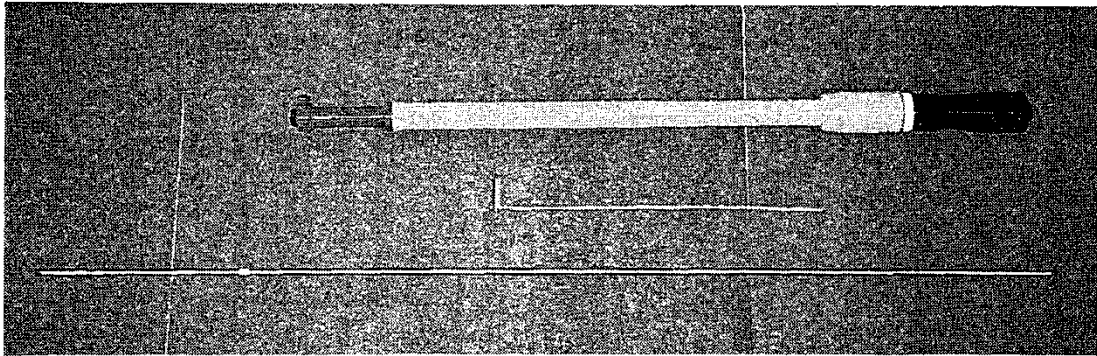


6L-18 CONNECTING-TYPE
GROUNDING ROD LEAD TERMINAL
AND DRIVING TOOL
(C RANK)



December 1957 Enforcement
April 2004 (Revision 03)

Distribution Department
TEPCO Power Grid, Incorporated

1. General provisions

1.1 Scope

This product shall be used for grounding of power distribution lines.

1.2 Type

The grounding rod and driving tool shall be one type with a diameter of 10 mm. The structure shall be as follows:

- (1) Connecting-type grounding rod
 - a. Grounding rod
 - b. Iron wedge
- (2) Lead terminal for connecting-type grounding rod
- (3) Driving tool for connecting-type grounding rod
 - a. Main body
 - b. Hammer

1.3 Indications

The components listed in Section 1.2 shall have indications of the following information:

- (1) Connecting-type grounding rod and lead terminal

The following information shall be indicated by stamping or other appropriate method at places shown in Attached drawing 1.

- a. Month and year of production Example: 91-12 for December 1991.
- b. Name or abbreviation of manufacturer

- (2) Driving tool for connecting-type grounding rod

The following information shall be indicated by stamping or other appropriate method at places shown in Attached drawing 3.

- a. Year of production Example: 91 for 1991.
- b. Name or abbreviation of manufacturer

2. Structure and materials

2.1 General matters

This product shall be made of materials of good quality and with careful finishing, shall be suitable for manual driving, and shall have a high durability.

2.2 Structure, materials and dimensions

Shall be in accordance with Attached drawing 1 through 4, as a standard. The allowable dimensional tolerances not specified in the drawings shall be within the range causing no practical harm.

2.3 Paint

Shall be as specified in Attached drawing 1 through 5.

2.4 Packing

Shall be as follows:

(1) Grounding rod

The products shall be packed as a set of 30, in a manner that they can be easily carried and handled. Also, each product shall have 2 tags indicating the following information:

- a. Name : Connecting-type grounding rod
- b. Type : 10-mm rod
- c. Quantity
- d. Year and month of production
- e. Name of manufacturer

(2) Lead terminal

Same as “(1) Grounding rod,” except that the name to be indicated shall be “Lead terminal for connecting-type grounding rod.”

(3) Driving tool

Each product shall be separately packed in a secure manner that it can be easily carried and handled. Also, each product shall have 2 tags indicating the following information:

- a. Name : Driving tool for connecting-type grounding rod
- b. Type : For 10-mm rod
- c. Year and month of production
- d. Name of manufacturer

3. Type test

3.1 General matters

This test shall be conducted for the following samples submitted by the manufacturer: 20 grounding rods, 20 lead terminals, and 2 driving tools. The following test items shall be performed, all of which must be satisfied:

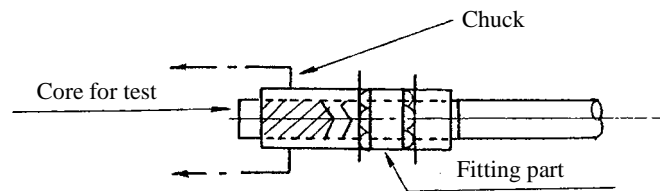
3.2 Structural examination

Check that the structural material dimensions comply with “2. Structure and materials.”

3.3 Fitting part tensile test (grounding rod)

Apply tension to the fitting part of grounding rod, as shown in Figure 1, until it breaks. At this time, the maximum load shall be 4,900N (500 kgf) or higher. This test shall be performed for 2 test pieces.

Figure 1 Fitting part tensile test



3.4 Connection pull-out test (grounding rod)

Connect 2 grounding rods by driving them using a tool, and then pull out the rod. At this time, the maximum load shall be 3,920N (400 kgf) or higher. This test shall be performed for 3 test pieces.

3.5 Tensile test for copper-coated steel rod of grounding rod (grounding rod)

Take a sample of at least 30 cm. Strip the copper coating off the chuck by pulling it with an appropriate method. Then secure the steel core directly to the chuck and pull until it breaks. At this time, the maximum load shall be 25.5 kN (2,600 kgf) or higher. This test shall be performed for 3 test pieces.

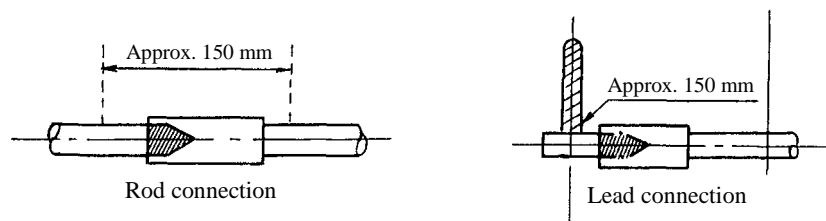
3.6 Lead wire tensile test (lead terminal)

Pull the lead wire perpendicular to the terminal until it breaks. At this time, the maximum load shall be 1,370N (140 kgf) or higher. This test shall be performed for 2 test pieces.

3.7 Contact resistance test for connecting part and lead terminal fitting part (grounding rod, lead terminal)

When the electric resistance is measured between the 2 points shown in Figure 2, the resistance shall be equal to or lower than the resistance of the rod part of the same length. This test shall be performed for 2 test pieces.

Figure 2 Contact resistance test

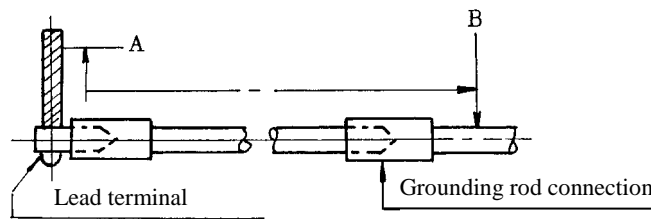


3.8 Current test (grounding rod, lead terminal)

Connect the grounding rod as shown in Figure 3 and then pass a current of 2 kA from the lead wire to the grounding rod for 1 second. At this time, the conditions below shall be satisfied. This test shall be performed for 2 test pieces.

- a. The electric resistance between A and B shall not increase by 50% or more when compared before and after the test.
- b. When the connecting part of grounding rod is pulled out, the maximum load shall be 3,920N (400 kgf) or higher.

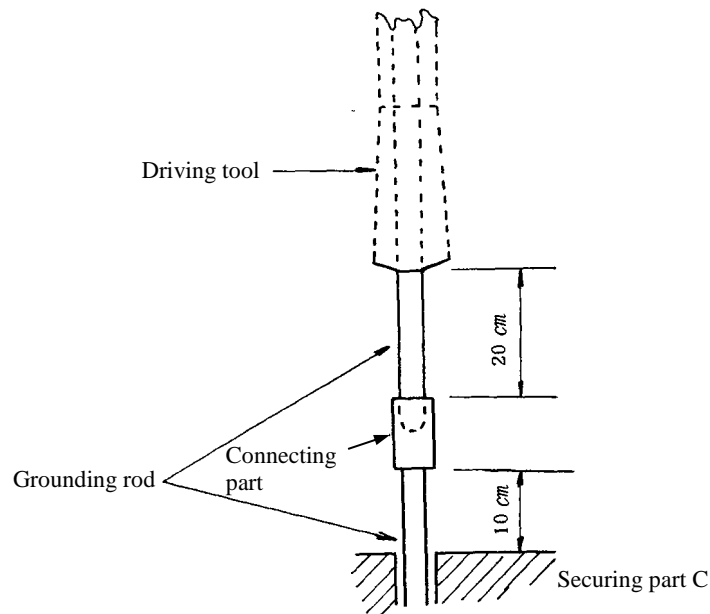
Figure 3 Current test



3.9 Connecting part driving test (grounding rod, driving tool)

Secure grounding rod A in the same manner as C, as shown in Figure 4. Then drive in grounding rod B using the driving tool to connect it with the other rod. After connection is complete, repeat normal driving continuously 15 times by one person, in the dimensions and positions shown in Figure 4. At this time, there shall be no abnormalities other than scratches made by securing part C or the tool chuck, or rod bending due to driving. This test shall be performed for 2 test pieces.

Figure 4 Connecting part driving test



4. Acceptance test

4.1 General matters

This test shall be performed to determine the acceptability of received products. Ten sets (300 pieces) of received grounding rods and lead terminals shall be treated as one lot (partition). Sample test shall be performed for each lot. When all the samples pass the test, the lot is determined to be acceptable. The tools shall be separately inspected to determine the acceptability.

Test item	Grounding rod and lead terminal		Tool	
	Test method	Test qty	Test method	Test qty
(1) Structural examination	Same as Section 3.2.	10 pieces	Section 3.2	Full qty
(2) Connecting part pull-out test	Same as Section 3.4.	1 piece	—	—

5. Manufacturing process inspection

5.1

For the type test, in principle, conduct a series of inspections on the design, material quality control, manufacturing process, and product management, to check that the production process produces completely the same items as the type test specimens.

6. Supplementary information

6.1 Supplementary information on the specifications

It shall be considered that the conditions which must be met by completed products are naturally included in the scope of this specification, even when they are not indicated in this document.

6.2 Cost of test piece

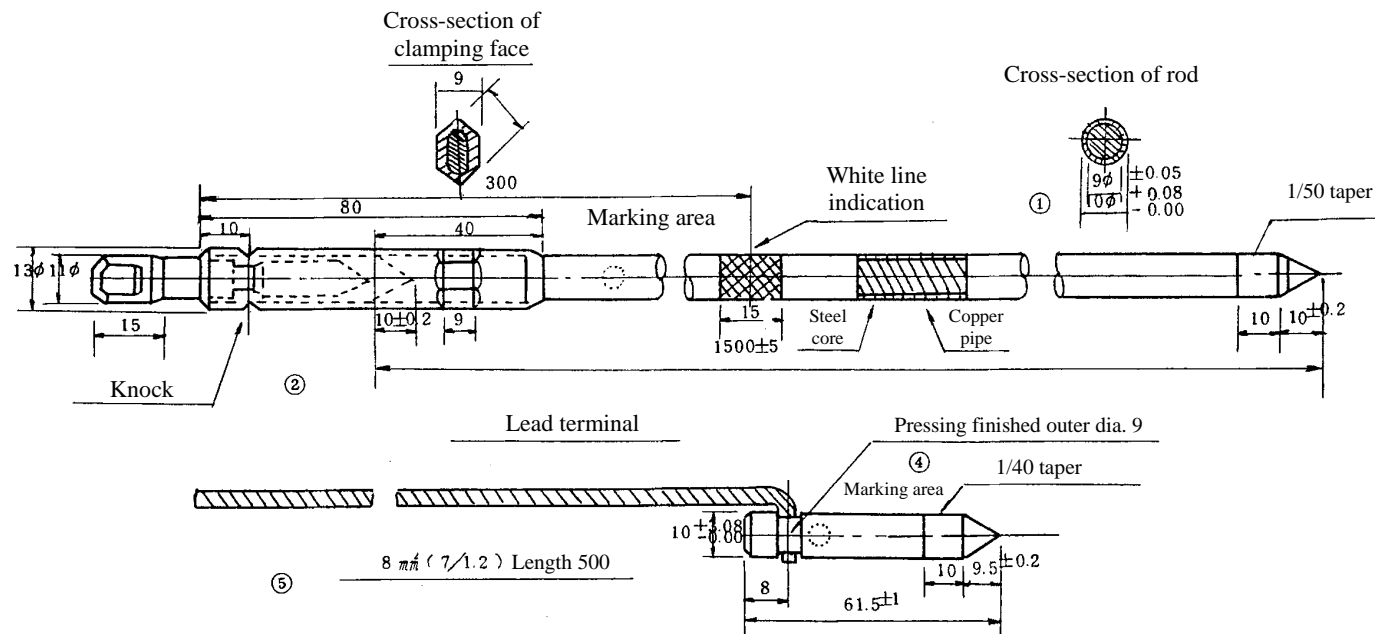
The test pieces shall be borne by the supplier.

6.3 Other

- (1) TEPCO shall be entitled to conduct, as an acceptance test, a test that is the same as the type test, when TEPCO find it necessary. In such a case, the test pieces shall be borne by the supplier, unless otherwise agreed.
- (2) TEPCO shall be entitled to conduct tests other than those specified as the type and an acceptance test, such as an on-site manufacturing process inspection and material inspection, when TEPCO find it necessary. In such a case, the test pieces shall be borne by the supplier.
- (3) When a substantial advantage for use or manufacturing is available by changing a part of this specification or approved manufacturing specification, it may be changed after approval by us.

Attached drawing 1 Connecting-type grounding I / lead terminal / product drawing

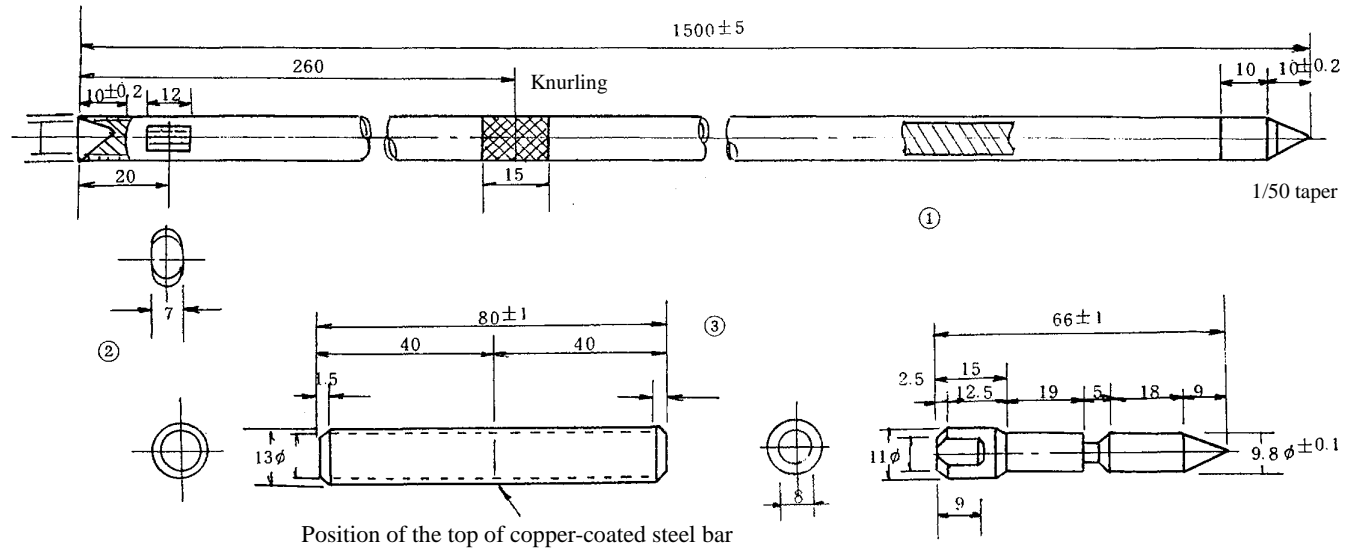
(Unit: mm)



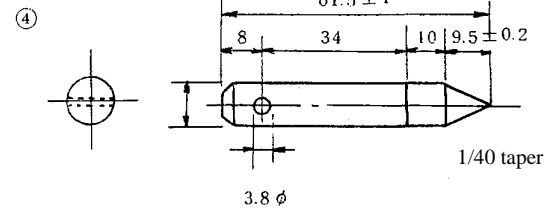
Item name	No.	Part name	Material	JIS	Processing	Qty
Connecting-type grounding rod	1	Copper-coated steel bar	Copper and copper alloy seamless tube	JIS H 3300	Cutting and pressing	1
			Cold-finished steel bar	JIS G 3123		
	2	Fitting pipe	Copper and copper alloy seamless tube	JIS H 3300	Cutting and pressing	1
	3	Iron wedge	Cold-finished steel bar	JIS G 3123	Cutting galvanizing	1
Lead terminal	4	Copper terminal	Copper and copper alloy bar	JIS H 3250	Cutting and pressing	1
	5	Lead wire	Electric and mild steel wire	JIS C 3102	Cut	1

Attached drawing 2 Connecting-type grounding rod, lead terminal parts drawing

(Unit: mm)

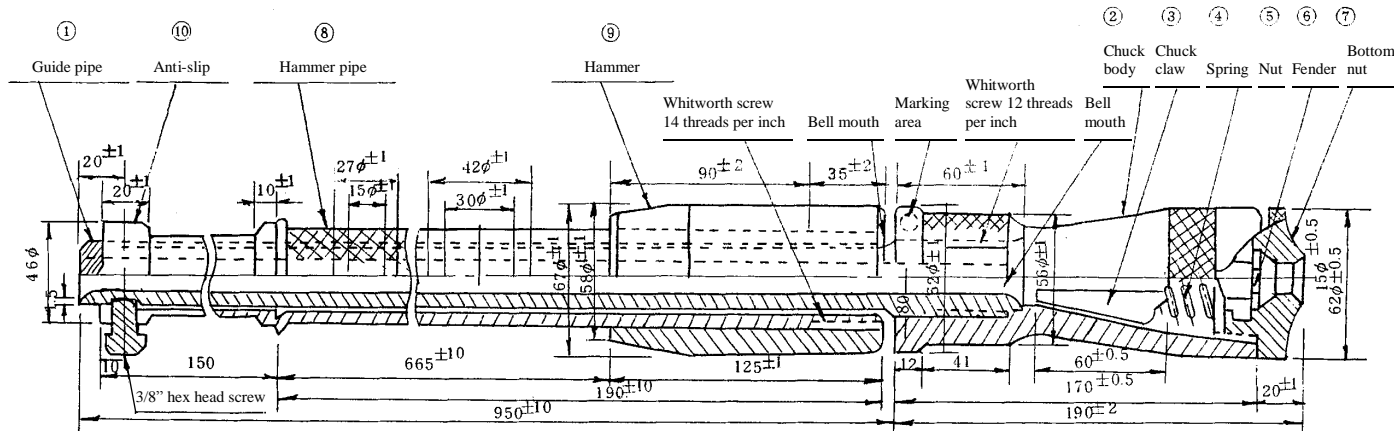


Item name	No.	Part name	Material	JIS	Processing	Qty
Connecting-type grounding rod	1	Copper pipe	Copper and copper alloy seamless tube	JIS H 3300	Pull out with steel core, make them stick together, and cut.	1
	2	Steel core	Cold-finished steel bar	JIS G 3123	Pull out and polish.	1
	3	Fitting pipe	Copper and copper alloy seamless tube	JIS H 3300	Cutting and pressing	1
	4	Iron wedge	Cold-finished steel bar	JIS G 3123	Cutting, zinc, plating	1
Lead terminal	5	Copper terminal	Copper and copper alloy bar	JIS H 3250	Cutting	1



Attached drawing 3 Connecting-type grounding rod driving tool production drawing

(Unit: mm)

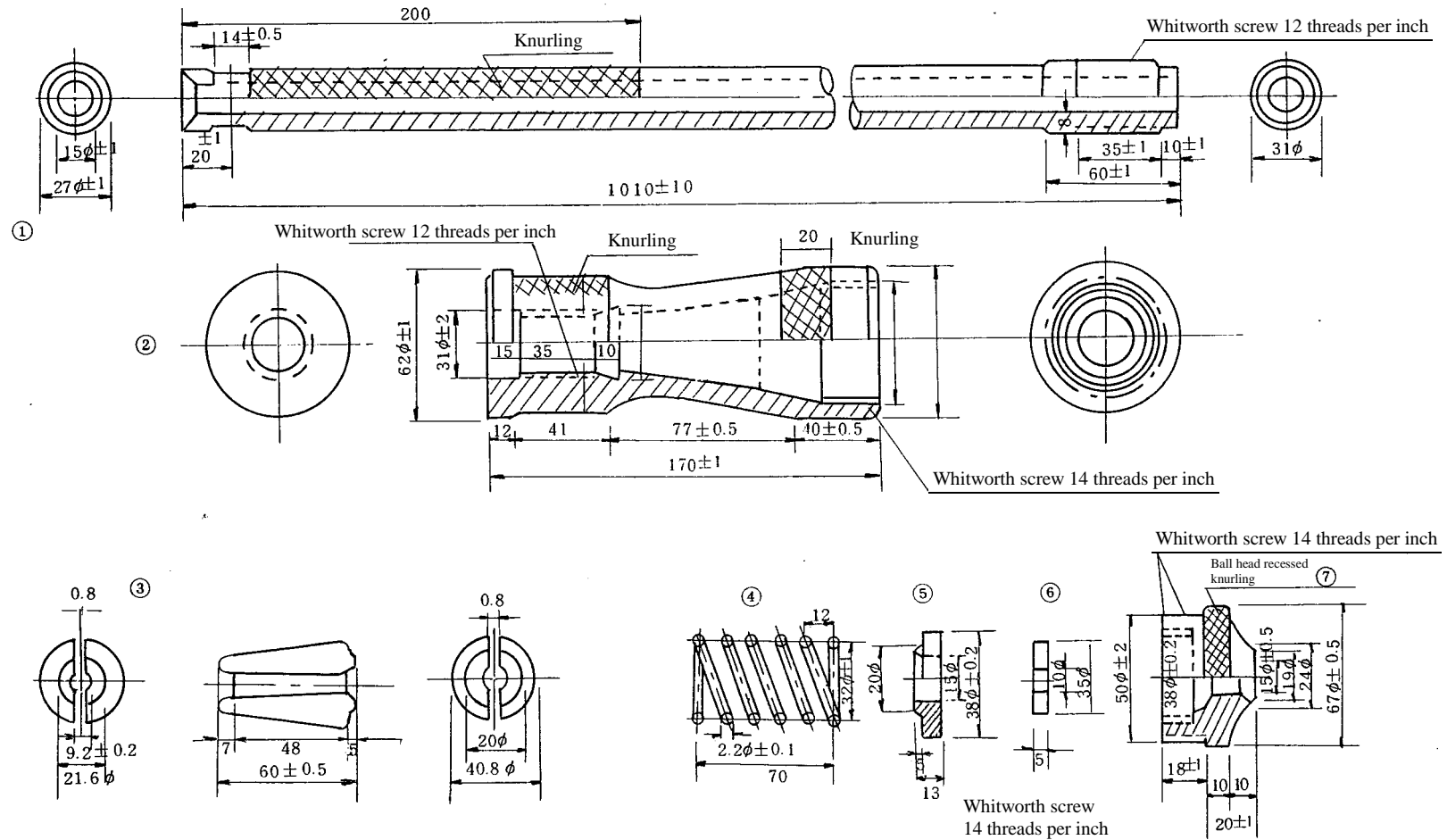


No.	Part name	Material	JIS	Processing	Qty
1	Guide pipe	Carbon steel pipe for pressure service	JIS G 3454	Forging, cutting, parkerizing, base enamel baking	1 piece
2	Chuck body	Chrome molybdenum steel	JIS G 4105	Cutting, parkerizing, base enamel baking	1 piece
3	Chuck claw	Chrome molybdenum steel	JIS G 4105	Cutting, quenching	1 set
4	Spring	Spring steel	JIS G 4801		1 piece
5	Nut	Rolled steel for general structure	JIS G 3101	Cutting	1 piece
6	Fender	Felt		Punching	1 piece
7	Bottom nut	Chrome molybdenum steel	JIS G 4105	Cutting, parkerizing, base enamel baking	1 piece
8	Hammer pipe	Carbon steel pipe for pressure service	JIS G 3454	Cutting, parkerizing, base enamel baking	1 piece
9	Hammer	Chrome molybdenum steel	JIS G 4105	Cutting, parkerizing, base enamel baking	1 piece
10	Anti-slip	Carbon steel pipe for pressure service	JIS G 3454	Cutting, parkerizing, base enamel baking	1 piece

Paint	
Color	Part name
Black	Guide pipe Chuck body bottom nut
Medial yellow No.540 by Kansai Paint Orange yellow No.302 by Nippon Paint	Hammer pipe Hammer
Scarlet medium No.586 by Kansai Paint Light vermilion No.318 by Nippon Paint	Anti-slip
Remarks	Total product weight 12 kg

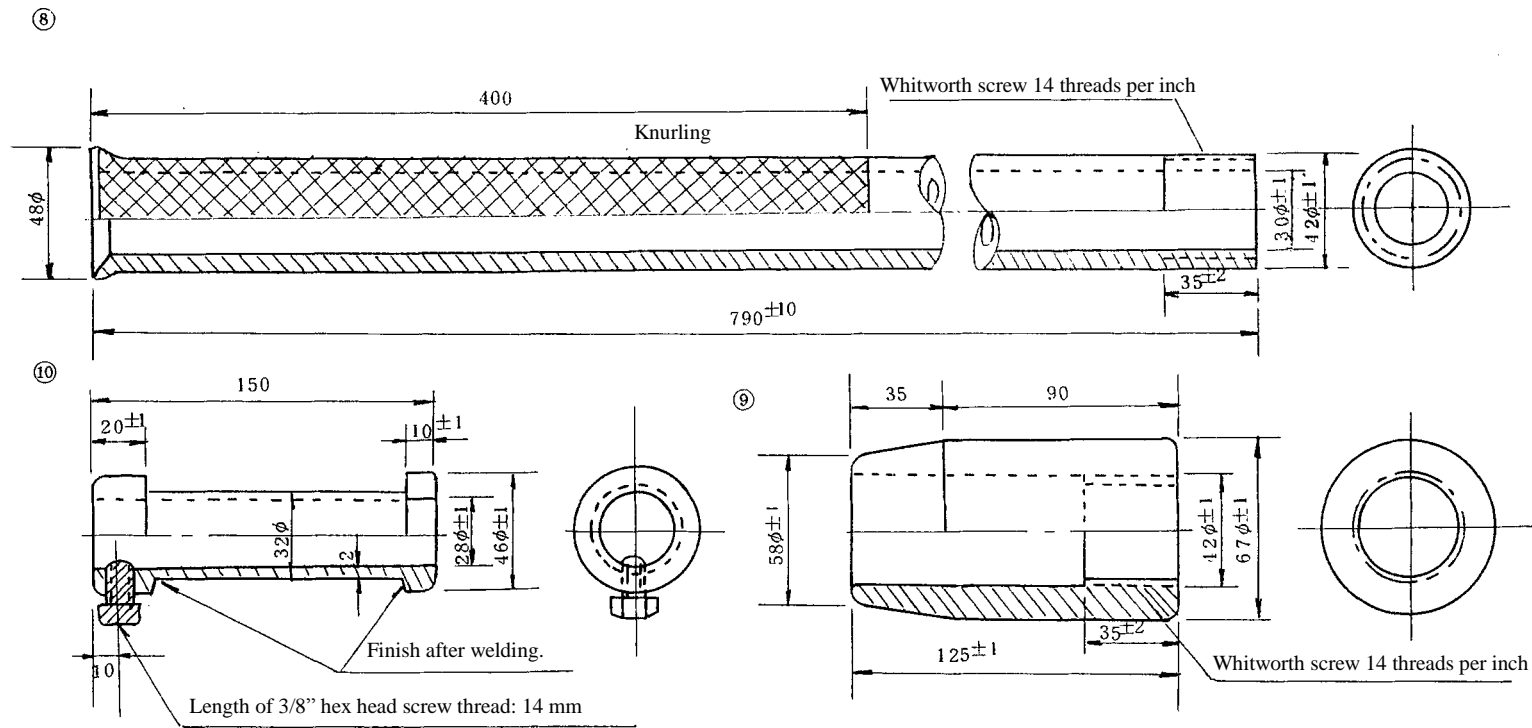
Attached drawing 4 Connecting-type grounding rod driving tool production drawing

(Unit: mm)



Attached drawing 5 Connecting-type grounding rod driving tool production drawing

(Unit: mm)



(Reference Translation)