INTERNATIONAL STANDARD ISO 4091

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Road vehicles — Electrical connections between towing vehicles and trailers — Test methods and requirements

Véhicules routiers — Liaisons électriques entre véhicules tracteurs et véhicules remorqués — Méthodes d'essai et exigences

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FOREWORD

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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.

International Standard ISO 4091 was developed by Technical Committee ISO/TC 22, *Road vehicles*, and was circulated to the member bodies in March 1977.

It has been approved by the member bodies of the following countries :

Australia	Iran	Poland
Austria	Italy	Romania
Belgium	Japan	South Africa, Rep. of
Brazil	Korea, Rep. of	Spain
Czechoslovakia	Mexico	Sweden
France	Netherlands	Switzerland
Germany	New Zealand	Turkey

The member body of the following country expressed disapproval of the document on technical grounds :

United Kingdom

Printed in Switzerland

Road vehicles — Electrical connections between towing vehicles and trailers — Test methods and requirements

1 SCOPE

This International Standard specifies the test methods and performance requirements for electrical connections between towing vehicles and trailers.

2 FIELD OF APPLICATION

This International Standard applies to electrical connections type 24 N and 24 S used for vehicles fitted with electrical equipment operating at a nominal voltage of 24 V and type 12 N and 12 S used for vehicles fitted with electrical equipment operating at a nominal voltage of 12 V.

NOTE — These electrical connections are described in the International Standards ISO 1185, ISO 1724, ISO 3731 and ISO 3732.

3 REFERENCES

ISO 1185, *Road vehicles — Electrical connections between towing vehicles and towed vehicles with 24 V electrical equipment — Type 24 N (normal).*

ISO 1724, *Road vehicles — Electrical connections between towing vehicles and towed vehicles with 6 or 12 V electrical equipment — Type 12 N (normal).*

ISO 3731, *Road vehicles — Electrical connections between towing vehicles and trailers with 24 V electrical equipment — Type 24 S (supplementary).*

ISO 3732, *Road vehicles — Electrical connections between towing vehicles and trailers with 6 or 12 V electrical equipment — Type 12 S (supplementary).*

4 TESTS

4.1 Insertion and withdrawal forces

The insertion and withdrawal forces shall be measured between plug and socket of the same make.

Ambient temperature 23 ± 5 °C.

The pins and the tubes shall be dry and clean.

Insertion and withdrawal forces shall be measured by a static test (dead weight method) at the tenth cycle of insertion and withdrawal. The cover must be disengaged.

4.1.1 *Insertion force*

Maximum value : 200 N

4.1.2 *Withdrawal force*

Maximum value : 200 N

Minimum value : 20 N

4.2 Current carrying capacity

Ambient temperature : 23 ± 5 °C.

Each contact, but not more than two adjacent contacts simultaneously, one being the common return, shall be capable of carrying 15 A (d.c.) continuously. This requirement shall be considered to be met if the temperature rise above ambient of each contact, measured at the terminals of both the tube and the pin, as close as possible to the insulation, does not exceed 20 °C, the contacts having carried 15 A (d.c) continuously for 1 h; connections to the terminals shall be by insulated cables of 1,5 mm^2 cross-section of at least 1 m in length.

4.3 Maximum permissible voltage drop

The voltage drop between the pins and the corresponding tubes shall be measured between plug and socket of the same make. It shall be measured at the tenth insertion.

Ambient temperature : 23 ± 5 °C.

4.3.1 Provided that all terminals on the connector are readily accessible (for example, that connecting cables are not moulded into either the socket or the plug), the following voltage drops shall be measured :

a) between the terminals of each pin and its corresponding tube;

b) between each terminal and a point 10 mm from the terminal on a connecting conductor of 1,5 mm^2 cross-sectional area.

The measured voltage drops shall not exceed the following values respectively with a current of up to 10 A flowing :

a) 5 mV/A

b) 0,5 mV/A

4.3.2 If the terminals in either the plug or the socket (but not both) are not readily accessible (for example, if a cable is moulded in), the following voltage drops shall be measured :

a) between each accessible terminal, and a point on the conductor connected to its corresponding pin (or tube) 100 mm from the face of the plug (or socket);

b) between each accessible terminal and a point 10 mm from the terminal on a connecting conductor of 1,5 mm^2 cross-sectional area.

The measured voltage drops shall not exceed the following values respectively with a current of up to 10 A flowing :

a) 5,5 mV/A

b) 0,5 mV/A

4.3.3 If the terminals in both plug and socket, are not readily accessible (for example, if cables are moulded in), the voltage drops between each pair of corresponding conductors shall be measured at points on the cables 100 mm from the faces of the plug and the socket. The measured voltage drops shall not exceed 6 mV/A respectively with a current of up to 10 A flowing.

4.4 Flash test

The flash test shall be carried out on plug and socket separately.

Ambient temperature : 23 ± 5 °C.

Relative humidity : 65 ± 5 %.

The insulation between the contacts and between each contact and the case (when metallic) shall withstand 1 000 $V_{r.m.s.}$ (50 or 60 Hz) for 1 min.

4.5 Ability to withstand extreme temperatures

The connector shall be subjected to the following temperature cycle :

Initial temperature : + 23 ± 5 °C

High temperature : + 70 ± 2 °C for 15 min

Low temperature : − 25 ± 3 °C for 15 min

After completion of the temperature cycle, the connector shall be subjected to the mechanical, voltage drop and flash tests and shall not show visible cracks or deformation.