



TECHNICAL REPORT

**Electrical installations in ships –
Part 370: Guidance on the selection of cables for telecommunication and data
transfer including radio-frequency cables**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.060.20; 47.020.60

ISBN 978-2-8322-7596-2

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

CONTENTS

FOREWORD	3
INTRODUCTION	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Selection of cables	6
5 Fundamental considerations	7
6 Constructional considerations	7
6.1 Selection of conductor	7
6.2 Selection of insulation	7
6.3 Cable elements	7
6.4 Selection of screen, core screen or shield	8
6.5 Selection of outer sheath	8
6.6 Selection of metallic sheath (covering), braid or armour	8
7 Marking	8
8 Guidance on the selection of appropriate tests	9
9 Guide to use	9
9.1 Purpose	9
9.2 General	9
9.3 Voltage rating	10
9.3.1 Data and telecommunication cables	10
9.3.2 High-frequency radio communications cables	10
9.4 Current ratings	10
9.5 Thermal considerations	10
9.6 Size of conductors	10
9.7 Radius of bend	11
9.8 Tensile stress	11
9.9 Compression	11
9.10 Mechanical damage	11
9.11 Electromagnetic interference	12
9.12 Terminations	12
9.13 Joints	12
10 Performance in a fire	12
Annex A (informative) Table of tests	14
Bibliography	17
Table 1 – Classification of cables by frequency range	9
Table A.1 – Table of tests for cables according to the standard IEC 60092-370	14

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSTALLATIONS IN SHIPS –

Part 370: Guidance on the selection of cables for telecommunication and data transfer including radio-frequency cables

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.

The main task of IEC technical committees is to prepare International Standards. However, a technical committee may propose the publication of a Technical Report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 60092-370, which is a Technical Report, 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 second edition cancels and replaces the first edition published in 2009. This edition constitutes a technical revision.

This edition includes the following significant technical change with respect to the previous edition: 30 V AC was added in voltage rating for data cables.

The text of this Technical Report is based on the following documents:

Draft TR	Report on voting
18A/421/DTR	18A/422/RVDTR

Full information on the voting for the approval of this Technical Report 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 of 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.

INTRODUCTION

IEC 60092 (all parts) concerns electrical installations in sea-going ships, and fixed and mobile offshore units, incorporating good practice and co-ordinating as far as possible existing rules.

These standards form a code of practical interpretation and amplification of the requirements of the International Convention on Safety of Life at Sea, a guide for future regulations which may be prepared and a statement of practice for use by shipowners, shipbuilders, mobile and fixed offshore units owners and builders and appropriate organisations.

Cables selected for installation on board ships and on offshore installations are usually installed and are expected to operate in much harsher environments than equivalent land based types. The risk of mechanical abuse during installation, physical dislocation due to tension and bending allied with extremes of temperature are examples of the conditions to which these cables may be subject. If faults occur unlike onshore installations, trained experienced technicians may not always be readily available to affect a repair or replacement.

ELECTRICAL INSTALLATIONS IN SHIPS –

Part 370: Guidance on the selection of cables for telecommunication and data transfer including radio-frequency cables

1 Scope

This part of IEC 60092, which is a Technical Report, gives guidance and lays down the basic recommendations for the selection and installation of shipboard and offshore unit cables intended for electrical systems used in both essential and non-essential analogue or digital signal communication, transmission and control networks, including types suitable for high-frequency signals (i.e. signals with a frequency of more than 10^5 Hz). These cables are not suitable for direct connection to low impedance supplies. Where such cables are required, attention is drawn to IEC 60092-353.

Cables intended to have limited circuit integrity (fire resistance) when affected by fire are not covered by this document.

Fibre optical cables are not included.

Sub-sea or umbilical cables are not included.

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