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Road vehicles — Automotive cables —

Part 11:
Dimensions and requirements for coaxial RF cables with a specified analogue bandwidth up to 6 GHz (20 GHz)

Véhicules routiers — Câbles automobiles —

Partie 11: Dimensions et exigences des câbles RF coaxiaux de bande passante analogique spécifiée jusqu'à 6 GHz (20 GHz)

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Foreword

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

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A list of all parts in the ISO 19642 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.

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Introduction

This document was prepared following a joint resolution to improve the general structure of the ISO Automotive Electric Cable standards. This new structure adds more clarity and, by defining a new standard family, opens up the standard for future amendments.

Many other standards currently refer to ISO 6722-1, ISO 6722-2 and ISO 14572. So these standards will stay valid at least until the next scheduled systematic review and will be replaced later on by the ISO 19642 series.

For new Automotive Cable Projects customers and suppliers are advised on using the ISO 19642 series.

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Road vehicles — Automotive cables —

Part 11:
Dimensions and requirements for coaxial RF cables with a specified analogue bandwidth up to 6 GHz (20 GHz)

WARNING — The use of this International Standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety practices and determine the applicability of regulatory limitations prior to use.

1 Scope

This International Standard specifies the dimensions and requirements for coaxial RF cables with a specified analogue bandwidth up to 6 GHz (for special cases up to 20 GHz) intended for use in road vehicle applications where the nominal system voltage is 30 V a.c. or 60 V d.c..

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2 Normative References

The following referenced documents are indispensable for the application 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.

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ISO 19642-1, *Road vehicles — Automotive cables — Terminology and design guidelines*

ISO 19642-2, *Road vehicles — Automotive cables — Test methods*

ISO 19642-3, *Road vehicles — Automotive cables — Part 3: Dimensions and requirements for 30 V a.c. or 60 V d.c. single core copper conductor cables*

IEC 62153-4-3, *Metallic communication cable test methods — Part 4-3: Electromagnetic compatibility (EMC) - Surface transfer impedance — Triaxial method*

IEC 62153-4-4, *Metallic communication cable test methods — Part 4-4: Electromagnetic compatibility (EMC) — Test method for measuring of the screening attenuation as up to and above 3 GHz, triaxial method*

ASTM B 452, *Standard Specification for Copper-Clad Steel Wire for Electronic Application*

ASTM B 105, *Standard Specification for Hard-Drawn Copper Alloy Wires for Electric Conductors*

3 Terms and definitions

See ISO 19642-1.

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4 Specifications

4.1 General test conditions

The test conditions of ISO 19642-2 shall apply. The descriptions of the tests are found in ISO 19642-2. This part only contains requirements and specific remarks. The cables shall be submitted to the tests as specified in paragraph 7. Test overview tables.

NOTE 1 If suppliers and customers agree upon modifications or changes to the methods and requirements, it is required that all the changes and modifications are clearly documented.

NOTE 2 The paragraph numbers in this part are aligned with the paragraph numbers in ISO 19642-2 “Test methods”. Test paragraph numbers not needed in this part are intentionally omitted.

4.2 Voltage rating

The voltage rating is established by the rating of the cores 30 V a.c. or 60 V d.c..

4.3 Temperature classes

The temperature class rating is established by the rating(s) of the core and sheath. The rating of the cable shall be equal to the lowest rating of the core and sheath. For details on temperature classes see ISO 19642-1.

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4.4 Cable construction

For detailed information on preferred constructions please refer to the preferred constructions in Table 12.

Other constructions and materials are permissible when agreed between customer and supplier.

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4.5 Safety concerns

See the “Warning" at the beginning of this document.

4.5.1 Core

4.5.1.1 Conductor

4.5.1.1.1 Conductor material

For preferred conductor materials see ISO 19642-3 Table 1. Additional materials such as copper clad steel (CCS) per ASTM B452 and copper alloys per ASTM B105 may be used.

4.5.1.1.2 Conductor construction

For preferred conductors of the core see ISO 19642-3. Additionally, single-strand conductors as well as other conductors may be used as agreed between the customer and the supplier.

4.5.1.1.3 Conductor diameter

For construction requirements of preferred cable types please refer to Table 12.

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4.5.2 Dielectric core

4.5.2.1 Insulation material

Insulation material must be documented.

4.5.2.2 Dielectric core outside diameter

Please refer to Table 12.

4.5.3 Screen

4.5.3.1 Screen Construction

The screen shall consist of at least one metallic braid. Additionally, the use of metal foils, single or double-sided metal layered polymer foils is allowed. The metal foil shall be between the dielectric and the braid. A metallic side of the foil must be in electrical contact to the braid. For construction requirements of cable types please refer to Table 12.

4.5.3.2 Diameter under sheath

For construction requirements of cable types please refer to Table 12.

4.5.4 Sheath

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4.5.4.1 Sheath material

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Sheath material must be documented.

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4.5.4.2 Sheath thickness

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For construction requirements of preferred cable types please refer to Table 12.

4.5.4.3 Outside cable diameter

For construction requirements of preferred cable types please refer to Table 12

4.6 Cable designation

The cable designation is put together using the fields according to Table 1. The entries follow the example.

Example CX174a

Table 1 — Cable designator fields

CX	for coaxial cable
174	an up to 3 digit reference number to identify similar cable types
a	a lower case version designator to differentiate between similar constructions

For cable designators of preferred cable types refer to Table 12.

4.7 Testing of representative cable constructions

When a test is required, all cable constructions shall meet the requirements. However, if testing of representative cable constructions is permitted by agreement between customer and supplier, compliance for a cable family may be demonstrated by testing samples of selected cable types only.

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Compliance of a cable family made of the same insulation and sheath compound may be demonstrated by testing the sample of the cable family with the smallest sheath wall thickness only. Resistance to flame propagation 6.5.14 shall be performed on all sheathed finished cables. RF testing according to Table 10 is required for all members of the cable family.

4.8 Reference and requirements for the tests according ISO 19642-2

All tests are defined in ISO 19642-2. This part only contains requirements and specific remarks.

4.9 General remark on requirements

Requirements are specified in Table 12 of this standard for the preferred coaxial RF cable types. The requirements for other coaxial RF cable types shall be as agreed between customer and supplier.

5 Requirements for the conductor and dielectric

5.1 General

The conductor and dielectric shall fulfil the requirements per the tests as specified in Table 8 of this document according to its temperature class rating.

The details of the usage of "If required" tests shall be established by agreement between customer and supplier. Both have to define

1. if the test has to be performed
2. if the test has to be performed for gathering data without a limit
3. a mandatory limit

Numbers and titles in this paragraph are aligned with the tests defined in ISO 19642-2 giving an implicit reference. Tests not required for this part are intentionally omitted in this document.

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5.2 Dimensional tests

5.2.1 Dielectric core outside diameter

No single value shall be outside the specified values in Table 12 of this document.

5.2.2 Insulation thickness

Test is not applicable.

5.2.3 Conductor diameter

No single value shall be outside the specified values Table 12 of this document.

5.2.4 Cross sectional area

Test is not applicable.

5.2.5 In-process dielectric outside diameter

In-process dielectric outside diameter monitoring is mandatory. No single value shall be outside the specified values in Table 12 of this document.

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5.3 Electrical tests

5.3.1 Conductor resistance

No single value shall be outside the specified values in Table 12 of this document.

5.3.2 Determination of temperature coefficients

Test is not required.

5.3.3 Withstand Voltage

Test is not applicable.

5.3.4 Withstand voltage after environmental testing

5.3.4.1 Test voltage

1 kV a.c., hold for 1 minute.

5.3.4.2 Requirement

Breakdown shall not occur.

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5.3.5 Insulation faults

5.3.5.1 Test voltage

1 kV a.c..

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5.3.5.2 Requirement

Breakdown shall not occur.

5.3.6 Insulation volume resistivity

The usage of this text shall be established by agreement between customer and supplier. In this case the value shall be ≥ 1 x 10^9 Ω mm.

5.4 Mechanical tests

5.4.1 Strip force (A) of dielectric

The usage of this test shall be established by agreement between customer and supplier. In this case measure the strip force between inner conductor and dielectric cable insulation. The measured force shall be within the values as agreed between customer and supplier.

5.4.2 Abrasion test

Test is not applicable.

5.4.3 Breaking force of the finished cable

Test is not applicable.

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