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Compression tools for wire connectors of interior wiring

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law:

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Compression tools for wire connectors of interior wiring

1 Scope This Japanese Industrial Standard specifies compression tools mainly used for the connector prescribed below from among the connectors for general interior and outside wall wiring (hereafter referred to as “tools”).

- (1) The crimp-type terminal lugs for copper conductors specified in **JIS C 2805** (hereafter referred to as “terminals”).
- (2) The non-insulated crimp-type sleeves for copper conductors specified in **JIS C 2806** (hereafter referred to as “sleeves”).

Remarks : Normative references to this Standard are given below.

JIS B 7502 *Micrometer callipers*

JIS C 0702 *General rules for insulation construction of class II electrical appliances*

JIS C 2805 *Crimp-type terminal lugs for copper conductors*

JIS C 2806 *Non-insulated crimp-type sleeves for copper conductors*

JIS C 3301 *Rubber insulated flexible cords*

JIS C 3306 *Polyvinyl chloride insulated flexible cords*

JIS C 3312 *600 V Grade polyvinyl chloride insulated and sheathed portable power cables*

JIS C 3327 *600 V Rubber insulated flexible cables*

JIS C 8511 *Alkaline primary batteries*

JIS C 8512 *Manganese dioxide lithium primary batteries*

JIS C 8701 *Lead acid batteries for general service*

JIS C 8705 *Sealed nickel-cadmium cylindrical rechargeable single cells*

JIS G 3444 *Carbon steel tubes for general structural purposes*

JIS G 4051 *Carbon steels for machine structural use*

JIS G 4105 *Chromium molybdenum steels*

JIS H 4040 *Aluminium and aluminium alloy rods, bars and wires*

JIS H 5202 *Aluminium alloy castings*

JIS Z 2245 *Method of Rockwell and Rockwell superficial hardness test*

JIS Z 8703 *Standard atmospheric conditions for testing*

2 Definitions For the purposes of this Standard the following principal definitions shall apply:

- (1) **crimp-type connection** The connection accomplished in such a way that the joint is deformed by application of a pressure produced by a pair of asymmetric dies.

- (2) **pressure setting** The maximum value of operating oil pressure marked on the pump, for a tool with separated head (MPa).
- (3) **crimp confirming mechanism** A mechanism which can regulate or confirm the distance between dies in order to obtain proper crimp-type connection.
- (4) **pressure regulating device** A device which regulate the pressure applied to the dies by actuating the automatic release valve or the like at completion of the connection, in order to obtain proper crimp-type connection.
- (5) **crimp height** The distance between concave part and convex part of the crimp formed on a wire connector after completion of crimp-type connection.
- (6) **crimp mark** The mark stamped on a wire connector so as to identify the used die, at the completion of crimp-type connection.
- (7) **pump unit** The generic term for combination of pump, pressure regulating device, etc.

3 Classification and mounting mechanism The classification of tools and mounting mechanism of heads and dies shall be as shown in Table 1.

Table 1 Classification of tools and mounting mechanism of head and die

Classification	Mounting mechanism of head	Mounting mechanism of die
Single-hand type tool	One body	Fixed or replaceable
Both-hands type tool		
Hand operated hydraulic tool		
Motor operated mechanical tool		
Motor operated hydraulic tool		
Hand operated hydraulic tool with separated head	Replaceable	
Foot operated hydraulic tool with separated head		
Power operated hydraulic tool with separated head		

4 Performances

4.1 Hardness of die When the test of 6.2 is carried out, the hardness of die shall be not less than Rockwell hardness HRC38.

4.2 Maximum load at handle or pedal When the test of 6.3 is carried out on hand operated or foot operated tool, the maximum load applied to the handle or pedal shall not exceed the relevant value given in Table 2.

Table 2 Maximum load at handle or pedal

Classification		Maximum load N
Single-hand type tool		390 [590 ⁽¹⁾]
Both-hands type tool		340
Hand operated hydraulic tool	Hand type ⁽²⁾	245
	Stationary type ⁽³⁾	490
Hand operated hydraulic tool with separated head		490
Foot operated hydraulic tool with separated head		490

Notes (1) Applicable for terminals and sleeves of types B and P with nominal size 8 or more and sleeves of type E (ring sleeve).

(2) Hand type means a tool intended for operation by holding it with both hands.

(3) Stationary type means a tool intended for operation by placing it on the floor, etc.

4.3 Oil pressure of pump unit When the test of 6.4 is carried out on hydraulic tools, the oil pressure at the pump unit shall fall within $\pm 5\%$ from the pressure setting.

4.4 Endurance When the test of 6.5 is carried out the specimen shall not show signs of wear detrimental to practical service at any part and shall satisfy the following requirements:

- (1) When the test of 6.5 (1) is carried out on the single-hand type tool, both-hands type tool and hand operated hydraulic tool, the ratio of the maximum load at the handle after completion of endurance test to that before the test shall be not less than the relevant value given in Table 3.

Table 3 Ratio of maximum load at handle after endurance test

Classification	Ratio %
Single-hand type tool	70
Both-hands type tool	90
Hand operated hydraulic tool	90

- (2) When the motor operated mechanical tool is tested as specified in 6.5 (2), the ratio of the maximum current consumption after completion of endurance test to that before the test shall be not less than 90 %.
- (3) When the hydraulic tool is tested as specified in 6.5 (3), the ratio of the hydraulic pressure after completion of test to that before the test shall be not less than 90 %. However, hand operated hydraulic tool may be examined as specified in (1).

4.5 Temperature rise When the motor operated tool is tested as specified in **6.6**, the temperature rise shall not exceed the relevant value given in Table 4.

Table 4 Temperature rise of motor operated tool

Unit : °C

Position of measurement		Temperature rise
Motor winding	Of Class A insulation	75
	Of Class E insulation	90
	Of Class B insulation	95
	Of Class F insulation	110
Knob of switch and push buttons	Of metal, ceramics and glass	30
	Of others	45
Accessible enclosure (including gear case and bearing)	Of metal, ceramics and glass	35
	Of others	50
Handle operated by a man during service	Of metal, ceramics and glass	25
	Of others	40

Remarks : The limit of ambient temperature is 30 °C.

4.6 Insulation resistance When the motor operated tool fed from a commercial power supply is tested as specified in **6.7**, the insulation resistance shall satisfy the performances specified in **8.1** (insulation resistance) of **JIS C 0702**.

4.7 Dielectric withstand voltage When the motor operated tool fed from a commercial power supply is tested as specified in **6.8**, the specimen shall withstand the test voltage.

4.8 Leakage current When the motor operated tool fed from a commercial power supply is tested as specified in **6.9**, the leakage current shall satisfy the performances specified in **JIS C 0702**.

4.9 Resistance to shock When the motor operated tool is tested as specified in **6.10**, the resistance to shock shall comply with the following requirements:

- (1) The live part shall not be exposed.
- (2) No short circuit shall occur when the tool is connected to the power supply.
- (3) The insulation resistance between live parts and dead metal parts liable to be grounded of the tool fed from a commercial power supply, measured with a d.c. 500 V insulation resistance tester, shall be not less than 2 MΩ.
- (4) No flaws, cracks or other abnormalities which may result in risks of electric shock, fire, etc. shall appear when the weight treated with polyamide is allowed to fall on the tool.

4.10 Crimp height When the test of **6.11** is carried out, the crimp height shall not exceed the value specified by the tool manufacturer.

4.11 Performance of connection The performance of connection shall be as follows:

- (1) The terminals shall satisfy the performances specified in **3.2** (temperature), **3.3** (electrical resistance), **3.4** (salt mist) and **3.7** (vibration fatigue) of **JIS C 2805**, when subjected to the test of **6.12 (1)**.
- (2) The sleeves shall satisfy the performances specified in **3.2** (temperature) and **3.3** (tensile strength) of **JIS C 2806**, when subjected to the test of **6.12 (2)**.

4.12 Bending of cord The motor operated tool equipped with a power supply cord shall be tested for the bending of cord and the results shall be as follows:

- (1) **Bending at joint of body and cord** When the joint of body and cord is tested as specified in **6.13.1**, no short circuit shall occur in the cord.

Further, the relative breakage of component wires shall not exceed 10 %.

- (2) **Bending at joint of non-renewable connector and cord** When the joint of non-renewable connector and cord is tested as specified in **6.13.2**, no short circuit shall occur in the cord.

Further, the relative breakage of component wires shall not exceed 20 %.

5 Materials and construction

5.1 Materials The materials shall be as follows:

- (1) The dies shall be made of the steel of class SCM435 specified in **JIS G 4105** or at least the equivalent in mechanical properties.
- (2) Such principal metallic parts as the head and pump units shall be made of the metals specified in **JIS G 3444**, **JIS G 4051**, **JIS G 4105**, **JIS H 4040** or **JIS H 5202**, or at least the equivalent in mechanical properties.

5.2 Construction The construction shall be as follows:

- (1) The tool shall be free from detrimental flaws, cracks, rust and other defects at any part, and be well finished.
- (2) The tool shall be so constructed that the operation is simple, and the replaceable-die tool ensures easy and firm replacement of dies.
- (3) The tool shall ensure no excessive clearance, smooth operation and favourable handling conditions.
- (4) The tooth part of die shall especially be finished smooth, and shall not cause flaws, cracks, etc. on the wire connector when crimp-type connection work is carried out.
- (5) The tool shall be equipped with the following crimp confirming device: