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Road vehicles — Multi-core connecting cables —

Part 3: Construction, dimensions and marking of unscreened sheathed low-voltage cables

Véhicules routiers — Câbles de raccordement multiconducteurs — Partie 3: Construction, dimensions et marquage des câbles basse tension gainés non blindés

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*.

This third edition cancels and replaces the second edition (ISO 4141-3:2006), which has been technically revised. The main changes compared to the previous edition are as follows:

— temperature range of cable defined as Class A and Class B have been added;

— normative references ISO 11446-1 and ISO 11446-2 (replacing ISO 11446), and ISO 25981 were added;

— reference to ISO 25981 was added to 5.1.1;

— the minimum diameter according to ISO 12098 was changed from 14 to 13 in Table 1;

— in 5.3 the definitions of L_B, L_W (was L_A) and $L_{Emax.}$ (was $L_{Amax.}$) were added;

— in Table 2, Type 3 L_W changed;

— Figure 2 was added;

— reference to ISO 25981 was added to Table 3;

— reference to ISO 25981 was added to Table A.1.

A list of all parts in the ISO 4141 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.

Road vehicles — Multi-core connecting cables —

Part 3: Construction, dimensions and marking of unscreened sheathed low-voltage cables

1 Scope

This document specifies the construction, dimensions and marking of unscreened sheathed low-voltage multi-core cables for the connection of towing and towed vehicles, suitable for temperature range of class A and class B defined in ISO 6722-1:2011, Table 1.

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 1185, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — 7-pole connector type 24 N (normal) for vehicles with 24 V nominal supply voltage*

ISO 1724, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — 7-pole connector type 12 N (normal) for vehicles with 12 V nominal supply voltage*

ISO 3731, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — 7-pole connector type 24 S (supplementary) for vehicles with 24 V nominal supply voltage*

ISO 3732, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — 7-pole connector type 12 S (supplementary) for vehicles with 12 V nominal supply voltage*

ISO 4141-1, *Road vehicles — Multi-core connecting cables — Part 1: Test methods and requirements of basic performance sheathed cables*

ISO 4141-2, *Road vehicles — Multi-core connecting cables — Part 2: Test methods and requirements of high performance sheathed cables*

ISO 7638-1, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — Part 1: Connectors for braking systems and running gear of vehicles with 24 V nominal supply voltage*

ISO 7638-2, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — Part 2: Connectors for braking systems and running gear of vehicles with 12 V nominal supply voltage*

ISO 11446-1, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — Part 1: 13-pole connectors for vehicles with 12 V nominal supply voltage not intended to cross water fords*

ISO 11446-2, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — Part 2: 13-pole connectors for vehicles with 12 V nominal supply voltage intended to cross water fords*

ISO 12098, *Road vehicles — Electrical connections between towing vehicles and trailers — 15 pole connector for commercial vehicles equipped with 24V systems — Dimensional characteristics and contact allocation*

ISO 25981, *Road vehicles — Connectors for the electrical connection of towing and towed vehicles — Connectors for electronically monitored charging systems with 12V or 24V nominal supply voltage*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

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

4 General Requirements

Multi-core sheathed connecting cables for basic performance according to this document shall comply with the requirements of ISO 4141-1.

Multi-core sheathed connecting cables for high performance according to this document shall comply with the requirements of ISO 4141-2.

5 Construction and dimensions

5.1 Single cores

5.1.1 General

During construction of the cable, the positions of the single cores within the cable construction shall be laid up, as far as possible, in accordance with the contact positions of the connector as specified in ISO 1185, ISO 1724, ISO 3731, ISO 3732, ISO 7638-1, ISO 7638-2, ISO 11446-1, ISO 11446-2, ISO 12098 or ISO 25981 as applicable.

NOTE Annex A provides a synopsis of the nominal cross-sections of single cores in multi-core cables specified in the International Standards cited above.

5.1.2 Additional elements

Fillers may be used to complete the cable construction. Non-metallic tapes or wrappings under the sheath or an inner sheath may be applied.

5.2 Outer sheath dimensions

5.2.1 Thickness

The minimum thickness of the sheath, measured in accordance with ISO 4141-1, shall be 1 mm.

5.2.2 Outside diameter

The outside diameter of the multi-core cable, measured in accordance with ISO 4141-1, shall be as specified in Table 1.

The cable ovality, measured in accordance with ISO 4141-1, shall not exceed 10 %.

Table 1 — Outside diameter of multi-core cables

Dimensions in millimetres

Outside diameter	Multi-core cable for use with connectors as in								
	ISO 1185	ISO 1724	ISO 3731	ISO 3732	ISO 7638-1 ISO 7638-2		ISO 11446-1 ISO 11446-2	ISO 12098	ISO 25981
					5 poles	7 poles			
max.	13,5	13,5	13,5	13,5	13,5	15,5	15,0	17,0	16,0
min.	8,0	8,0	8,0	8,0	8,0	11,0	10,0	13,0	12,0

5.3 Coil dimensions

Dimensions of the coiled connecting cables shall be as detailed in Table 2 and Figures 1 and 2.

L_B = Block length or Retracted length

This is the length of the coiled part of the spiral excluding straight tails, in its unstretched state.

L_W = Working length

This is the total length of the coiled connecting cable including straight tails, when it is connected between the towing and towed vehicle without any articulation.

$L_{Emax.}$ = max. admitted extension length

Maximum length of the coiled connecting cable including straight tails, at which the cable still function according to the requirements.

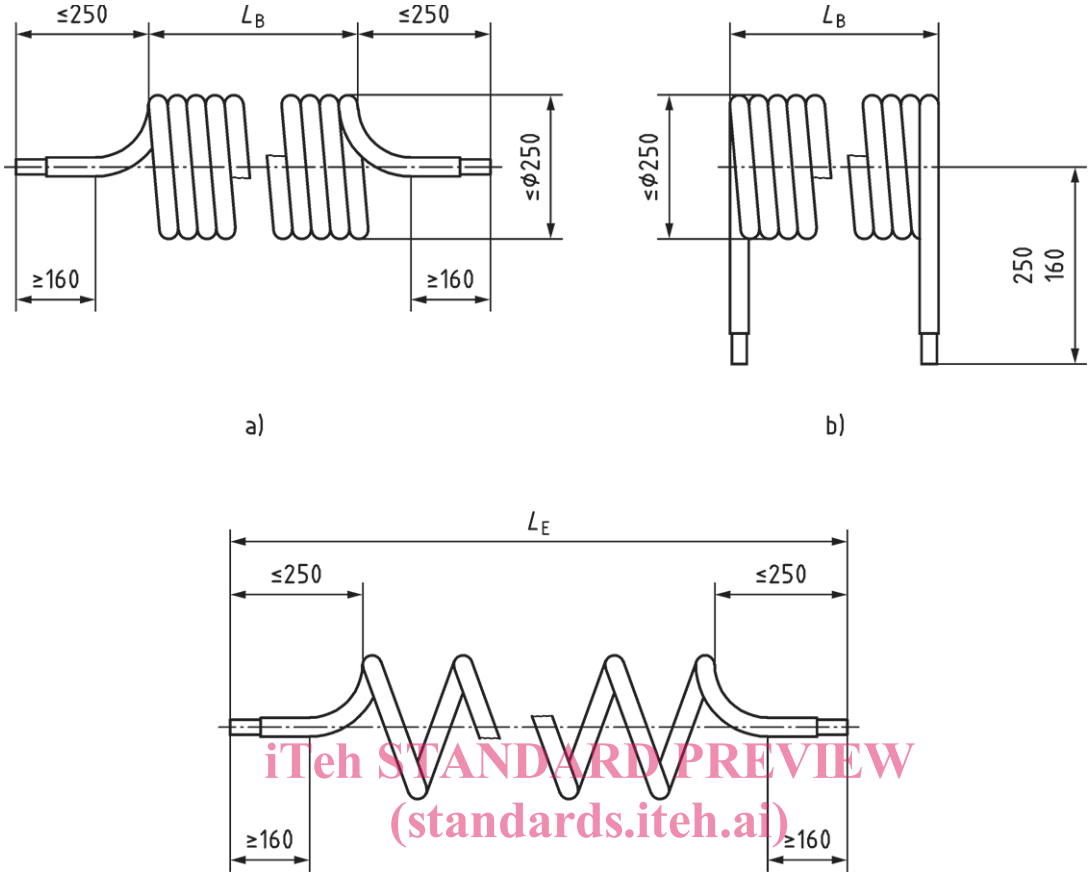
NOTE This normally occurs when the cable is connected between the towing and towed vehicle when the vehicle is fully articulated.

Table 2 — Overall dimensions of coiled multi-core cables

Dimensions in millimetres

Type of coiled connecting cable	Block length Retracted length L_{Bmax}	Working length L_W	Max. admitted extension length $L_{E\ max.}$
1	500	≤1 750	3 000
2	550	≤2 250	4 000
3	600	≤3 000	4 500

Dimensions in millimetres



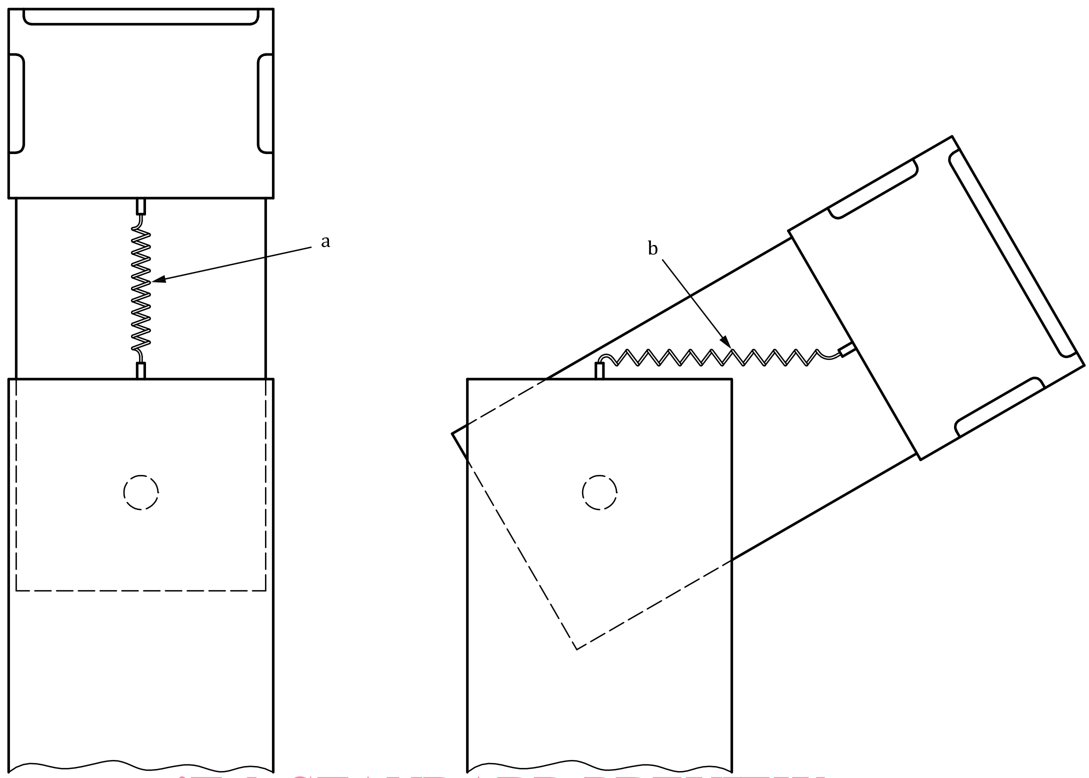
Key

a) and b) position of the straight tails depending on the production process

L_B block length

L_E extension length

Figure 1 — Overall dimensions of coiled connecting cables



a Working length.

b "Maximum admitted extension" length.

Figure 2 — Overall dimensions of coiled connecting cables

6 Marking

6.1 Cores

Cores shall be identified by either of the following:

a) by the insulation colour as specified in Table 3;

b) by numerals as specified in Figure 3 and Table 3, printed in a colour contrasting with that of the core insulation.

Alternative methods may be used by agreement between manufacturer and user.

Table 3 — Colour and marking of cores

Single core insulation colour	Single cores allocated to and marked with contact number according to the connector standard ISO							
	ISO 1185	ISO 1724	ISO 3731	ISO 3732	ISO 7638-1 ISO 7638-2	ISO 11446-1 ISO 11446-2	ISO 12098	ISO 25981
Yellow	3	1	3	1	3	1	1	7
Blue	7	2	7	2	—	2	3	5
White	1	3	1	3	5	3	4	—
Green	5	4	5	4	—	4	2	—

