

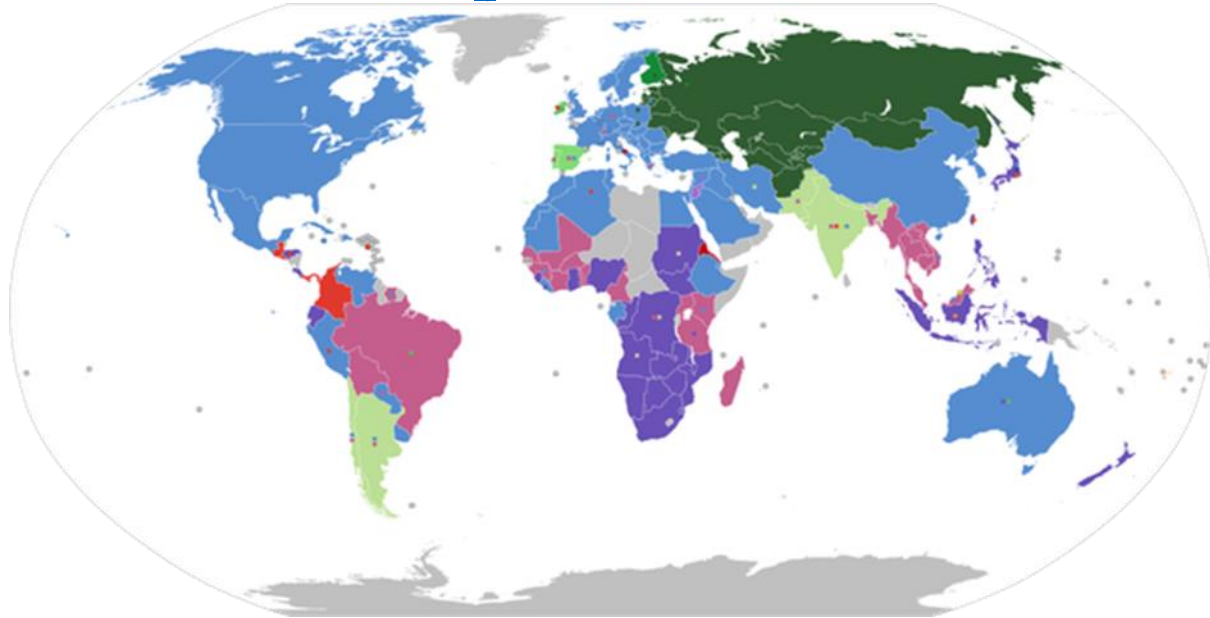
FEATURE

Rail Gauges

[Unci Narynin](#)

Designer of Model Railway Rolling Stock at Self-Employment (2001-present)

Author has 4.3K answers and 3.9M answer views [3y](#)

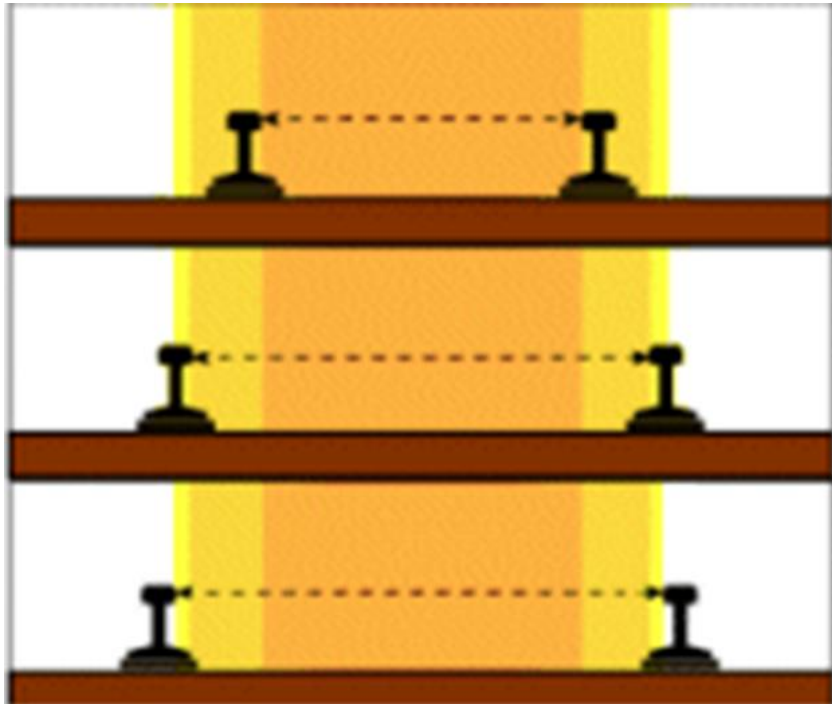





World map of rail gauges, from [File:Rail gauge world.svg](#)

- Blue is standard gauge 1435 mm, found in central/northern Europe (but not the Iberian peninsula: 1668 mm), Turkey, Iran and China.
- Dark green is Russian gauge 1520 mm (Finland is almost the same).
- Light green is India/Pakistan with 1676 mm gauge.
- Gauge changing trains between standard and Iberian gauge operate by Talgo or CAF gauge changing systems in Spain (where high speed lines are standard gauge).
- Gauge changing trains between standard and Russian gauge operate by changing bogies or SUW2000 system (Poland/Ukraine). Recently another train Turkey — Georgia — Azerbaijan has been introduced with new Stadler gauge changing cars.
- China has some international trains to Russia and Kazakhstan (bogie changing).
- Though China has a long border to India, for geographic regions (Himalaya, the world's tallest mountains) there is no rail connection.

Railroads - Broad Gauge

Excerpted from <https://www.globalsecurity.org/military/world/russia/railroad-gauge.htm>



| | |
|--|--|
|  | Meter Gauge 1000 mm 3 ft 3 $\frac{3}{8}$ in |
|  | Standard Gauge 1435 mm 4 ft 8 $\frac{1}{2}$ in |
|  | Broad Gauge 1520 mm 4 ft 11 $\frac{7}{8}$ in |

<https://www.globalsecurity.org/military/world/russia/images/broad-gauge-image1.gif>

The standard rail track in Russia is significantly wider than the one in Europe.

In the 19th Century Russia became one of the first countries in the world to introduce a single gauge standard. The Russian gauge of 5 ft / 1520 mm was approved as the new standard on 12 September 1842.

The selection process was done chiefly by Mel'nikov. It was not by chance that the gauge of 1524 mm was selected. It was broader than the American one, and as a result ensured better stability, and higher tonnage capacity, and, moreover, allowed higher speeds than the narrower gauges. Secondly, 1524 mm is 5 feet sharp - a round number, which was very convenient for calculations.

In 1852 the broad gauge became standard for new railways in Russia and its vassals, and later in the Soviet Union. In late 1960s a transition to the 1520-mm railways started to ease calculations.

Popular belief holds that wide Russian gauge was selected to prevent railroad invasion. Also important were the defensive concerns - broader gauge was deemed to be a delaying factor: it was to prevent the enemy from moving fast using Russian railways. In the territories they occupied in 1939, the Soviets converted the standard gauge railroads to the Russian broad gauge.

During World War II Germans had a headache trying to find rolling stock and organize freight transportation in occupied territories. By the end of 1941, over 23000 km of track had been converted from Russian broad gauge to German standard gauge.

Where trains encounter a different gauge (a break-of-gauge), such as at the Spanish-French border or the Russian-Chinese one, the traditional solution has always been trans-shipment - transferring passengers and freight to cars on the other system. This is obviously far from optimal,

and a number of more efficient schemes have been devised.

One common one is to build cars to the smaller of the two systems' loading gauges with bogies that are easily removed and replaced, with switching of the bogies at an interchange location on the border.

A more modern and sophisticated method is to have multigauge bogies whose wheels can be moved inward and outward. Normally they are locked in place, but special equipment at the border unlocks the wheels and pushes them inward or outward to the new gauge, relocking the wheels when done. This can be done as the train moves slowly over special equipment.

In some cases, breaks of gauge are avoided by installing dual gauge track, either permanently or as part of a changeover process to a single gauge.

The Spanish railways run on a 5ft 3 in / 1668 mm broad gauge [rather broader than that of Russia]. The Talgo train that runs from Paris to Barcelona used a mechanical method of expanding the undercarriage to accommodate the broader Spanish tracks.

All other trains stop at Irun or at Port Bou, where the passenger get off the French train and climb aboard a Spanish one. The move to extend the French TGV to Barcelona required the construction of an entirely new rail line, leaving the older broader gauge intact.