INTERNATIONAL STANDARD

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Second edition
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Road vehicles — Connection interface for pyrotechnic devices, two-way and three-way connections —

Part 2: Test methods and general performance requirements

Véhicules routiers — Interface de raccordement pour dispositifs pyrotechniques, deux voies et trois voies —

Partie 2: Méthodes d'essai et exigences des performances générales

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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. www.iso.org/directives

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The committee responsible for this document is ISO/TC 22, *Road vehicles*, Subcommittee SC 3, *Electrical and electronic equipment*.

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 WTO principles in the Technical Barriers to Trade (TBT) see the following URL: http://www.iso.org/iso/home/standards_development/resources-for-technical-work/foreword.htm

This second edition cancels and replaces the first edition (ISO 19072-2:2007), of which it constitutes a minor revision.

ISO 19072 consists of the following parts, under the general title *Road vehicles — Connection interface for pyrotechnic devices, two-way and three-way connections*:

— *Part 1: Pocket interface definition*

— *Part 2: Test methods and general performance requirements*

— *Part 3: Pyrotechnic device and harness connector assembly – type 1*

— *Part 4: Pyrotechnic device and harness connector assembly – type 2*

Introduction

Road vehicles integrate an increasing number of pyrotechnic devices contributing to occupant safety in vehicles (for example, frontal and side air bags, safety belt pretensioner, etc.).

To build the complete system providing the function requires a supply of various components from several different equipment makers. Vehicle manufacturers need to define a common specification to ensure that connectors designed and produced by the various equipment makers meet the same performance criteria and requirements.

In the current design of this vehicle equipment, three areas of connection have been identified:

— between the pyrotechnic device (e.g. initiator) and the harness connector;

— between the tab holder and the clip holder of the harness connector;

— between the harness connector and the electronic control module.

The connection between the pyrotechnic device and the harness connector is the only connection that can be standardized and forms the subject of this part of ISO 19072. Due to the location of the safety device in the vehicle, the connector design could be a right angle or straight.

A sealed variant of the pyrotechnic device/initiator harness connector assembly is defined in Annex A.

A two-way (without ground) variant of the pyrotechnic device/initiator harness connector assembly is also defined in Annex B.

A variant without a retainer of the pyrotechnic device/initiator harness connector assembly is defined in Annex C.

Road vehicles — Connection interface for pyrotechnic devices, two-way and three-way connections —

Part 2: Test methods and general performance requirements

1 Scope

The purpose of this part of ISO 19072 is to define the performance criteria and requirements of a three-way connection interface, including ground connection, linking the pyrotechnic device and harness connector built into a road vehicle.

Performance criteria and requirements are also defined for a sealed variant of the pyrotechnic device/initiator harness connector assembly.

Performance criteria and requirements are also defined for a two-way (without ground) variant of the pyrotechnic device/initiator harness connector assembly.

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

ISO 20653, *Road vehicles — Degrees of protection (IP code) — Protection of electrical equipment against foreign objects, water and access*

3 Terms and definitions

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

3.1
connector
assembly used to connect several conductors together or a single conductor to an appliance

Note 1 to entry: Male/female connector is a housing containing male/female contacts and accessory items. A male connector may be permanently fixed to a wiring harness or to an appliance (an electronic control unit [ECU] for example). A female connector is generally permanently fixed to a wiring harness.

3.2
female contact
contact (including means for cable attachment) designed for electrical engagement on its inner surface and to accept entry of a male contact, thus forming an electrical connection

3.3
housing
connector without its contacts

3.4
locking device
mechanical system preventing unmating of a connector which can be released through a deliberate action

3.5
male contact
contact (including means for cable attachment) designed for electrical engagement on its outer surface and to enter a female contact, thus forming an electrical connection

3.6
retainer
ring holding an optional shorting clip (shunt) and providing coding and electrical insulation, generally made of plastic

Note 1 to entry: The shorting clip (shunt) may be omitted by decision between manufacturer and supplier.

3.7
short-circuit deactivation device
mechanical system used to open the short circuit

3.8
short-circuited initiator
inert initiator with two male contacts internally short-circuited with a shunt, used for testing

3.9
squib holder
part of the pyrotechnic device, holding the initiator and the retainer

3.10
initiator
part of the pyrotechnical device with two male contacts

4 Functional characteristics of mated connectors

4.1 General

Mated connectors shall meet the requirements specified in 4.2 to 4.16.

Unless other specifications are given, the temperature class to be taken into account for these tests (see ISO 8092-2) is class 2.

4.2 Visual examination

The test and corresponding requirements shall comply with ISO 8092-2.

4.3 Mating and unmating

The test has to be carried out in compliance with ISO 8092-2 by measuring the force applied on the connector.

The connector shall not be locked during the mating and unmating process unless otherwise specified.

The mating/unmating sequence shall comply with the one described in Table 7.

The maximum connecting and disconnecting force measured on the connector shall be less than 40 N.

NOTE The movements of the mating sequence (Table 7) can be carried out simultaneously with the same force.

4.4 Resistance to tensile and compressive force between the connector and squib holder equipped with initiator and retainer

4.4.1 Test

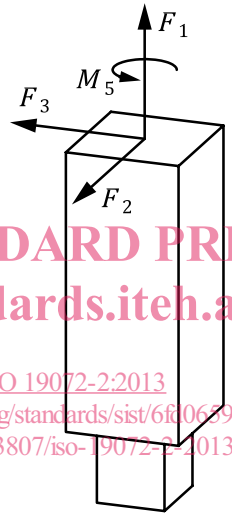
4.4.1.1 General

The connector shall be locked for testing.

This test is a destructive test carried out on an assembly comprising a squib holder, an initiator with male contacts, and a retainer.

4.4.1.2 Straight connectors

The test is carried out on a new sample, applying the forces in the directions shown in Figure 1 on the straight connector without its cable.



Key

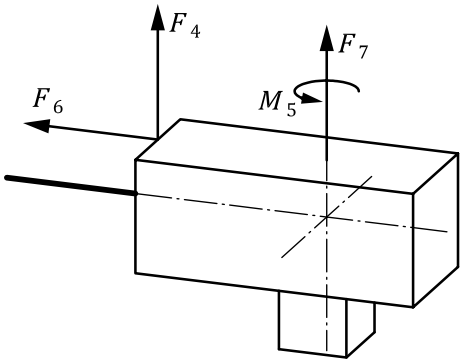
F_1 tensile force
F_2 tensile and compressive forces
F_3 tensile and compressive forces
M_5 torque

Figure 1 — Direction of forces applied on straight connectors

4.4.1.3 Right-angle connectors

The test is carried out on a new sample, applying the forces F_4 and F_6 on the connector body where the cable exits the connector in the directions shown in Figure 2.

Apply the force F_7 in the central axis of the connector as shown in Figure 2.



Key

F_4 tensile and compressive forces
F_6 tensile and compressive forces
F_7 tensile force
M_5 Torque

Figure 2 — Direction of forces applied on right-angle connectors

4.4.2 Requirements

4.4.2.1 Straight connectors

Mated straight connectors shall be able to withstand minimum forces and torque indicated in Table 1.

Table 1 — Minimum tensile and compressive force values for straight connectors

Forces/torque applied to straight connectors	Minimum values of tensile/compressive forces or torque for straight connectors
F_1	120 N[a]
F_2	80 N
F_3	80 N
M_5	1,5 Nm

[a] For the test carried out with force F_1, after 10 cycles, the value of the minimum force is 100 N.

4.4.2.2 Right-angle connectors

Mated right-angle connectors shall be able to withstand minimum forces and torque indicated in Table 2.

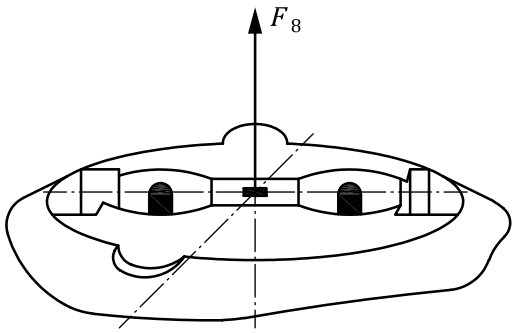
Table 2 — Minimum values of tensile/compressive forces or torque for right-angle connectors

Forces/torque applied to right-angle connectors	Minimum values of tensile/compressive forces or torque for right-angle connectors
F_4	70 N
M_5	1,5 Nm
F_6	80 N
F_7	100 N

4.5 Mechanical strength of the retainer in the squib holder

4.5.1 Test

The test is carried out on a new sample by applying the force in the direction shown in Figure 3 on the retainer installed in the squib holder.



Key

F_8 force applied to retainer installed in squib holder

Figure 3 — Direction of force applied to the retainer installed in the squib holder

4.5.2 Requirements

The retainer installed in the squib holder without mated connector shall withstand minimum force F_8 indicated in Table 3.

Table 3 — Minimum force applied to the retainer installed in the squib holder

Force applied to the retainer installed in the squib holder	Minimum value of force applied to the retainer installed in the squib holder
F_8	10 N

4.6 Combination of temperature/humidity/vibration

4.6.1 Test

Samples from a series application are assembled with a cable, mated, and preconditioned for 48 h in a ventilated heat chamber at (65 ± 2) °C.

The mated connectors are then secured to a vibrating table with the male contacts connected in series on the short-circuited initiator side and connected to a direct current source delivering an intensity of 50 mA, so that the variation in contact resistance can be determined throughout the test. Apply the frequency variations indicated in Table 4 to the connection by logarithmic modulation of 1 octave/min for 48 h per axis (i.e. 144 h in total) using the test setup described in Figures 4 and 5.