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JIS E 1303 : 2001

Railway turnouts and crossings

ICS 45.080

Descriptors : turnouts, diamond crossings

Reference number : **JIS E 1303 : 2001 (E)**

Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Land, Infrastructure and Transport through deliberations at the Japanese Industrial Standards Committee in accordance with the Industrial Standardization Law. Consequently **JIS E 1303** : 1993 is replaced with **JIS E 1303** : 2001.

Conformity to this Standard may come under employment of the following patent rights.

1	Title of the invention	Railway crossing
	Date of registration	1984-6-28 (relating to pressure welded railway crossing)
2	Title of the invention	Welded crossing and its production method
	Date of registration	1988-1-30 (relating to non-groove electron beam welding crossing)

This description does not influence the above patent rights on the effect, scope and so forth.

These patentees ensure, to Japanese Standards Association, intending to license anybody indiscriminately to the said patent rights on rational conditions.

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

Railway turnouts and crossings

1 Scope This Japanese Industrial Standard specifies railway turnouts and crossings of 1 067 mm and 1 435 mm gauges (hereafter referred to as "turnouts and/or crossings"). This Standard does not apply to those for SHINKANSEN railways based on the National SHINKANSEN network Law.

2 Normative references The standards listed in Attached Table 1 contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of those standards (including amendments) shall be applied.

3 Definitions For the main terms used in this Standard, the following, besides the definitions in **JIS E 1311**, shall apply.

a) **non-groove electron beam welding crossing** A crossing welded by irradiation of electron beam in a vacuum circumference with the welding surfaces of the rail base materials being in contact closely each other without forming grooves.

4 Classification of turnouts and crossings To be classified into the following 4 types:

a) Simple turnout

b) Symmetrical turnout

c) Diamond crossing

d) Run-over type turnout

5 Construction, shape and dimensions

5.1 Construction A turnout consists of switch, crossing, guards and rails, and a diamond crossing consists of obtuse crossing, crossings, guards and rails.

Figs. 1 and 2 show examples of constructions.

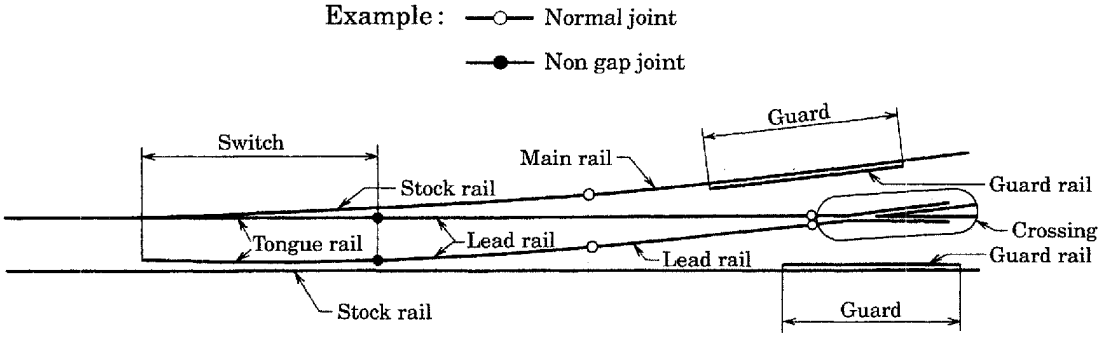

Fig. 1 Example of simple turnouts

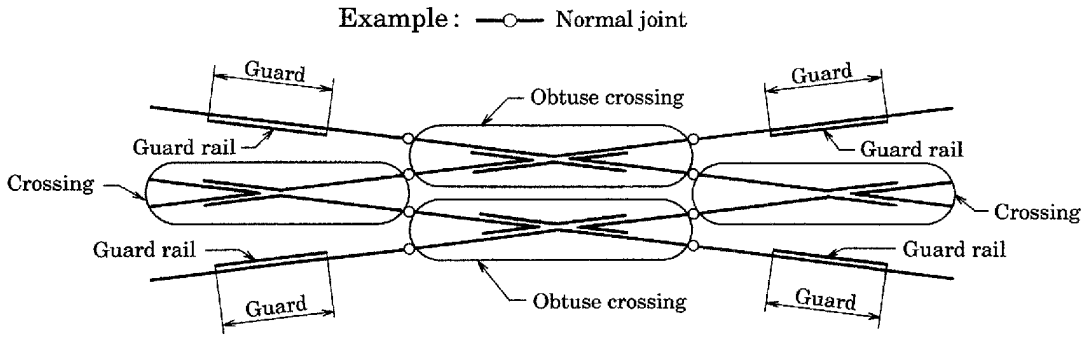

Fig. 2 Example of diamond crossings

5.2 Shape and dimensions

5.2.1 Geometry For the geometry of turnouts and crossings, **JIS E 1304** applies.

5.2.2 Shape and dimensions of switch For the shape and dimensions of switches, **JIS E 1305** applies.

5.2.3 Shape and dimensions of crossing For the shape and dimensions of crossings, **JIS E 1306** applies.

5.2.4 Shape and dimensions of guard For the shape and dimensions of guards, **JIS E 1307** applies.

5.2.5 Dimensional tolerance Dimensional tolerances shall be as follows:

a) Switches, crossings and guards shall be as given in Attached Figs. 1 to 15.

b) Unless otherwise specified particularly, bolts and nuts shall meet grade C of **JIS B 1180** and **JIS B 1181**.

c) Split pins shall comply with **JIS B 1351**.

d) Rivets shall comply with **JIS B 1214**.

e) The spherical countersunk hole on floor plates intended to hold the head of rail fixing bolts shall be formed in such dimensions as that head top surface of bolts having basic sizes will recess 0.5 mm to 1.5 mm inside the bottom surface of floor plates.

f) When bolt locking washers, fish plates and the like have a stop groove, those on the groove shall be ±0.5 mm in width and ±0.5 mm in depth.

g) To be ±0.5 mm for the hole diameter of bolts and the like, and $^{+1.5}_{-0.5}$ mm for the side length of rail spikes which are not specified in the attached figures.

5.2.6 Shop assembling turnouts and crossings Shop assembling turnouts and crossings shall comply with Annex 1 besides the provisions of **5.2.1** to **5.2.5**.

6 Materials

6.1 Rails The material of rails to be used for turnouts and crossings shall be in accordance with **JIS E 1101** and **JIS E 1120**. For slack quenching S rails, however, Annex 2 shall apply.

6.2 Pressure welded crossing The material of rails to be used for pressure welded crossings shall comply with **JIS E 1101** and **JIS E 1120**. This applies to 100 kg rails (1) similarly.

Note (1) A rail having specific sectional shape, of which approximate value of mass per 1 m is stated in numerals, to be used for forming nose rail toe.

6.3 Non-groove electron beam welding crossing The material of rails to be used for non-groove electron beam welding crossings [hereafter referred to as "NEW crossings" (abbreviation)] shall comply with **JIS E 1120**.

6.4 Manganese steel crossing The material of manganese steel crossings shall be SCMnH3 of **JIS G 5131**.

6.5 Components For the material of components of turnouts and crossings, those indicated in Table 1 or at least equivalent thereto shall be used.

Table 1 Material of component

Name of component	Material	Applicable provisions for shape and dimensions
Switch rod	SS400 of **JIS G 3101**	Attached Figs. 7.1 and 7.2 of **JIS E 1305**
	SM400A of **JIS G 3106**	Attached Figs. 1.2 to 1.5, 3.10, 3.11, 8.3 and 9.3 of **JIS E 1305**
		Attached Figs. 14.2,14.3 and 17.4 of **JIS E 1306**
Stretcher bar	SS400 of **JIS G 3101**	Attached Fig. 3.12 of **JIS E 1305**
	SM400A of **JIS G 3106**	Attached Figs. 1.6, 1.7, 8.4 and 9.4 of **JIS E 1305**
Bearing clip	SS400 of **JIS G 3101**	Attached Figs. 7.3 to 7.6 and 8.5 of **JIS E 1305**
	SM400A of **JIS G 3106**	Attached Figs. 1.8, 3.13 to 3.17 and 6.2 of **JIS E 1305**
		Attached Figs. 14.4, 17.5 and 17.6 of **JIS E 1306**
Stud	SS400 of **JIS G 3101** or FCD400 of **JIS G 5502**	Attached Figs. 1.9, 3.18 to 3.21 and 7.7 of **JIS E 1305**
		Attached Figs. 14.5, 17.7 and 17.8 of **JIS E 1306**
Filler	SS400 of **JIS G 3101** or SC450 of **JIS G 5101**	Attached Figs. 1.10,1.11, 6.3, 6.4, 7.8 and 7.9 of **JIS E 1305**
		Attached Figs. 1 to 6 ⑥ ⑦, 7 to 10 ⑦ ⑧, 12 ⑥ ⑦, 13 ⑫ to ⑮, 14.10 and 14.11 of **JIS E 1306**
	SS400 of **JIS G 3101**	Attached Figs. 14.6 to 14.9 of **JIS E 1306**
	FC200 of **JIS G 5501**	Attached Figs. 1 ⑤ ⑧ to ⑬, 2 ⑤ ⑧ to ⑩, 3 ⑤ ⑧ to ⑮, 4 ⑤ ⑧ to ⑬, 5 ⑤ ⑧ to ⑩, 6 ⑤ ⑧ to ⑮, 7 ⑥ ⑨ to ⑮, 8 ⑥ ⑨ to ⑯, 9 ⑥ ⑨ to ⑮, 10 ⑥ ⑨ to ㉑, 11 ⑤ to ⑪, 12 ⑤ ⑧ to ⑫, 13 ⑦ to ⑪ ⑯ to ⑳, 20 ③ ④ and 21 ③ to ⑤ of **JIS E 1306**
		Attached Figs. 1.1, 8.1, 9.1 to 9.4 of **JIS E 1307**

Table 1 (continued)

Name of component	Material	Applicable provisions for shape and dimensions
Fish plate	SS400 of **JIS G 3101**	Attached Figs. 1.12, 6.5, 6.6, 7.10, 7.11, 8.6 to 8.8, 9.5 and 9.6 of **JIS E 1305**
		Attached Fig. 14.12 of **JIS E 1306**
	SS400 of **JIS G 3101** or SC450 of **JIS G 5101**	Attached Figs. 14.13 to 14.16 of **JIS E 1306**
Collar	S30C to S45C of **JIS G 4051** heat-treated into a hardness of HS 30 to 45	Attached Figs. 1.13, 7.12 and 8.9 of **JIS E 1305**
		Attached Fig. 14.17 of **JIS E 1306**
Washer	SS400 of **JIS G 3101** or FCD400 of **JIS G 5502**	Attached Figs. 1.14 to 1.20, 3.22 to 3.34, 7.13 to 7.19, 8.10 to 8.12 and 1.29 ② of **JIS E 1305**
		Attached Figs. 1 ⑭ to ⑰, 2 ⑪ to ⑭, 3 ⑯ to ⑲, 4 ⑭ to ⑰, 5 ⑪ to ⑭, 6 ⑯ to ⑲, 7 ⑯ to ⑲, 8 ⑰ to ⑳, 9 ⑯ to ⑲, 10 ㉒ to ㉕, 11 ⑫ to ⑮, 12 ⑬ to ⑯, 13 ㉑ to ㉔, 14.18 to 14.26, 17.9 to 17.16, 17.19, 20 ⑤ to ⑦ and 21 ⑥ to ⑩ of **JIS E 1306**
		Attached Figs. 1.2 to 1.6, 4.1 to 4.3, 9.5, 9.6, 10.1 to 10.4 and 11.1 of **JIS E 1307**
	SS400 of **JIS G 3101**, SC450 of **JIS G 5101** or FCD400 of **JIS G 5502**	Attached Fig. 1.29 ① of **JIS E 1305**
	Heat-treated SUP6, SUP9 of **JIS G 4801**, SK5 or SK7 of **JIS G 4401**	Attached Fig. 1.30 of **JIS E 1305**
		Attached Figs. 17.17, 17.18 of **JIS E 1306**
Rail brace	SS400 of **JIS G 3101**, SC450 of **JIS G 5101** or FCD450 of **JIS G 5502**	Attached Figs. 1.21, 3.35 to 3.37 and 8.13 of **JIS E 1305**
		Attached Figs. 14.27, 14.28,17.20 and 17.21 of **JIS E 1306**
	FC200 of **JIS G 5501**	Attached Fig. 7.20 of **JIS E 1305**
		Attached Fig. 9.7 of **JIS E 1307**
Base plate	SS400 of **JIS G 3101**	Attached Figs. 1.22 to 1.28, 3.38 to 3.54, 7.21 to 7.23, 8.14 to 8.17 and 9.7 to 9.9 of **JIS E 1305**
		Attached Figs. 11 ⑳ ㉑, 14.29 to 14.43 and 17.22 to 17.40 of **JIS E 1306**
		Attached Figs. 1.7,4.4, 4.5, 8.2, 9.8, 9.9,10.5,10.6 and 11.2 of **JIS E 1307**
Bolt	SS490 of **JIS G 3101**	Attached Figs. 3 ㉟, 4 ㉗ and 5 ㉞ of **JIS E 1305**
		Attached Figs. 17 ㉝, 18 ㊳ and 19 ㉚ of **JIS E 1306**
	S45C to S55C of **JIS G 4051** heat-treated into a hardness of HB 255 to 331 (2)	Attached Figs. 1 ㉖ to ㉛, 2 ㉕ to ㉚, 6 ㉓ to ㉖, 7 ㉒ to ㉔, 8 ⑳ to ㉒ and 9 ㉑ to ㉓ of **JIS E 1305**
		Attached Figs. 1 ⑱, 2 ⑮, 3 ⑳,4 ⑱, 5 ⑮, 6 ⑳, 7 ⑳, 8 ㉑, 9 ⑳, 10 ㉖,11 ⑯, 12 ⑰, 13 ㉕, 14 ㉖ to ㉛, 15 ㉕ to ㉚, 16 ㉖ to ㉛ and 20 ⑧ of **JIS E 1306**
		Attached Figs. 1,2, 3 ⑩, 8 ⑩, 9 ⑨, 10 and 11 ⑧ of **JIS E 1307**

Table 1 (concluded)

Name of component	Material	Applicable provisions for shape and dimensions
Bolt	To be grade B property class 10.9 of **JIS E 1107**	Attached Figs. 3 ㊱ to ㊴, 4 ㉘ to ㉛ and 5 ㉟ to ㊳ of **JIS E 1305**
		Attached Figs. 17 ㉞ to ㊲, 18 ㊴ to ㊷, 19 ㉛ to ㉞ and 21 ⑪ to ⑭ of **JIS E 1306**
		Attached Figs. 1,2,3 ⑨, 4,5,6,7 ⑦ ⑧, 8 ⑨, 10 and 11 ⑦ of **JIS E 1307**
Nut	At least SS400 of **JIS G 3101**	Nuts to be mated with a bolt of SS490 of **JIS G 3101** in material
	S45C to S55C of **JIS G 4051** heat-treated (2)	Nuts to be mated with a bolt of S45C to S55C of **JIS G 4051** heat-treated in material or that according to grade B of **JIS E 1107**
Fang bolt	SS400 of **JIS G 3101**	Attached Fig. 7 ㉕ of **JIS E 1305**
		Attached Fig. 9 ⑩ of **JIS E 1307**
Spring washer	No. 2 of **JIS B 1251**	Attached Fig. 3.12 of **JIS E 1305**
	JIS E 1115	—
Rivet	SV400 of **JIS G 3104**	—
Split pin	SWRM12 of **JIS G 3505**	—

Note (2) For those according to the following attached figures, materials at least equivalent to SS400 of **JIS G 3101** may be used.

Attached Figs. 3 ㊳, 4 ㉚, 5 ㊲ and 7 ㉒ to ㉔ of **JIS E 1305**

Attached Figs. 11 ⑯, 14 ㉙, 15 ㉘, 16 ㉙, 17 ㉟, 18 ㊵ and 19 ㉜ of **JIS E 1306**

Attached Fig. 9 ⑨ of **JIS E 1307**

7 Manufacture and processing

7.1 Processing of rail

7.1.1 Cutting Machinings shall be taken for cutting rails, fusing and breaking cuts shall not be permitted.

7.1.2 Bending For bending rails or correcting the warp, such means shall be taken so as not to affect the qualities.

7.1.3 Forming For the forming of the head, bottom and web of rails, machining or hot-forging process shall apply. In the case of hot-forging, such a means shall be taken so as not affect the qualities.

7.1.4 Drilling The drilling of rails (3) shall be by means of machining.

Note (3) The following drillings shall be made after the bending process.

— Switch rod and bearing clip attaching holes on a movable rail

— Holes nearby bending point on a tongue rail