

INTERNATIONAL STANDARD

NORME INTERNATIONALE

Industrial systems, installations and equipment and industrial products –
Labelling of cables and cores

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Systèmes industriels, installations et appareils et produits industriels –
Etiquetage des câbles et des conducteurs isolés

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IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland
Email: inmail@iec.ch
Web: www.iec.ch

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**INDUSTRIAL SYSTEMS, INSTALLATIONS
AND EQUIPMENT AND INDUSTRIAL PRODUCTS –
LABELLING OF CABLES AND CORES**

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The text of this standard is based on the following documents:

CDV	Report on voting
3/849/CDV	3/881/RVC

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

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- replaced by a revised edition, or
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INTRODUCTION

Additional labelling of cables and cores might be required within larger systems or installations with many cores of the same colour or with many cables, and where therefore the use of the designations provided by the cable manufacturer only would be ambiguous.

Due consideration should be given to the fact that additional labelling will cause additional cost, usually increasing with the number of characters in the labelling string and the number of different labelling elements. The available space may also impose restrictions with regard to the number of characters, their height and the length of the labelling. As a general rule the use of additional labelling should therefore be limited to a necessary minimum and be kept as short as practicable.

However, also the advantages and benefits should be taken into considerations in choosing additional labelling of cables and cores.

It is important to notice that a single machine or a system has different needs of information in the different phases of its lifecycles (assembling, production, service and maintenance).

Additional labelling of cables and cores gives the following advantages:

- the possibilities to communicate and identify signals and connections across different involved engineering disciplines and departments like:
 - process engineering,
 - software engineering,
 - electrical engineering,
 - mechanical/fluid engineering, [IEC 62491:2008](#)
 - control engineering, <http://standards.iteh.ai/catalog/standards/sist/bc0fd101-d7be-4018-9fc4-f656427606f6/iec-62491-2008>
- minimizing the time used to locate an eventual error (and the reason for it) in the test phase;
- saving time when locating an eventual error (and the reason for it) in the service and maintenance phase;
- remove the doubt of which core should be connected to which terminal, when replacing components that are placed close to each other;
- if used in pre-planning, it gives a clear view for panel-builders, electricians/technicians; service/maintenance and system controllers which will minimize misunderstandings regarding connections.

Besides being used in connections between terminal blocks, labelling can also be used when single core cables connect components inside units as: cubicle, pulpit, case, etc.; such methods make possible:

- a rapid and secure cabling between the terminals of two objects;
- a rapid visual check of cabling, not necessarily looking up in the circuit diagrams;
- a correct and secure change of an object during the maintenance operations of plants.

INDUSTRIAL SYSTEMS, INSTALLATIONS AND EQUIPMENT AND INDUSTRIAL PRODUCTS – LABELLING OF CABLES AND CORES

1 Scope

This standard provides rules and guidelines for the labelling of cables and cores/conductors used in industrial installations, equipment and products, in order to maintain a clear relation between the technical documentation and the actual equipment and for other purposes. The following methods are described and designated:

- use of coloured cables and designated cores;
- additional identification labelling;
- additional connection labelling; and
- additional signal labelling.

The physical design of the labels, the material to be used for the labels as well as cable manufacturers' product bound marking of cables and cores are not part of this standard.

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.

IEC 60445, *Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals and conductor terminations*

IEC 60757, *Code for designation of colours*

IEC 61082-1:2006, *Preparation of documents used in electrotechnology – Part 1: Rules*

IEC 61175, *Industrial systems, installations and equipment and industrial products – Designation of signals*

IEC 81346-1, *Industrial systems, installations and equipment and industrial products – Structuring principles and reference designations – Part 1: Basic rules (to be published)*

IEC 61666, *Industrial systems, installations and equipment and industrial products – Identification of terminals within a system*

ISO/IEC 646, *Information technology – ISO 7-bit coded character set for information interchange*

3 Terms and definitions

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

3.1

conductor (of a cable)

part of a cable which has the specific function of carrying current

[IEV 461-01-01]

3.2

cable

assembly of one or more conductors and/or optical fibres, with a protective covering and possibly filling, insulating and protective material

[IEV 151-12-38]

3.3

core

assembly comprising a conductor with its own insulation (and screens if any)

[IEV 461-04-04]

3.4

terminal

conductive part of a device, electric circuit or electric network, provided for connecting that device, electric circuit or electric network to one or more external conductors

[IEV 151-12-12, modified]

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3.5

terminal block

assembly of terminals in a housing or body of insulating material to facilitate interconnection between multiple conductors

[IEV 581-06-36]

3.6

terminal designation

identifier of a terminal with respect to the object to which it belongs, related to one aspect of the object.

[IEC 61666, 3.8]

3.7

signal designation

unambiguous identifier of a signal within a system

[IEC 61175, 3.2]

3.8

reference designation

identifier of a specific object with respect to the system of which the object is a constituent, based on one or more aspects of that system

3.9

labelling (of a cable or core)

label or labels attached to a cable or core indicating appropriate characteristics

3.10**identification labelling**

labelling showing the identifier of an object as a constituent of a specific installation, system, equipment or product

3.11**connection labelling**

labelling of a cable or core showing the identifier of the terminal, terminal block or equipment to which it is connected

3.12**local-end connection labelling**

system of labelling of cables and cores where the labelling of the end of the cable or core refers to the terminal, terminal block or equipment to which it is connected

3.13**remote-end connection labelling**

system of labelling of cables and cores where the labelling of the end of the cable or core refers to the terminal, terminal block or equipment to which the other end of it is connected

3.14**both-end connection labelling**

system of labelling of cables and cores where each end of a cable or core is provided with local-end connection labelling and remote-end connection labelling

3.15**signal labelling**

system of labelling of cables and cores used as a supplement to other labelling generally based on the signal(s) carried by the cable or core

3.16**composite labelling**

system of labelling where two or more of the identification labelling, connection labelling and signal labelling systems are used together

4 Rules**4.1 General requirements**

Cables and cores shall be recognizable at each end; it shall be possible to relate cables and cores to the technical documentation.

This may be carried out by:

- the designation and marking provided by the manufacturer of the cable, see 4.2, or
- an additional labelling, see 4.3.

Additional labelling might be required within larger systems or installations with many cores of the same colour or with many cables, and where therefore the use only of the designations provided by the cable or core manufacturer would be ambiguous.

The additional labelling shall be based on one or more of the following:

- the identifier of the cable or core, see Clause 5;
- the connection of the cable or core, see Clause 6, or
- the signal carried by the cable or core, see Clause 7.

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4.2 Use of designated cable cores

Cable cores are often designated by the manufacturer applying methods such as:

- coloured insulation of the single cores;
- differently coloured (including multi-coloured) insulation of the cores of the cables, or
- differently numbered cores of cables.

These designations should, to the extent possible, be used for the identification of the cores. Additional labelling is in such cases normally not required.

The use of such designations shall be described in the documentation of the equipment in accordance with 7.5 and 9.3 of IEC 61082-1.

For the indication of the colours of cable cores in the documentation, the colour coding of IEC 60757 shall be applied.

NOTE The colour does not provide any information on where the core is to be connected. The connection information is in entirety to be found in associated connection table or connection diagram.

Table 1 shows an example of a connection table in which the colours (designated in accordance with IEC 60757) of the cable cores are used for the identification

Table 1 – Example of connection table in which the cable cores are identified by means of codes for their colour

Core colour	Local end	Remote end
GNYE	A4X1:PE	B4X1:PE
BK	A4X1:11	B4X1:33
BN	A4X1:17	B4X1:34
RD	A4X1:18	B4X1:35

4.3 Use of additional labelling

The additional labelling, where required, shall be one of the following types:

- identification labelling of the cable or core, see Clause 5;
- connection labelling of the cable or core, see Clause 6:
 - local-end connection labelling,
 - remote-end connection labelling,
 - both-end connection labelling;
- signal labelling of the cable or core, see Clause 7.
- Composite labelling, see Clause 8.

The method used shall be specified in the supporting documentation, see Clause 11.

Additional information, for example a reference to a page number of the circuit diagram, may be added on the label. The use of such additional information shall be explained in the technical documentation. For an example, see Clause A.5.

5 Identification labelling

5.1 General

The purpose of identification labelling is to show the identifier of the cable or core as a constituent of the system of which it is a part. The same labelling is valid and may be used all along a cable or core, even if it has junctions in its run.

The identification labelling does not provide any information on the connection. The connection information is in its entirety to be found in associated documentation.

NOTE 1 For further information on the preparation of the relevant document types, see IEC 61082-1.

The preferred identifier of a cable or core is a reference designation in accordance with IEC 81346-1. That standard provides further guidance on how to create unambiguous reference designations within an installation, system or equipment.

The reference designation can take different forms depending on, in which structure the core is identified and to which object the core is associated.

NOTE 2 “Cable numbers” are considered as a kind of reference designation. For further information, see IEC 81346-1.

The reference designation should normally be shown with relevant prefix sign, but this may be omitted if no ambiguity can arise.

NOTE 3 In the examples of this standard the first prefix sign of the reference designations (even if named “complete”) has been deliberately omitted in order not to give a reader the impression that a specific one is required for cables and connections.

[IEC 62491:2008](https://standards.iteh.ai/catalog/standards/sist/bc0fd101-d7be-4018-9fc4-f656427606f6/iec-62491-2008)

EXAMPLE 1: <https://standards.iteh.ai/catalog/standards/sist/bc0fd101-d7be-4018-9fc4-f656427606f6/iec-62491-2008>

Cables between terminals belonging to the same object within which cable or core are identified. See Figure 1 and Table 2. The labels at each end as well as possible intermediate labels are shown.

- W23 is a single core cable with end labels and an intermediate label;
- W24 is a cable with end labels and intermediate labels. Also, the labels of each core of this cable are shown in the example. Note that the additional labelling of the cable cores could be omitted if the cable cores are unambiguously designated by numerals or colours by the cable manufacturer as described in 4.2.

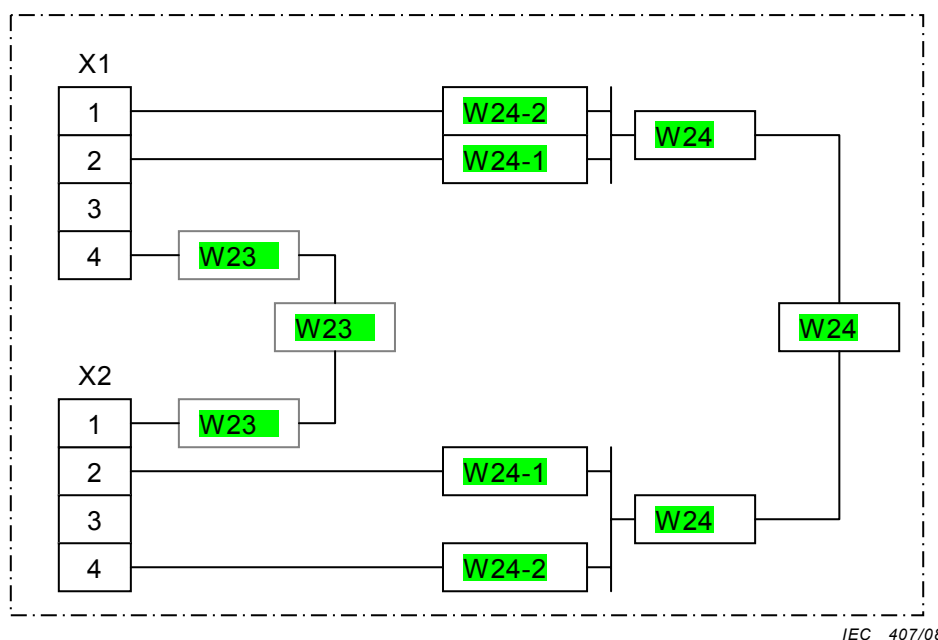


Figure 1 – Example of identification labelling of a single core cable (W23) and of a multi-core cable (W24) in which also the different cores are labelled
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Table 2 – Connection table corresponding to Figure 1 with labelling

Cable reference designation	Core reference designation	Terminal	Terminal	Labelling
W23		X1:4	X2:1	W23
W24	-1	X1:2	X2:2	W24-1
	-2	X1:1	X2:4	W24-2

The initial part of the reference designation identifying the object within which the labelling is required to be unambiguous may be omitted if no ambiguity can occur. This requires that the reference designation of this object is clearly shown on a label related to that object.

NOTE 4 The complete reference designation of the cable or core is still the concatenation of the reference designation of the object and that of the cable or core.

EXAMPLES 2 (see Figure 2 and Table 3):

If the object of which the cable core is completely a constituent has a reference designation A1B2C3D4 and if the cable core is connecting two terminals within this unit, then the core labelling could be abbreviated to W23 while the full reference designation of that core is A1B2C3D4W23.

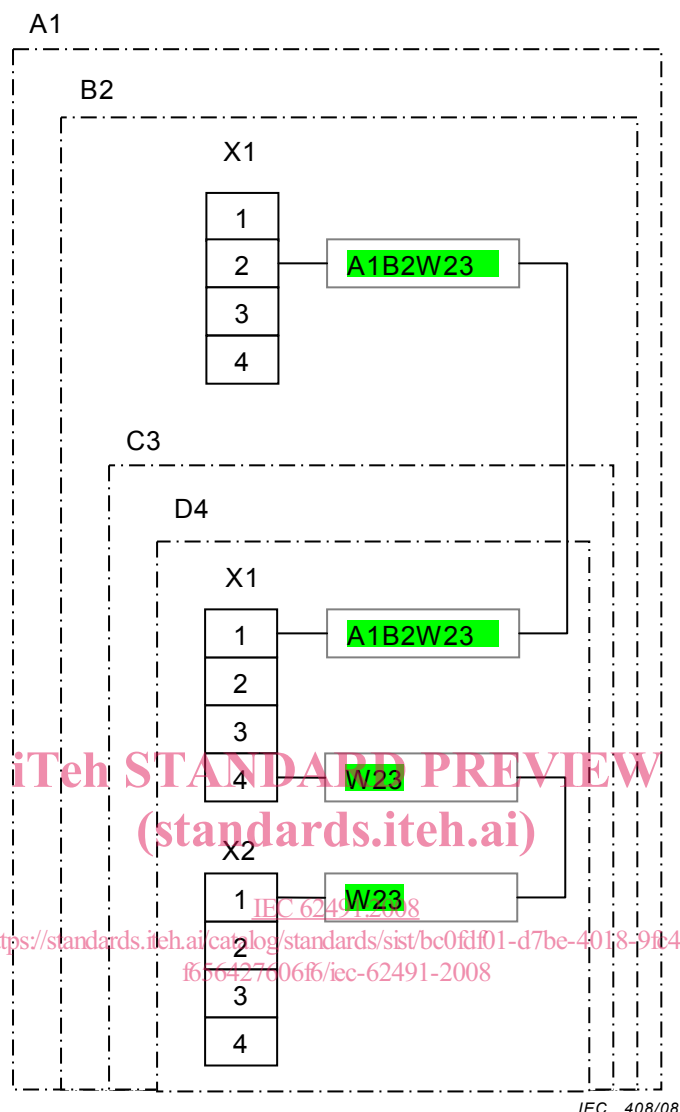


Figure 2 – Example of identification labelling of cores where the initial part of the reference designation has been partly omitted

Table 3 – Connection table corresponding to Figure 2 with labelling

Reference designation	Terminal	Terminal	Labelling
A1B2C3D4W23	A1B2C3D4X1:4	A1B2C3D4X2:1	W23
A1B2W23	A1B2X1:2	A1B2C3D4X1:1	A1B2W23

EXAMPLES 3 (see Figure 2 and Table 3):

If the core is crossing border lines between objects, the full reference designation that is relevant in this case needs to be presented on the label. For example the core connecting terminal block X1 inside A1B2C3D4 and terminal block X1 inside A1B2 is identified with respect to the object of which it is completely a constituent (i.e. A1B2) by A1B2W23.