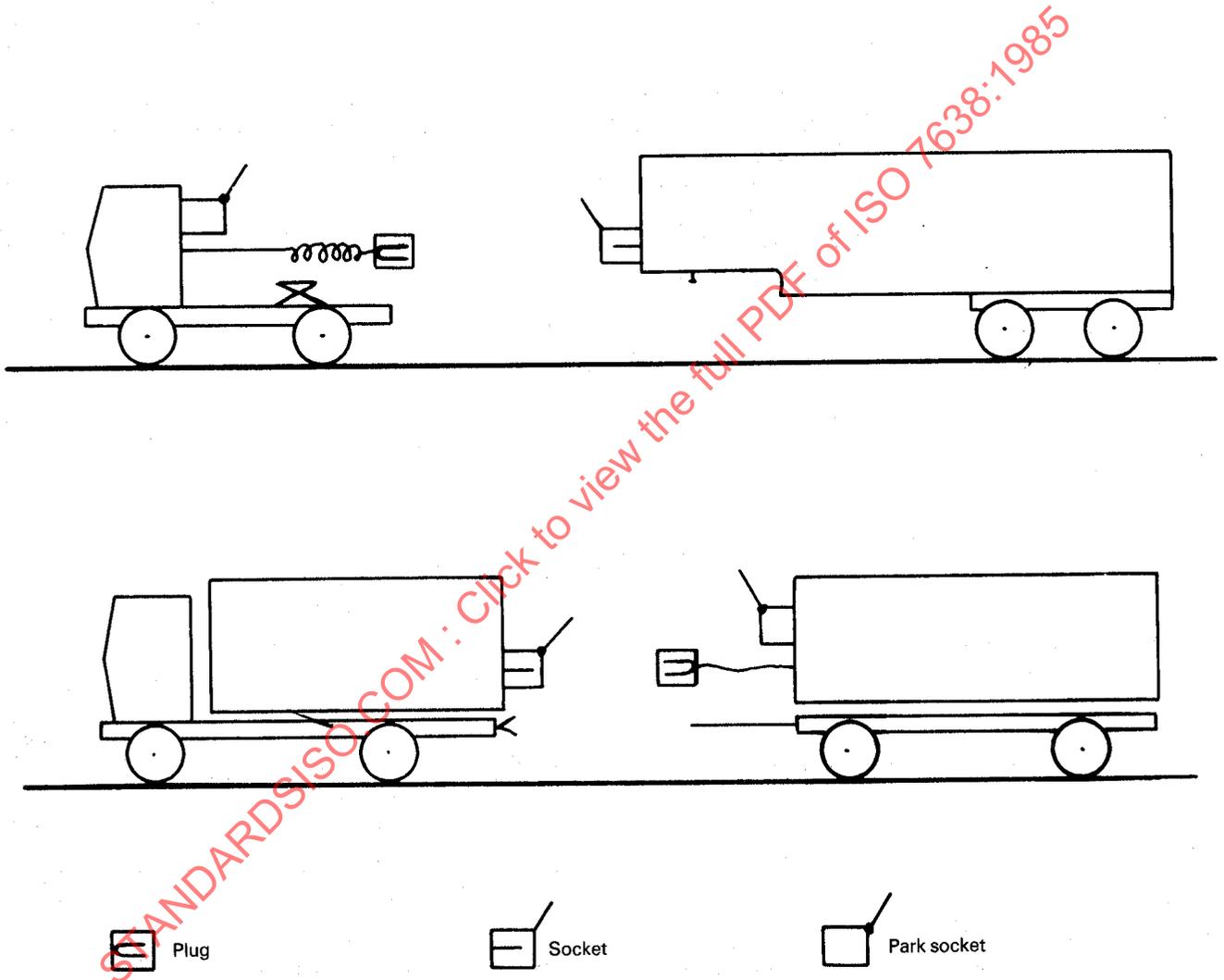


Figure 4 – Electrical connection positions

5.2 Open space around the connection

An uncluttered open space shall be provided around the connection (see figure 5).

Dimensions not specified are left to the manufacturer's discretion.

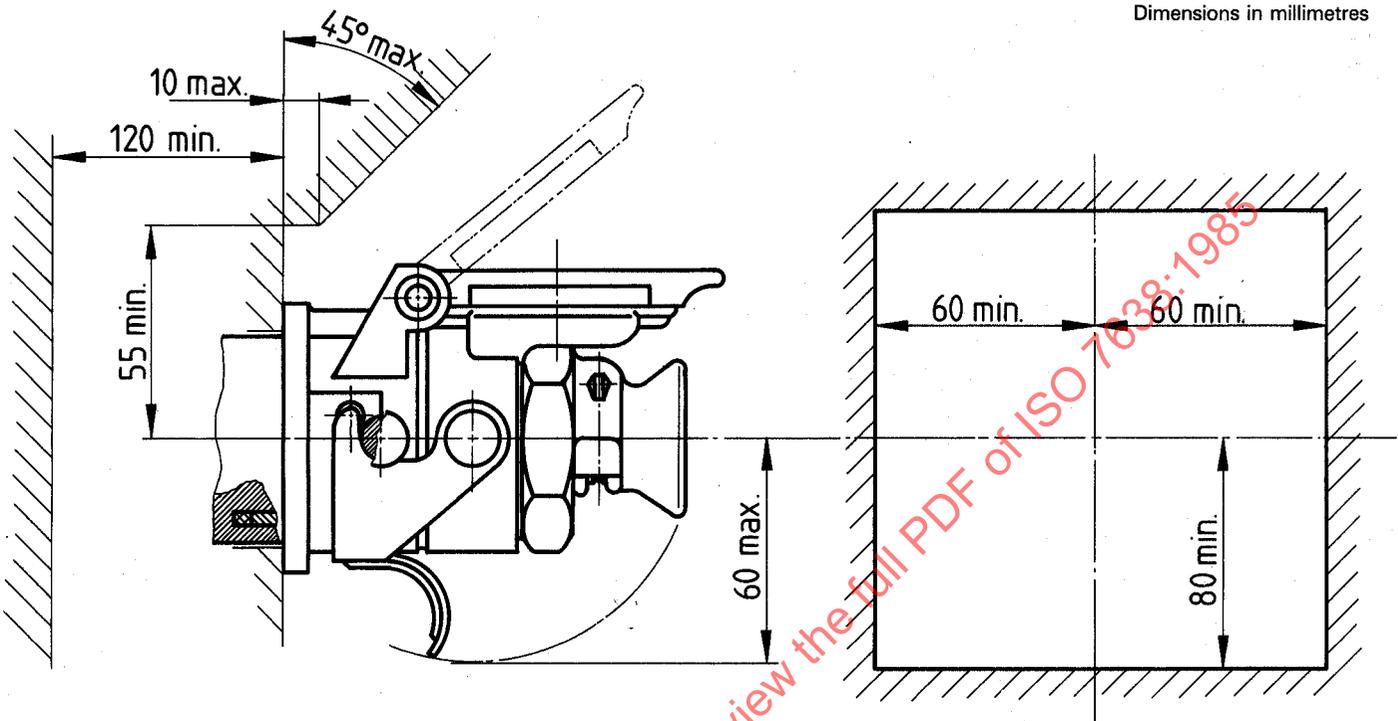


Figure 5 — Clearance dimensions

6 General requirements

6.1 Contact arrangement

The contacts shall be arranged as shown in figures 1 and 2.

6.2 Contact allocation and electrical requirements

The contact allocation, current carrying capacities and cross-sections of the conductor connected at the rear terminal of the pin and tube shall be as given in table 1.

Table 1

Contact number	Function	Current carrying capacity A	Minimum cross-sectional area of the conductor connected at the rear terminal of the pin and tube mm ²
1	plus electrovalve	30 ¹⁾	6 or 2 × 2,5
2	plus electronics	2	1,5
3	minus electronics	2	1,5
4	minus electrovalve	30 ¹⁾	6 or 2 × 2,5
5	warning device	2 (24 V)	1,5
6	spare ²⁾		
7	spare ²⁾		

1) Maximum current for short duration.

2) Positions 6 and 7 do not have pins and tubes. The allocations of these contacts will be covered in a future revision of this International Standard.

These positions shall, however, be planned to allow contacts equivalent to contacts 1 and 4. The holes to positions 6 and 7 in both the plug and the socket should be covered by stoppers at the junction point to provide for later insertion of pins in these tubes.

6.3 Warning device

It is essential that any failure of the brake anti-lock device on the trailer shall be indicated to the driver by a tell-tale lighting up on the dashboard. To achieve this, the wire to pin 5 of the trailer connector shall be connected to the corresponding contact of the warning device on the trailer. This circuit shall remain open under normal working; a failure of the anti-lock device shall close the contact to the negative line of the circuit (see figure 6).

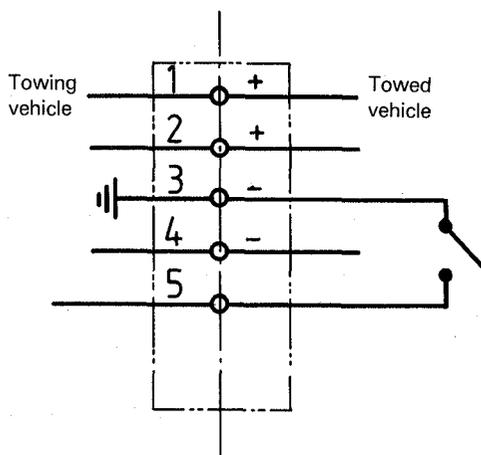


Figure 6 — Warning device

To confirm the correct operation of the warning device, the tell-tale shall be lit up briefly by the warning device each time the engine is started.

7 Performance requirements

NOTE — For test procedures, see clause 8.

No cracks and/or deformation of the connection shall appear during or after the tests.

7.1 Static load

The different parts of the plug shall withstand a static load of at least 500 N (test procedure, see 8.1).

7.2 Strength of locking device

The locking device shall withstand a withdrawal force of at least 1 500 N (test procedure, see 8.2).

7.3 Insertion, withdrawal and locking forces

7.3.1 Insertion and withdrawal forces

The insertion and withdrawal forces of the connection shall be within the range of 5 to 15 N, ignoring the influences of the ejector and the locking device (test procedure, see 8.3.1).

7.3.2 Pressure force of the ejector

The ejector shall produce a force within the range of 35 to 75 N, including any force variation over the ejector spring travel (test procedure, see 8.3.2).

7.3.3 Operational force of the locking device

The force needed to operate the locking device shall not exceed 160 N (test procedure, see 8.3.3).

7.4 Current carrying capacity (overheating)

Contacts 1 and 4 (electrovalve) shall be capable of carrying 25 A simultaneously for a period of 30 min. The temperature rise shall not exceed 20 °C (The initial temperature of the contacts is ambient temperature.) For test procedure, see 8.4.

7.5 Permissible voltage drop

The voltage drop between the pins and the corresponding tubes after 10 insertions shall not exceed the following values:

- 3 mV/A between the terminal of each pin and the terminal of the corresponding tube;
- 0,5 mV/A between each terminal and the conductor connected to it.

For test procedure, see 8.5.

7.6 Flash resistance

The insulation between the contacts and between each contact and the case (when metallic) shall withstand 1000 V r.m.s. (50 or 60 Hz) for 1 min (test procedure, see 8.6).

7.7 Ability to withstand extreme temperature

The requirements defined in 7.3 and 7.6 shall be achieved after subjecting the plug and socket to the temperature cycle test specified in 8.7.

7.8 Cover holding ability

The socket and park socket cover closing springs shall retain the cover closed when subjected to the test in 8.8.

7.9 Resistance to vibration

After subjecting the mated plug and socket to the vibration test specified in 8.9, verify the requirements in 7.11 and 7.12 successively.

Then check that the insertion and withdrawal forces are as specified in 7.3.1; the values shall not vary more than 50 % from those measured initially.

Then check that the voltage drop of the connection (see 8.5) does not vary by more than 50 % from that measured initially.

7.10 Neutral salt spray

No marks of corrosion shall be visible after subjecting the connection to the salt spray test in 8.10 for a period of 48 h.

7.11 Protection against ingress of water

The plug mated with the socket and park socket respectively and assembled as specified by the manufacturer, and the socket with the cover closed, shall be protected against ingress of water according to the second characteristic numeral 4 of IEC Publication 529, and checked as in 8.11.

7.12 Protection against dust

The plug and socket mated and assembled as specified by the manufacturer, and the socket with the cover closed shall meet the degree of protection against dust of IP 5 X in IEC Publication 529. The cover hinging shall not be affected by dust (test procedure, see 8.12).

7.13 Endurance

The mated plug and socket shall be subjected to the endurance test in 8.13. After this test, the requirements of 7.11 and 7.12 shall be checked successively.

The insertion and withdrawal forces specified in 7.3.1 shall then be rechecked; the values shall not vary by more than 50 % from those measured initially.

The voltage drop between the terminal of each pin and its tube shall not vary by more than 50 % from that measured initially.

8 Test procedures

The performance requirements for each case are specified in clause 7. The annex provides a table of the tests to be carried out. Unless otherwise specified, the tests shall be carried out at an ambient temperature of 23 ± 5 °C and at relative humidity of (65 ± 10) %.

The following requirements shall be checked by visual examination:

- clauses 4.1, 4.2, 4.3 and 5.2 for the dimensional requirements.
- clauses 5.1 and 6, unless otherwise stated.

The tests below shall be carried out with new connections as delivered by the manufacturer, with the exception of the tests in 8.7, 8.9, 8.11, 8.12 and 8.13.

8.1 Static load test

Load the plug with a vertical static load. Each external part of the plug shall be subjected to the test.

8.2 Strength of locking device test

Apply a longitudinal force along the centreline of the connection to the mated and locked plug. The force required to extract the plug from the socket is defined as being the strength of the locking device of the connection.

8.3 Insertion, withdrawal and locking forces

8.3.1 Insertion and withdrawal tests

Render the ejector inoperable prior to the insertion and withdrawal force test.

Measure the insertion and withdrawal forces with a suitable measuring device. Measure the force along the centreline of the connection at the first insertion and first withdrawal.

8.3.2 Pressure force of the ejector test

Measure the pressure force of the ejector in the socket along its moving direction over the full travel range with a suitable device.

8.3.3 Operational force of the locking device test

Measure the operational force of the locking device while engaging and disengaging.

The force is defined as lying tangential to the radius between the centrepoint of the operational area of the locking device and its pivot centre as specified by the manufacturer.

8.4 Current carrying capacity test (overheating)

The test shall be carried out on a mated connection (plug with socket).

Connect conductors of 1 m length each and cross-sectional area of either 6 mm², or $2 \times 2,5$ mm² as selected by the manufacturer to each terminal of contacts 1 and 4 of the plug and the socket.

Simultaneously subject these contacts to a current of 25 A for 30 min. Measure the temperatures immediately before and after the test at the terminals of both pins and holes as close as possible to the insulation.

8.5 Permissible voltage drop test

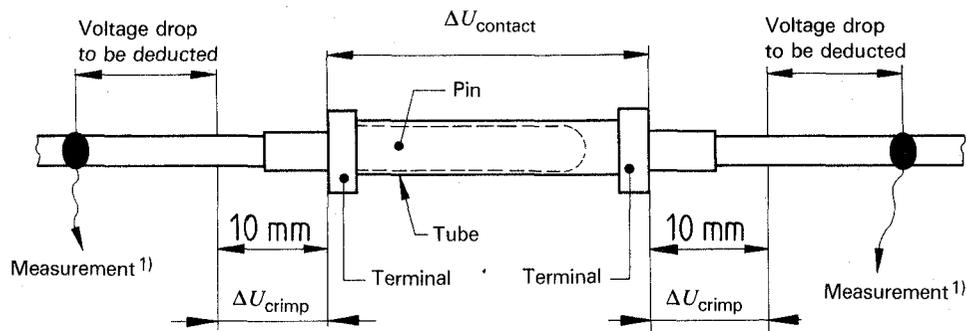
Measure the voltage drop between the terminals of the pins and their tubes after the tenth insertion and at a test current of 10 A.

Measure the voltage drop of the crimped terminal between the terminal and the conductor connected at a point 10 mm from the terminal (see figure 7).

Where the terminals of either the plug and/or the socket are not readily accessible, extra cabling may be necessary: additional voltage drop caused by such additional cable length shall be subtracted from the measured value.

8.6 Flash resistance test

The flash test shall be carried out on plug and socket separately with a test voltage of 1000 V r.m.s. (50 or 60 Hz).



1) This measurement point shall be as close as possible to the terminal.

Figure 7 — Measurement of voltage drop

8.7 Ability to withstand extreme temperature test

Carry out the following temperature cycle on the plug and socket separately.

8.7.1 Place the plug or socket, preconditioned at an ambient temperature of $23 \pm 5 \text{ }^\circ\text{C}$, in a test chamber having a temperature of $80 \pm 2 \text{ }^\circ\text{C}$ for 1 h.

8.7.2 Allow the specimen to cool down in an ambient temperature, for 1 h.

8.7.3 Place the specimen in a test chamber having a temperature of $-40 \pm 3 \text{ }^\circ\text{C}$ for 1 h.

8.7.4 Allow the specimen to reach stabilized ambient temperature for 1 h.

8.7.5 Immediately after this test cycle, carry out the flash test (see 8.6) and then determine the engaging and disengaging forces (see 8.3).

8.8 Cover holding ability test

Test the ability of the spring to keep the cover closed on a suitable vibration test bench to subject the socket and the park socket to a 5 g r.m.s. axial acceleration.

Mount the socket rigidly on the test bench in a position as on the vehicle.

Maintain the vibration frequency between 20 and 200 Hz.

8.9 Resistance to vibration test

Subject the mated plug and socket on a suitable vibration test bench to sinusoidal vibrations of 5 g r.m.s. acceleration. The socket shall be rigidly mounted on the test bench in a position as on the vehicle. The plug is assembled on a spiroflex cable designed for use with anti-lock devices of working length of about 4,5 m. Support the cable at 1 m from the foremost plane of the plug, by a device independent of the vibration test bench (see figure 8).

Carry out the initial test, along the central axis of the connection, for 16 h, followed by tests in horizontal transverse and vertical directions for 16 h each. The total test duration is $3 \times 16 \text{ h}$, i.e. 48 h.

Ensure that the vibration frequency changes continuously from 5 to 50 Hz and back every 2 min.

8.10 Neutral salt spray test

Carry out the test in accordance with ISO 3768 for 48 h, on the following three units:

- a) plug and socket mated and equipped as recommended by the component manufacturer (i.e. with or without cable sealing);
- b) socket only with cover closed;
- c) plug inserted in the park socket.

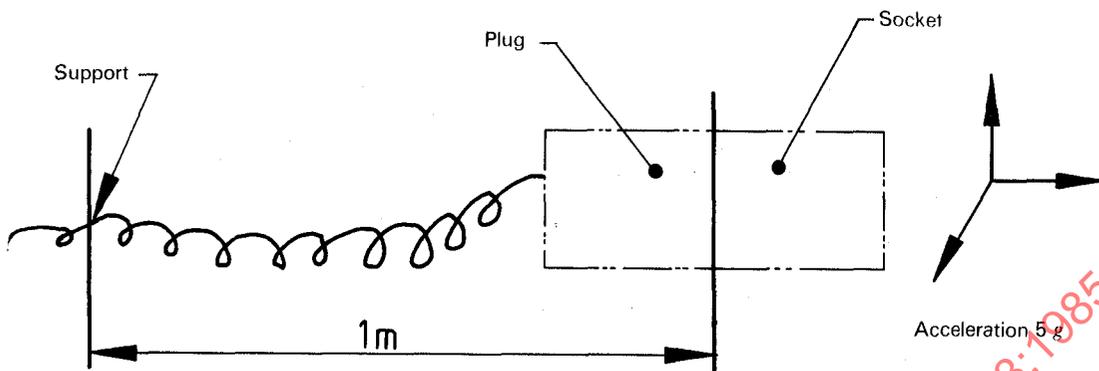


Figure 8 – Vibration test

8.11 Protection against ingress of water test

Carry out this test in accordance with IEC Publication 529, but at increased water pressure to take account of the specific use of the anti-lock device connector.

Follow IEC Publication 529 procedure for the second characteristic numeral 4 (clause 8.4 and figure 4), modified as follows:

- a) Water pressure 4 bar.
- b) The radius of the oscillating tube can be different; the water supply shall then be capable of delivering the quantity of water required appropriate to the actual length of the oscillating tube.
- c) The oscillating tube shall have spray holes of a diameter of 0,8 mm over the whole semicircle of 180°.
- d) The unit under test is mounted on a support with a vertical axis and is located at approximately the centrepoint of the semicircle. The support shall be perforated so as to avoid acting as a baffle.
- e) The unit being tested shall be sprayed from each direction by oscillating the tube to the limits of its travel in each direction at a rate of approximately 90°/s for 10 min.

Carry out the test on the same three units as in 8.10.

8.12 Protection against dust test

Carry out the test in accordance with IEC Publication 529, clause 7.5, on the following two units:

- a) plug and socket mated and assembled as recommended by the component manufacturer;
- b) socket only with cover closed.

8.13 Endurance test

Carry out the test with plug and socket mated and equipped with necessary contacts but without the cable.

The test consists of 20 000 mechanical cycles without electrical load. One cycle is defined by the following operations:

- a) opening of the cover;
- b) insertion of the plug into the socket;
- c) latching and unlatching the locking device;
- d) withdrawal of the plug;
- e) closing the socket cover.

Insert and withdraw the plug at a velocity of 500 ± 100 mm/min.

Carry out 4 cycles per min.