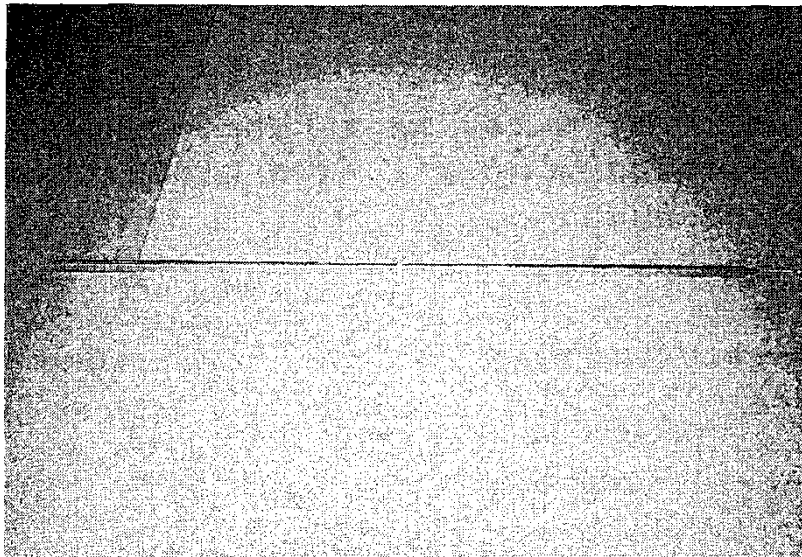


6L-10 PLASTIC MOLDING FOR GROUNDING



September 1986 Enforcement
August 1999 (Revision 01)

Distribution Department
TEPCO Power Grid, Incorporated

1. General provisions

1.1 Scope

This product shall be used to protect grounding wires of overhead distribution lines when attached to utility poles.

1.2 Related standards

JIS C 8430 (Unplasticized polyvinyl chloride (PVC-U) conduits)

1.3 Indication

The following information shall be indicated at the position specified in the attached drawing in such a manner that the indication is not easily removable:

- (1) Manufacturer's mark
- (2) Year of production: According to the western calendar.
- (3) TEPCO mark
- (4) Terrestrial line

1.4 Packing

Up to 50 pieces shall be bundled together as a set and put in a paper box. As a standard, they shall be packed so as to be protected from damage during transportation and direct sunlight. The following information shall be indicated clearly on the surface:

- (1) Product name
- (2) Quantity
- (3) Name of manufacturer
- (4) Year and month of production: According to the western calendar.
- (5) Other necessary information

2. Structure and materials

2.1 General matters

When attached to a utility pole by a specified method, the product shall have a good adhesion property, be free from deflection and bending, and be durable enough to withstand a long time of use.

2.2 Structure and materials

- (1) The pipe body of the product shall be straight and even in thickness, and have a superior mounting workability.
- (2) The synthetic resin products that constitute the product shall have a strength equal to or higher than the values specified in JIS C 8430 (Unplasticized polyvinyl chloride (PVC-U) conduits). At the same time, they shall be manufactured from materials with a high weather resistance.
- (3) The color of molding shall be gray (Munsell N5°).

2.3 Shape and dimensions

The shape and dimensions of the pipe body of the product shall be in accordance with the attached drawing. The allowable dimensional tolerances not specified in the drawing shall be within the range causing no practical harm.

3 Type test

3.1 General matters

This test shall be conducted for 3 pieces of the same type, in order to closely check the quality of the product. The test items shall be as follows:

3.2 Appearance inspection

Check that the product is free from practically harmful scratches, cracks and other practical problems.

3.3 Fitting test

Check the fitting of the molding to confirm that the molding can be attached and removed with a normal force and that the fitting area has no gap.

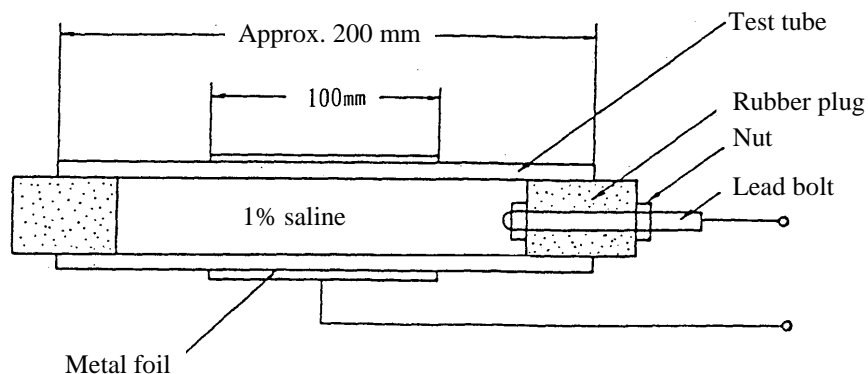
3.4 Shape and dimensions

Closely check the shape and dimensions to make sure that they are in accordance with this specification.

3.5 Withstand voltage test

Prepare a test tube of approximately 20 cm in length. At the center of the test tube, wrap a strip of metal foil (10 cm in width) around the outer circumference, as shown in Figure 1, and make the foil well-adhered to the tube using petrolatum. Fill the test tube with saline of approximately 1 percent and leave it for at least 2 hours at room temperature (10 to 30°C). Then apply a voltage having a waveform close to the sine wave of commercial frequency between both electrodes, and increase the voltage rapidly from 0V to 10000V. The test tube shall withstand the voltage for 1 minute.

Figure 1



3.6 Tensile test

Calculate the cross-sectional area of a dumbbell specimen using the following formula (Figure 2):

$$S = t \times b$$

Where S : Cross-sectional area (mm²)

t : Minimum thickness (mm)

b : Minimum thickness (width) of string (mm)

Pull the test specimen at a speed of 10 mm/min according to JIS Z 2241 (Metallic materials-Tensile testing-Method of test at room temperature). Then divide the maximum load by the cross-sectional area obtained by the above formula, to calculate the tensile strength (MPa [kg f/mm²]).

Perform the test at 10 to 30°C, and calculate the tensile strength at 20°C using the following formula:

$$f_{20} = f_{\theta} + 0.0665 (\theta - 20)$$

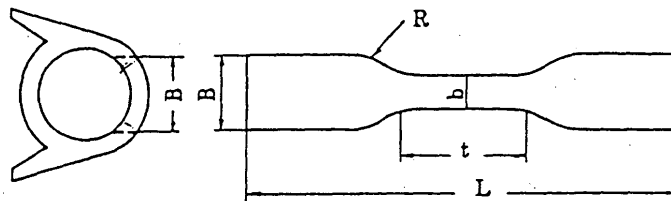
Where f_{20} : Tensile strength at 20°C (MPa [kg f/mm²])

f_{θ} : Tensile strength at θ °C (MPa [kg f/mm²])

θ : Temperature during the test (°C)

The obtained value shall be 46.1 MPa [4.7 kg f/mm²] or higher.

Figure 2



Nominal	Dimension (mm)				
	L	t	B	b	R
22 or less	90	25	8	5	6

3.7 Compression test

Place a test specimen between two flat plates. Then apply pressure in the direction perpendicular to the tube axis at a speed of 10 mm/min, until the inner surfaces come in contact without the test tube breaking, to obtain the maximum load (N [kgf]). Perform the test at 10 to 30°C, and calculate the compressive load at 20°C using the following formula:

$$P_{20} = \frac{P_{\theta}}{1 + 0.015(20 - \theta)}$$

Where P_{20} : Compressive load at 20°C (N [kg f])

P_{θ} : Compressive load at θ °C (N [kg f])

θ : Temperature during the test (°C)

The obtained value shall be 637N [65 kg f] or higher.

3.8 Heat resistance test

Put a gauge mark of a length of 200 mm in the tube axis direction, at approximately the center of the test specimen.

Heat the test specimen in a thermostatic chamber at 70 +/-2°C for 3 hours. Then take out the specimen and leave it until it is cooled to room temperature. After that, measure the length across the mark again to obtain the rate of change (%) relative to 200 mm.

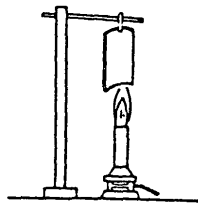
The obtained value shall be +/-1% or less.

3.9 Fire-retardant test

Attach one end of a test specimen to a stand, as shown in Figure 3. Place a Bunsen burner with a flame length of approximately 15 mm under the free end of the specimen. Leave the specimen for 1 minute in a state where the tip of

the flame reaches the lower end of the specimen. After 1 minute, remove the flame. At this point, the flame on the specimen shall go out by itself.

Figure 3



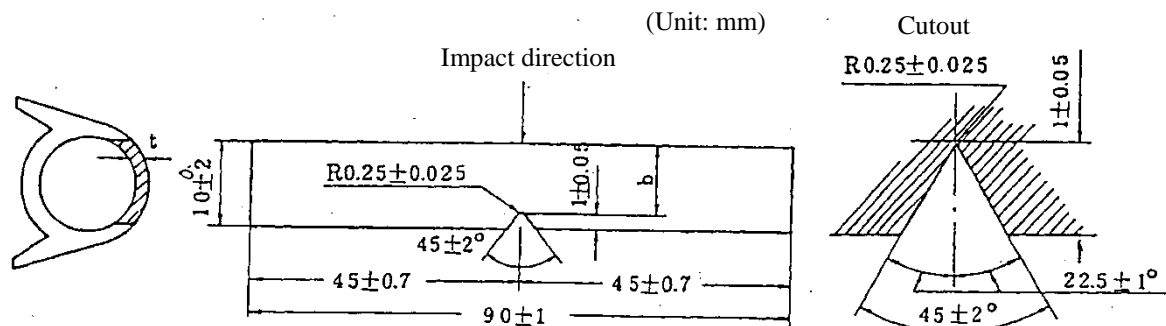
3.10 Impact test

Cut out a test specimen from the test tube, as shown in Figure 4. In a temperature-controlled room at $20 \pm 2^\circ\text{C}$, adjust the state for at least 1 hour. After that, attach the test specimen to a Charpy impact machine specified in JIS K 7111 (Plastics-Determination of Charpy impact properties). The distance between the supporting points shall be 60 ± 0.2 mm. After that, apply an impact once from the back side of the cutout and measure the energy required for fracture (N·cm [kgf·cm]). Divide the energy by the original sectional area of the cutout ($t \times b$), to obtain the impact value.

The test shall be performed for 7 specimens. An average value shall be calculated from 5 specimens, with the maximum and minimum impact values removed.

The obtained value shall be 352.8J [36 kgfcm/cm^2] or higher.

Figure 4

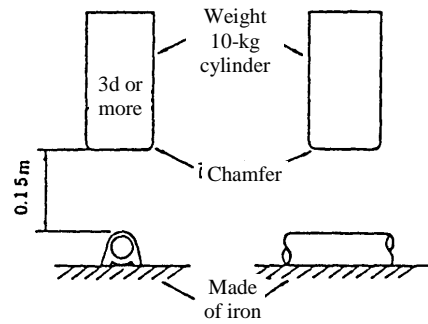


- Remarks
1. Figure 4 is based on No.1 test specimen of JIS K 7111 (Plastics-Determination of Charpy impact properties).
 2. The cutout shall be made by machine processing.

3.11 Low-temperature impact test

Take out a test specimen of an appropriate length from a completed product. Leave the specimen in a low-temperature chamber of -10°C for 1 hour. Immediately after taking out the specimen from the chamber, place it on an iron table shown in Figure 5, and drop a weight of 10 kg from a height of 0.15 m onto the specimen. At this time, the tube shall show no crack.

Figure 5



3.12 Weather resistant test (reference)

Take out a test specimen specified in Section 3.5 through 3.11 from a completed product. Expose the specimen to light sources for 2000 hours according to the method specified in JIS A 1415 (Methods of exposure to laboratory light sources for polymeric material of buildings). After that, compare the degradation state between before and after the test, and record the specimen in color photographs. Also, record the data on the tests of Section 3.5 through 3.11 and brittle temperatures for each test piece.

Attached table 1 Test item and initial performance

Item	Initial performance
Withstand voltage	Withstand AC 10000V for 1 minute.
Tensile	46.1 MPa [4.7 kg f/mm ²] or more
Compression	Shall show no crack. The load shall be 637N [65 kg f] or higher.
Heat resistance	The rate of change shall be +/-1% or less.
Flame resistance	The flame shall go out by itself.
Impact resistance	352.8J [36 kg f·cm/cm ²] or more
Low-temperature impact resistance	No crack shall be caused by a falling weight of 10 kg (from a height of 0.15 m).

4. Manufacturing process test

4.1 General matters

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 mall-production process produces completely the same items as the type test specimens.

5. Acceptance test

5.1 General matters

This test shall be conducted before acceptance of completed products. Test specimens shall pass all the tests.

5.2 Test items and contents

Take samples and conduct the tests as specified in Chapter 3 Type test. A part of the tests may be omitted if TEPCO permit it.

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.

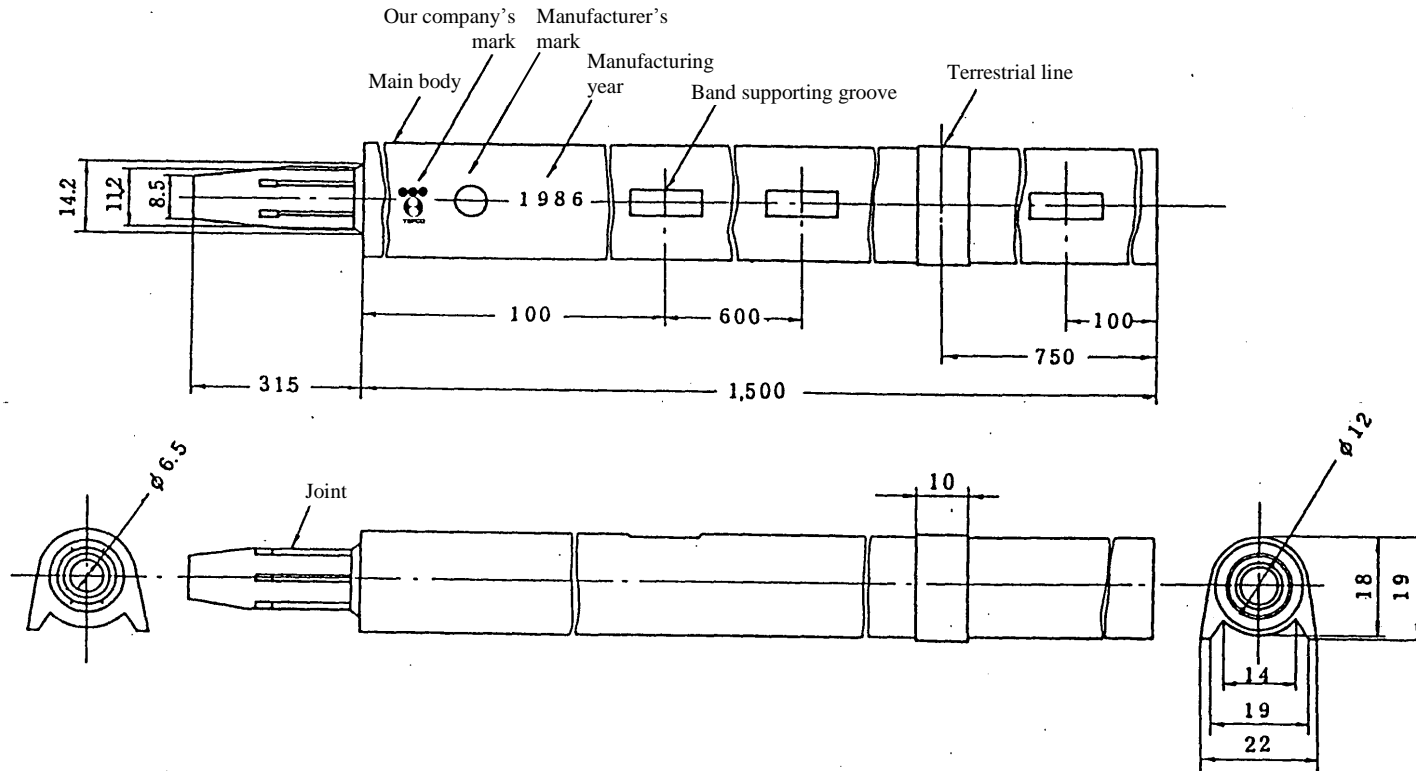
6.3. Other

- (1) The manufacturing specification shall be accompanied by technical documents containing descriptions on the quality control system (including responsibility system and quality control standards) and the inspection system (including structural standards, inspection items, and methods).
- (2) TEPCO shall be entitled to conduct a manufacturing process test when TEPCO find it necessary.
- (3) When a substantial advantage for use or manufacturing is available by changing a part of this specification, it may be changed after approval by TEPCO.

(Reference Translation)

Attached drawing - Plastic molding for grounding

(Unit: mm)



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