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(IEIEJ)

**Conduit systems—
Part 1: General requirements**

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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 Institute of Electrical Installation Engineers of Japan (IEIEJ) 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 8461-1:2005** is replaced with this Standard.

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JIS C 8461 series consists of the following four parts under the general title “*Conduit systems*”:

Part 1: General requirements

Part 21: Particular requirements—Rigid conduit systems

Part 22: Particular requirements—Pliable conduit systems

Part 23: Particular requirements—Flexible conduit systems

Conduit systems—

Part 1: General requirements

Introduction

This Japanese Industrial Standard has been prepared based on the second edition of **IEC 61386-1** published in 2008 with some modifications of the technical contents.

The portions given sidelines or dotted underlines 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 Scope

This Standard specifies requirements and tests for conduit systems, including conduits and conduit fittings, for the protection and management of insulated conductors and/or cables in electrical installations or in communication systems up to 1 000 V a.c. and/or 1 500 V d.c. This Standard applies to metallic, non-metallic and composite conduit systems, including threaded and non-threaded entries which terminate the system. This Standard does not apply to enclosures and connecting boxes which come within the scope of **JIS C 8462** series.

NOTE 1 Certain conduit systems may also be suitable for use in hazardous atmospheres. Regard should then be taken of the extra requirements necessary for equipment to be installed in such conditions.

NOTE 2 Earthing conductors may or may not be insulated.

NOTE 3 This Standard, **JIS C 8461-21**, **JIS C 8461-22** and **JIS C 8461-23** may also apply to a conduit or conduit fittings used in conduit systems.

NOTE 4 The International Standard corresponding to this Standard and the symbol of degree of correspondence are as follows.

IEC 61386-1:2008 *Conduit systems for cable management—Part 1: General requirements* (MOD)

In addition, 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**.

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 0920:2003 *Degrees of protection provided by enclosures (IP Code)*

NOTE : Corresponding International Standard: IEC 60529:2001 *Degrees of protection provided by enclosures (IP Code)* (IDT)

JIS C 60695-2-11:2004 *Fire hazard testing—Glow-wire flammability test method for end-products*

NOTE : Corresponding International Standard: IEC 60695-2-11:2000 *Fire hazard testing—Part 2-11: Glowing /hot-wire based test methods—Glow-wire flammability test method for end-products* (IDT)

JIS C 60695-11-2:2007 *Fire hazard testing—Part 11-2: Test flames—1 kW nominal pre-mixed flame—Apparatus, confirmatory test arrangement and guidance*

NOTE : Corresponding International Standard: IEC 60695-11-2:2003 *Fire hazard testing—Part 11-2: Test flames—1 kW nominal pre-mixed flame—Apparatus, confirmatory test arrangement and guidance* (IDT)

JIS K 8594 *Petroleum benzine*

JIS S 6006 *Pencil, coloured pencils and leads for them*

IEC 60417 *Graphical symbols for use on equipment*

IEC 60423:2007 *Conduit systems for cable management—Outside diameters of conduits for electrical installations and threads for conduits and fittings*

3 Terms and definitions

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

3.1 conduit system

cable management system consisting of conduits and conduit fittings for the protection and management of insulated conductors and/or cables in electrical or communication installations, allowing them to be drawn in and/or replaced, but not to be inserted laterally

3.2 conduit

part of a conduit system of circular cross-section for insulated conductors and/or cables in electrical or communication installations, allowing them to be drawn in and/or replaced

3.3 conduit fitting

device designed to join components of a conduit system, or for them to change direction

3.4 terminating conduit fitting

conduit fitting that terminates a conduit system

3.5 metallic conduit and/or conduit fitting

conduit or conduit fitting which consists of metal only

3.6 non-metallic conduit and/or conduit fitting

conduit or conduit fitting which consists uniquely of non-metallic material and which has no metallic components whatsoever

3.7 composite conduit and/or conduit fitting

conduit or conduit fitting comprising both metallic and non-metallic materials

3.8 non-flame propagating conduit and/or conduit fitting

conduit or conduit fitting which is liable to catch fire as a result of an applied flame, but in which the flame does not propagate, and which extinguishes itself within a limited time after the flame is removed

3.9 plain conduit

conduit in which the profile is even in the longitudinal section (see NOTE to **3.10**)

3.10 corrugated conduit

conduit in which the profile is corrugated in the longitudinal section

NOTE : Both annular and helical corrugated conduits are permissible, and a combination of both corrugated and plain conduit is possible.

3.11 rigid conduit

conduit which cannot be bent, or which can only be bent with the help of a mechanical aid, with or without special treatment

3.12 pliable conduit

conduit which can be bent by hand with reasonable force, and which is not intended for frequent flexing

3.13 flexible conduit

conduit which can be bent by hand with reasonable small force, and which is intended to flex frequently throughout its life

3.14 self-recovering conduit

pliable conduit which deforms when a transverse force is applied for a short time and which, after removal of this force, returns close to its original shape within a further short time

3.15 threadable conduit and conduit fitting

conduit and conduit fittings which carry a thread for connection, or in or on which a thread can be formed

3.16 non-threadable conduit and conduit fitting

conduit and conduit fittings which are suitable for connection only by means other than threads

3.17 external influence

factors which may affect the conduit system

NOTE : Examples of such factors are a presence of water, oil or building materials, low and high temperatures, and corrosive or polluting substances.

4 General requirements

4.1 Conduit and conduit fittings shall be so designed and constructed that in normal use their performance is reliable and they provide protection to the user or surroundings.

When assembled in accordance with manufacturer's instructions as part of a conduit system, conduits and conduit fittings shall provide mechanical and, where required, electrical protection of the insulated conductors and cables contained therein.

4.2 The protective properties of the joint between the conduit and conduit fitting shall not be less than that declared for the conduit system.

4.3 Conduit and conduit fittings shall withstand the stresses likely to occur during transport, storage, recommended installation practice and application.

4.4 Compliance is checked by all relevant requirements and tests.

5 General conditions for tests

5.1 Tests in accordance with this Standard are type tests. Conduit systems, having the same classification, which can vary in colour only, shall be the same product type.

5.2 Unless otherwise specified, the tests shall be carried out at an ambient temperature of (20 ± 5) °C.

5.3 Unless otherwise specified, each test shall be made on three new samples, which may be taken from one length.

NOTE : Certain tests, for instance the checking of dimensions, do not affect a change in the property of the samples; therefore these samples are considered as new samples and can be used for further tests.

5.4 Samples of non-metallic and composite conduits and conduit fittings shall be conditioned for at least 240 h, at a temperature of (23 ± 2) °C and a relative humidity between 40 % and 60 %. All tests shall be carried out immediately after general conditioning. However, this does not apply to samples which pass the tests without conditioning.

5.5 Unless otherwise specified, the samples for each test shall be in a clean and new condition, with all parts in place and mounted as in normal use. After checking dimensions in accordance with clause 8, and unless otherwise specified in the relevant test, the conduit fittings shall be assembled with adequate lengths of conduit of the type for which they are intended. Due regard shall be taken of the manufacturer's instructions, especially where force is required in the assembly of the joint.

NOTE : Where similarities are claimed, the selection of representative fittings for test purposes can be agreed between the manufacturer, or responsible vendor, and the testing station.

5.6 Where the conduit entries are part of the detachable or loose type conduit fitting, the detachable conduit fitting shall be capable of being assembled again, after the test, according to the manufacturer's instructions without loss of the declared properties according to clause 6.

5.7 Unless otherwise specified, three samples are subjected to the tests, and the requirements are satisfied if the tests are met.

If only one of the samples does not satisfy a test, due to an assembly or a manufacturing defect, that test and any preceding one which may have influenced the result of the test shall be repeated, and also the tests which follow shall be carried out in the required sequence on another full set of samples, all of which shall comply with the requirements.

NOTE : If the additional set of samples is not submitted at the same time, a failure of one sample will entail a rejection. The applicant, when submitting the first set of samples, may also submit an additional set of samples which may be used, should one sample fail. The testing station will then, without further request, test the additional set of samples and will reject them only if a further failure occurs.

5.8 When toxic or hazardous processes are used, due regard shall be taken of the safety of the persons within the test area.

5.9 Conduit systems which are used as an integral part of other equipment shall also be tested in accordance with the relevant standard for that equipment.

6 Classification

NOTE : Annex A shows the classification coding format for declared properties of the conduit system, which may be incorporated in the manufacturer's literature.

6.1 According to mechanical properties

6.1.1 Resistance to compression

- 1 Very light
- 2 Light
- 3 Medium
- 4 Heavy
- 5 Very heavy

6.1.2 Resistance to impact

- 1 Very light
- 2 Light
- 3 Medium
- 4 Heavy
- 5 Very heavy

6.1.3 Resistance to bending

- 1 Rigid
- 2 Pliable
- 3 Pliable/Self-recovering
- 4 Flexible

6.1.4 Tensile strength

- 1 Very light
- 2 Light
- 3 Medium
- 4 Heavy
- 5 Very heavy

6.1.5 Suspended load capacity

- 1 Very light
- 2 Light
- 3 Medium
- 4 Heavy
- 5 Very heavy

6.2 According to temperature

6.2.1 Classification according to lower temperature range is specified in table 1.

Table 1 Lower temperature range

Classification	Transport, application and installation— Temperature not less than: °C
1	+ 5
2	– 5
3	– 15
4	– 25
5	– 45

6.2.2 Classification according to upper temperature range is specified in table 2.

Table 2 Upper temperature range

Classification	Transport, application and installation— Temperature not more than: °C
1	60
2	90
3	105
4	120
5	150
6	250
7	400

6.3 According to electrical characteristics

6.3.1 With electrical continuity characteristics

6.3.2 With electrical insulating characteristics

6.3.3 With electrical continuity and insulating characteristics

6.4 According to resistance to external influences

6.4.1 Protection against ingress of solid objects: protection in accordance with **JIS C 0920:2003** to a minimum of IP3X

6.4.2 Protection against ingress of water: protection in accordance with **JIS C 0920:2003** to a minimum of IPX0

6.4.3 Resistance against corrosion

6.4.3.1 Without protection

6.4.3.2 With protection as detailed in table 10

6.5 According to resistance to flame propagation

6.5.1 Non-flame propagating

6.5.2 Flame propagating

7 Marking and documentation

7.1 Each conduit shall be marked on the product with the following items.

- a) the manufacturer's or responsible vendor's name or trade mark or identification mark.
- b) a product identification mark, which may be, for example, a catalogue number, a symbol or the like, in such a way that it can be identified in the manufacturer's or responsible vendor's literature.

7.1.1 The conduit may also be marked with the classification code, which shall be in accordance with Annex A, and which shall include at least the first four digits.

7.1.2 The manufacturer shall be responsible for indicating the compatibility of parts within a conduit system.

7.1.3 The manufacturer shall provide in his literature its classification in accordance with clause **6** and all information necessary for the proper and safe transport, storage, installation and use.

7.2 The conduit fitting shall be marked in accordance with **7.1**, on the product wherever possible, but where this is impractical, then the mark may be on a label attached to the product, or on the smallest supplied package.

7.3 Flame propagating material shall be orange in colour. It shall not be coloured orange by painting or other superficial means.

Non-flame propagating material may be of any colour except yellow, orange or red, unless clearly marked on the product to be of non-flame propagating material.

7.4 Earthing facilities shall be indicated by the symbol for protective earth in accordance with **IEC 60417**, symbol **IEC 60147-5019** (2006-08). This marking shall not be placed on easily removable parts, for example screws.

7.5 Compliance with **7.1** to **7.4** is checked by inspection.

7.6 The marking shall be durable and clearly legible.

Compliance is checked by inspection and by rubbing the marking by hand for 15 s with a piece of cloth soaked with water, and again for 15 s with a piece of cloth soaked with petroleum spirit.

After the test, the marking shall be legible.

NOTE 1 Petroleum spirit is defined as the aliphatic solvent hexane with a content of aromatics of maximum 0.1 % volume, a kauri-butanol value of 29, initial boiling point 65 °C, a dry point 69 °C, and density of approximately 0.68 g/cm³.

NOTE 2 Marking may be applied, for example, by moulding, pressing, engraving, printing, adhesive labels or water slide transfers.

NOTE 3 Marking made by moulding, pressing or engraving is not subjected to this test.

8 Dimensions

8.1 Threads and outside diameters, where appropriate, shall comply with **IEC 60423:2007**.

Compliance is checked by means of the gauges specified in **IEC 60423:2007**.

8.2 Other dimensions shall comply with the relevant particular requirements of this Standard.