

Railroad Spikes.

Size measured under head.	Average No. per Keg. 150 lbs.	No. to lay 1 mile track, 4 to tie. Ties 2 feet from centre to centre.	Rail used. Weight per yard.	Size measured under head.	Average No. per Keg. 150 lbs.	No. to lay 1 mile track, 4 to tie. Ties 2 feet from centre to centre.	Rail used. Weight per yard.
Inches.		Lbs. Kegs.		Inches.		Lbs. Kegs.	
$5\frac{1}{2} \times \frac{9}{16}$	280	5670=38	45 to 70	$4 \times \frac{1}{8}$	630	2560=17	28 to 30
$5 \times \frac{1}{8}$	300	5170=35	40 to 56	$3\frac{3}{4} \times \frac{1}{8}$	675	2350=16	20 to 28
$4\frac{1}{2} \times \frac{1}{8}$	400	3960=27	35 to 40	$3\frac{1}{2} \times \frac{1}{8}$	890	1780=12	16 to 20
$4 \times \frac{1}{8}$	450	3520=24	30 to 35	$3 \times \frac{1}{8}$	1030	1540=10\frac{1}{2}	16 to 20
$3\frac{1}{2} \times \frac{1}{8}$	510	3110=21	30 to 35	$2\frac{1}{2} \times \frac{1}{8}$	1260	1320=8\frac{1}{2}	12
$4\frac{1}{2} \times \frac{1}{8}$	510	3110=21	28 to 30	$2\frac{1}{2} \times \frac{1}{8}$	1620	1000=6\frac{1}{2}	8

Cross-Ties per Mile of Single Track.

18 inches from centre to centre,	-	3520 Ties.	27 inches from centre to centre,	-	2347 Ties.
20 inches from centre to centre,	-	3168 Ties.	30 inches from centre to centre,	-	2112 Ties.
22 inches from centre to centre,	-	2880 Ties.	33 inches from centre to centre,	-	1920 Ties.
24 inches from centre to centre,	-	2640 Ties.	36 inches from centre to centre,	-	1760 Ties.

Number of Joints and Bolts per Mile Single Track Railroad.

Length of Rail.	No. Joints.	No. Bolts, 2 Hole Plates.	No. Bolts, 4 Hole Plates.
24 Feet.	440	880	1760
26 Feet.	406	812	1624
28 Feet.	378	756	1512
30 Feet.	352	704	1408

Weight of Fish-Plate Bolts per 100.

$3\frac{3}{4} \times \frac{1}{2}$ with 1 Nut,	90 lbs.	$4 \times \frac{1}{2}$ with 1 Nut,	102 lbs.
$3\frac{3}{4} \times \frac{1}{2}$ with 2 Nuts,	131 lbs.	$4 \times \frac{1}{2}$ with 2 Nuts,	138 lbs.

The above size Bolts are in general use. Other sizes made if desired.

Street Rail Iron and Mine Rails.

KIND.	SIZE.	Weight per Yard
Improved Street,	$4\frac{1}{2}$ in. wide.	32 pounds.
Ordinary Street,	5 "	47 "

Other sizes and patterns to order.

T Rails for Saw Mills and Other Yards.

12, 14, 16, 18 pounds per yard.

Melting Point of Metals.

Copper,	2160 Degrees, Fahrenheit.	Bismuth, 507 degrees, Fahrenheit.
Antimony,	255 " "	Lead, 620 " "
Zinc,	740 " "	Tin, 475 " "

Expansion of Metals—(Faraday).

The Length of the Bar at 32°=1.

METALS.	At 212°.	Expan. per deg. Fah.
Brass	1.0019062	.0000106
Copper	1.001745	.0000097
Cast Iron	1.0011112	.0000062
Steel	1.0011899	.0000066
Wrought Iron	1.0012575	.000007
Tin	1.002	.0000111
Zinc	1.002942	.0000163

Almost all bodies expand in equal proportions for each degree between freezing and boiling. To ascertain the expansion of a body, multiply the dimension of the body by the number of degrees of increase of temperature and then by the expansion per degree.

EXAMPLE.—Required the expansion of a steel rail 30 feet long, with an increase of temperature of 100°. $30 \times 100 = 3000 \times .0000066 = .0198$ foot $\approx \frac{1}{50}$ inch.