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**Crimp-type terminal lugs for copper
conductors**

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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 Japan Electrical Manufacturers' Association (JEMA)/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 2805:2003** has been replaced with this Standard.

However, **JIS C 2805:2003** may be applied in the **JIS** mark certification based on the relevant provisions of Article 19 Clause 1, etc. of the Industrial Standardization Law until October 19th, 2011.

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Crimp-type terminal lugs for copper conductors

Introduction

This Japanese Industrial Standard was established in 1969 and has gone through six revisions to this day. The last revision was taken place in 2003, and the revision at this time is to correspond to the diversification of insulant materials afterwards.

The corresponding International Standard has not yet been published at this moment.

1 Scope

This Standard specifies the non-insulated crimp-type terminal lugs which are crimped directly and the insulated crimp-type terminal lugs which are crimped through the insulant thereof (hereafter referred to as “non-insulated terminal lugs” and “insulated terminal lugs”, respectively, and as “terminal lugs” for both types in generic term) which are intended for connection of annealed copper stranded wires or solid wires principally used as the internal wiring of electric power machine and apparatus and the mutual wiring among such machines and apparatuses, in such a manner that the terminal lug is connected to the end of wire using the connecting tool specified in **JIS C 9711** or that assigned by the terminal lug manufacturer (hereafter referred to as “tool”).

NOTE : The insulated terminal lugs specified in this Standard are those used for the wiring of control circuit or the like.

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 B 4652 *Hand torque tools—Requirements and test methods*
- JIS B 7507 *Vernier, dial and digital callipers*
- JIS C 1302 *Insulation resistance testers*
- JIS C 1602 *Thermocouples*
- JIS C 2320 *Electrical insulating oils*
- JIS C 3307 *600 V Polyvinyl chloride insulated wires*
- JIS C 9711 *Compression tools for wire connectors of interior wiring*
- JIS H 3100 *Copper and copper alloy sheets, plates and strips*
- JIS H 8501 *Methods of thickness test for metallic coatings*
- JIS H 8619 *Electroplated coatings of tin*
- JIS K 2240 *Liquefied petroleum gases*
- JIS Z 2371 *Methods of salt spray testing*

- JIS Z 3261 *Silver brazing filler metals*
 JIS Z 3264 *Copper phosphorus brazing filler metals*
 JIS Z 8703 *Standard atmospheric conditions for testing*
 JIS Z 8704 *Temperature measurement—Electrical methods*

3 Classification, symbol and nominal size

The classification, symbol and nominal size shall be as given in table 1.

Table 1 Classification, symbol and nominal size

Classification	Symbol	Nominal size	NOTE
Non-insulated terminal lug	R	See table 7	Non-insulated terminal lug with one mounting hole
	RD	See table 8	Non-insulated terminal lug with two mounting holes
Insulated terminal lug	RAA	See table 9	Insulated terminal lug with straight tubular insulant of 60 °C in rated temperature
	RAB		Insulated terminal lug with straight tubular insulant of 75 °C in rated temperature
	RAC		Insulated terminal lug with straight tubular insulant of 90 °C in rated temperature
	RAD		Insulated terminal lug with straight tubular insulant of 105 °C in rated temperature
	RBA	See table 10	Insulated terminal lug with stepped tubular insulant of 60 °C in rated temperature
	RBB		Insulated terminal lug with stepped tubular insulant of 75 °C in rated temperature
	RBC		Insulated terminal lug with stepped tubular insulant of 90 °C in rated temperature
	RBD		Insulated terminal lug with stepped tubular insulant of 105 °C in rated temperature

4 Performance

4.1 Secureness of crimped connection

When the terminal lug is tested in accordance with **7.5**, there shall be no breakage of insulant, crack of terminal lug, peeling of brazed part, etc. which are detrimental to use.

4.2 Temperature rise

When the terminal lug is tested in accordance with **7.6**, the temperature rise of crimped connection (hereafter referred to as “crimping zone”) shall not exceed 30 K.

4.3 Cyclic heating

When the terminal lug is tested in accordance with **7.7**, the temperature rise at the 25th cycle shall not exceed the temperature rise of the connected wire, and the temperature rise at the 125th cycle shall not exceed the temperature rise at the 25th cycle plus 8 K.

4.4 Electrical resistance

When the non-insulated terminal lug is tested in accordance with 7.8, the electrical resistance of the crimping zone between the terminal lug and the wire shall not exceed 100 % of the electrical resistance of the wire employed for the test.

4.5 Salt spray

When the non-insulated terminal lug is tested in accordance with 7.9, there shall be no exposure of base metal, pin hole or other interference on use. Also, when tested in accordance with 7.8, the electrical resistance of the crimping zone between the terminal lug and the wire measured after the salt spray test shall not increase 20 % or more from that measured before the test.

4.6 Overcurrent withstand

When the terminal lug is tested in accordance with 7.10, there shall be no melting of terminal lug, deformation, coming-off of wire or other interference on use, and the requirements of 4.7 shall be conformed. For the non-insulated terminal lug, when tested in accordance with 7.8, the electrical resistance of the crimping zone between the terminal lug and the wire measured after the overcurrent withstand test shall not increase 20 % or more from that measured before the test.

4.7 Tensile strength

When the terminal lug is tested in accordance with 7.11, there shall be no slip on the crimping zone between the terminal lug and the wire, breakage, coming-off of wire, deformation of terminal lug or other interference on use.

4.8 Vibration fatigue

When the terminal lug is tested in accordance with 7.12, there shall be no cut or coming-off of wire, deficit of tongue part, crack detrimental to use, etc., and the requirements of 4.7 shall be conformed. For the non-insulated terminal lug, when tested in accordance with 7.8, the electrical resistance of the crimping zone between the terminal lug and the wire measured after the vibration fatigue test shall not increase 20 % or more from that measured before the test.

4.9 Insulation resistance

When the insulated terminal lug is tested in accordance with 7.13, the insulation resistance between the surface of insulant and the live part shall be not less than 100 MΩ.

4.10 Dielectric withstand voltage

When the insulated terminal lug is tested in accordance with 7.14, it shall withstand.

4.11 Resistance to aging

When the insulated terminal lug is tested in accordance with 7.15, there shall be no crack, split, internal blister, etc. in the insulant which are detrimental to use. Also, the insulant shall not easily come out from the cylindrical part of the terminal lug. Successively, the dielectric withstand voltage test (7.14) shall be carried out, and the requirements of 4.10 shall be conformed.

4.12 Secureness of insulant

When the insulated terminal lug is tested in accordance with **7.16**, the insulant shall not move by not less than 1.0 mm to the axial direction toward any side.

4.13 Flame retardancy

When the insulated terminal lug is tested in accordance with **7.17**, the duration of flaming in each cycle shall not exceed 15 s, and the total duration of flaming shall not exceed 30 s.

4.14 Resistance to oil

When the insulated terminal lug is tested in accordance with **7.18**, there shall be no crack, split, internal blister in the insulant which are detrimental to use. Successively, the dielectric withstand voltage test (**7.14**) shall be carried out, and the requirements of **4.10** shall be conformed.

4.15 Secureness of crimped connection at low temperature

When the insulated terminal lug is tested in accordance with **7.19**, there shall be no crack, split, internal blister in each part of the terminal lug which are detrimental to use. Successively, the dielectric withstand voltage test (**7.14**) shall be carried out, and the requirements of **4.10** shall be conformed.

5 Appearance, dimensions and metallic coating

The appearance, dimensions and metallic coating shall conform to the following items.

- a) The terminal lug shall be free from flaw, rust, split, crack, etc. detrimental to use.
- b) The terminal lug shall conform to the dimensions given in table 7 to table 10.
- c) The thickness of metallic coating of terminal lug shall be not less than 1 µm when tested in accordance with **7.4**.

6 Material and manufacturing method

6.1 Material

6.1.1 Conductor

The material for conductor shall be copper with the symbol C1020P or C1020R specified in **JIS H 3100** or other material at least equivalent in quality.

6.1.2 Insulant

The insulant shall be cylindrically formed, and the material thereof shall be the thermoplastic resin suitable for the rated temperature given in table 2.

Table 2 Material of insulant

Unit: °C

Material of insulant	Rated temperature ^{a)}
Thermoplastic resin	60
	75
	90
	105
Note ^{a)} The rated temperature means the upper limit permissible for continuous use.	

6.2 Manufacturing method

6.2.1 Non-insulated terminal lug

The non-insulated terminal lug shall be manufactured in such a manner that the copper sheet or copper strip specified in **6.1.1** is punched, formed to a cylindrical shape convenient for the insertion and the crimped connection of the non-insulated wire(s), finished to the dimensions given in table 7 or table 8, and the seam thereof shall be brazed with the silver brazing filler metal specified in **JIS Z 3261**, the copper phosphorus brazing filler metal specified in **JIS Z 3264** or that at least equivalent. The brazing filler metal may be altered as occasion demands.

Then, the terminal lug shall be treated by means of electroplated coating of tin specified in **JIS H 8619**. The thickness of coating shall be not less than 1 µm, and the specification of **5.5** of **JIS H 8619** shall not be applied.

6.2.2 Insulated terminal lug ¹⁾

The insulated terminal lug shall be manufactured in such a manner that the insulant specified in **6.1.2** is finished to the dimensions given in table 9 or table 10, then the non-insulated terminal lug specified in **6.2.1** is inserted into the insulant by machine or other method.

In this case, the brazing of the seam of the cylindrical part of terminal lug may be omitted, if the requirements of clause 4 are conformed.

Note ¹⁾ The insulated terminal lugs may be manufactured in continuous form.

7 Test method

7.1 Testing conditions

The testing conditions shall be as follows.

- Unless otherwise specified, the tests shall be carried out in a room at ordinary temperature of $20\text{ °C} \pm 15\text{ °C}$ and at ordinary humidity (65 ± 20) % specified in **JIS Z 8703**. The tests of **7.6** and **7.7** shall be carried out by maintaining the specimen in quiet air at 15 °C to 35 °C .
- The specimen shall be prepared so that two terminal lugs are tightened in back-to-back or in front-to-back with the torque given in table 3 by means of the torque