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STANDARD

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(JCMA)

**Rubber insulated cables—Rated
voltages up to and including
450/750 V—Part 1: General
requirements**

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In the event of any doubts arising as to the contents,
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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Economy, Trade and Industry, 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 & Cable Makers' Association (JCMA) 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 3663-1:2007** is replaced with this Standard.

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JIS C 3663 series consists of the following 8 parts under the general title “*Rubber insulated cables—Rated voltages up to and including 450/750 V*”:

Part 1: General requirements

Part 2: Test methods

Part 3: Heat resistant silicone insulated cables

Part 4: Cords and flexible cables

Part 5: Lift cables

Part 6: Arc welding electrode cables

Part 7: Heat resistant ethylene-vinyl acetate rubber insulated cables

Part 8: Cords for applications requiring high flexibility

Rubber insulated cables—Rated voltages up to and including 450/750 V— Part 1: General requirements

Introduction

This Japanese Industrial Standard has been prepared based on Edition 4.1 of **IEC 60245-1** published in 2008 with some modifications of the technical contents, namely, the conditions of the voltage test, so that they are more suitable for the actuality of the test conducted in Japan.

The portions underlined with dots are the matters in which the contents of the corresponding International Standard have been modified. A list of modifications with the explanations is given in Annex JA.

1 General

1.1 Scope

This Standard specifies the rigid and flexible cables with insulation, and sheath if necessary, based on vulcanized rubber of rated voltages, U_0/U , up to and including 450/750 V used in power installations of nominal voltage not exceeding 450/750 V a.c.

NOTE 1 For some types of flexible cables the term “cord” is used.

The particular types of cables are specified in **JIS C 3663-3**, **JIS C 3663-4** or other standards (hereafter referred to as “particular standards”). The code designation of these types of cables are given in Annex A.

The test methods specified in **JIS C 3663** series shall be in accordance with **JIS C 3665-1-1**, **JIS C 3660-2-1**, and **JIS C 3660** series.

NOTE 2 The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

IEC 60245-1:2008 *Rubber insulated cables—Rated voltages up to and including 450/750 V—Part 1: General requirements* (MOD)

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

1.2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For standards with the year indication, only the editions of the indicated year shall be applied and the revisions (including amendments) made thereafter shall not be applied. For those without the indication of the year, the most recent edition (including amendments) shall be applied.

JIS C 3660-1-1:2003 *Common test methods for insulating and sheathing materials of electric and optical cables—Part 1-1: Methods for general application—Measurement of thickness and overall dimensions—Tests for determining the mechanical properties*

NOTE : Corresponding International Standard: IEC 60811-1-1:1993 *Common test methods for insulating and sheathing materials of electric cables—Part 1: Methods for general application—Section 1: Measurement of thickness and overall dimensions—Tests for determining the mechanical properties* (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)

JIS C 3660-1-4:2003 *Common test methods for insulating and sheathing materials of electric and optical cables—Part 1-4: Methods for general application—Test at low temperature*

NOTE : Corresponding International Standard: IEC 60811-1-4:1985 *Common test methods for insulating and sheathing materials of electric cables—Part 1: Methods for general application—Section Four: Tests at low temperature* (IDT)

JIS C 3660-2-1:2003 *Common test methods for insulating and sheathing materials of electric and optical cables—Part 2-1: Methods specific to elastomeric compounds—Ozone resistance, hot set and mineral oil immersion tests*

NOTE : Corresponding International Standard: IEC 60811-2-1:1998 *Insulating and sheathing materials of electric and optical cables—Common test methods—Part 2-1: Methods specific to elastomeric compounds—Ozone resistance, hot set and mineral oil immersion tests* (IDT)

JIS C 3660-3-1:2003 *Common test methods for insulating and sheathing materials of electric and optical cables—Part 3-1: Methods specific to PVC compounds—Pressure test at high temperature—Test for resistance to cracking*

NOTE : Corresponding International Standard: IEC 60811-3-1:1985 *Common test methods for insulating and sheathing materials of electric cables—Part 3: Methods specific to PVC compounds—Section One: Pressure test at high temperature—Tests for resistance to cracking* (IDT)

JIS C 3663-2:2003 *Rubber insulated cables—Rated voltages up to and including 450/750 V—Part 2: Test methods*

NOTE : Corresponding International Standard: IEC 60245-2:1994 *Rubber insulated cables—Rated voltages up to and including 450/750 V—Part 2: Test methods* (MOD)

JIS C 3663-3:2003 *Rubber insulated cables—Rated voltages up to and including 450/750 V—Part 3: Heat resistant silicone insulated cables*

NOTE : Corresponding International Standard: IEC 60245-3:1994 *Rubber insulated cables—Rated voltages up to and including 450/750 V—Part 3: Heat resistant silicone insulated cables* (IDT)

JIS C 3663-4:2007 *Rubber insulated cables—Rated voltages up to and including 450/750 V—Part 4: Cords and flexible cables*

NOTE : Corresponding International Standard: IEC 60245-4:1994 *Rubber insulated cables—Rated voltages up to and including 450/750 V—Part 4: Cords and flexible cables* (MOD)

JIS C 3663-7:2001 *Rubber insulated cables—Rated voltages up to and including 450/750 V—Part 7: Heat resistant ethylene-vinyl acetate rubber insulated cables*

NOTE : Corresponding International Standard: IEC 60245-7:1994 *Rubber insulated cables—Rated voltages up to and including 450/750 V—Part 7: Heat resistant ethylene-vinyl acetate rubber insulated cables* (MOD)

JIS C 3664:2007 *Conductors of insulated cables*

NOTE : Corresponding International Standard: IEC 60228:1978 *Conductors of insulated cables* (IDT)

The above **JIS** normative reference is a standard corresponding to the most recent edition of the above **IEC**, namely **IEC 60228:2004**; there is no deviation in the technical contents of the cited matter between the two editions.

JIS C 3665-1-1:2007 *Tests on electric and optical fibre cables under fire conditions—Part 1-1: Test for vertical flame propagation for a single insulated wire or cable—Apparatus*

NOTE : Corresponding International Standard: IEC 60332-1:1993 *Tests on electric cables under fire conditions—Part 1: Test on a single vertical insulated wire or cable* (IDT)

The above **JIS** normative reference is a standard corresponding to the most recent edition of the above **IEC**, namely **IEC 60332-1-1:2004**; there is no deviation in the technical contents of the cited matter between the two editions.

JIS C 3665-1-2:2007 *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 1kW pre-mixed flame*

IEC 60173:1964 *Colours of the cores of flexible cables and cords*

IEC 62440 *Electric cables with a rated voltage not exceeding 450/750 V—Guide to use*

2 Terms and definitions

For the purpose of this Standard, the following terms and definitions apply.

2.1 Definitions relating to insulating and sheathing materials

2.1.1 type of compound

category in which a compound is placed according to its properties, as determined by specific tests

NOTE : The type designation is not directly related to the composition of the compound.

2.1.2 rubber compound

combination of materials suitably selected, proportioned, treated and vulcanized, of which the characteristic constituent is a rubber and/or synthetic elastomer

NOTE : Vulcanization is defined as a post-application treatment taking place after the insulation and/or sheath has been applied in order to induce permanent cross-linking of the elastomer.

2.1.3 polychloroprene compound (PCP) or other equivalent synthetic elastomer

vulcanized compound in which the elastomer is polychloroprene or other equivalent synthetic elastomer providing a compound with properties similar to PCP

2.1.4 ethylene-vinyl acetate rubber compound (EVA) or other equivalent synthetic elastomer

cross-linked compound in which the elastomer is ethylene-vinyl acetate or other equivalent synthetic elastomer providing a compound with properties similar to EVA

2.1.5 ethylene-propylene rubber compound (EPR) or equivalent synthetic elastomer

cross-linked compound in which the elastomer is ethylene-propylene or equivalent synthetic elastomer providing a compound with properties similar to EPR

2.1.6 cross-linked polyvinyl chloride (XLPVC)

combinations of materials of which polyvinyl chloride is the characteristic constituent, including adequate cross-linking agents, suitably selected, proportioned and treated which, when cross-linked, meet the requirements given in the particular standard

2.2 Definitions relating to the tests

2.2.1 type tests (symbol T)

tests required to be made before supplying a type of cable covered by this Standard on a general commercial basis, in order to demonstrate satisfactory performance characteristics to meet the intended application

NOTE : These tests are of such a nature that, after they have been made, they need not be repeated, unless changes have been made in the cable materials or design which might change the performance characteristics.

2.2.2 sample tests (symbol S)

tests made on samples of completed cable, or components taken from a completed cable, adequate to verify that the finished product meets the design specifications

2.3 rated voltage, U_0/U

reference voltage for which the cable is designed, and which serves to define the electrical tests

NOTE 1 The rated voltage is expressed by the combination of two values, U_0 and U (U_0/U).

U_0 : the r.m.s. value between any insulated conductor and “earth” (metal covering of the cable or the surrounding medium)

U : the r.m.s. value between any two phase conductors of a multicore cable or of a system of single-core cables

In an alternating-current system, the rated voltage of a cable is at least equal to the nominal voltage of the system for which it is intended

This condition applies both to the value U_0 and to the value U .

In a direct current system, the nominal voltage of the system is not higher than 1.5 times the rated voltage of the cable.

NOTE 2 The operating voltage of a system may permanently exceed the nominal voltage of such a system by 10 %. A cable can be used at a 10 % higher operating voltage than its rated voltage if the latter is at least equal to the nominal voltage of the system

3 Marking

3.1 Indication of origin and cable identification

Cables shall be provided with an indication of the manufacturer, which shall be either a repetitive marking of the manufacturer's name or trademark, or an indication thread.

Marking may be by printing or by reproduction in relief on, or in, the insulation or sheath, or by printing on a proofed tape or a separate marker tape.

3.1.1 Continuity of marks

Each specified mark shall be regarded as continuous if the distance between the end of the mark and the beginning of the next identical mark does not exceed:

- 550 mm, if the marking is on the outer sheath of the cable;
- 275 mm, if the marking is:
 - a) on the insulation of an unsheathed cable, or;
 - b) on the insulation of a sheathed cable, or;
 - c) on a tape within a sheathed cable.

3.2 Durability

Printed markings shall be durable. Compliance with this requirement shall be checked by the test given in 1.8 of JIS C 3663-2.