

## Ferritic stabilized stainless steel

Type 17Cr-Ti stainless steel:  
EN 1.4510, AISI 439

### Applications

- Automotive exhaust system parts: mufflers, pipes, catalytic converters, support parts.
- Domestic appliance internal parts

### Welding

- Conventional welding methods are applicable, austenitic 308L and ferritic 430LNb or 439 filler metals can be used.
- Austenitic filler metal will result in more a ductile weld.
- Ferritic filler metals are recommended to use in sulphuric environments and under thermal stresses.
- Shielding gases should be based on Ar/He, mixed with maximum of 2 % oxygen or carbon dioxide to improve the arc stability. Hydrogen and nitrogen additions are forbidden.
- Heat input should be minimized to reduce the grain coarsening effect in the heat-affected zone.
- Titanium stabilization prevents sensitization effect in the heat-affected zone.
- Adequate corrosion resistance in the welded joint is achieved using either mechanical descaling or pickling.

### Fabrication

- Grade 1.4510 can be formed using typical forming processes like folding, bending, drawing, etc.
- It has higher minimum proof strength than standard austenitic stainless steel grade 1.4301 / AISI 304 in combination with lower work hardening behavior.
- Due to the stabilization, the r-value is higher compared to the non-stabilized ferritic stainless steel such as 1.4016.
- These characteristics mean excellent deep-drawability and other forming related properties.

### Corrosion resistance

- Outokumpu produces grade 1.4510 with a typical chromium content of 17 wt-% .
- Titanium alloying reduces sensitivity for intergranular corrosion.
- Oxidation resistance is good up to 950°C.
- Relatively high chromium content improves resistance to crevice corrosion
- Grade 1.4510 is not susceptible to chloride induced stress corrosion cracking.
- The best material performance is reached usually with the help of adequate design and regular cleaning during use (if applicable).

### Outokumpu Tornio Works

FI-95400 Tornio, Finland  
Tel. +358 16 4521, Fax +358 16 452 620, www.outokumpu.com  
Domicile: Tornio, Finland. Business ID 0823315-9, VAT FI08233159

### Physical properties

- Crystal structure is fully ferritic, and therefore material is ferromagnetic as soft annealed condition.
- Density: 7,7 g/cm<sup>3</sup>
- Coefficient of thermal expansion:  $11 \times 10^{-6} 1/K$  (T = 20...100 °C)
- Thermal conductivity at 20°C: 25 W/(m x K)
- Modulus of elasticity at 20°C: 220 GPa

### Mechanical properties

- For cold rolled materials.

	Grade	Proof strength R <sub>p0,2</sub> (N/mm <sup>2</sup> )	Tensile strength R <sub>m</sub> (N/mm <sup>2</sup> )	Elongation after fracture A (%)
EN	1.4510	240 Min.	420...600	23 Min.
AISI	439	205 Min.	415 Min.	22 Min.

- Minimum values of 0,2 % proof strength (R<sub>p0,2</sub>, N/mm<sup>2</sup>) at elevated temperatures, EN 10088-2.

EN	100	150	200	250	300	350
1.4510	195	190	185	175	165	155

### Chemical compositions (typical)

EN	C	Cr	Ni	Ti	Fe
	wt-%	wt-%	wt-%	wt-%	wt-%
1.4510	0,015	17	-	0,4	Bal.

### Further information

- Standard Specification EN 10088-2:2005
- Standard Specification ASTM A 240 - 09
- Technical Customer Service

#### Disclaimer:

Information given in this document may be amended without notice. Care has been taken to ensure that the contents are accurate but Outokumpu and its affiliated companies makes no warranty underrating and have no liability for the anything in this document unless explicitly agreed in writing.