Advantage and Disadvantage of Railway Sleepers

1- Timber or wooden sleepers:

Wooden sleepers are regarded **to be best as they fulfill almost all the requirements of an ideal sleeper. The life of timber sleepers depends on their ability to resist wearing, decay, attack by vermin i.e., white ants, and quality of the timber used.** Following are the advantages and disadvantages of using wooden sleepers.

- **Advantages:-**

1- Fittings for wooden sleepers are few and simple in design.

2- These sleepers are able to resist the shocks and vibrations due to heavy moving loads and give less noisy track.

3- Wooden sleepers are easy to lay, relay, pack, lift and maintain.

4- These wooden sleepers are suitable for all types of ballast.

5- They are best for track-circuited operations as wooden sleepers are over all economical.

- **Disadvantages:-**

1- The sleepers are subjected to wear, decay, attack by white ants, cracking and splitting, rail cutting, etc.

2- It is difficult to maintain the gauge in case of wooden sleepers.

3- Track is easily disturbed i.e., alignment maintenance is difficult.

4- Wooden sleepers have got minimum life (12 to 15 years) as compared to other types of sleepers.

5- Maintenance cost of wooden sleepers is highest as compared to other sleepers.

2- Metal sleepers:-

Metal sleepers are either of steel or cast-iron. **Cast-iron is in greater use than steel for sleepers because it is less prone to corrosion.**

- **Advantages:-**

1- Metal sleepers are uniform in strength and durability.

2- In metal sleepers, the performance of fitting is better and lesser creep occurs.

3- Metal sleepers are economical, as life is longer and maintenance is easier.

4- Gauge can be easily adjusted and maintained in case of metal sleepers.

- **Disadvantages:-**

1- More ballast are required than other type of sleepers.

2- Fittings are greater in number.

3- Metal, C.I. or steel are liable to rust.

4- Metal being good conductor of electricity interferes with track circuiting.

5- Metal sleepers are unsuitable for bridges, level crossing and in case of points and crossings.

6- Metal sleepers are only suitable for stone ballast.

3- Concrete sleeper:-

These sleepers are mainly of two types

a- Reinforced concrete sleepers.

b- Pre-stressed concrete sleepers.

Experiments have been proved that concrete is an ideal material for the sleepers for the following reasons:

They are made of a strong homogeneous material, impervious to effect of moisture, and is unaffected by the chemical attack of atmospheric gases or sub-soil salts.

- **Advantages :-**

1- These sleepers free from natural decay and attack by insects.

2- They have maximum life compared with the other sleepers. And life under normal conditions is (40 to 60 years).

3- This is not affected by moisture, chemical action of ballast, and sub-soil salts.

4- There is no difficulty in the circuiting.

5- The high weight of sleepers helps in minimizing joint maintenance by providing longer welded lengths, greater stability of the track and better resistance against temperature rise.

6- The sleepers have higher elastic modulus and can resist the stresses introduced by fast and heavy traffic.

- **Disadvantages:-**

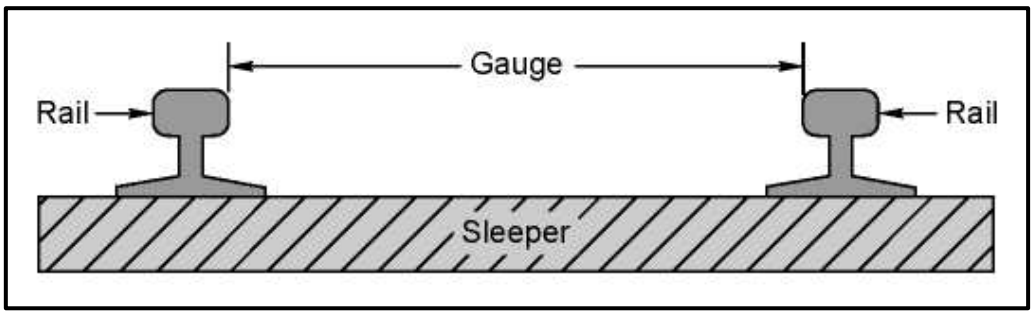
1- The weight of concrete sleeper is as high as 2.5 to 3 times of wooden sleeper.

2- These sleepers require pads and plugs for spikes.

3- They damage the bottom edge during the packing.

Gauges of Railway Track

The gauge of a railway track is defined as:



Track gauge is the clear distance between the inside heads of rail 5/8 in below the top of rail.

The distance between the inner faces of a pair of wheels is called **Wheel gauge**.

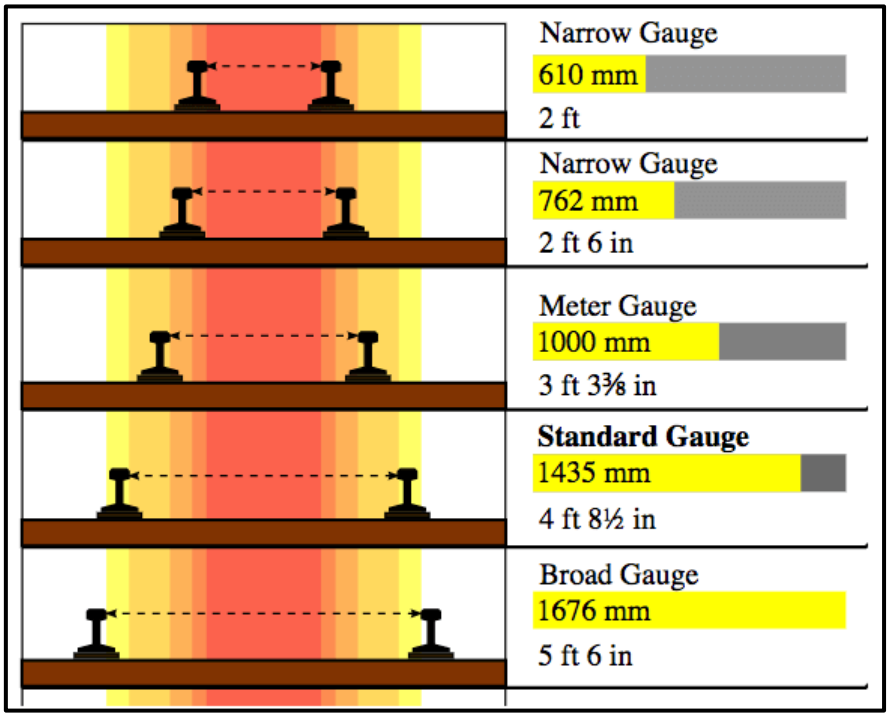
There are many types of track gauges, they can be classified into:

1- Standard gauge = **1435 mm** or 1451mm.

2- Broad (wide) gauge = **1676 mm**, 1600mm, or 1524mm.

3- Meter gauge = **1000 mm** or 1069mm.

4- Narrow gauge = **762mm** or 610 mm.



Gauge (mm)	% Length of World Network
1000	9
1069	7.8
1435	61.6
1524	8.8
1600	1.3
1676	6.1
21 other	5.4
	∑ = 100%

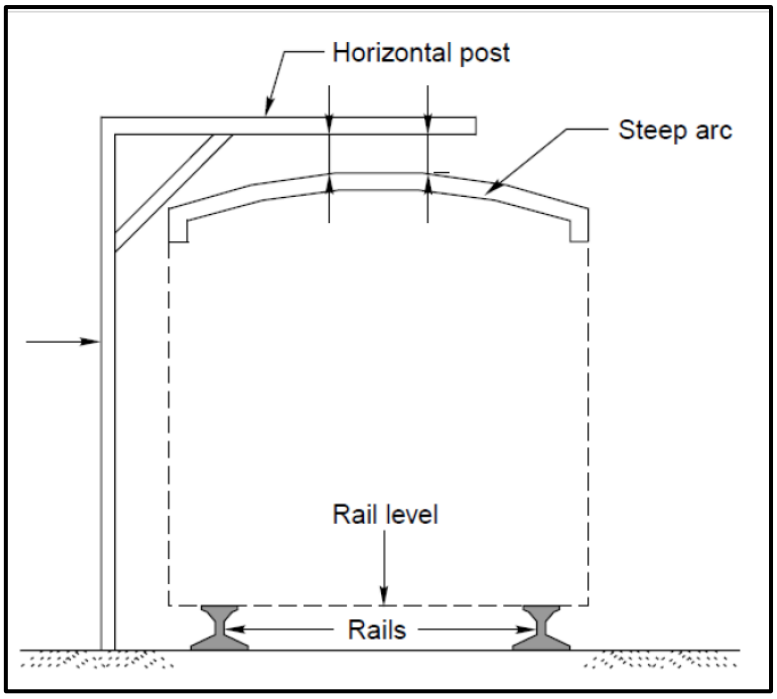
*** Gauge of the Track on Tangent line of the truck

Gauges of the railway track can be classified into:

A-Track gauge

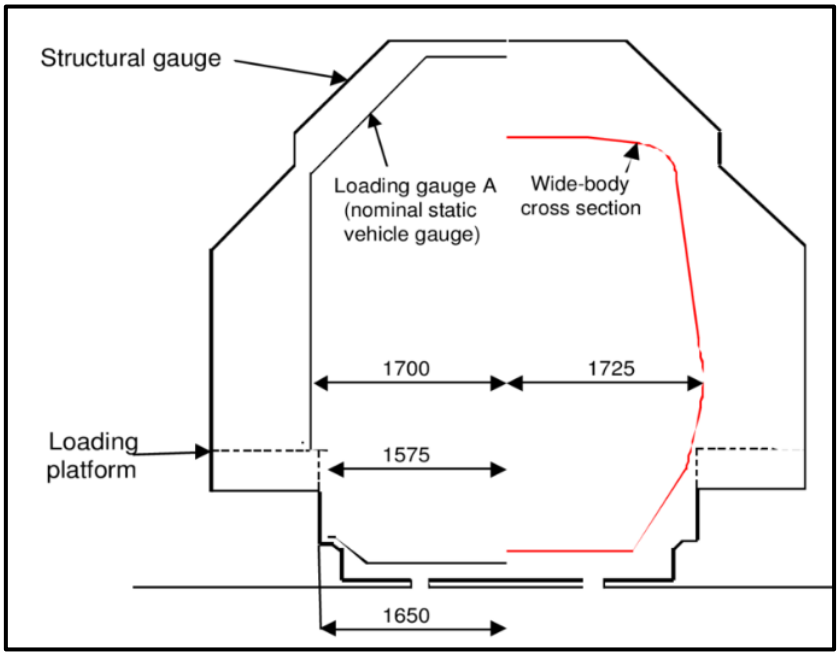
B-Clearance gauge: (structure gage & loading gauge)

Loading gauge is a limit above and to both sides of the track, which no part of rolling stock or their loads are allowable to encroach upon.



Structure Gauge: is the limit above and to both side of track within which permanent structure or installation is permitted to be built.

1. Structure Gauge (I).
2. Structure Gauge (II).
3. Structure Gauge (III).



Structure Gauge I: no structure / installation of any type are permitted within this gauge. This gauge is the exceptional minimum clearance. First isolated structure like signal in between track where structure gauge.

Structure Gauge II: recommended minimum clearance for isolated structures such as signals, columns and posts. It is the exceptional minimum clearance for other structure.

Structure Gauge III: it is recommended within clearance for all other structures.

Structure Gauge in Tunnels: this shall be determined individually for each case taking into account all relevant factors such as speeds, No. of tracks, (both present and future), length of tunnels, geotechnical features, …. etc.