

ICS 45.080

TB

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

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Concrete turnout sleeper for ballasted track

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(English Translation)

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1 Scope

This standard specifies the technical requirements, inspection methods, inspection rules, signs, storage and transportation of prestressed concrete turnout sleepers for ballasted tracks.

This standard applies to prestressed concrete turnout sleepers for ballasted tracks (hereinafter referred to as turnout sleepers).

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 1499.1 Steel for the reinforcement of concrete - Part 1: Hot rolled plain bars GB/T 5223 Steel wires for the pre-stressing of concrete TB 10424 Standard for constructional quality acceptance of railway concrete engineering TB 10425 Standard for check and accept of railway concrete strength TB/T 1878 Fatigue test method for prestressed concrete sleepers TB/T 1879 Static load crack resistance test method for prestressed concrete sleepers TB/T 3275 Railway concrete TB/T 3300 Prestressed concrete sleeper for ballasted track of high-speed railway YB/T 5294 Low carbon steel wire for general uses

3.1.1 Turnout sleepers shall be manufactured, according to the design drawings

approved by the prescribed procedures and this standard.

3.1.2 Turnout sleepers shall be produced in a factory; the factory shall have the necessary

tooling equipment and mature production technology.

3.2.1 Aggregate shall have a re-inspection report for entering the factory. The other raw

materials and embedded parts shall have the manufacturer's delivery certificate and re-inspection report.

3.2.2 The cement shall be Portland cement or ordinary Portland cement. The strength grade of cement shall not be lower than 42.5; early-strength cement shall not be used; the alkali content shall not exceed 0.60%; the sulfur trioxide content shall not exceed 3.0%; the specific surface area shall be 300 m²/kg ~ 350 m²/kg. Other technical requirements shall comply with the provisions of TB/T 3275.

3.2.3 Coarse aggregates shall be continuously graded crushed gravels of 5 mm ~ 20

mm; crushed pebbles shall not be used. Other technical requirements shall comply with the provisions of TB/T 3275.

The fine aggregate is natural medium-coarse river sand. The mud content shall not be greater than 1.5% by mass. Other technical requirements shall meet the requirements of TB/T 3275.

Aggregates, which have alkali-carbonate reactivity or alkali-silicic acid reactivity by a mortar bar expansion (rapid method), greater than or equal to 0.20%, shall not be used.

Before the turnout sleeper is put into production, the source of the aggregate is changed, OR the aggregate has been used for one year, the alkali activity of the aggregate shall be tested and evaluated by an inspection organization, which has corresponding qualifications, according to the method specified in TB/T 3275.

3.2.4 The mixing water shall comply with the relevant provisions of TB/T 3275.

3.2.5 The water reducing agent shall comply with the relevant provisions of TB/T 3275.

3.2.6 Mineral admixtures shall comply with the relevant provisions of TB/T 3275.

3.2.7 Steel materials for turnout sleepers shall meet the following requirements:

- a) The prestressed steel wire shall comply with the provisions of GB/T 5223;
- b) When low-carbon steel hot-rolled smooth round steel bar is used for the stirrup, its performance shall meet the requirements of GB 1499.1; when low-carbon cold-drawn steel wire is used, its performance shall meet the requirements of YB/T 5294 and the steel used shall not be lower than Q235;

c) Low-carbon cold-drawn steel wire is used for the spiral reinforcement; its performance shall meet the requirements of YB/T 5294.

3.2.8 The embedded parts in the turnout sleeper shall meet the relevant technical requirements.

3.2.9 Unless otherwise specified, the storage and use of cement, mineral admixtures, coarse aggregate, fine aggregate, water reducer shall comply with the provisions of TB/T 3275. The storage and use of steel shall comply with the provisions of TB 10424.

3.3 Manufacturing

3.3.1

The prestressed steel wire shall be stretched by automatic tensioning equipment; the tensioning equipment shall be inspected and calibrated regularly. Tensile force shall comply with the design requirements. When the design does not specify the deviation of the initial tension force, the deviation shall not be greater than 1.5% of the design value.

Prestressed steel wires shall be uniformly stressed, when cutting, grouping, stretching prestressed steel bars. When the long-line pedestal method is used for production, a single partial tensioning process shall be adopted; the absolute deviation of the prestress between the same sleeper's prestressed steel wires shall not be greater than 5%. When the flowline machine set method is used for production, the cutting deviation of steel wire shall be not more than 1.5/10000 of the steel wire length; meanwhile, the maximum difference of the cutting length of the same group of steel wire shall be not more than 2 mm.

The tensioning of the prestressed steel wire shall be carried out in accordance with the procedure of: 0 -> Initial tension force -> Hold the load for 1 min -> Increase tension to initial tension -> Lock nut.

3.3.2

The concrete mix ratio shall be determined by factory tests. The amount of concrete cementitious material shall not exceed 500 kg/m³.

Concrete mixing shall use a forced mixer. The mixing time and material measurement error shall meet the requirements of TB/T 3275.

The temperature of the steel mold shall be 5 °C ~ 35 °C. The temperature of the concrete entering the mold shall be 5 °C ~ 30 °C.

The forming operation of the turnout sleeper shall be carried out on the forming equipment; the concrete shall be ensured to be dense.

3.3.3 When natural curing is used for the turnout sleeper, it shall be carried out

immediately after vibration molding; meanwhile the concrete shall be covered with direct moisture-retaining materials. The difference -- between the concrete temperature of the sleeper core and the surface concrete temperature of the turnout sleeper -- shall not be greater than 15 °C; the ambient temperature for starting curing shall be 5 °C ~ the surface, which is caused by shrinkage or stress.

3.4.10 The installation holes of switchover equipment shall meet the design requirements; the anti-rust and anti-blocking measures shall be taken.

4 Inspection method

4.1

In addition to the visual inspection of the surface appearance, the external dimensions and appearance quality of the turnout sleeper shall be tested, using general or special measuring tools that are regularly calibrated.

4.2

Concrete specimens shall be formed and cured, under the same conditions as the turnout sleepers; the 28-day specimens shall be subjected to standard curing after de-moulding.

4.3

The performance test of cement, coarse aggregate, fine aggregate, mixing water, water reducing agent, mineral admixture shall be carried out according to the provisions of TB/T 3275. The appearance and main dimensions of the embedded casing shall be inspected, according to the relevant requirements of the fastener system; the internal thread shall be inspected by the go-no-go gauge.

4.4

The performance test of concrete mixture shall be carried out, according to the provisions of TB/T 3275.

4.5

The concrete compressive strength test shall be carried out, according to the cube specimen test method in TB/T 3275; the 28-day concrete strength shall be evaluated according to the method in TB 10425.

4.6

The elastic modulus test of concrete is carried out, according to the test method for prism specimens in TB/T 3275.