Stainless Steel Applications – Automotive

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

Materials for motor vehicle 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 (i.e. corrosion resistant). Stainless steels are used in motor vehicle applications because they are resistant to corrosion and high temperature oxidation, offer energy absorption properties and maintain their mechanical properties over a wide temperature range.

The following examples may serve to indicate the considerations made in selecting a suitable grade of stainless steel for motor vehicle applications. For applications where corrosion resistance is of primary importance, austenitic stainless steel grade 1.4301 (AISI 304) and its derivatives are suitable for mild environments (e.g. interior components, fuel tanks, etc). Grade 1.4401 (AISI 316) and its derivatives are suited to applications where chloride is present in the service environments. For temperatures up to 870 °C, grades 1.4301 (AISI 304), 1.4401 (AISI 316), 1.4512 (AISI 409) and their respective derivatives may be used for application requiring moderate oxidation resistance. For example, 1.4512 (AISI 409) is often used in exhaust systems for high volume production cars, while 1.4301 (AISI 304) and its derivatives are used in the exhaust systems for low volume luxury cars. Catalytic converters also use stainless steels for both internal and external components.

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

Motor Vehicle Applications – Applications and Grades

Application/Use	**Stainless Steel**	
	Type	**EN 10088 Grade**
Fuel tanks	Austenitic	1.4301 (AISI 304) 1.4307 (AISI 304L)

Exhaust systems	Ferritic Austenitic	1.4512 (AISI 409) 1.4509 1.4301 (AISI 304) 1.4307 (AISI 304L)
HOSE CLIPS	*Ferritic*	1.4016 (AISI 430)
Housings for catalytic converters and turbochargers	Austenitic	1.4301 (AISI 304) 1.4307 (AISI 304L) 1.4541 (AISI 321) 1.4401 (AISI 316) 1.4404 (AISI 316L) 1.4818 (ASTM S30415)[153 MA]
Internal components for catalytic converters	Austenitic Ferritic	1.4818 (ASTM S30415) [153 MA] 1.4835 (ASTM S30815) [253 MA] 1.4833 (AISI 309) 1.4845 (AISI 310) - (AISI 442) 1.4762 (AISI 446)
Internal components for turbochargers (eg rotors)	Austenitic	1.4835 (ASTM S30815) [253 MA] 1.4845 (AISI 310)
Chassis for buses and trucks, structural components	Austenitic Ferritic	1.4301 (AISI 304) 1.4307 (AISI 304L) 1.4003 (ASTM S41050) [3Cr12]
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)

Internal and external trim (eg bumpers, door scuff plates, headlight bezels, etc)	Austenitic	1.4301 (AISI 304)
		1.4307 (AISI 304L)
	Ferritic	1.4016 (AISI 430)
		1.4113 (AISI 434)
		1.4526 (AISI 436)

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 (eg transport, consumer goods etc) are defined, along with the stainless steel grades most commonly used for those applications. Although this extract deals only with automotive applications, similar summaries can be found under the following library headings:

- *What can stainless steel do for… - Transport*
    - *Shipbuilding/Marine*
    - *Railway*
    - *Aerospace*
- *Home & Office*
    - *Consumer applications*