

1. Number of tracks

Main international lines must provide high capacity and allow precision timing of operation.

It is generally possible to meet both requirements only on lines with at least two tracks.

2. Vehicle loading gauge

This is the minimum loading gauge for main international lines.

On new lines, only a small marginal investment cost is normally incurred by adopting a high loading gauge, and the UIC C1 gauge has therefore been chosen.

The C1 gauge allows, for instance:

The transport of road goods vehicles and road trains (lorry with trailer, articulated vehicle, tractor and semi-trailer) conforming to the European road loading gauge (height 4 m, width 2.5 m) on special wagons with a loading height 60 cm above rail level;

The transport of ordinary road semi-trailers 2.5 m wide and 4 m high on recess wagons with normal bogies;

The transport of ISO containers 2.44 m wide and 2.9 m high on ordinary flat wagons;

The transport of swap-bodies 2.5 m wide on ordinary flat wagons.

The existing lines across mountainous regions (such as the Pyrenees, Massif Central, Alps, Jura, Appenines, Carpathians) have many tunnels conforming to the Technical Unit loading gauge, or gauges of slightly greater height at the centre of the track. Increasing this to conform to the UIC C1 gauge is in almost all cases impossible from the economic and financial standpoints.

The UIC B gauge has therefore been chosen for these lines, as it allows, for instance:

The transport of ISO containers 2.44 m wide and 2.90 m high on flat container-wagons with a loading height 1.18 m above rail level;

The transport of swap-bodies 2.5 m wide and 2.6 m high on ordinary flat wagons (loading height 1.246 m);

The transport of semi-trailers on recess wagons.

Most of the existing main international lines offer at least the UIC B gauge. In the case of the others, improvement to this standard does not normally require major investment.

3. Minimum distance between track centres

This is the minimum distance between track centres for double-track main lines outside stations.

An increase in the distance between track centres presents the following advantages:

Decrease in the aerodynamic pressure when two trains pass each other, an advantage which increases in proportion to the speed;

Some relief from the constraints imposed in the transport of out-of-gauge loads;

Possibility of using high-powered mechanized equipment for track maintenance and renewal.

On existing double-track lines, and outside stations, the distance between track centres varies between 3.5 m and 4 m. When tracks are completely renewed, efforts should be made to increase the distance, with the aim of achieving a minimum distance of 4 m.

On new lines, the choice of a generous between-track distance normally entails only a limited marginal investment, at least outside tunnels and up to 4.2 m. A minimum distance between track centres of 4.2 m has therefore been selected. This is sufficient for high speeds up to 300 km/h (e. g. the new Paris — south-east high-speed line between Paris and Lyon).

4. Nominal minimum speed

The nominal minimum speed determines the geometrical characteristics of the section (radius of curves and cant), the

safety installations (braking distances) and the braking coefficient of the rolling stock.

On existing lines, maximum speeds are dependent upon the radius of the curves. The nominal minimum speed selected (160 km/h) is the general practice on sections with straight track or wide-radius curves. In some cases the layout and signalling can be improved, without excessive investment, to allow 160 km/h to be reached on some sections.

On new lines much higher nominal speeds can be adopted. The nominal speeds selected are those for new lines recently completed, under construction or at the planning stage.

The nominal speed is not the same as the commercial speed. The commercial speed is the distance between the origin and destination of a train divided by the total journey time, including intermediate stops.

5. Authorized mass per axle

This is the authorized mass per axle which international main lines should be able to bear.

International main lines should be capable of taking the most modern existing and future vehicle traffic, in particular:

Locomotives with a mass per axle of 22.5 tonnes; on lines which normally take a mass per axle of 20 tonnes, locomotives with a slightly higher mass per axle are tolerated because the ratio of the number of locomotive axles to the total number of axles is usually very low and the suspension of a locomotive causes less wear than that of a wagon;

Rail cars and rail motor sets with a mass per axle of 17 tonnes (this is the mass per axle of the French Railways TGV sets);

Carriages with a mass per axle of 16 tonnes (in existing and planned ordinary carriage stock, no carriage has or will have a mass per axle, when loaded, exceeding 16 tonnes);

Wagons with a mass per axle of 20 tonnes, which corresponds to UIC class C; for new mixed or combined traffic lines a wagon mass per axle of 22.5 tonnes up to 100 km/h has been adopted, in conformity with recent UIC decisions. The mass per axle limits of 20 tonnes for a speed of 120 km/h and 18 tonnes for a speed of 140 km/h are those set by the UIC regulations.

The mass per axle values shown are for a wheel diameter of not less than 840 mm, in accordance with the UIC regulations.

6. Authorized mass per linear metre

The authorized mass per metre of length over buffers of vehicles which international lines should be capable of accommodating has been set at 81, conforming to UIC class C4.

7. Test train (bridge design)

This is the minimum "test train" on which bridge design for international main lines should be based.

On new lines for mixed or combined traffic, the UIC 71 test train is used.

On new lines restricted to passenger traffic, no international standard has been laid down.

8. Maximum gradient

This is the gradient not to be exceeded on main international lines.

On existing lines, the gradient is a factor which it is virtually impossible to alter.

On new lines reserved for passenger traffic, the value 35 mm/m has been adopted (this is the standard used on the Paris—south-east high-speed line between Paris and Lyon).

On new lines for mixed or combined traffic, the value 12.5 mm/m has been adopted. This is the highest in any current national planning.