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Carbon steel tie — plates

ICS 45.080

Descriptions : sleepers, fixtures, railway rails, sheet materials, steels

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of International Trade and Industry through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS E 1110 : 1988** is replaced with **JIS E 1110 : 1998**.

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In the event of any doubts arising as to the contents,
the original JIS is to be the final authority.

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Carbon steel tie — plates

Introduction This Japanese Industrial Standard has been prepared based on the first edition of **ISO 6305/2** *Railway components — Technical delivery requirements — Part 2: Unalloyed carbon steel baseplates* published in 1983, by adding the minimum necessary matters specified in the conventional **JIS E 1110:1988** (*Tie Plates*) to clauses or contents, in consideration of users' confusion due to the drastic overall revision of the conventional **JIS** and to widen the scope of choices available to users.

In addition, portions underlined with dots in this Standard are not stated in the original International Standard.

1 Scope This Standard specifies the quality, acceptance condition, shape and size required for carbon steel tie-plates (hereafter referred to as "tie-plates") rolled or hot forged to be used when fastening the rails specified in **JIS E 1101** to the wooden sleepers.

2 Normative references The normative references to this Standard are as follows:

JIS B 7420 *Plain limit gauges*

JIS E 1101 *Flat bottom railway rails and special rails for switches and crossings of non-treated steel*

JIS Z 2241 *Method of tensile test for metallic materials*

JIS Z 9015 *Sampling procedures for inspection by attributes*

3 Manufacturing method

3.1 Steelmaking process The steelmaking process shall be as follows.

- (1) The steelmaking process shall be at the manufacturer's option. If requested by the purchaser, the manufacturer shall state in his tender the type and the principal characteristics of the steelmaking process; he may not alter them without advising the purchaser's representative.
- (2) The steel used shall be of one of the grades defined in Table 1 and as selected by the purchaser.

Table 1 Grade of steel used of tie-plates

Tensile strength R_m (N/mm ²)	Minimum elongation (%)
380 to 480	24
480 to 620	18

Other steel grades may be used subject to agreement in the order between the purchaser and the manufacturer.

- (3) Continuously cast blooms may be used in addition to blooms made from ingots.

3.2 Manufacturing method The manufacturing method shall be as follows.

- (1) The tie-plate shall be formed by cutting to length a rolled section shown in attached figure 1 to attached figure 7.
- (2) When the tie-plate is not formed according to the above, it shall be formed from the bar steel, steel plate, or flat steel with the quality specified in 3.1 by hot forging.
- (3) Throughout the production process, the manufacturer shall use the best techniques so that the tie-plates satisfy the requirements of this Standard.

3.3 Classification and symbol, shape and size of tie-plate The classification and symbol, shape and size of tie-plate shall be classified according to the application, and shall be as given in table 2. However, when it is difficult to follow this, a copy of the final drawings shall be supplied to the manufacturer by the purchaser together with the notification of approval of the order.

Table 2 Classification and symbol, shape and size of tie-plate

Classification	Symbol	Application	Attached figure number
For 30 kg rail	30	To be used when fastening the rails by spikes directly.	Attached figure 1
For 37 kg and 40 kgN rail	40N		Attached figure 2
For 50 kg and 50 kgN rail, E type	50E		Attached figure 3
For 50 kg and 50 kgN rail joint, E type	50EJ		Attached figure 4
For 50 kg and 50 kgN rail, F type	50F	To be used when fastening rails elastically together with plate springs, bolts and nuts and the like.	Attached figure 5
For 50 kg rail joint, F type	50FJ		Attached figure 6
For 50 kgN rail joint, F type	50NFJ		Attached figure 7

3.4 Working gauge The working gauge shall be as follows.

- (1) If stated in the order, the manufacturer before starting production shall make up two sets of maximum and minimum working gauges at the manufacturer's expense. The tolerances and dimensional tolerances, and the wear allowances of this working gauge shall be in accordance with JIS B 7420. However, new working gauges need not be provided for items ordered in quantities of less than 10 000 at any one time.
- (2) If required by the purchaser, the working gauges shall be stamped after approval by the purchaser's representative.
- (3) One set of working gauges shall be made available to the receiving inspector for the period of acceptance testing.
- (4) Only these working gauges shall be valid for checking purposes.
- (5) When the working gauges have been approved by a purchaser, or by an outside testing agency, these shall be used for other purchasers wherever possible.

3.5 Marking The following information shall be marked on the conspicuous part of the surface of the outer rail side of tie-plate by embossing or the engraving.

- (1) The identification mark of the manufacturer's name
- (2) The last two figures of the year of manufacture
- (3) The symbol of classification

3.6 Surface defects The allowable range of surface defects shall be as follows. Any operation carried out either in the cold or hot state with the object of concealing a defect is not permitted.

- (1) The surface of tie-plates shall be free from defects such as strain and flaws adversely affecting their behaviour in service.
- (2) Slight defects outside the rail seating surface may be accepted by the receiving inspector if considered negligible.

3.7 Finishing

3.7.1 Cutting of tie-plate The cutting of tie-plate shall be as follows.

- (1) The rolled bars used shall be cut to the required length by any suitable method which does not impair the section and the quality of the metal. Each cut shall be perpendicular to the axis, clean and free of burrs.
- (2) In the case of hot forging, the suitable radius may be provided to a corner part.
- (3) Any projections shall be removed from the rail seating surface. Hammering is not allowed.
- (4) Downward deformation of tie-plate edges due to shearing is permissible up to a limit of 1.5 mm over a width of 20 mm for parts less than 33 mm thick and to 3 mm for parts more than 33 mm thick (see figure 1).

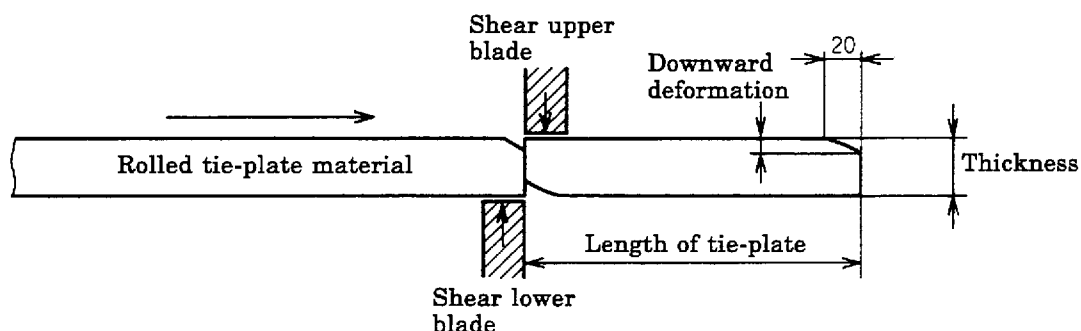


Figure 1 Downward deformation of tie-plate edges

3.7.2 Drilling and slotting The drilling and slotting shall be as follows.

- (1) By agreement with the purchaser, the holes shall be drilled or punched.
- (2) Slots and holes of special shape may be obtained by any suitable method.
- (3) The diameter and interval of the holes shall remain within the permissible tolerance limits.
- (4) Burrs resulting from drilling and slotting shall be carefully removed. Hammering is not allowed.

3.8 Dimensional tolerances The dimensional tolerances shall be as follows.

- (1) The methods and means of checking the principal dimensional tolerances shall be as given in Table 3.
- (2) If, for normal operations and by agreement between the manufacturer and the purchaser, gauges different from but equivalent to those given in 3.4 are used, only the gauge in 3.4 shall be used in case of dispute.

Table 3 Methods and means of checking the principal dimensional tolerances

	Dimensions	Tolerances ⁽¹⁾	Checking methods in accordance with Annex 1
Length L	Dimension parallel to the rail	± 4 mm	min/max gauge
Width W	Width of the rolled section	± 3 mm	min/max gauge
Thickness T_1, T_2		± 1 mm	The thickness shall be measured at the two extremities of the tie-plate section.
Deviation of the lips		-0.5 mm, $+1.5$ mm	min/max gauge
End squareness		± 4 mm	
Diameter of the holes		For drilled holes : ± 0.5 mm For punched holes: the above tolerances are increased by 0.10 times the thickness for the exit side of the punched hole.	
Position of the holes	The position of the holes shall enable the tie-plate to be mounted on a gauge with pins placed at the specified spacing; the diameter/size of the pins shall be 1.5 mm less than that of the holes. The length of the working gauge shall be equal to the length of the tie-plate plus the maximum tolerance. The tie-plates shall be able to fit over the working gauge, the pins engaging simultaneously in the holes, and the ends not overlapping the working gauge.		Working gauge
Surface inclination		$\pm 7/1000$	By difference of two thickness measurements taken as close as possible to the lips.

Note ⁽¹⁾ For high-speed tracks (as a guide ≥ 160 km/h) the question of tolerances shall be subject to agreement between the purchaser and the manufacturer.

3.9 Flatness For flatness, the clearance of four corners shall be measured by applying a ruler plate to the whole surface of the rail seat, and the tolerance limit shall be as follows.

- (1) The surfaces on which the rails bear shall not deviate from flatness by more than 0.5 mm.
- (2) The purchaser shall specify in the order whether the surface may be convex or concave.

Unless otherwise specified, the limit shall be 1.0 mm.

4 Conditions of acceptance testing

4.1 General The tests shall be carried out in the manufacturer's works; the preparation of the test pieces and the tests shall be at the manufacturer's expense. However, when the manufacturer purchases steel to be used, the presentation of the steel inspection certificate from the steel manufacturer may replace the tensile test if accepted by the purchaser.

4.1.1 Type and extent of tests One tensile test per cast for casts of 50 t or less and two tensile tests for casts exceeding 50 t.

4.1.2 Dimensions and finish Inspection of dimensions covers the dimensions and measurements below:

- (1) Length (L)
- (2) Width (W)
- (3) Thickness (T_1, T_2)
- (4) Deviation between lips (A)
- (5) Diameter of holes
- (6) Position of holes
- (7) Surface inclination
- (8) Flatness of the rail seat

The other dimensions for which tolerances are specified in table 3 may at any time be checked by the receiving inspector, but are not subject to the systematic inspection specified in 4.3.2.

4.2 Selection of test pieces

4.2.1 Mechanical test pieces The mechanical test pieces shall be selected as follows.

- (1) The parts shall be selected for sampling as directed by the receiving inspector.
- (2) The test pieces shall be cut in the rolling direction.
- (3) Cutting and finishing shall be carried out entirely in the cold state, by means of machine tools and without any hammering, cold deformation, hardening or annealing.