

# JAPANESE INDUSTRIAL STANDARD

Translated and Published by Japanese Standards Association

# $JIS \ C \ 3410^{\,:\,2010}$

# (JCMA/JSA)

# Cables and flexible cords for electrical equipment of ships

ICS 29.060.20;47.020.60 Reference number : JIS C 3410 : 2010 (E)

Date of Establishment: 1961-05-01 Date of Revision: 2010-10-25 Date of Public Notice in Official Gazette: 2010-10-25 Investigated by: Japanese Industrial Standards Committee Standards Board Technical Committee on Electricity Technology

JIS C 3410 : 2010, First English edition published in 2011-09

Translated and published by: Japanese Standards Association 4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

In the event of any doubts arising as to the contents, the original JIS is to be the final authority.

© JSA 2011

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 the publisher.

Printed in Japan

# Contents

# Page

Intro	oduction1
1	Scope1
<b>2</b>	Normative references2
3	Types and symbols2
4	Characteristics9
5	Materials11
5.1	Conductor11
5.2	Insulation
5.3	Glass yarn15
5.4	Fire resistant tape15
5.5	Tape15
5.6	Glass tape15
5.7	Aluminium laminated tape15
5.8	Copper tape15
5.9	Filler
5.10	Sheath
5.11	Armor
5.12	Bituminous compound
5.13	Paint
6	Construction
6.1	Conductor
6.2	Separator20
6.3	Fire resistant layer
6.4	Conductor screen
6.5	Insulation20
6.6	Insulation screen20
6.7	Tape20
6.8	Glass yarn braid21
6.9	Compound for glass yarn braid21
6.10	Identification
6.11	Pair twisting and cabling
6.12	Earth wire
6.13	Shield
6.14	Sheath22
6.15	Bedding
6.16	Metal wire braid
6 17	Protective covering

6.18	Tolerance on overall	diameter24			
7	Test procedure				
7.1	Construction				
7.2	Conductor resistanc	e24			
7.3	Dielectric strength.				
7.4	Insulation resistanc	e24			
7.5	Bending				
7.6	Flame retardance (single cable, cord and insulated wire)				
7.7	Flame retardance (b	ounched cables)25			
7.8	Fire resistance				
7.9	Materials25				
7.10	Partial discharge				
7.11	Partial discharge after bending				
7.12	Tan $\delta$ measurement	as function of voltage27			
7.13	Tan $\delta$ measurement	as function of temperature			
7.14	Heating cycle test plus partial discharge test				
7.15	Power-frequency vol	tage test after impulse withstand test			
8	Inspection2				
9	Packaging29				
10	Designation29				
11	Marking				
11.1	Marking on cable				
11.2	Marking on drum or	c coil 30			
Anne	ex JA (informative)	Current rating of cable53			
Annex JB (informative)		Voltage drop57			
Anne	ex JC (informative)	Short circuit current capacity59			
Anne	ex JD (informative)	Comparison table between JIS and corresponding International Standards61			

## Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry and the Minister of Land, Infrastructure, Transport and Tourism through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by The Japanese Electric Wire and Cable Makers' Association (JCMA) /Japanese Standards Association (JSA) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently, **JIS C 3410** : 1999 has been withdrawn and replaced with this Standard.

This **JIS** document is protected by the Copyright Law.

Attention is drawn to the possibility that some parts of this Standard may conflict with a patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have technical properties. The relevant Ministers and the Japanese Industrial Standards Committee are not responsible for identifying the patent right, application for a patent after opening to the public, utility model right or application for registration of utility model after opening to the public which have the said technical properties.

# Cables and flexible cords for electrical equipment of ships

#### Introduction

This Japanese Industrial Standard has been prepared based on the third edition of **IEC 60092-351** published in 2004, the second edition of **IEC 60092-353** published in 1995 and its Amendment 1 (2001), the second edition of **IEC 60092-354** published in 2003, the first edition of **IEC 60092-359** published in 1987 and its Amendment 1(1994) and Amendment 2 (1999) and the second edition of **IEC 60092-376** published in 2003. The technical contents of the above-mentioned standards have been modified in this Japanese Industrial Standard in order to prepare a standard for cables and flexible cords for ships reflecting the actual circumstances in this country. A list of modifications with explanations is given in Annex JD.

Portions with continuous sidelines or dotted underlines, and Annex JA, Annex JB and Annex JC are the contents not given in the corresponding International Standards.

#### 1 Scope

This Standard covers cables, <u>flexible cords and insulated wires</u> used for electrical installations in ships.

NOTE : The International Standards corresponding to this Standard and the symbol of degree of correspondence are as follows :

IEC 60092-351 : 2004 Electrical installations in ships—Part 351 : Insulating materials for shipboard and offshore units, power, control, instrumentation, telecommunication and data cables

IEC 60092-353: 1995 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 and Amendment 1:2001

IEC 60092-354 : 2003 Electrical installations in ships—Part 354 : Single- and three-core power cables with extruded solid insulation for rated voltages 6 kV ( $U_m$ =7.2 kV) up to 30 kV ( $U_m$ =36 kV)

IEC 60092-359 : 1987 Electrical installations in ships—Part 359 : Sheathing materials for shipboard power and telecommunication cables, and Amendment 1 : 1994 and Amendment 2 : 1999

IEC 60092-376 : 2003 Electrical installations in ships—Part 376 : Cables for control and instrumentation circuits 150/250 V (300 V)

(Overall evaluation : MOD)

The symbols which denote the degree of correspondence in the contents between **JIS** and the corresponding International Standard are IDT (identical), MOD (modified) and NEQ (not equivalent) according to **ISO/IEC Guide 21-1**.

### 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS C 3005 : 2000 Test methods for rubber or plastic insulated wires and cables

JIS C 3411 : 2010 Electrical installations in ships—General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications

NOTE : Corresponding International Standard : **IEC 60092-350** : 2008 Electrical installations in ships—Part 350 : General construction and test methods of power, control and instrumentation cables for shipboard and offshore applications (IDT)

JIS C 3660-1-2: 2003 Common test methods for insulating and sheathing materials of electric and optical cables—Part 1-2: Methods for general application—Thermal ageing methods

- NOTE : Corresponding International Standard : **IEC 60811-1-2** : 1985 Common test methods for insulating and sheathing materials of electric cables— Part 1 : Methods for general application—Section Two : Thermal ageing methods (IDT)
- IEC 60230 : 1966 Impulse tests on cables and their accessories

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 60331-31 : 2002 Tests for electric cables under fire conditions—Circuit integrity—Part 31 : Procedures and requirements for fire with shock—Cables of rated voltage up to and including 0.6/ 1 kV
- IEC 60885-2: 1987 Electrical test methods for electric cables. Part 2: Partial discharge tests

# 3 Types and symbols

The types and symbols of cables are as given in table 1.

The meanings of the letters used in the symbols in this table are as shown in table 2 and table 3.

Type of cable	Symbol	Table No.
0.6/1 kV Single core, ethylene-propylene (EP) rubber insulated, polyvinylchloride (PVC) sheathed and steel wire braided cable	0.6/1 kV SPYC	15
0.6/1 kV Single core, EP rubber insulated, PVC sheathed and steel wire braided cable with PVC protective covering	0.6/1 kV SPYCY	

# Table 1Types and symbols

Type of cable	Symbol	Table No.
0.6/1 kV Single core, EP rubber insulated, PVC sheathed and steel wire braided flame retardant cable	0.6/1 kV FA-SPYC	15
0.6/1 kV Single core, EP rubber insulated, PVC sheathed and steel wire braided flame retardant cable with PVC protective covering	0.6/1 kV FA-SPYCY	
0.6/1 kV Double core, EP rubber insulated and PVC sheathed cable	0.6/1 kV DPY	16
0.6/1 kV Double core, EP rubber insulated, PVC sheathed and steel wire braided cable	0.6/1 kV DPYC	
0.6/1 kV Double core, EP rubber insulated, PVC sheathed and steel wire braided cable with PVC protective covering	0.6/1 kV DPYCY	
0.6/1 kV Double core, EP rubber insulated and PVC sheathed flame retardant cable	0.6/1 kV FA-DPY	
0.6/1 kV Double core, EP rubber insulated, PVC sheathed and steel wire braided flame retardant cable	0.6/1 kV FA-DPYC	
0.6/1 kV Double core, EP rubber insulated, PVC sheathed and steel wire braided flame retardant cable with PVC protective covering	0.6/1 kV FA-DPYCY	
0.6/1 kV Three core, EP rubber insulated and PVC sheathed cable	0.6/1 kV TPY	17
0.6/1 kV Three core, EP rubber insulated, PVC sheathed and steel wire braided cable	0.6/1 kV TPYC	
0.6/1 kV Three core, EP rubber insulated, PVC sheathed and steel wire braided cable with PVC protective covering	0.6/1 kV TPYCY	
0.6/1 kV Three core, EP rubber insulated and PVC sheathed flame retardant cable	0.6/1 kV FA-TPY	
0.6/1 kV Three core, EP rubber insulated, PVC sheathed and steel wire braided flame retardant cable	0.6/1 kV FA-TPYC	
0.6/1 kV Three core, EP rubber insulated, PVC sheathed and steel wire braided flame retardant cable with PVC protective covering	0.6/1 kV FA-TPYCY	
0.6/1 kV Double core, EP rubber insulated, PVC sheathed and steel wire braided cable with common shield	0.6/1 kV DPYCSLA	18
0.6/1 kV Three core, EP rubber insulated, PVC sheathed and steel wire braided cable with common shield	0.6/1 kV TPYCYSLA	
0.6/1 kV Double core, EP rubber insulated, PVC sheathed, steel wire braided and PVC protective covered cable with common shield	0.6/1 kV DPYCYSLA	
0.6/1 kV Three core, EP rubber insulated, PVC sheathed metal with steel wire braided and PVC protective covered cable with common shield.	0.6/1 kV TPYCYSLA	
0.6/1 kV Double core, EP rubber insulated, PVC sheathed and steel wire braided flame retardant cable with common shield	0.6/1 kV FA-DPYCSLA	
0.6/1 kV Three core, EP rubber insulated, PVC sheathed and steel wire braided flame retardant cable with common shield	0.6/1 kV FA-TPYCSLA	

### Table 1(continued)