

INTERNATIONAL STANDARD

IEC
60092-376

Second edition
2003-05

Electrical installations in ships –

Part 376: Cables for control and instrumentation circuits 150/250 V (300 V)

Installations électriques à bord des navires –

Partie 376: Câbles pour circuits de commande et d'instrumentation 150/250 V (300 V)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSTALLATIONS IN SHIPS –**Part 376: Cables for control and instrumentation
circuits 150/250 V (300 V)**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60092-376 has been prepared by subcommittee 18A: Cables and cable installations, of IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units

This second edition of IEC 60092-376 cancels and replaces the first edition published in 1983, of which it constitutes a technical revision.

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

FDIS	Report on voting
18A/242/FDIS	18A/244/RVD

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 2008. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

ELECTRICAL INSTALLATIONS IN SHIPS –

Part 376: Cables for control and instrumentation circuits 150/250 V (300 V)

1 Scope and object

This part of IEC 60092 is applicable to screened and unscreened cables for control and instrumentation circuits on ships and offshore units. The cables have extruded solid insulation with a voltage rating of 150/250V (300V) (see Clause 4) and are intended for fixed installations.

The various types of cables are given in Clause 8. The construction requirements and test methods are expected to comply with those indicated in IEC 60092-350, unless otherwise specified in this standard.

NOTE Provision is made for fire resistant (limited circuit integrity) cables to be specified if required.

The object of this part of IEC 60092 is

- to standardise cables whose safety and reliability are ensured when they are installed in accordance with the requirements of IEC 60092-352;
- to lay down standard manufacturing requirements and characteristics of such cables directly or indirectly bearing on safety;
- to specify test methods for checking conformity with those requirements.

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 60228, *Conductors of insulated cables*

IEC 60092-350:2001, *Electrical installations in ships – Part 350: Shipboard power cables – General construction and test requirements*

IEC 60092-351, *Electrical installations in ships – Part 351: Insulating materials for shipboard and mobile and fixed offshore units power, telecommunication, and control data cables*

IEC 60092-352, *Electrical installation in ships – Part 352: Choice and installation of cables for low-voltage power systems*

IEC 60092-359, *Electrical installations in ships – Part 359: Sheathing materials for shipboard power and telecommunication cables*

IEC 60331-21, *Tests for electric cables under fire conditions – Circuit integrity – Part 21: Procedures and requirements – cables of rated voltage up to and including 0,6 / 1 kV*

IEC 60332-1, *Tests on electric cables under fire conditions – Part 1: Test on a single vertical insulated wire or cable*

IEC 60332-3-22, *Tests on electric cables under fire conditions – Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A*

IEC 60811 (all parts), *Common test methods for insulating and sheathing materials of electric cables*

IEC 61034-1, *Measurement of smoke density of cables burning under defined conditions – Part 1: Test apparatus*

IEC 61034-2, *Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements*

IEC 60092-353, *Electrical installations in ships – Part 353: Single and multicore non-radial field power cables with extruded solid insulation for rated voltages 1 kV and 3 kV*

3 Definitions

For the purposes of this standard, the definitions given in IEC 60092-350 and the following apply.

3.1

pair unit

a unit which consists of two cores laid up with or without interstitial fillers or binder tape(s)

3.2

triple unit

a unit which consists of three cores laid up with or without interstitial fillers or binder tape(s)

3.3

quad unit

a unit which consists of four cores laid up with or without interstitial fillers or binder tape(s)

3.4

electrostatic screen

surrounding earthed metallic layer to confine the electrical field within the cable cores, pair(s), triple(s) or quad(s) and/or to protect the cable core(s), pair(s), triple(s) or quad(s) from external electrical influence

3.5

drain wire

an uninsulated conductor which has the specific function of earthing an electrostatic tape screen by ensuring a low resistive path throughout the length of the cable

3.6

single unit cable

a cable consisting of either one pair, triple or quad unit, either unscreened or with an individual electrostatic screen

3.7

multi-unit cable

a cable consisting of more than one pair, triple or quad units either unscreened or with an individual electrostatic screen around each unit or having an electrostatic screen applied around the assembly of units (a collective screen)

3.8 braid armour

a covering formed from braided metal wires used to protect the cable from external mechanical effects

NOTE Copper wire braid armour may also provide the function of an electrostatic collective screen, providing it is earthed.

3.9 inner covering

a non-metallic covering which surrounds the assembly of the cores (and filler if any) of a multi-conductor cable and over which the protective covering is applied

4 Rated voltage

The standard rated voltage $U_o/U (U_m)$ is as follows:

$$U_o/U (U_m) = 150 \text{ V}/250 \text{ V} (300 \text{ V}) \text{ a.c.}$$

In the voltage designation of cables

U_o is the rated power-frequency voltage between the conductor and the earth or metallic covering for which the cable is designed;

U is the rated power-frequency voltage between conductors for which the cable is designed.

U_m is the maximum value of the highest system voltage for which the equipment may be used.

A d.c. voltage up to a maximum of 1,5 times the a.c. voltage may be used, provided that the voltage to earth does not exceed 250 V.

NOTE When circuits are to be supplied from a low impedance source, attention is drawn to IEC 60092-353 for 600/1000 V cables having a minimum conductor size of 1,5 mm².

5 Types of insulating compounds

The insulation compounds and their designations shall be selected from IEC 60092-351.

6 Types of sheathing compounds

The sheathing compounds and their designations shall be selected from IEC 60092-359.

7 Markings

7.1 Indication of origin and voltage rating

Identification of origin (manufacturer's name or trade mark), rated voltage (U_o/U) and construction (number of cores, pairs, triples or quads and cross sectional area of the conductor) to be printed, embossed or indented on the oversheath. It is allowed, in addition, to include an identification printed tape.

Multicore example :	"Name or Trade mark	150/250 V	19 x 1,5 mm ² "
Multi-unit example:	"Name or Trade mark	150/250 V	3 x 2 x 0,75 mm ² "

In the case of an outer metal braid armour applied above the oversheath, identification by threads or printed tapes inserted under the metal braid is permitted.

7.2 Continuity

The marking of the manufacturer's name or trademark is deemed to be continuous if the distance between the end of any marking and the beginning of the next does not exceed

- 550 mm if the indication is on the sheath, and
- 275 mm in all other cases.

7.3 Durability

The printed marking shall be indelible.

Compliance with this requirement is checked by the test described in 16.2.

7.4 Legibility

The marking of the manufacturer's name or trademark shall be legible.

The colours of identification threads, if any, shall be easy to recognise or easily made recognisable, if necessary, by cleaning.

7.5 Core identification

Identification of cores shall be made within multicore cables or cores within pair, triple or quad unit(s), according to one of the methods below.

7.5.1 Multicore cables

Identification shall be made by inscription of numbers on each core starting from the centre beginning with 1 in accordance with the following.

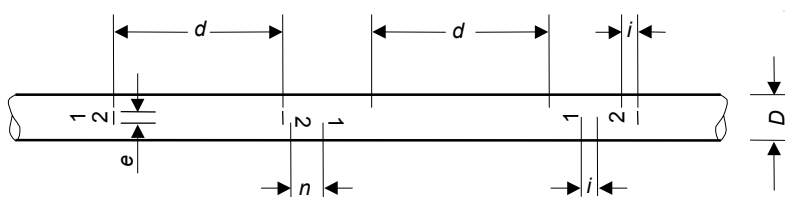
7.5.1.1 Identification

The identification shall be composed of marks at regular intervals along the entire length of core and comprising of

- a) a reference number in Arabic numerals;
- b) a dash which underlines this reference number and indicates the direction in which the number must be read.

7.5.1.2 Arrangement of the marks

Two consecutive marks shall always be placed upside down in relation to one another. The arrangement of the marks is shown in Figure 1.



IEC 1639/03

Figure 1 – Arrangement of the marks