
**Motorcycles and mopeds —
Communication between vehicle and
external equipment for diagnostics
— Diagnostic connector and related
electrical circuits, specification and use**

*Motos et vélomoteurs — Communication entre véhicule et
équipement externe pour les diagnostics — Raccord de diagnostic et
circuits électriques relatifs, spécifications et utilisation*

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Foreword

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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).

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For an explanation on 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 the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 38, *Motorcycles and mopeds*.

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Introduction

This International Standard specifies on-board diagnostic connector for motorcycles and mopeds.

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Motorcycles and mopeds — Communication between vehicle and external equipment for diagnostics — Diagnostic connector and related electrical circuits, specification and use

1 Scope

This International Standard specifies a minimum set of requirements for a diagnostic connector used in communication between motorcycles and mopeds, and external equipment for diagnostics. Its aim is to promote the use of a common diagnostic connector throughout the motorcycle industry. The diagnostic connection consists of two mating connectors, the vehicle connector and the external test equipment connector. Applicable to all types of motorcycles and mopeds, the connector specified is sealed with positive locking feature and is intended for short-term diagnostic connection only.

This International Standard specifies functional requirements for

- a) the vehicle connector, separated into the four principal areas of
 - connector location,
 - connector design,
 - connector contact allocation, and
 - electrical requirements for connector and related electrical circuits, and
- b) the external test equipment connector, separated into the three principal areas of
 - connector design,
 - connector contact allocation, and
 - electrical requirements for connector and related electrical circuits.

The dimensional requirements of the vehicle connector are given as a minimum specification, to allow design freedom.

2 Normative references

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

ISO 8092-2:2005, *Road vehicles — Connections for on-board electrical wiring harnesses — Part 2: Definitions, test methods and general performance requirements*

ISO 16750-2, *Road vehicles — Environmental conditions and testing for electrical and electronic equipment — Part 2: Electrical loads*

3 Terms and definitions

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

ISO 19689:2016(E)

3.1 connection

two mated connectors or contacts

[SOURCE: ISO 15031-3:2004, 3.1]

3.2 connector

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

[SOURCE: ISO 15031-3:2004, 3.2]

3.3 contact

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

[SOURCE: ISO 15031-3:2004, 3.3]

3.4 female contact

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

EXAMPLE Receptacle, sleeve.

[SOURCE: ISO 15031-3:2004, 3.4]

3.5 male contact

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

EXAMPLE Tab, pin, blade.

[SOURCE: ISO 15031-3:2004, 3.5]

4 Vehicle connector location

4.1 General

It should be recognized that country or regional governments could mandate a connector location which supersedes these provisions.

4.2 Recommended location

The vehicle connector shall be located in easily access. The preferred location is under the seating position.

4.3 Vehicle operation

Attachment of any external test equipment to the vehicle connector shall not preclude normal physical and electrical operation of the vehicle.

See ISO 15031-3:2004, 4.5.

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5 Vehicle and external test equipment connector design

5.1 Dimensions

For the dimensions of the external test equipment connector, see [Annex A](#).

The external test equipment connector shall be mateable with the vehicle connector; compliance of the electrical, mechanical and climatic performances of the connection shall be guaranteed.

5.2 Number of contacts

The vehicle connector and the external test equipment connector shall be capable of accommodating 6 contacts.

5.3 Contact requirements

The vehicle connector shall consist of female contacts that will mate with the male blade contacts of the external test equipment connector.

See ISO 15031-3:2004, 5.3.1.

5.4 Connector colour/features

The vehicle connector shall be red coloured.

The vehicle connector and the external test equipment connector shall have latching features to ensure that the external test equipment connector will remain mated when properly connected. The latching feature shall be designed to provide a positive feel when the external test equipment connector is fully seated.

The vehicle connector shall have the latch mechanism that can be released when disconnect latched connectors.

5.5 Temperature class

The minimum temperature range for the selected material shall be Class 2, in accordance with the environmental temperature range specified in ISO 8092-2:2000, Table 3, i.e. $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$.

See ISO 15031-3:2004, 5.7.

5.6 External test equipment connector cycle life

The external test equipment manufacturer shall specify the minimum number of mating cycles the external test equipment connector is capable of while meeting the requirements.

See ISO 15031-3:2004, 5.8.

5.7 Contact and connector parameters and performance requirements

5.7.1 Preconditioning

Take unused samples and perform 200 mating cycles before applying the test given in [5.7.5](#) and the requirements given in [5.7.3](#) and [5.7.4](#).

5.7.2 Functional parameters for contacts

The functional parameters for the contacts are as follows:

- a) the blade size for the external test equipment connector shall be in accordance with [Annex A](#);
- b) the current-carrying capacity for contacts more than 3,5 A d.c. (full circuits test)/7,5 A d.c. (single circuit test) at 20 °C;
- c) the temperature range shall be -40 °C to +85 °C (Class 2 of the environmental temperature range according to ISO 8092-2:2005, Table 3);
- d) the voltage range shall be in accordance with ISO 16750-2;
- e) the contact system shall accept a cross-sectional area of cable conductors of up to 0,50 mm² and 20 AWG.

5.7.3 Performance requirements for contacts

The contact system (i.e. mated contact pairs) shall meet the performance requirements given under point a) of this subclause, following performance of each of the environmental exposures according to [5.7.5](#). Tests of connection resistance shall be in accordance with ISO 8092-2:2005, 4.8.1.1.

- a) Resistance cable-to-cable per contact pair: 30 mΩ at initial mating when tested with a constant current source of 1 A in accordance with ISO 8092-2:2005, 4.8.1.3.
- b) Recommended connection resistance at low current: 100 mΩ at initial mating when tested with a constant current source of 100 μA in accordance with ISO 8092-2:2005, 4.8.1.2.

5.7.4 Connector system performance requirements

The connector system shall meet the performance requirements given under points a) to e) of this subclause, following performance of each of the environmental exposures according to [5.7.5](#). Measurements shall be taken at room temperature (23°C ± 5°C).

- a) Insulation resistance between adjacent contacts tested in accordance with ISO 8092-2:2005, 4.12: ≥100 MΩ.
- b) Contact retention in housing tested in accordance with ISO 8092-2:2005, 4.7: ≥60 N.
- c) Connection (with lock) and disconnection (without lock) force tested in accordance with ISO 8092-2:2005, 4.3.1, fully equipped with 6 contact pairs: ≤75 N.
- d) Polarization features shall prevent mismatching of connectors when a force of 150 N is applied.
- e) Water tightness test in accordance with ISO 8092-2:2005, 4.9.1.1.2 (leakage current ≤50 μA at 48 V) and 4.9.1.1.3.

5.7.5 Accelerated environmental exposures for the vehicle connector

Accelerated environmental testing shall be conducted for the vehicle connector when not mated to the external test equipment connector. However, the suitable cover according to [5.7.4 e\)](#) shall be attached on the vehicle connector. Perform each environmental exposure, a) to d), as follows, with separate sample groups. After exposure, the vehicle connector shall be mated to the original external test equipment connector for the performance tests given in [5.7.3](#) and [5.7.4](#).

- a) Thermal cycling

Perform the test in accordance with ISO 8092-2:2005, 4.22.1 with the following modifications.

- cycles: 1 000 times

— transition time: 5 min max.

b) Temperature/humidity cycling

Perform the test in accordance with ISO 8092-2:2005, 4.10.1 with the following modifications.

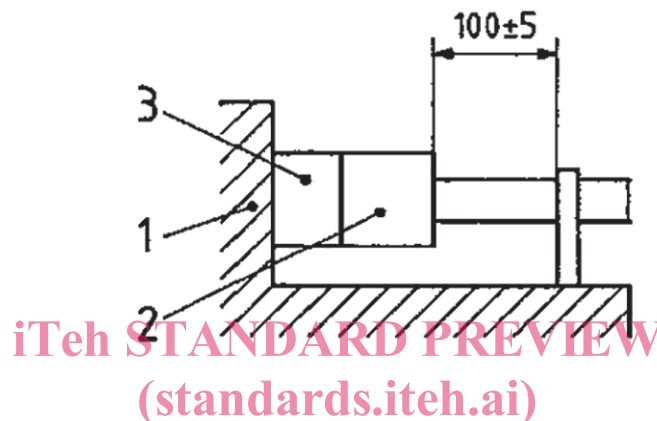
— cycles: 15 times

c) Mechanical shock

Apply three shocks at 50 g in each of the three mutually perpendicular axes of the connector.

See ISO 15031-3:2004, 5.10.5 c).

The test method refers to the [Figure 1](#).



Key

- 1 test bench
- 2 test sample
- 3 fixed connector

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Figure 1 — Test method 1

d) Vibration

Sinusoidal ($1,5 \pm 0,15$) mm amplitude by 15 g for 2 h in each of the three mutually perpendicular axes at room temperature.

See ISO 15031-3:2004, 5.10.5 d).

The test method refers to the [Figure 1](#).

e) Chemical fluids

This subclause is in accordance with ISO 8092-2:2005, 4.23.1 and 4.23.2

6 Contact allocation and specifications for related electrical circuits

6.1 Vehicle and external test equipment connector contact designation and general allocation

See [Figure 2](#) and [Table 1](#) for vehicle connector and external test equipment contact designations.