CHAPTER 7

RAIL

7-1. Defective rail and remedial actions.

a. Remedial actions for rail defects are presented in table 7-1. Where rail defects have been identified but remedial action has not been completed, the operating restrictions presented in table 7-1 shall apply. Appendix B provides brief descriptions of the common rail defects that may be observed in track.

Table 7-1
Rail Defects, Operating Restrictions, and Remedial Actions

Defect Type	*Operating Restrictions Until Repairs Are Completed (Maximum Operating Speed)*	*Remedial Actions*		
		Replace Entire Defective Rail	*Crop Defect*[2,3]	*Apply Joint Bars (Fully Bolted)*
Bolt hole crack	10 mph	Allowed	Allowed	--
Broken base	5 mph	Allowed	Allowed	Not allowed
Corrosion - greater than 1/4 inch	10 mph	REQUIRED	Not allowed	Not allowed
Complete break - clean and square	CLOSE TO TRAFFIC	Preferred	--	Allowed[3]
Complete break - rough or angled	CLOSE TO TRAFFIC	Preferred	Allowed	Not allowed[4]
Crushed head	10 mph	Preferred	Allowed	Not allowed
Defective weld	10 mph	Preferred	Preferred	Not allowed
End batter - greater than 1/4 inch	10 mph	Allowed	Allowed	--
Fissure - compound[5]	CLOSE TO TRAFFIC	Preferred[1]	Allowed	Not allowed[4]
Fissure - transverse[5] - Size less than 40%[6]	5 mph	Allowed[1]	Allowed	Allowed
Size greater than 40%[6]	CLOSE TO TRAFFIC	Preferred[1]	Allowed	Allowed
Fracture - detail[5] - Size less than 40%[6]	5 mph	Allowed[1]	Allowed	Allowed
Size greater than 40%[6]	CLOSE TO TRAFFIC	Preferred[1]	Allowed	Allowed
Fracture - engine burn[5] - Size less than 40%[6]	5 mph	Allowed[1]	Allowed	Allowed
Size greater than 40%[6]	CLOSE TO TRAFFIC	Preferred[1]	Allowed	Not allowed[4]
Head/web separation	CLOSE TO TRAFFIC	REQUIRED	Not allowed	Not allowed
Piped rail	10 mph	REQUIRED	Not allowed	--
Running surface damage (depth greater than 1/4 inch)	10 mph	Allowed	Allowed	Not allowed
Short rail (rail less than 13 feet long)	NO RESTRICTION	REQUIRED	--	Not allowed
Split rail - horizontal	5 mph	REQUIRED	Not allowed	Not allowed
Split head - vertical	CLOSE TO TRAFFIC	REQUIRED	Not allowed	Not allowed
Split web	5 mph	REQUIRED	Not allowed	Not allowed
Torch cut - rail ends	10 mph	Preferred	Allowed	Not allowed
bolt holes	5 mph	Preferred	Allowed	Not allowed
Wear on 90 lb or larger rail				
Side wear greater than 1/2 inch	10 mph	REQUIRED[7]	Not allowed	Not allowed
Vertical wear greater than 1/2 inch	10 mph	REQUIRED	Not allowed	Not allowed
Wear on rail less than 90 lb				
Side wear greater than 3/8 inch	10 mph	REQUIRED	Not allowed	Not allowed
Vertical wear greater than 3/8 inch	10 mph	REQUIRED	Not allowed	Not allowed

Notes:
[1]If two or more of these defects are found in any individual rail, that rail shall be replaced.
[2]Rails may be cropped by cutting the rail with a rail saw or other appropriate cutting tool, at least 6 inches either side of the defect.
[3]Not allowed if results in a rail length of less than 13 feet (See "Short Rail" below).
[4]May be allowed as an emergency measure until defect is removed provided operations are restricted to 5 mph and an inspector is present.
[5]If broken through or cracked out, rules for rough or angled complete break apply.
[6]Defect size estimated from internal rail flaw testing. If size is unknown, assume greater than 40%.
[7]90 lb or larger rail with wear on one side only may be transposed.

Table 7-1. Rail defects, operating restrictions, and remedial actions.

b. Multiple defects. Any individual rail having two or more of the fissure or fracture type defects listed in table 7-1, whether they are the same or different, shall be removed and replaced.

c. Worn rails. On rail suspected of being worn more than the allowances provided for in table 7-1, wear measurements shall be taken at the center and at each end of the rail not more than 1 foot from the end of the joint bar. Rail wear measurements shall consist of a vertical head wear meas-

urement and a side wear measurement as shown in figure 7-1. Table C-1 presents a table of details and properties for various rail sections. This table may be used to assist in identifying rail sections and estimating the amount of rail wear.

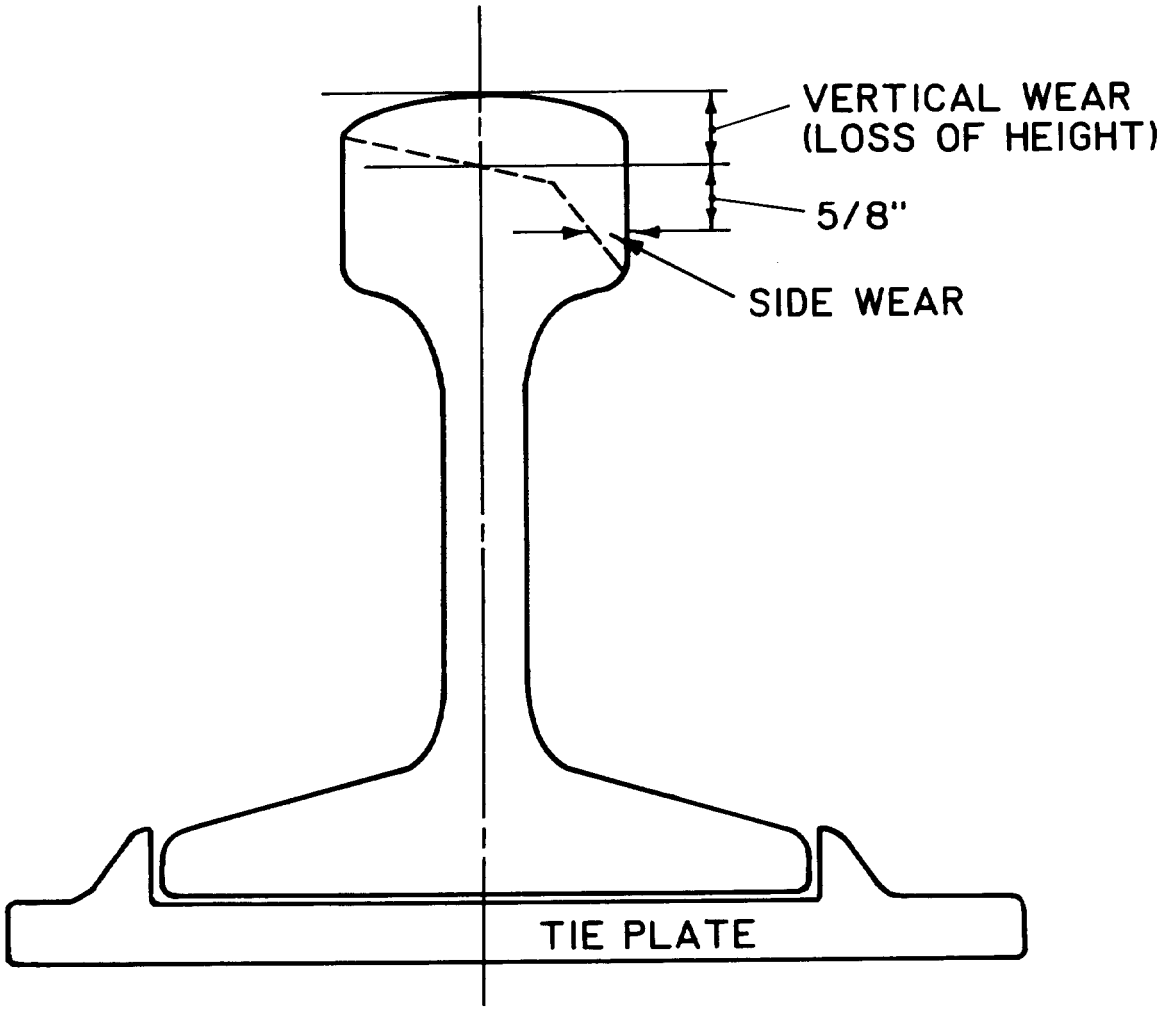

Figure 7-1. Rail wear measurement.

d. Base corrosion. Rail shall be removed from track if the base is corroded more than ¼ (0.25) inch as shown in figure 7-2.

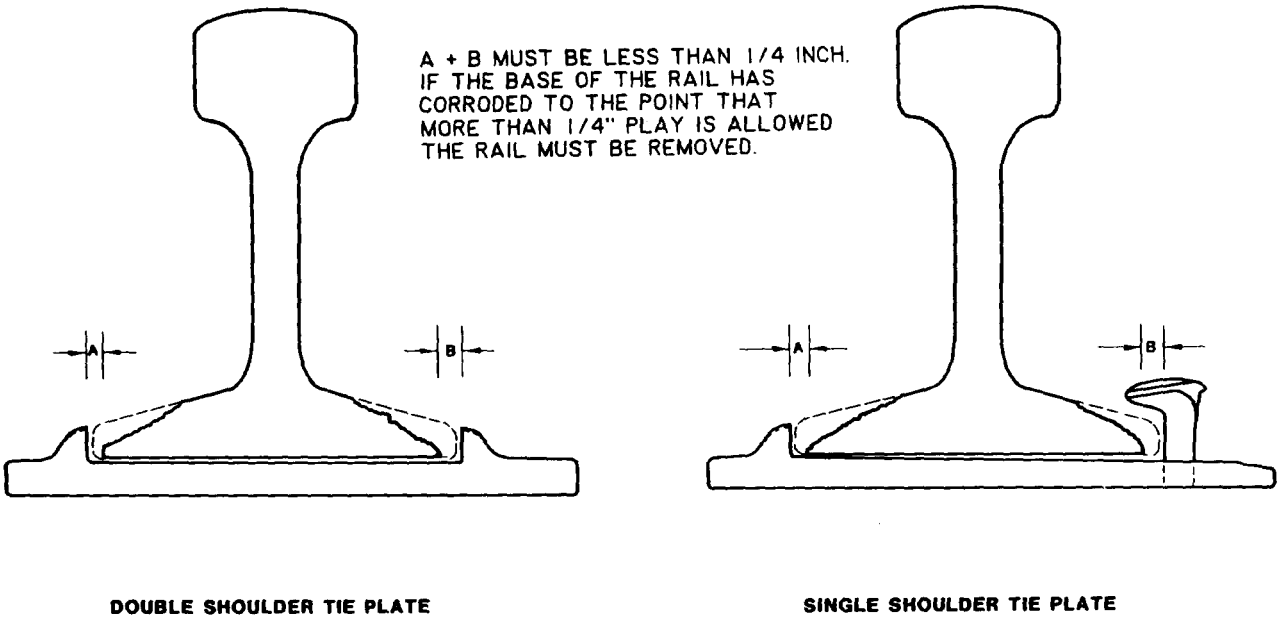

Figure 7-2. Rail base corrosion measurement.

e. End batter. Rail end batter is measured ½ (0.50) inch from the rail end with an 18-inch straightedge laid only on the rail being measured as shown in figure 7-3. Table 7-1 presents limits and remedial actions for end batter.

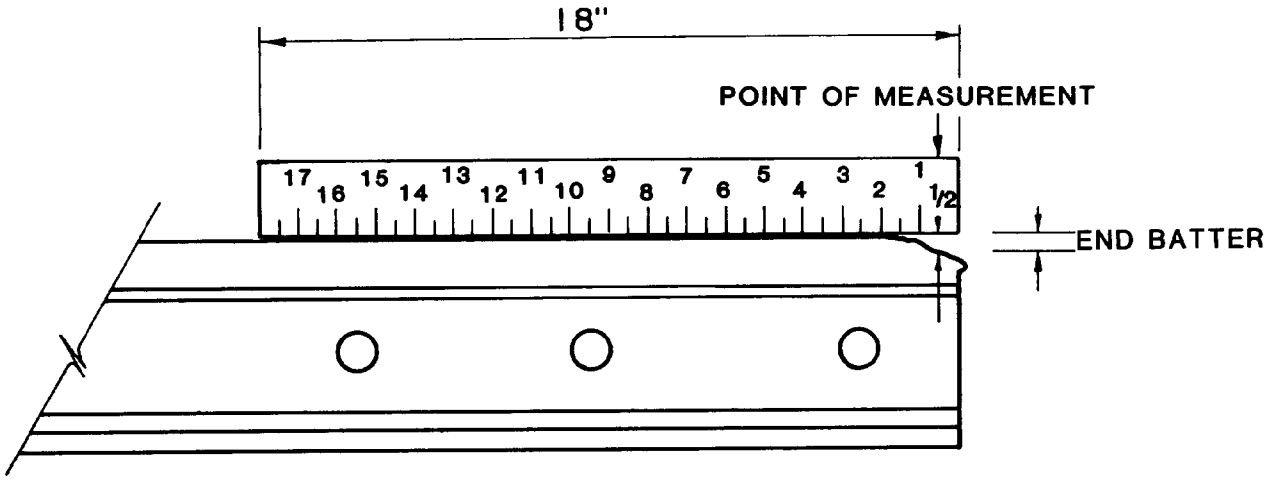

Figure 7-3. End batter measurement.

f. Running surface damage. Rail running surface damage, such as deep engine burns, dents, etc., is measured at the midpoint of an 18-inch straightedge laid on the railhead over the defect. Table 7-1 presents limits and remedial actions for rail surface damage.

7-2. Rail maintenance.

a. Rail. New rail used in the maintenance of Army and Air Force track shall meet the requirements specified in the AREA *Manual For Railway Engineering,* chapter 4.

b. Internal defect inspection. A "continuous search" internal rail defect inspection shall be performed at least once every 3 to 6 years on Categories A and B track. This internal rail defect inspection should be conducted using ultrasonic inspection techniques. Table 7-2 presents the recommended frequency for rail defect inspections.

Table 7-2. Recommended rail defect inspection frequencies

Annual Day-To-Day Traffic (Car Movements)	*Inspection Frequency*
1 million gross tons (MGT) or more (greater than 7,200 car movements per year).	3 years or 3 MGT, whichever is less
0.50 to 0.99 MGT (3,600 to 7,200 car movements per year).	5 years or 5 MGT, whichever is less
Less than 0.50 MGT (less than 3,600 car movements per year).	6 years or after a rail break

c. Torch cut. Rail shall not be flame cut in any manner. This includes cropping of the rail end, burning bolt holes, and trimming mismatched ends. Rail shall be cut using a rail saw or other appropriate cutting tool.

d. Short rail. Rail less than 13 feet in length shall not be installed in track.

7-3. Lightweight rail.

Lightweight rail is defined as rail weighing less than 90 pounds/yard. Research has shown that lightweight rail may not be suitable for use in track which is subjected to heavy wheel loads.

a. Rail weights of 70 pounds/yard or less should be replaced if that rail is to experience car loads of more than 50 tons (25,000 pounds axle loads).

b. Rail weighing 75 to 85 pounds/yard may be adequate depending upon support conditions. A structural evaluation and stress analysis is necessary to determine the adequacy of these rail weights. Rail not adequate to support the desired wheel loads should be replaced.

c. The existence of lightweight rail in Categories A and B track should be considered when planning major repair and/or rehabilitation projects.