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

TB 10423-2014

**Standard for Constructional Quality Acceptance of Railway
Station and Yard Engineering
(English Translation)**

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1 Scope

This Part of TB/T 1632 specifies the requirements, inspection methods, inspection rules for rail fixed and mobile flash butt welding.

This section applies to flash butt welding of 50 kg/m ~ 75 kg/m new rails.

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 230.1-2009 Metallic materials - Rockwell hardness test - Part 1: Test method (scales A, B, C, D, E, F, G, H, K, N, T)

GB/T 231.1-2009 Metallic materials - Brinell hardness test - Part 1: Test method

GB/T 4340.1-2009 Metallic materials - Vickers hardness test - Part 1: Test method

GB/T 6394 Metal - Methods for estimating the average grain size

GB/T 8170 Rules of rounding off for numerical values & expression and judgement of limiting values

GB/T 13298 Inspection methods of microstructure for metals

TB/T 1632.1-2014 Welding of rails - Part 1: General specification

TB/T 2622.2 Movable gas pressure welding equipment of steel rail - Technical specification for heater

TB/T 2622.3 Movable gas pressure welding equipment of steel rail - Technical specification for gas control box

3.1 Requirements for welding rails

Rails used for flash butt welding shall comply with the provisions in Chapter 4 of TB/T 1632.1-2014.

3.2.1 Basic configuration

It shall be equipped with equipment or device, for track gauge and end slope treatment, rail end de-rusting, rail flash butt welding, welding rod shaping, joint heat treatment, joint straightening, joint shape finishing, flatness inspection, ultrasonic flaw detection, etc.

3.2.2 Basic requirements

Rail flash butt welding equipment shall be able to automatically record and store the process of pressure, current and displacement changing with time during the welding process. The joint heat treatment equipment shall be able to automatically record and store the process of joint temperature changing with time during heating and cooling.

3.3 Personnel requirements

Welding personnel shall hold a post training certificate, which is issued by a technical institution, as recognized by the competent railway authority.

3.4.1 Basic process

The basic process of rail flash butt welding includes:

- Selection of rails;
- Inspection and treatment of rails before welding;
- Rust removal before welding;
- Welding and pushing;
- Welding rod shaping (coarse grinding);
- Post-weld heat treatment;
- Aging (suitable for stationary flash butt welding);
- Straightening of welded joints;
- Shape finishing and straightness inspection;
- Flaw detection.

3.4.2 Inspection and treatment of rails before welding

3.4.2.1

Check the main geometric dimensions of the rail

Rail height (H), rail head width (WH), rail bottom width (WF), section asymmetry (A), rail crown fullness (C), end slope (vertical, horizontal direction), end twist, end and rail straightness.

3.4.2.2

The surface quality of the rails shall be inspected. The mirror inspection of the bottom surface of the rails shall be carried out, for fixed flash butt welding.

3.4.2.3

The straightening method can be used, to correct the bending of the end of the rail. For the bending of the end of the rail that cannot be straightened, the end of the curved rail shall be sawed off. The end slope of the rail after sawing shall meet the requirements of the corresponding rail standard.

3.4.3 Rust removal before welding

3.4.3.1

The end faces of the rails to be welded AND the contact parts between the rails and the electrodes of the flash butt welding machine shall be de-rusted.

3.4.3.2

If the rust-removed surface of the rail is to be welded for more than 24 hours

OR if it is polluted by water, oil or dirt after grinding, it shall be de-rusted again.

3.4.3.3

If the rail waist is in contact with the electrode, the protruding rolling mark on the contact part shall be ground to be level with the parent metal.

3.4.4 Welding and pushing

3.4.4.1

The rail temperature before welding should not be lower than 10 °C.

3.4.4.2

The pushing and embossing process shall be completed automatically. The pushing and embossing process shall not damage the welded joint and the rail base metal. The surface after pushing and embossing shall have no visible cracks or welding slag intrusion. The maximum allowable pushing and embossing margin of each part of joint (the height of the

welding rod after pushing the embossing) is 2 mm for the rail head, 2.5 mm for the bottom of the rail head, 2 mm for the rail waist, 1.5 mm for the rail bottom.

3.4.4.3

After the welding head is pushed and embossed and before grinding, use a detection ruler ($L_0 = 1\text{ m}$) to check the joint misalignment; measure and calculate the joint misalignment at 15 mm ~ 25 mm on both sides of the weld center line, as shown in Figure 1 and Figure 2. The amount of misalignment of joints shall not exceed the value specified in Table 1. For welded joints whose misalignment exceeds the maximum allowable value, the joints shall be cut off and re-welded. The sawing position shall not be less than 50 mm from the center line of the weld. Before re-welding, the end of the rail shall be at room temperature.

3.4.4.6

The welded joints (finished products) of each rail shall be marked. The mark shall be located on the same side of the welded long rail waist, at 1 m ~ 6 m away from the weld. The marking shall be clear and upright, which shall be identifiable within at least 5 years (or 1 overhaul period). The marking method shall ensure that each rail welded joint (finished product) can trace the records and relevant information of the production process.

3.4.5 Welding rod shaping (rough grinding)

3.4.5.1

Milling or grinding can be used to shape the welding rod. The base metal of the rail shall not be damaged, when the welding rods are shaped.

3.4.5.2 After welding rod shaping (coarse grinding), the surface roughness of welded

joints shall meet the requirements of flaw detection and scanning.

3.4.5.3 The rails shall be ground longitudinally, not transversely; there shall be no grinding burns on the rail surface.

3.4.5.4 The vertical and horizontal misalignment of the non-working face of the welded

joint shall transition smoothly.

3.4.5.5 When the line design speed $v > 160\text{ km/h}$, the height of the welding rods on the lower surface of the rail bottom of the rail flash butt welding joints shall not be greater than 0.5 mm (except for joints welded by tension locking); the edges and corners of the welding rods at the bottom of the rails shall transition smoothly.