



IEC 60092-353

Edition 4.0 2016-09
REDLINE VERSION

INTERNATIONAL STANDARD



**Electrical installations in ships –
Part 353: Power cables for rated voltages 1 kV and 3 kV**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 29.060.20; 47.020.60

ISBN 978-2-8322-3652-9

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	8
4 General requirements	8
4.1 Rated voltage	8
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	9
5 Constructional requirements	9
5.1 General description	9
5.1.1 Overview	9
5.1.2 Unarmoured cables (excluding 1,8/3 kV)	9
5.1.3 Armoured cables	9
5.2 Conductors	10
5.3 Insulation	10
5.3.1 Material	10
5.3.2 Application	11
5.3.3 Thickness of insulation	11
5.4 Cabling (including fillers and binders)	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 Construction	12
5.6.2 Application	13
5.7 Inner sheath	13
5.7.1 Material	13
5.7.2 Application	13
5.7.3 Thickness of inner sheath	13
5.8 Braid armour	14
5.8.1 General	14
5.8.2 Braid wire diameter	14
5.8.3 Coverage density	14
5.8.4 Application of the armour	14
5.9 Outer sheath	14
5.9.1 Material	14
5.9.2 Application	14
5.9.3 Thickness of outer sheath	15
5.9.4 Colour of outer sheath	15
6 Tests – Methods and requirements	15
Annex A (informative) Alternative enhanced insulation thickness for 0,6/1 kV	19
Annex B (informative) Identification of cores of multicore cables	20
B.1 Inscription	20

B.2	Arrangement of the marks	20
B.3	Spacing and dimensions of the marks	20
B.4	Appearance of inscription	21
Bibliography		22
Figure B.1	– Arrangement of the marks	20
Table 1	– Insulation thickness	11
Table 2	– Thickness of extruded inner covering and fictitious diameters.....	12
Table 3	– Requirements of drain wire	13
Table 4	– Tests applicable to all cables (<i>1 of 2</i>)	16
Table 5	– Additional tests required for halogen-free cables	17
Table 6	– Additional test required for low smoke cables	18
Table 7	– Additional tests required for fire resistant cables	18
Table 8	– Additional tests required for specific performances.....	18
Table A.1	– Alternative enhanced insulation thickness for 0,6/1 kV	19
Table B.1	– Dimensions of the marks	21

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSTALLATIONS IN SHIPS –

Part 353: Power cables for rated voltages 1 kV and 3 kV

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.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60092-353 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 fourth edition cancels and replaces the third edition published in 2011. This edition constitutes a technical revision.

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

- a) updated references to IEC 60092-350 for general construction and test methods and IEC 60092-360 for insulating and sheathing materials.

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

FDIS	Report on voting
18A/399/FDIS	18A/400/RVD

Full information on the voting for the approval of this document 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.

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

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

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

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

ELECTRICAL INSTALLATIONS IN SHIPS –

Part 353: Power cables for rated voltages 1 kV and 3 kV

1 Scope and object

This part of IEC 60092 is applicable to shipboard and offshore non radial field power cables with extruded solid insulation, having a voltage rating of 0,6/1 (1,2) kV ~~and~~ or 1,8/3 (3,6) kV intended for fixed installations.

Cables ~~for use in circuits requiring resistance to~~ designed to maintain circuit integrity during fire are included.

The various types of power cables are given in 5.1. The constructional requirements and test methods ~~shall comply~~ are aligned with those indicated in IEC 60092-350, unless otherwise specified in this document.

The object of this document is

- to standardize cables whose safety and reliability is ensured when they are installed in accordance with the requirements of IEC 60092-352 or IEC 61892-4,
- 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 60038:2009, IEC standard voltages~~

IEC 60050-461:2008, *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 60092-351, Electrical installations in ships – Part 351: Insulating materials for shipboard and offshore units, power, control, instrumentation, telecommunication and data cables~~

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

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

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

IEC 60228:2004, *Conductors of insulated cables*

IEC 60331-1:~~2009~~, 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:~~2009~~, 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 60331-11:1999, Tests for electric cables under fire conditions – Circuit integrity – Part 11: Apparatus – Fire alone at a flame temperature of at least 750 °C
Amendment 1 (2009)¹~~

IEC 60331-21:~~1999~~, 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

IEC 60332-1-2:~~2004~~, Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame

IEC 60332-3-22:~~2000~~, Tests on electric cables **and optical fibre cables** under fire conditions – Part 3-22: Test for vertical flame spread of vertically-mounted bunched wires or cables – Category A
~~Amendment 1 (2008)²~~

IEC 60445:~~2010~~, Basic and safety principles for man-machine interface, marking and identification – Identification of equipment terminals, conductor terminations and conductors

IEC 60684-2:~~1997~~, Flexible insulating sleeving – Part 2: Methods of test
~~Amendment 1 (2003)³~~

IEC 60754-1:~~1994~~, Test on gases evolved during combustion of materials from cables – Part 1: Determination of the ~~amount of~~ halogen acid gas **content**

IEC 60754-2:~~1994~~, Test on gases evolved during combustion of ~~electric materials from~~ cables – Part 2: Determination of ~~degree of acidity of gases evolved during the combustion of materials taken from electric cables by measuring pH~~ **acidity (by pH measurement)** and conductivity
~~Amendment 1 (1997)~~

~~IEC 61034-1:2005, Measurement of smoke density of cables burning under defined conditions – Part 1: Test apparatus~~

IEC 61034-2:~~2005~~, Measurement of smoke density of cables burning under defined conditions – Part 2: Test procedure and requirements

~~IEC 61892-4, Mobile and fixed offshore units – Electrical installations – Part 4: Cables~~

¹ ~~There exists a consolidated edition (1.1) which includes IEC 60331-11:1999 and its amendment 1.~~

² ~~There exists a consolidated edition (1.1) which includes IEC 60332-3-22:2000 and its amendment 1.~~

³ ~~There exists a consolidated edition (2.1) which includes IEC 60684-2:1997 and its amendment 1 and its corrigendum.~~

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Electrical installations in ships –
Part 353: Power cables for rated voltages 1 kV and 3 kV**

**Installations électriques à bord des navires –
Partie 353: Câbles d'énergie pour les tensions assignées 1 kV et 3 kV**



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 cables (excluding 1,8/3 kV)	8
5.1.3 Armoured cables.....	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 (including fillers and binders).....	11
5.5 Inner covering.....	11
5.5.1 General	11
5.5.2 Thickness of inner covering.....	11
5.6 Screen.....	12
5.6.1 Construction	12
5.6.2 Application.....	13
5.7 Inner sheath	13
5.7.1 Material	13
5.7.2 Application.....	13
5.7.3 Thickness of inner sheath	13
5.8 Braid armour.....	13
5.8.1 General	13
5.8.2 Braid wire diameter.....	14
5.8.3 Coverage density	14
5.8.4 Application of the armour	14
5.9 Outer sheath.....	14
5.9.1 Material	14
5.9.2 Application.....	14
5.9.3 Thickness of outer sheath	14
5.9.4 Colour of outer sheath	15
6 Tests – Methods and requirements	15
Annex A (informative) Alternative enhanced insulation thickness for 0,6/1 kV	18
Annex B (informative) Identification of cores of multicore cables.....	19
B.1 Inscription.....	19

B.2	Arrangement of the marks	19
B.3	Spacing and dimensions of the marks	19
B.4	Appearance of inscription	20
Bibliography		21
Figure B.1 – Arrangement of the marks		19
Table 1 – Insulation thickness		11
Table 2 – Thickness of extruded inner covering and fictitious diameters		12
Table 3 – Requirements of drain wire		12
Table 4 – Tests applicable to all cables (<i>1 of 2</i>)		15
Table 5 – Additional tests required for halogen-free cables		16
Table 6 – Additional test required for low smoke cables		17
Table 7 – Additional test required for fire resistant cables		17
Table 8 – Additional tests required for specific performances		17
Table A.1 – Alternative enhanced insulation thickness for 0,6/1 kV		18
Table B.1 – Dimensions of the marks		20

INTERNATIONAL ELECTROTECHNICAL COMMISSION

ELECTRICAL INSTALLATIONS IN SHIPS –**Part 353: Power cables for rated voltages 1 kV and 3 kV**

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 60092-353 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 fourth edition cancels and replaces the third edition published in 2011. This edition constitutes a technical revision.

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

- a) updated references to IEC 60092-350 for general construction and test methods and IEC 60092-360 for insulating and sheathing materials.

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

FDIS	Report on voting
18A/399/FDIS	18A/400/RVD

Full information on the voting for the approval of this document 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.

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

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

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

ELECTRICAL INSTALLATIONS IN SHIPS –

Part 353: Power cables for rated voltages 1 kV and 3 kV

1 Scope and object

This part of IEC 60092 is applicable to shipboard and offshore non radial field power cables with extruded solid insulation, having a voltage rating of 0,6/1 (1,2) kV or 1,8/3 (3,6) kV intended for fixed installations.

Cables designed to maintain circuit integrity during fire are included.

The various types of power cables are given in 5.1. 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 standardize cables whose safety and reliability is ensured when they are installed in accordance with the requirements of IEC 60092-352 or IEC 61892-4,
- 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 60092-360, *Electrical installations in ships – Part 360: Insulating and sheathing materials for shipboard and offshore units, power, control, instrumentation and telecommunication cables*

IEC 60228, *Conductors of insulated 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*

IEC 60332-1-2, *Tests on electric and optical fibre cables under fire conditions – Part 1-2: Test for vertical flame propagation for a single insulated wire or cable – Procedure for 1 kW pre-mixed flame*

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

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

IEC 60684-2, *Flexible insulating sleeving – Part 2: Methods of test*

IEC 60754-1, *Test on gases evolved during combustion of materials from cables – Part 1: Determination of the halogen acid gas content*

IEC 60754-2, *Test on gases evolved during combustion of materials from cables – Part 2: Determination of acidity (by pH measurement) and conductivity*

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

SOMMAIRE

AVANT-PROPOS.....	24
1 Domaine d'application et objet.....	26
2 Références normatives.....	26
3 Termes et définitions.....	27
4 Exigences générales.....	27
4.1 Tension assignée.....	27
4.2 Marquages.....	28
4.2.1 Indication de l'origine et indication de tension.....	28
4.2.2 Continuité du marquage.....	28
4.2.3 Identification des conducteurs.....	28
5 Exigences de construction.....	28
5.1 Description générale.....	28
5.1.1 Vue d'ensemble.....	28
5.1.2 Câbles non armés (à l'exclusion de 1,8/3 kV).....	29
5.1.3 Câbles armés.....	29
5.2 Âmes conductrices.....	30
5.3 Isolation.....	30
5.3.1 Matériau.....	30
5.3.2 Application.....	30
5.3.3 Épaisseur de l'enveloppe isolante.....	30
5.4 Assemblage (y compris les bourrages et rubans de maintien).....	31
5.5 Revêtement d'assemblage.....	31
5.5.1 Généralités.....	31
5.5.2 Épaisseur du revêtement d'assemblage.....	32
5.6 Écran.....	32
5.6.1 Construction.....	32
5.6.2 Application.....	33
5.7 Gaine interne.....	33
5.7.1 Matériau.....	33
5.7.2 Application.....	33
5.7.3 Épaisseur de la gaine interne.....	33
5.8 Armure tressée.....	33
5.8.1 Généralités.....	33
5.8.2 Diamètre du fil de la tresse.....	34
5.8.3 Densité de surface.....	34
5.8.4 Application de l'armure.....	34
5.9 Gaine externe.....	34
5.9.1 Matériau.....	34
5.9.2 Application.....	34
5.9.3 Épaisseur de la gaine externe.....	34
5.9.4 Couleur de la gaine externe.....	35
6 Essais – Méthodes et exigences.....	35
Annexe A (informative) Autres épaisseurs renforcées pour des enveloppes isolantes 0,6/1 kV.....	38
Annexe B (informative) Identification des conducteurs des câbles multipolaires.....	39

B.1	Inscription	39
B.2	Disposition des marques	39
B.3	Espacement et dimensions des marques	39
B.4	Aspect de l'inscription	40
Bibliographie		41
Figure B.1 – Disposition des marques		39
Tableau 1 – Épaisseur de l'enveloppe isolante		31
Tableau 2 – Épaisseur du revêtement d'assemblage extrudé et diamètres fictifs		32
Tableau 3 – Exigences relatives au fil de continuité		32
Tableau 4 – Essais applicables à tous les câbles (1 de 2)		35
Tableau 5 – Essais supplémentaires exigés pour les câbles sans halogène		36
Tableau 6 – Essai supplémentaire exigé pour les câbles à faible émission de fumée		37
Tableau 7 – Essais supplémentaires exigés pour les câbles résistants au feu		37
Tableau 8 – Essais supplémentaires exigés pour performances spécifiques		37
Tableau A.1 – Autres épaisseurs renforcées pour des enveloppes isolantes 0,6/1 kV		38
Tableau B.1 – Dimensions des marques		40

COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

INSTALLATIONS ÉLECTRIQUES À BORD DES NAVIRES –

Partie 353: Câbles d'énergie pour les tensions assignées 1 kV et 3 kV

AVANT-PROPOS

- 1) La Commission Électrotechnique Internationale (IEC) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de l'IEC). L'IEC a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. À cet effet, l'IEC – entre autres activités – publie des Normes internationales, des Spécifications techniques, des Rapports techniques, des Spécifications accessibles au public (PAS) et des Guides (ci-après dénommés "Publication(s) de l'IEC"). Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec l'IEC, participent également aux travaux. L'IEC collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
- 2) Les décisions ou accords officiels de l'IEC concernant les questions techniques représentent, dans la mesure du possible, un accord international sur les sujets étudiés, étant donné que les Comités nationaux de l'IEC intéressés sont représentés dans chaque comité d'études.
- 3) Les Publications de l'IEC se présentent sous la forme de recommandations internationales et sont agréées comme telles par les Comités nationaux de l'IEC. Tous les efforts raisonnables sont entrepris afin que l'IEC s'assure de l'exactitude du contenu technique de ses publications; l'IEC ne peut pas être tenue responsable de l'éventuelle mauvaise utilisation ou interprétation qui en est faite par un quelconque utilisateur final.
- 4) Dans le but d'encourager l'uniformité internationale, les Comités nationaux de l'IEC s'engagent, dans toute la mesure possible, à appliquer de façon transparente les Publications de l'IEC dans leurs publications nationales et régionales. Toutes divergences entre toutes Publications de l'IEC et toutes publications nationales ou régionales correspondantes doivent être indiquées en termes clairs dans ces dernières.
- 5) L'IEC elle-même ne fournit aucune attestation de conformité. Des organismes de certification indépendants fournissent des services d'évaluation de conformité et, dans certains secteurs, accèdent aux marques de conformité de l'IEC. L'IEC n'est responsable d'aucun des services effectués par les organismes de certification indépendants.
- 6) Tous les utilisateurs doivent s'assurer qu'ils sont en possession de la dernière édition de cette publication.
- 7) Aucune responsabilité ne doit être imputée à l'IEC, à ses administrateurs, employés, auxiliaires ou mandataires, y compris ses experts particuliers et les membres de ses comités d'études et des Comités nationaux de l'IEC, pour tout préjudice causé en cas de dommages corporels et matériels, ou de tout autre dommage de quelque nature que ce soit, directe ou indirecte, ou pour supporter les coûts (y compris les frais de justice) et les dépenses découlant de la publication ou de l'utilisation de cette Publication de l'IEC ou de toute autre Publication de l'IEC, ou au crédit qui lui est accordé.
- 8) L'attention est attirée sur les références normatives citées dans cette publication. L'utilisation de publications référencées est obligatoire pour une application correcte de la présente publication.
- 9) L'attention est attirée sur le fait que certains des éléments de la présente Publication de l'IEC peuvent faire l'objet de droits de brevet. L'IEC ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de brevets et de ne pas avoir signalé leur existence.

La Norme internationale IEC 60092-353 a été établie par le sous-comité 18A: Câbles électriques pour navires et unités mobiles et fixes en mer, du comité d'études 18 de l'IEC: Installations électriques des navires et des unités mobiles et fixes en mer.

Cette quatrième édition annule et remplace la troisième édition parue en 2011. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) mise à jour des références à l'IEC 60092-350 pour la construction générale et les méthodes d'essai et à l'IEC 60092-360 pour les matériaux d'isolation et de gainage.

Le texte de ce document est issu des documents suivants:

FDIS	Rapport de vote
18A/399/FDIS	18A/400/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Cette publication a été rédigée selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 60092, publiées sous le titre général *Installations électriques à bord des navires*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives à la publication recherchée. À cette date, la publication sera

- reconduite,
- supprimée,
- remplacée par une édition révisée, ou
- amendée.

INSTALLATIONS ÉLECTRIQUES À BORD DES NAVIRES –

Partie 353: Câbles d'énergie pour les tensions assignées 1 kV et 3 kV

1 Domaine d'application et objet

La présente partie de l'IEC 60092 est applicable aux câbles pour installations à bord des navires et en mer, à champ non radial, à isolement massif extrudé et avec une tension assignée de 0,6/1 (1,2) kV ou de 1,8/3 (3,6) kV destinés aux installations fixes.

Les câbles conçus pour assurer l'intégrité des circuits au cours d'un incendie sont inclus.

Les différents types de câbles d'énergie sont indiqués en 5.1. Leurs exigences de fabrication et leurs méthodes d'essai sont conformes à celles qui sont indiquées dans l'IEC 60092-350 sauf spécification contraire dans le présent document.

L'objet du présent document est

- de normaliser des câbles qui soient sûrs et fiables lorsqu'ils sont installés conformément aux exigences de l'IEC 60092-352 ou de l'IEC 61892-4,
- d'établir les caractéristiques pour de tels câbles et les exigences normalisées relatives à leur fabrication se référant directement ou indirectement à la sécurité, et
- de préciser les méthodes d'essai pour vérifier la conformité à ces exigences.

2 Références normatives

Les documents ci-après, dans leur intégralité ou non, sont des références normatives indispensables à l'application du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60050-461, *Vocabulaire Électrotechnique International – Partie 461: Câbles électriques*

IEC 60092-350:2014, *Installations électriques à bord des navires – Partie 350: Construction générale et méthodes d'essai des câbles d'énergie, de commande et d'instrumentation des navires et des unités mobiles et fixes en mer*

IEC 60092-360, *Installations électriques à bord des navires – Partie 360: Matériaux d'isolation et de gainage des câbles d'alimentation, de commande, d'instrumentation et de télécommunication installés à bord des navires et des unités en mer*

IEC 60228, *Âmes des câbles isolés*

IEC 60331-1, *Essais pour câbles électriques soumis au feu – Intégrité des circuits – Partie 1: Méthode d'essai au feu avec chocs pour les câbles de tension assignée au plus égale à 0,6/1,0 kV et de diamètre externe supérieur à 20 mm, à une température d'au moins 830 °C*

IEC 60331-2, *Essais pour câbles électriques soumis au feu – Intégrité des circuits – Partie 2: Méthode d'essai au feu avec chocs pour les câbles de tension assignée au plus égale à 0,6/1,0 kV et de diamètre externe inférieur ou égal à 20 mm, à une température d'au moins 830 °C*

IEC 60331-21, *Essais de câbles électriques soumis au feu – Intégrité des circuits – Partie 21: Procédures et prescriptions – Câbles de tension assignée jusqu'à et y compris 0,6/1,0 kV*

IEC 60332-1-2, *Essais des câbles électriques et à fibres optiques soumis au feu – Partie 1-2: Essai de propagation verticale de la flamme sur conducteur ou câble isolé – Procédure pour flamme à prémélange de 1 kW*

IEC 60332-3-22, *Essais des câbles électriques et des câbles à fibres optiques soumis au feu – Partie 3-22: Essai de propagation verticale de la flamme des fils ou câbles montés en nappes en position verticale – Catégorie A*

IEC 60445, *Principes fondamentaux et de sécurité pour les interfaces homme-machines, le marquage et l'identification – Identification des bornes de matériels, des extrémités de conducteurs et des conducteurs*

IEC 60684-2, *Gaines isolantes souples – Partie 2: Méthodes d'essai*

IEC 60754-1, *Essai sur les gaz émis lors de la combustion des matériaux prélevés sur câbles – Partie 1: Détermination de la quantité de gaz acide halogéné*

IEC 60754-2, *Essai sur les gaz émis lors de la combustion des matériaux prélevés sur câbles – Partie 2: Détermination de la conductivité et de l'acidité (par mesure du pH)*

IEC 61034-2, *Mesure de la densité de fumées dégagées par des câbles brûlant dans des conditions définies – Partie 2: Procédure d'essai et exigences*