

INTERNATIONAL STANDARD

**Electrical installations in ships –
Part 376: Cables for control and instrumentation circuits 150/250 V (300 V)**





THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2017 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
Fax: +41 22 919 03 00
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigenda or an amendment might have been published.

IEC Catalogue - webstore.iec.ch/catalogue

The stand-alone application for consulting the entire bibliographical information on IEC International Standards, Technical Specifications, Technical Reports and other documents. Available for PC, Mac OS, Android Tablets and iPad.

IEC publications search - www.iec.ch/searchpub

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee,...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and also once a month by email.

Electropedia - www.electropedia.org

The world's leading online dictionary of electronic and electrical terms containing 20 000 terms and definitions in English and French, with equivalent terms in 16 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

IEC Glossary - std.iec.ch/glossary

65 000 electrotechnical terminology entries in English and French extracted from the Terms and Definitions clause of IEC publications issued since 2002. Some entries have been collected from earlier publications of IEC TC 37, 77, 86 and CISPR.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: csc@iec.ch.



IEC 60092-376

Edition 3.0 2017-05

INTERNATIONAL STANDARD

**Electrical installations in ships –
Part 376: Cables for control and instrumentation circuits 150/250 V (300 V)**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 47.020.60

ISBN 978-2-8322-4321-3

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD.....	4
1 Scope and object.....	6
2 Normative references	6
3 Terms and definitions	7
4 General requirements	7
4.1 Rated voltage	7
4.2 Markings.....	8
4.2.1 Indication of origin and voltage identification	8
4.2.2 Continuity of marking.....	8
4.2.3 Core identification.....	8
5 Constructional requirements	8
5.1 General description.....	8
5.1.1 Overview	8
5.1.2 Unarmoured single- or double-sheathed cable	9
5.1.3 Armoured single-sheathed cable with outer sheath only.....	9
5.1.4 Armoured double-sheathed cable with inner and outer sheath only.....	9
5.1.5 Armoured single-sheathed cable with inner sheath only.....	9
5.2 Conductors	10
5.3 Insulation	10
5.3.1 Material	10
5.3.2 Application.....	10
5.3.3 Thickness of insulation	10
5.4 Cabling	11
5.4.1 General	11
5.4.2 Core assembly.....	11
5.4.3 Forming pair, triple or quad units	11
5.4.4 Fillers	11
5.4.5 Number of cores, pair, triple or quad units	12
5.5 Inner covering.....	12
5.5.1 General	12
5.5.2 Thickness of inner covering	12
5.6 Screen.....	12
5.6.1 Individual screen	12
5.6.2 Collective electrostatic screen	13
5.7 Inner sheath.....	14
5.7.1 Material	14
5.7.2 Application.....	14
5.7.3 Thickness of inner sheath.....	14
5.8 Braid armour.....	15
5.8.1 General	15
5.8.2 Braid wire diameter.....	15
5.8.3 Coverage density.....	15
5.8.4 Application of the armour.....	15
5.9 Outer sheath.....	15
5.9.1 Material	15
5.9.2 Application.....	16

- 5.9.3 Thickness of outer sheath..... 16
- 5.9.4 Colour of outer sheath 16
- 6 Tests – methods and requirements 16
- Annex A (informative) Core identification 20
- Annex B (informative) Identification of cores of multicore cables 21
 - B.1 Inscription 21
 - B.2 Arrangement of the marks 21
 - B.3 Spacing and dimensions of the marks 21
 - B.4 Appearance of inscription..... 22
- Annex C (informative) Number of cores, pair, triple or quad units..... 23
 - C.1 Number of cores 23
 - C.2 Number of pair, triple or quad units 23
- Bibliography..... 24

- Figure B.1 – Arrangement of the marks..... 21

- Table 1 – Electrical resistance of conductors 10
- Table 2 – Insulation thickness..... 11
- Table 3 – Thickness of inner covering..... 12
- Table 4 – Requirements of drain wire..... 13
- Table 5 – Tests applicable to all cables 17
- Table 6 – Additional tests required for halogen-free cables 18
- Table 7 – Additional test required for low smoke cables 19
- Table 8 – Additional tests required for fire resistant cables 19
- Table 9 – Additional tests required for specific performances 19
- Table A.1 – Preferred colour code for single unit cables 20
- Table B.1 – Dimensions of the marks 22

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSTALLATIONS IN SHIPS –

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

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). 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. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. 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: Electric cables for ships and mobile and fixed offshore units, of IEC technical committee 18: Electrical installations of ships and of mobile and fixed offshore units.

This third edition of IEC 60092-376 cancels and replaces the second edition published in 2003, of which it constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) new structure in line with IEC 60092-353 and IEC 60092-354;
- b) requirements and test methods have been divided in several tables for clarification (enhanced cold properties, oil resistance or resistance to drilling fluids) and have been aligned to IEC 60092-350;

c) the new testing methods for fire resistant cables are referenced in this document.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
18A/404/FDIS	18A/409/RVD

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

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

A list of all parts in the IEC 60092 series, published under the general title *Electrical installations in ships*, can be found on the IEC website.

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

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

A bilingual version of this publication may be issued at a later date.

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 5. The constructional requirements and test methods are aligned with those indicated in IEC 60092-350, unless otherwise specified in this document.

The object of this document 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, and
- to specify test methods for checking conformity with those requirements.

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.

IEC 60050-461, *International Electrotechnical Vocabulary – Part 461: Electric cables*

IEC 60092-350:2014, *Electrical installations in ships – Part 350: General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications*

IEC 60092-352, *Electrical installations in ships – Part 352: Choice and installation of electrical cables*

IEC 60092-360:2014, *Electrical installations in ships – Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables*

IEC 60331-1, *Tests for electric cables under fire conditions – Circuit integrity – Part 1: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter exceeding 20 mm*

IEC 60331-2, *Tests for electric cables under fire conditions – Circuit integrity – Part 2: Test method for fire with shock at a temperature of at least 830 °C for cables of rated voltage up to and including 0,6/1,0 kV and with an overall diameter not exceeding 20 mm*

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 0,6/1,0 kV*