

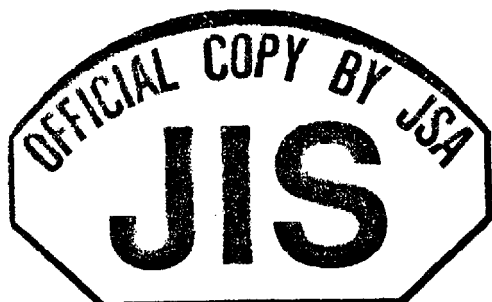
# JIS

This standard was revised in 4, 1994

## JAPANESE INDUSTRIAL STANDARD

Pull-off for overhead contact system  
of electric railway

Ⓔ JIS E 2201-1989



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## JAPANESE INDUSTRIAL STANDARD

J I S

Pull-off for Overhead Contact  
System of Electric Railway

E 2201-1989

1. Scope

This Japanese Industrial Standard specifies the pull-off, hereinafter referred to as the "fitting", used for overhead contact system used of contact wire of 85 to 170 mm<sup>2</sup> in nominal sectional area of JIS E 2101.

Remark: The units and numerical values given in { } in this Standard are based on the traditional units and are currently the criteria in force.

2. Classification and Symbols

Classes and symbols of fittings shall be classified according to use and structure and, in accordance with Table 1.

Further, in the case of using a corrosion resistant material, "corrosion resistant" or letter "B" shall be appended at the end of class or symbol, and thereafter according to material of arm of Table 5, "for general region" or letter of "A" or otherwise "for contaminated region" or letter "B", appended.

Table 1. Classification and Symbols

Classification			Symbol	Use		Structure	Shape (Informative reference)
Class 1	S	15	CS 15	For catenary equipment	For simple catenary equipment	Drawing angle 15 degrees	Reference 1 Fig. 1 and Fig. 2
		11	CS 11		For simple catenary equipment	Drawing angle 11 degrees	Reference 1 Fig. 3
	T	CT	For twin simple catenary equipment				
	C	CC	For compound catenary auxiliary equipment			Reference 1 Fig. 4	
Class 2	No. 1	D 1	For direct suspension system		Curve ear	Reference 1 Fig. 5	
	No. 2	D 2				Reference 1 Fig. 6	
	No. 3	D 3				Reference 1 Fig. 7	
	No. 4	D 4			Curve hanger	Reference 1 Fig. 8	

Remarks 1. In the case where Class 1 T and Class 1 C are provided, these shall be used in combination with Class 1 S.

2. In the case where Class 2 No. 4 is provided it shall be used in combination with Class 2 No. 1.

Applicable Standards See page 12.

3. Performance

Performances of fittings shall be in accordance with Table 2.

Table 2. Performances

Item		Classification				
		Class 1			Class 2 No. 1 to No. 3	Class 2 No. 4
		Retaining fitting for auxiliary catenary wire	Rod			
Proof tensile load	kN{kgf}	2.94 {300}	2.94 {300}	5.88 {600}	4.90 {500}	6.37 {650}
Proof com- pressive load	kN{kgf}	1.96 {200}	—	—	—	—
Proof twisting moment	N·m{kgf·cm}	49.0 {500}	—	—	49.0 {500}	—
Proof load in the slip test	kN{kgf}	0.98 {100}	—	—	—	—
Corrosion resistance of surface		In the case of zinc hot dip galvanizing, when the adhering amount test is carried out, it shall be not less than 400 g/m <sup>2</sup> or when copper sulfate test is carried out, it shall not attain the end point at four times. In the case of electroplated coating of zinc, white corrosion substances shall not be generated, in 48 h salt water spray test.				

Remark: The maximum torque, maximum tensile load, maximum compressive load, and maximum twisting moment of fittings are shown in Reference 2.

4. Structure

4.1 General The general structure of fittings shall be as follows:

- (1) Fittings shall be of such structure that the ear is clamped to contact wire by bolt, nut, wedge, hollow screw, etc. However, Class 1 C and Class 2 No. 4 are excepted.
- (2) As to Class 1 T, the fitting shall not enter in the range of about 50 mm with taking the point apart by 100 mm horizontally from the centre of contact wire as the centre.
- (3) Class 1 C shall be of such structure that the auxiliary catenary wire is retained by set fitting of the auxiliary catenary wire to be retained by bolts, wedges, etc. and this is retained by rod, arm, etc.
- (4) The arm and ear of Class 1 shall be of such structure as to be rotated easily.
- (5) The fitting shall not be interference to inclination and push up of pantagraph, and especially in the case of Class 1 S 11 and Class 1 T, the rising up angle of arm shall be attached sufficiently.
- (6) As to Class 2 No. 4, the structure is not specified specially, but the length shall be not more than 250 mm, the mass, not more than 1 kg, and, be of such structure that it is able to keep the curve ear vertically, and the attaching working and regulation of curve are made easily.

- (7) Each piece of ear shall be able to keep the contact wire in a mutually parallel condition between them.
- (8) The part where ear and contact wire contact shall be free from such parts as tooth state, protrusions, etc. having a fear to injury the contact wire.
- (9) Parts of the same type capable of being decomposed shall have interchangeability.

4.2 Common Parts The common parts of fittings shall be as follows:

- (1) The hexagon head bolt shall be the one of JIS B 1180. The cup head square neck bolt shall be the one of JIS B 1171.
- (2) The nut shall be hexagon nut of JIS B 1181.
- (3) The spring lock washer shall be No. 2 of JIS B 1251.
- (4) The split pin shall be the one of JIS B 1351.

5. Appearance, Shape and Dimensions

The appearance, shape and dimensions of fittings shall be as follows:

- (1) The fitting shall be free from defects harmful to use such as in complete plating, cracks, burrs, remarkable uneven thickness, etc.  
Furthermore, the castings shall be free from surface roughness, flaws, crazings, fins, cavities, etc.
- (2) The drawing angle of arm shall be 15 degrees for Class 1 S 15, and, 11 degrees for Class 1 S 11 and Class 1 T.
- (3) The length of contact wire placed between ears shall be not less than 25 mm.
- (4) The distance between the crest part of contact wire and the lower edge of ear in the condition where the ear is attached to the applied contact wire shall be in accordance with Table 3.

Table 3. Distance between Crest Part of Contact Wire and Lower Edge of Ear

Unit: mm

Kind of contact wire	Distance between crest part of contact wire and lower edge of ear
170 mm <sup>2</sup>	7.5 max.
150 mm <sup>2</sup>	7.0 max.
110 mm <sup>2</sup>	6.5 max.
85 mm <sup>2</sup>	6.0 max.