

Track surface	Class of track				
	1 (inches)	2 (inches)	3 (inches)	4 (inches)	5 (inches)
The deviation from uniform profile on either rail at the mid-ordinate of a 62-foot chord may not be more than .....	3	2¾	2¼	2	1¼
The deviation from zero crosslevel at any point on tangent or reverse crosslevel elevation on curves may not be more than .....	3	2	1¾	1¼	1
The difference in crosslevel between any two points less than 62 feet apart may not be more than* <sup>1,2</sup> .....	3	2¼	2	1¾	1½
*Where determined by engineering decision prior to the promulgation of this rule, due to physical restrictions on spiral length and operating practices and experience, the variation in crosslevel on spirals per 31 feet may not be more than .....	2	1¾	1¼	1	¾

<sup>1</sup> Except as limited by § 213.57(a), where the elevation at any point in a curve equals or exceeds 6 inches, the difference in crosslevel within 62 feet between that point and a point with greater elevation may not be more than 1½ inches. (Footnote 1 is applicable September 21, 1999.)

<sup>2</sup> However, to control harmonics on Class 2 through 5 jointed track with staggered joints, the crosslevel differences shall not exceed 1¼ inches in all of six consecutive pairs of joints, as created by 7 low joints. Track with joints staggered less than 10 feet shall not be considered as having staggered joints. Joints within the 7 low joints outside of the regular joint spacing shall not be considered as joints for purposes of this footnote. (Footnote 2 is applicable September 21, 1999.)

[63 FR 34029, June 22, 1998; 63 FR 45959, Aug. 28, 1998]

**Subpart D—Track Structure**

**§ 213.101 Scope.**

This subpart prescribes minimum requirements for ballast, crossties, track assembly fittings, and the physical conditions of rails.

**§ 213.103 Ballast; general.**

Unless it is otherwise structurally supported, all track shall be supported by material which will—

- (a) Transmit and distribute the load of the track and railroad rolling equipment to the subgrade;
- (b) Restrain the track laterally, longitudinally, and vertically under dynamic loads imposed by railroad rolling equipment and thermal stress exerted by the rails;
- (c) Provide adequate drainage for the track; and
- (d) Maintain proper track crosslevel, surface, and alinement.

**§ 213.109 Crossties.**

- (a) Crossties shall be made of a material to which rail can be securely fastened.
- (b) Each 39 foot segment of track shall have—
  - (1) A sufficient number of crossties which in combination provide effective support that will—
    - (i) Hold gage within the limits prescribed in § 213.53(b);
    - (ii) Maintain surface within the limits prescribed in § 213.63; and

(iii) Maintain alinement within the limits prescribed in § 213.55.

(2) The minimum number and type of crossties specified in paragraphs (c) and (d) of this section effectively distributed to support the entire segment; and

(3) At least one crosstie of the type specified in paragraphs (c) and (d) of this section that is located at a joint location as specified in paragraph (f) of this section.

(c) Each 39 foot segment of: Class 1 track shall have five crossties; Classes 2 and 3 track shall have eight crossties; and Classes 4 and 5 track shall have 12 crossties, which are not:

- (1) Broken through;
- (2) Split or otherwise impaired to the extent the crossties will allow the ballast to work through, or will not hold spikes or rail fasteners;
- (3) So deteriorated that the tie plate or base of rail can move laterally more than ½ inch relative to the crossties; or
- (4) Cut by the tie plate through more than 40 percent of a ties' thickness.

(d) Each 39 foot segment of track shall have the minimum number and type of crossties as indicated in the following table (this paragraph (d) is applicable September 21, 2000).

Class of track	Tangent track and curves ≤ 2 degrees	Turnouts and curved track over 2 degrees
Class 1 track .....	5	6

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Class of track	Tangent track and curves $\leq 2$ degrees	Turnouts and curved track over 2 degrees
Class 2 track .....	8	9
Class 3 track .....	8	10
Class 4 and 5 track .....	12	14

(e) Crossties counted to satisfy the requirements set forth in the table in paragraph (d) of this section shall not be—

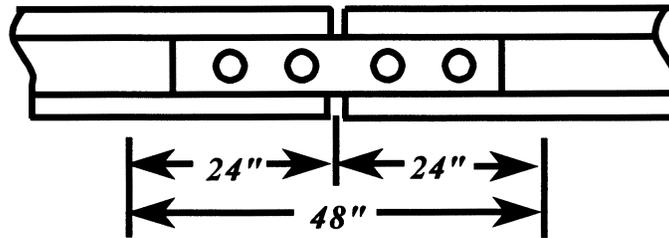
- (1) Broken through;
- (2) Split or otherwise impaired to the extent the crossties will allow the ballast to work through, or will not hold spikes or rail fasteners;

(3) So deteriorated that the tie plate or base of rail can move laterally  $\frac{1}{2}$  inch relative to the crossties; or

(4) Cut by the tie plate through more than 40 percent of a crosstie's thickness (this paragraph (e) is applicable September 21, 2000).

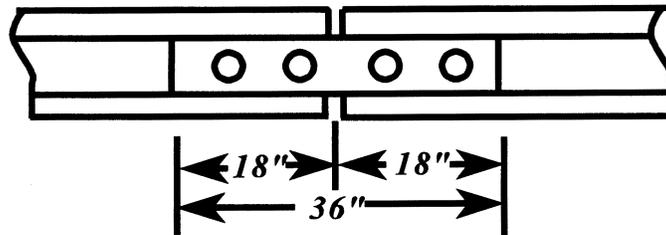
(f) Class 1 and Class 2 track shall have one crosstie whose centerline is within 24 inches of each rail joint location, and Classes 3 through 5 track shall have one crosstie whose centerline is within 18 inches of each rail joint location or, two crossties whose centerlines are within 24 inches either side of each rail joint location. The relative position of these ties is described in the following diagrams:

**Classes 1 and 2**

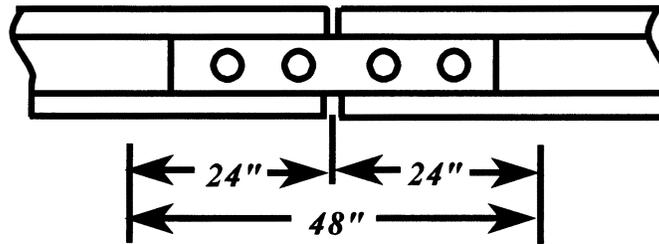


Each rail joint in Classes 1 and 2 track shall be supported by at least one crosstie specified in paragraphs (c) and (d) of this section whose centerline is within 48" shown above.

**Classes 3 through 5**



Each rail joint in Classes 3 through 5 track shall be supported by either at least one crosstie specified in paragraphs (c) and (d) of this section whose centerline is within 36" shown above, or:



Two crossties, one on each side of the rail joint, whose centerlines are within 24" of the rail joint location shown above.

(g) For track constructed without crossties, such as slab track, track connected directly to bridge structural components and track over servicing pits, the track structure shall meet the requirements of paragraphs (b)(1)(i), (ii), and (iii) of this section.

[63 FR 34029, June 22, 1998; 63 FR 46102, Aug. 28, 1998]

#### §213.110 Gage restraint measurement systems.

(a) A track owner may elect to implement a Gage Restraint Measurement System (GRMS), supplemented by the use of a Portable Track Loading Fixture (PTLF), to determine compliance with the crosstie and fastener requirements specified in §§213.109 and 213.127 provided that—

(1) The track owner notifies the appropriate FRA Regional office at least 30 days prior to the designation of any line segment on which GRMS technology will be implemented; and

(2) The track owner notifies the appropriate FRA Regional office at least 10 days prior to the removal of any line segment from GRMS designation.

(b) Initial notification under paragraph (a)(1) of this section shall include—

(1) Identification of the line segment(s) by timetable designation, milepost limits, class of track, or other identifying criteria; and

(2) The most recent record of million gross tons of traffic per year over the identified segment(s).

(c) The track owner shall also provide to FRA sufficient technical data to establish compliance with the minimum design requirements of a GRMS vehicle which specify that—

(1) Gage restraint shall be measured between the heads of rail—

(A) At an interval not exceeding 16 inches;

(B) Under an applied vertical load of no less than 10,000 pounds per rail; and

(C) Under an applied lateral load which provides for a lateral/vertical load ratio between 0.5 and 1.25, and a load severity greater than 3,000 pounds but less than 8,000 pounds.

(d) Load severity is defined by the formula— $S=L-cV$

Where—

S=Load severity, defined as the lateral load applied to the fastener system (pounds).

L=Actual lateral load applied (pounds).

c=Coefficient of friction between rail/tie which is assigned a nominal value of (0.4).

V=Actual vertical load applied (pounds).

(e) The measured gage values shall be converted to a Projected Loaded Gage 24 (PLG 24) as follows—