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

Part 5: Test methods and general performance requirements for wiring harness connector operation

Véhicules routiers — Connexions pour faisceaux de câblage électrique embarqués —

Partie 5: Méthodes d'essai et exigences générales de performance pour le raccordement du connecteur du faisceau de câblage

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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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 of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 32, *Electrical and electronic components and general system aspects*.

A list of all parts in the ISO 8092 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Along with the increase of electrical components mounted on a road vehicle, the types and numbers of connectors mounted on the automobile increase and the connector mating work becomes harder in such circumstances. Especially from the viewpoint of ergonomics, this problem is addressed seriously. To comprehend the characteristics of connector mate/unmate operation, their test procedures are specified in this document.

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

Part 5: Test methods and general performance requirements for wiring harness connector operation

1 Scope

This document 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 document 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 document is not applicable to internal connections of electronic devices.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 19642 (all parts), *Road vehicles — Automotive cables*

IEC 61672-1, *Electroacoustics — Sound level meters — Part 1: Specifications*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

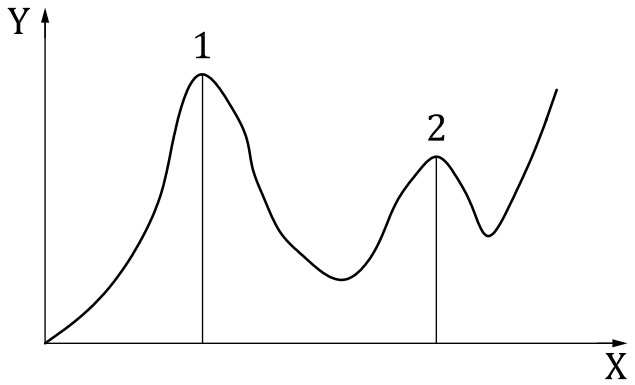
3.1
male connector
assembly of male *terminal* (3.3) and housing that terminates conductors for the purpose of providing connection and disconnection to a suitable mating connector

3.2
female connector
assembly of female *terminal* (3.3) and housing that terminates conductors for the purpose of providing connection and disconnection to a suitable mating connector

3.3
terminal
connector contact connected with a corresponding element of the same purpose, used to form an electric circuit (including wiring parts)

3.4
inertial lock
connector locking mechanism designed so that the lock peak comes before contact is established between male and female *terminal* (3.3) and becomes higher than the terminal connection peak in the connector mating process

Note 1 to entry: It is applicable only to connectors without lever/slider. See Figure 1.



Key
1 lock peak
2 terminal connection peak
X mating stroke
Y mating force

Figure 1 — Inertial lock

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 Measurement condition

All measurements shall be performed with unused samples at (23 ± 5) °C and 45 % to 75 % relative humidity unless otherwise specified. Cables shall be in compliance with applicable part of the ISO 19642 series and cables used shall be noted in the test report.

The cable attachment shall be performed in accordance with the terminal manufacturer's specifications, or as agreed between customer and supplier.

4.2 Mating force measurement and classification

4.2.1 Sample preparation

Prepare a minimum of 10 samples consisting of fully populated male connectors and female connectors.

If a mating connector is not available, a device interface may be used to carry out tests. This shall represent the intended device's interface.

4.2.2 Test procedure

Test procedure is as follows.

a) Mate the connectors at constant speed of 50 ± 10 mm/min, and then record the mating force diagram. (Refer to Figures 2 to 4.)

b) Write the applied mating speed on the measurement report.

c) Repeat steps a) and b) for the samples.

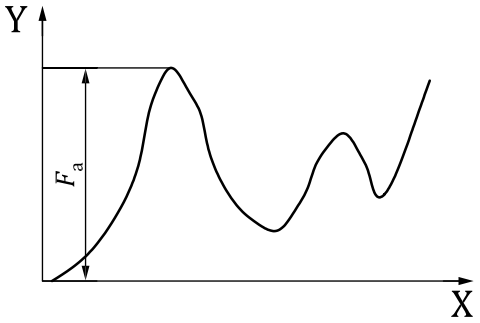
4.2.3 Classification

a) For the mating force, use the maximum mating force (F_a), which is defined in Figure 2 a) and b), and classify it in accordance with Table 1.

Table 1 — Mating force

Class	Value of F_a (N)
1	$F_a \leq 45$
2	$45 < F_a \leq 70$
3	$F_a > 70$

a) Normal lock



b) Inertial lock

Key

X stroke (mm)

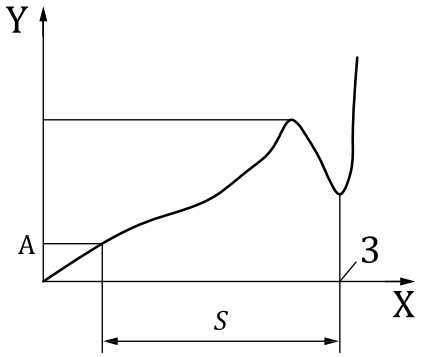
Y mating force (N)

Figure 2 — Maximum mating force (F_a)

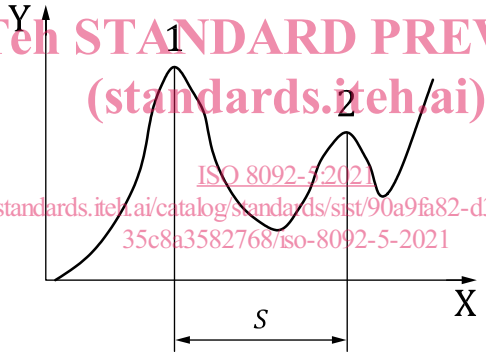
b) For the mating stroke, use the stroke (S), which is defined in Figure 3 a) and b), and classify it in accordance with Table 2.

Table 2 — Mating stroke

Class	Mating stroke (mm)
1	$S < 4{,}5$
2	$4{,}5 \leq S < 5{,}5$
3	$5{,}5 \leq S < 6{,}5$
4	$S \geq 6{,}5$



a) Normal lock



b) Inertial lock

Key

1 lock peak
2 terminal connection peak
3 completion of mating
A 10 (N)
X stroke (mm)
Y mating force (N)

Figure 3 — Mating stroke (*S*)

c) For the mating force gap (R), using the values defined in Figure 4 a) and b), divide the mating completion force gap (g) by the maximum mating force (F_a) to calculate the percentage [see Formula (1)], and classify it in accordance with the Table 3.

$$R = (g/F_a) \times 100 \quad (1)$$