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**RAILWAY INDUSTRY STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

TB/T 3111-2017

**Copper and Copper Alloy Stranded Conductors for Electric
Railway
(English Translation)**

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1 Scope

This Part specifies the fastener composition, assembly performance, technical requirements of parts, inspection methods, inspection rules, marking and packaging, storage and transportation of type V fastening system.

This Part is applicable to type V fastening system for high-speed railway with ballasted tracks.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document;

for the undated documents, only the latest version (including all the amendments) is applicable to this standard.

GB/T 224 Determination of depth of decarburization of steels

GB/T 230.1 Metallic materials - Rockwell hardness test - Part 1: Test method(scales

A, B, C, D, E, F, G, H, K, N, T)

GB/T 232 Metallic materials - Bend test

GB 443-1989 Lubricating oils for total loss systems L-AN

GB/T 528 Rubber, vulcanized or thermoplastic - Determination of tensile stress- strain

properties

GB/T 531.1 Rubber vulcanized or thermoplastic - Determination of indentation hardness - Part 1: Durometer method (Shore hardness)

GB/T 699 Quality carbon structural steels

GB/T 1040.1 Plastics - Determination of tensile properties - Part 1: General principles

GB/T 1040.2 Plastics - Determination of tensile properties - Part 2: Test conditions for molding and extrusion plastics

TB/T 2329 Fatigue test method for type I and type II fastening elastic strip

TB/T 2478 Grading diagram for elastic strip metallographic structure

TB/T 2626 Technical specification for rubber subplate under railway concrete track

TB/T 3395.1 Fastening systems for high-speed railway - Part 1: General requirement

TB/T 3396.1 Test methods for fastening systems of high-speed railway - Part 1:
Determination of longitudinal rail restraint

TB/T 3396.2 Test methods for fastening systems of high-speed railway - Part 2:
Determination for clamping force

TB/T 3396.4 Test methods for fastening systems of high-speed railway - Part 4: Test of
fatigue performance of fastening assembly

TB/T 3396.5 Test methods for fastening systems of high-speed railway - Part 5:
Determination of electrical resistance

TB/T 3396.6 Test methods for fastening systems of high-speed railway - Part 6:
Effect of severe environmental conditions

TB/T 3396.7 Test methods for fastening systems of high-speed railway - Part 7:
Vertical load test for cast-in fastening components

3 Fastener components

The type V fastening system is composed of spiral spikes, flat washers, elastic strips, gauge baffles, under-rail subplates (rubber subplates or composite subplates), embedded casings. It can also include height-adjusting subplates. The connection and assembly of the fasteners is as shown in Figure 1.

5.2.1 Raw materials

The raw material of spiral spikes is high-quality carbon structural steel, alloy structural steel or cold heading steel. The performance of raw materials shall meet the requirements of GB/T 699, GB/T 3077 or GB/T 6478.

5.2.2 Type size

The type and size of the spiral spike shall comply with the design requirements; the position of the hexagonal head as relative to the center line of the bolt, the full run-out, the straightness of the bolt shall comply with the requirements of grade C in GB/T 3103.1-2002.

5.2.3 Appearance

5.2.3.1

There shall be no folds and wrinkles at the connection between the head of the spiral spike and the shaft.

5.2.3.2

Except for the first thread, the threads of the spiral spikes shall be even and complete.

5.2.3.3

Spiral spikes shall not be over-burned; the surface of the thread shall be smooth and clean, without cracks, dents, burrs, floating rust, flash, burns, oxide scales that affect the use.

5.2.4 Mechanical properties

The minimum actual tensile force of the spiral spike shall not be less than 190 kN; the elongation at break shall not be less than 12%; the hardness shall not be greater than 34 HRC.

5.2.5 Cold bending performance

There shall be no cracks on the threaded part of the spiral spike (after anti-rust treatment), after the 15° cold bending test.

5.2.6 Anti-rust performance

The surface of the spiral spike shall be subject to anti-rust treatment. The spikes after anti-rust treatment shall meet the thread precision requirements; the protection level shall not be lower than level 5, after 120 h neutral salt spray (NSS) test.

5.3.1 Raw materials

The raw material of the rubber part of the rubber subplate and the composite subplate is mainly composed of natural rubber or synthetic rubber; reclaimed rubber shall not be sleeper and the rail shall be 0.5 mm.

5.4.3 Appearance

The surface of gauge baffles shall be uniform in color and free from visible defects, such as pinholes, burnt marks, flashes, burrs. The position of the parting line, the injection port and the ejector pin shall not be set on the contact plane of the gauge baffle, the sleeper and the rail.

5.4.4 Drainage rate

The gauge baffle shall be conditioned by absorbing water. The drainage rate of the gauge baffle, after water absorption conditioning, shall not be less than 0.4%.

5.4.5 Hardness

The hardness of the gauge baffle shall not be less than 105 HRR.

5.4.6 Internal voids

There shall be no air bubbles or voids inside the gauge baffle.

5.4.7 Insulation resistance

The insulation resistance of the gauge baffle shall be greater than 5×10^6 ohm.

5.4.8 Compressive performance

The gauge baffle shall not be damaged after the compressive performance test; its warping value shall not be greater than 0.5 mm.

5.5.1 Raw materials

The raw material of the embedded casing is glass fiber reinforced polyamide 66 or other materials, whose performance is not inferior. The physical and mechanical properties of raw materials shall meet the requirements in Table 3.

5.5.2 Type size

The type and size of the embedded casing shall meet the design requirements; the perpendicularity shall be 0.5 mm.