Rails are rolled to a certain maximum length, 30 feet being the usual standard on American roads, but there is always a certain proportion of shorter rails allowed, which, however, must conform to regular specified lengths, these being generally arranged to conform to the standard spacings of the cross ties.

The following specification of the Pennsylvania Railroad Company for steel rails, adopted January 27th, 1879, may be regarded as a standard for first class manufacture.

"As it is the desire of the Pennsylvania Railroad Company to have on the roads under their control none but first-class tracks in every respect, and as the rails laid down on these tracks form an important part in the achievement of this result, the Pennsylvania Railroad Company have found it necessary to make certain demands in regard to the manufacture of their steel rails, with which the different rolling mills and rail inspectors will be required to comply.

1. The steel used for rails shall be in accordance with the 'pneumatic,' or 'the open hearth' process, and contain not less than thirty, nor more than fifty one hundredths of one per cent. of carbon.

2. The result of the carbon test of each charge, of which the Pennsylvania Railroad Company is to receive rails, and of which an official record is kept at each mill, is to be exhibited to the rail inspector.

3. A test bar three-quarters of an inch wide and about ten inches long, is to be taken from a web of rail made from each charge.

4. The number of the charge and place and year of manufacture shall be marked in plain figures and letters on the side of the web of each rail.

5. The sections of the rails rolled shall correspond with the respective templates issued by the Pennsylvania Railroad Company showing the shape and dimensions of the different rails adopted as their standard.

6. The space between the web of the rails and template representing the splice bar shall not be less than one-quarter of an inch, nor more than three-eighths of an inch.

7. The weight of rails shall be kept as near to the standard weights as can be demanded, after complying with section No. 5.

8. Circular holes, one inch in diameter, shall be drilled through the web in the centre thereof, at equal distances from the upper surface of the flange and lower surface of the head, and three and fifteen sixteenths inches from the end of the rail to the centre of the first hole, and of five inches from the centre of the first hole to the centre of the second hole,

9. The lengths of rails at sixty degrees Fahrenheit shall be kept within one quarter of an inch of the standard lengths, which are thirty feet, twenty-seven and one-half feet, and twenty-five feet. That not more than ten per cent. of the shorter lengths, not more than five per cent. of No. 2 rails, will be accepted on any one contract.

10. The rough edges produced at the ends of the rails by the saw shall be well trimmed off and filed.

11. All rails are to be straightened in order to insure a perfectly straight track.

12. The causes for temporary rejection of the rails are:

1. Crooked rails.
2. Imperfect ends (which, after being cut off, would give a perfect rail of one of the standard short lengths).
3. Missing test reports.
4. A variation of more than one-quarter of an inch from the standard lengths.

13. The causes for the permanent rejection of a rail, as a No. 1 rail, are:

1. A bad test report, showing a deficiency or excess of carbon.
2. The presence of a flaw of one-quarter of an inch in depth in any part of the rail.
3. A greater variation beteen the rail and splice bar than is allowed in paragraph No. 6.
4. The presence of such other imperfections as may involve a possibility of the rail breaking in the track."

In the construction of a railroad, the rails should be accurately laid to line and level stakes as given by the engineer. On straight lines, the two rails of a track must be laid to the same level, but on curves the outer rail is elevated according to the degree of curvature, the elevation commencing at each end back of the point of curvature, by a distance also depending upon the sharpness of the curve, and increasing to the curve itself, around which the full elevation is carried uniformly. The amount of elevation varies on different roads, and, indeed, on the branches and main stem of the same road, depending upon the velocity at which trains are intended to be run. If one rides at a rapid rate over a road adapted in this respect for slow speeds, he will soon discover the want of elevation to the curves. John B. Henck, an American Civil Engineer of great reputation for his "Field-book for Railroad Engineers," published many years ago, gives the following table for elevation of the outer rail on curves, based on the question of centrifugal force tending to throw the car against the outer rail and the elevation of the same above the inner one to counteract it. Practical use of this table has demonstrated its correctness. M in the middle represents the speed of train in miles per hour, and the elevation is given in decimals of a foot for the degree of curvature and the speed of train M.