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**Connecting devices for low-voltage
circuits for household and similar
purposes — Part 2-2: Particular
requirements for connecting devices as
separate entities with screwless-type
clamping units**

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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 based on the Industrial Standardization Law.

Consequently, JIS C 2814-2-2:2001 is replaced with this Standard.

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JIS C 2814 series consists of the following 5 parts under the general title “*Connecting devices for low-voltage circuits for household and similar purposes*”:

Part 1: General requirements

Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units

Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units

Part 2-3: Particular requirements for connecting devices as separate entities with insulation-piercing clamping units

Part 2-4: Particular requirements for twist-on connecting devices

Connecting devices for low-voltage circuits for household and similar purposes — Part 2-2 : Particular requirements for connecting devices as separate entities with screwless-type clamping units

Introduction

This Japanese Industrial Standard has been prepared based on the second edition of IEC 60998-2-2 published in 2002 with some modifications of the technical contents to conform to the power distribution situation in Japan. This Standard shall be used together with JIS C 2814-1: 2009.

The portions given sidelines or dotted underlines are the matters in which the contents of the original International Standard have been modified. A list of modifications with the explanations is given in Annex JC.

1 Scope

Scope given in clause 1 of JIS C 2814-1 and the following shall apply.

This Standard specifies the connecting devices with screwless-type clamping units primarily suitable for connecting unprepared conductors.

In this Standard, screwless-type terminals are referred to as terminals.

NOTE 1 This Standard does not include insulation-piercing connecting devices (JIS C 2814-2-3), twist-on connecting devices (JIS C 2814-2-4) and flat, quick-connect terminations (JIS C 2809).

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

IEC 60998-2-2 : 2002 *Connecting devices for low-voltage circuits for household and similar purposes — Part 2-2 : Particular requirements for connecting devices as separate entities with screwless-type clamping units* (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.

2 Normative references

Normative references given in clause 2 of JIS C 2814-1 and the following shall apply.

JIS C 2814-1 : 2009 *Connecting devices for low-voltage circuits for household and*

similar purposes — Part 1 : General requirements

NOTE : Corresponding International Standard : IEC 60998-1 : 2002 *Connecting devices for low-voltage circuits for household and similar purposes — Part 1 : General requirements* (MOD)

3 Terms and definitions

For the purposes of this Standard, the terms and definitions given in clause 3 of JIS C 2814-1 and the following shall apply.

3.101 screwless-type terminal

terminal for the connection and disconnection of two or more conductors, and the connection thereof shall be made directly or indirectly by means of springs, wedges, or the like

NOTE : Examples of screwless-type terminals are given in figure 102.

3.101.1 universal terminal

terminal for the connection and disconnection of all types of conductors (rigid and flexible)

3.101.2 non-universal terminal

terminal for the connection and disconnection of a certain type of conductor only [for example, solid conductors only or rigid (solid or stranded) conductors only]

3.101.3 push-wire terminal

non-universal terminal in which the connection is made by pushing in rigid (solid or stranded) conductors

4 General

General shall be in accordance with clause 4 of JIS C 2814-1.

5 General notes on tests

General notes on tests shall be in accordance with clause 5 of JIS C 2814-1, provided that 5.3 and 5.4 shall be in accordance with this Standard.

5.3 The tests shall be carried out in the sequence shown in Annex AA for each set.

5.4 In accordance with 5.4 of JIS C 2814-1, provided that the first sentence shall be as follows.

The necessary number of new samples to be submitted to the tests shall be divided into sets as shown in Annex AA, and this Standard is conformed if all the tests are met.

6 Main characteristics

Main characteristics shall be in accordance with clause 6 of JIS C 2814-1.

7 Classification

Classification given in clause 7 of JIS C 2814-1 and the following shall apply.

7.101 Classification according to types of conductors which terminals can accept

7.101.1 Universal terminal

7.101.2 Non-universal terminal

- terminals for solid conductors
- terminals for rigid conductors
- terminals for flexible conductors

8 Marking

Marking given in clause 8 of JIS C 2814-1 and the following shall apply.

8.101 Non-universal terminals classified according to 7.101.2 shall be marked as follows.

- The letter "s" or "sol", or the explanation shall be provided for terminals declared for solid conductors ; however, this marking may be omitted when ϕ marking is provided.
- The letter "r" or the explanation shall be provided for terminals declared for rigid conductors.
- The letter "f" or the explanation shall be provided for terminals declared for flexible conductors.

This marking shall appear where it is practical on the end product or on the smallest package unit, or in technical information and/or catalogues.

NOTE : In the "marking by the explanation" above, "for solid conductors", "for rigid conductors", "for flexible conductors", etc. are included.

8.102 An appropriate marking indicating the length of insulation to be removed before insertion of the conductor into the terminal shall be shown on the product or on the smallest package unit or in technical information and/or catalogues.

9 Protection against electric shock

Protection against electric shock shall be in accordance with clause 9 of JIS C 2814-1.

10 Connection of conductors

Connection of conductors given in clause 10 of JIS C 2814-1 and the following shall apply.

10.101 The connection or disconnection of conductors shall be made as follows.

- Either a general purpose tool or a convenient device integral with the terminal to open it and to assist the insertion or the withdrawal of the conductors (for example, for universal terminals) shall be used.
- By the simple insertion. For the disconnection of the conductors, an operation other than a pull on the conductor only shall be necessary (for example, for push-wire terminals).

10.102 Connecting devices shall accept two or more conductors of the same or of different nominal cross-sectional areas or compositions, if applicable.

Universal terminals shall accept rigid (solid or stranded) and flexible unprepared conductors.

Non-universal terminals shall accept the types of conductors designated by the manufacturer.

The relationship between the rated connecting capacity of clamping units and the connectable conductors, and the diameters of conductors are given in table 101.

10.103 Each terminal for connecting devices of Type 1 shall accept conductors of cross-sectional areas and types as given in table 101 for the relevant values of the rated connecting capacity. In addition, terminals shall provide appropriate connection of at least the two successive smaller cross-sectional areas. See table 101A also.

- a) A terminal having the rated connecting capacity of 1 mm² shall be capable of clamping reliably rigid and/or flexible conductors of 0.5 mm², 0.75 mm² and 1 mm².
- b) A terminal having the rated connecting capacity of 10 mm² shall be capable of clamping reliably rigid conductors of 4 mm², 6 mm² and 10 mm² and/or flexible conductors of 4 mm² and 6 mm².
- c) A terminal having the rated connecting capacity of 25 mm² shall be capable of clamping reliably rigid conductors of 10 mm², 16 mm² and 25 mm² and/or flexible conductors of 6 mm², 10 mm² and 16 mm².
- d) A terminal for flexible conductors only having a rated connecting capacity of 25 mm² shall be capable of clamping reliably flexible conductors of 10 mm², 16 mm² and 25 mm². (Exception: special types of terminals may accept a smaller range of cross-sectional areas as designated by the manufacturer.)

Each terminal for connecting devices of Type 2 shall be capable of reliably clamping the conductors having the cross-sectional area which is marked or specified in the instruction manual by the manufacturer.

Table 101 Rated connecting capacity and connectable conductors (Type 1)

Rated connecting capacity mm ²	Connectable conductors and theoretical diameters thereof				
	Metric				
	Rigid conductors			Flexible conductors	
	mm ²	Solid ϕ mm	Stranded $d^{b)}$ mm	mm ²	$d^{b)}$ mm
0.2	0.2	0.51	0.53	0.2	0.61
0.34	0.34	0.63	0.66	0.34	0.8
0.5	0.5	0.9	1.1	0.5	1.1
0.75	0.75	1.0	1.2	0.75	1.3
1.0	1.0	1.2	1.4	1.0	1.5
1.5	1.5	1.5	1.7	1.5	1.8
2.5	2.5	1.9	2.2	2.5	2.4 ^{a)}
4.0	4.0	2.4	2.7	4.0	3.0 ^{a)}
6.0	6.0	2.9	3.3	4.0	3.0 ^{a)}
10.0	10.0	3.7	4.2	6.0	3.9
16.0	16.0	4.6	5.3	10.0	5.1
25.0	25.0	—	6.6	16.0	6.3
35.0	35.0	—	7.9	25.0	7.8
NOTE 1 Correspondence with AWG is given in table BB.2.					
NOTE 2 The maximum diameters of rigid and flexible conductors shall be in accordance with table C.1 of JIS C 3664 and IEC 60344.					
Notes a) (This Note in the corresponding International Standard is deleted.)					
b) d indicates the maximum outside diameter.					

Table 101A Reference table for rated connecting capacity and connectable conductors (Type 1)

Rated connecting capacity mm ²	Connectable conductors capacity mm ²		
	Rigid conductors	Flexible conductors for rigid/flexible common terminal	Flexible conductors only
	Marking r/no marking	No marking	Marking f
0.2	0.2	0.2	0.2
0.34	0.2, 0.34	0.2, 0.34	0.2, 0.34
0.5	0.2, 0.34, 0.5	0.2, 0.34, 0.5	0.2, 0.34, 0.5
0.75	0.34, 0.5, 0.75	0.34, 0.5, 0.75	0.34, 0.5, 0.75
1.0	0.5, 0.75, 1.0	0.5, 0.75, 1.0	0.5, 0.75, 1.0
1.5	0.75, 1.0, 1.5	0.75, 1.0, 1.5	0.75, 1.0, 1.5
2.5	1.0, 1.5, 2.5	1.0, 1.5, 2.5	1.0, 1.5, 2.5
4.0	1.5, 2.5, 4.0	1.5, 2.5, 4.0	1.5, 2.5, 4.0
6.0	2.5, 4.0, 6.0	2.5, 4.0	2.5, 4.0, 6.0
10.0	4.0, 6.0, 10.0	4.0, 6.0	4.0, 6.0, 10.0
16.0	6.0, 10.0, 16.0	4.0, 6.0, 10.0	6.0, 10.0, 16.0
25.0	10.0, 16.0, 25.0	6.0, 10.0, 16.0	10.0, 16.0, 25.0
35.0	16.0, 25.0, 35.0	10.0, 16.0, 25.0	—

10.104 Compliance with the requirements of 10.101 to 10.103 shall be checked by visual inspection and by the following tests.

10.104.1 The test shall be carried out on new three terminals with copper conductors or electric wires designated by the manufacturer as given in table 101 by placing the conductors of smallest diameter and largest diameter in each clamping unit alternatively.

This connection and disconnection shall be made five times with the smallest diameter conductor and five times with the largest diameter conductor.

New conductors shall be used each time except for the 5th time where the conductor used for the 4th insertion shall be clamped at the same place.

For each insertion, the conductors shall be either pushed as far as possible into the terminal or shall be inserted so that adequate connection is obvious.

After these tests, the terminal shall not be damaged in such a way as to impair its further use.

10.104.2 Three new terminals shall be fitted with new conductors of the types and of the cross-sectional areas as given in table 101 or electric wires designated by the manufacturer. Before insertion into the terminal, wires of stranded rigid conductors and flexible conductors shall be reshaped.

It shall be possible to fit the conductor into the terminal without undue force in the case of universal terminals and with the force necessary by hand in the case of push-wire terminals.

The conductor shall be either pushed as far as possible into the terminal or inserted so that adequate connection is obvious.

After the test, no wire of the conductor shall have escaped outside the terminal.

10.105 Three new clamping units shall be sequentially fitted with new conductors of the number, cross-sectional area and type (flexible and/or rigid stranded) designated by the manufacturer in the apparatus as given in figure 101.

The tests shall be carried out on the following a) and b) by using new samples.

- a) conductors of the smallest cross-sectional area
- b) conductors of the largest cross-sectional area

The length of the test conductor shall be 75 mm longer than the height H specified in table 102.

The test conductor shall then be connected in the clamping unit in the intended manner.

The conductor shall be subjected to the following test.

The end of the conductor shall be passed through an appropriate sized bushing in a platen positioned at a height H below the fixture as given in table 102. The bushing is to be positioned in a horizontal plane such that its centre line describes a circle of 75

mm diameter concentric with the centre of the clamping unit. In the horizontal plane, the platen is then rotated at a rate of 10 r/min $\pm$ 2 r/min.

The distance between the mouth of the clamping unit and the upper surface of the bushing shall be within 15 mm of the height as given in table 102. The bushing may be lubricated to prevent binding, twisting or rotation of the insulated conductor. A mass as given in table 102 shall be suspended from the end of the conductor.

The duration of the test shall be 15 min.

NOTE : When securing the terminal, care shall be taken to avoid exerting excessive force on the terminal which may affect the connection.

During the test, the conductor shall neither slip out of the clamping unit nor break near the clamping unit, nor shall the conductor be damaged in such a way as to render it unfit for further use.

Table 102 Relationship between mass, height and cross-sectional area of conductors

Cross-sectional area of conductors mm ²	Diameter of conductor ϕ mm	Diameter of bushing hole ^{a)} mm	Height ^{b)} <i>H</i>	Mass for conductor kg
0.2		6.4	260	0.2
0.34		6.4	260	0.2
0.5		6.5	260	0.3
0.75		6.5	260	0.4
1.0		6.5	260	0.4
~~1.25~~		~~6.5~~	~~260~~	~~0.4~~
1.5		6.5	260	0.4
~~2.0~~	1.6	~~9.5~~	~~280~~	~~0.7~~
2.5		9.5	280	0.7
~~3.5~~	2.0	~~9.5~~	~~280~~	~~0.7~~
4.0		9.5	280	0.9
~~5.5~~	2.6	~~9.5~~	~~280~~	~~1.4~~
6.0		9.5	280	1.4
~~8.0~~		~~9.5~~	~~280~~	~~2.0~~
10.0		9.5	280	2.0
~~14.0~~		~~13.0~~	~~300~~	~~2.9~~
16.0		13.0	300	2.9
~~22.0~~		~~13.0~~	~~300~~	~~4.5~~
25.0		13.0	300	4.5
35.0		14.5	300	6.8
NOTE 1 The relationship between mm ² and AWG is given in Annex BB.				
NOTE 2 ~~(This NOTE in the corresponding International Standard is deleted.)~~				
Notes ^{a)} if the bushing-hole diameter is not large enough to accommodate the conductor without binding, a bushing having the next largest hole size may be used.				
^{b)} Tolerances for height shall be $H \pm 15$ mm.				