

## Stainless Steel Applications - Railways

A short description of the various grades of stainless steel used in railway applications. It has been written primarily from a European perspective and may not fully reflect the practice in other regions.

Materials for railway applications are required to maintain the integrity of the structure (i.e. to be sufficiently robust to withstand their service environment) and to be inert (ie corrosion resistant). Stainless steels are used in railway applications because they are resistant to corrosion, easily fabricated and offer good mechanical properties.

The following examples may serve to indicate the considerations made in selecting a suitable grade of stainless steel for railway applications. Austenitic stainless steel grades 1.4301 (AISI 304) and 1.4310 (AISI 301) are suitable for mild service environments and have been used in the construction of railway carriages, while ferritic stainless steel 1.4003 (ASTM S41050) has been used for freight wagons. Stainless steel is selected for both applications because it does not need protective paint coatings and thus maintenance costs are reduced.

Stainless steel is also used extensively in railway buildings and construction applications. In particular, the fire resistant properties of stainless steel have been utilised in underground railway stations (e.g. wall cladding and tunnel linings). See architectural applications for further details.

Typical applications for stainless steels in railway applications are shown in the table below.

### Railway Applications – Applications and Grades

Application/Use	Stainless Steel	
	Type	EN 10088 Grade
Carriage door skins, skins for carriages and locomotives	Austenitic	1.4301 (AISI 304) 1.4307 (AISI 304L) 1.4310 (AISI 301)
Carriage chassis and structural components	Austenitic	1.4003 (ASTM S41050) 3Cr12] 1.4301 (AISI 304) 1.4307 (AISI 304L)



Application/Use	Stainless Steel	
	Type	EN 10088 Grade
Freight wagon chassis and structural components	Ferritic	1.4003 (ASTM S41050)[3Cr12]
Railway exhaust systems	Ferritic Austenitic	1.4512 (AISI 409) 1.4509 1.4301 (AISI 304) 1.4307 (AISI 304L)
Carriage trim eg beading for windows, door handles, handrails, luggage racks, etc	Austenitic  Ferritic	1.4301 (AISI 304) 1.4307 (AISI 304L) 1.4401 (AISI 316) 1.4404 (AISI 316L) 1.4016 (AISI 430)
Under-train components e.g. tubes for compressed air and water systems, battery boxes, etc	Austenitic	1.4301 (AISI 304) 1.4307 (AISI 304L) 1.4401 (AISI 316) 1.4404 (AISI 316L)

*Footnote: The above information has been extracted from a document prepared by Tony Newson of Eurofer, Brussels, whose objective was to provide a summary of the basic grades of stainless steel commercially available and to indicate which grades are most commonly used in some of the principal application categories.*

*Broad categories of use (e.g. transport, consumer goods etc) are defined, along with the stainless steel grades most commonly used for those applications. Although this extract deals only with railway applications, similar summaries can be found under the following library headings:*

- *What can stainless steel do for... - Transport*
  - *Automotive*
  - *Shipbuilding/Marine*



- *Aerospace*
- *Home & Office*
  - *Consumer applications*