

UGINOX

F 17 T

Titanium stabilized
17% chromium ferritic
stainless steel

European désignation ⁽¹⁾	
	Variant
X3CrTi17	X2CrTi17
1.4510	1.4520
American désignation ⁽²⁾	
430 ⁽²⁾	AISI 439 ⁽³⁾

(1) According to NF EN 10088-2
(2) According to ASTM A 268
(3) According to ASTM A 240

Chemical composition

Mean values

Element	C	Mn	Si	Cr	Ti
Weight %	0.02	0.40	0.35	16.5	0.40

General characteristics

UGINOX F 17 is derived from UGINOX F 17 by the addition of titanium. This grade enables good toughness and ductility to be obtained in welds. Stabilization with titanium leads to very

good resistance to intergranular and pitting corrosion. UGINOX F 17 T also has good drawability.

Typical applications

- Domestic appliances.
- Dairy equipment.
- Tubes for the sugar industry.
- Superheater dryer tubes.
- Sink units.
- Hot water tanks.

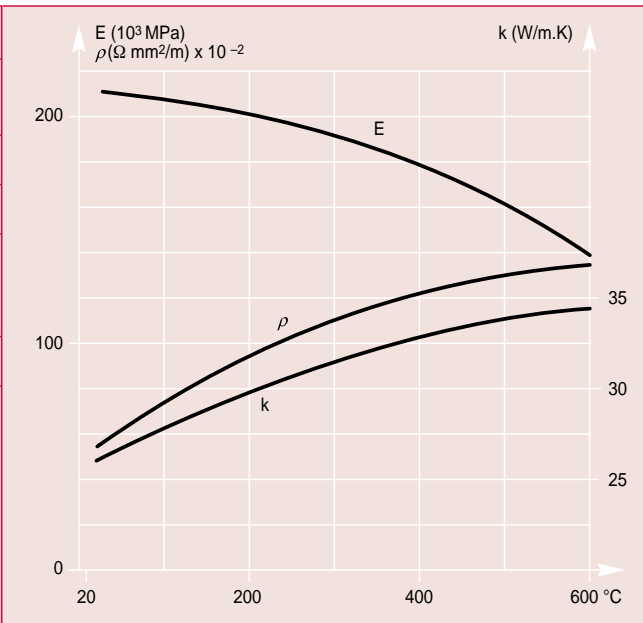
Product range

- Forms : sheets, blanks, coils, oscillated coils, strips, circle.
- Thicknesses : 0.05 to 4 mm.
- Width : according to thickness, maximum 1500 mm.
- Finish : cold rolled.

Physical properties

(cold rolled sheet)

Density	d	–	4 °C	7,7
Melting temperature (solidus)		°C		1460
Specific heat	c	J/kg.K	20 °C	460
Thermal conductivity	k	W/m.K	20 °C	26
Mean coefficient of thermal expansion	α	$10^{-6} \cdot K^{-1}$	20 - 100 °C 20 - 200 °C 20 - 400 °C	10,2 10,5 11,0
Electrical resistivity	ρ	$\Omega \text{ mm}^2/\text{m}$	20 °C	0,60
Young's modulus	E	$\text{MPa} \times 10^3$	20 °C	205



Tensile properties

Annealed condition

According to NF EN 10002-1 (Oct. 1990), specimen perpendicular to the rolling direction

Specimen

Lo = 80 mm (thickness < 3 mm)
Lo = 5,65 $\sqrt{S_0}$ (thickness \geq 3 mm).

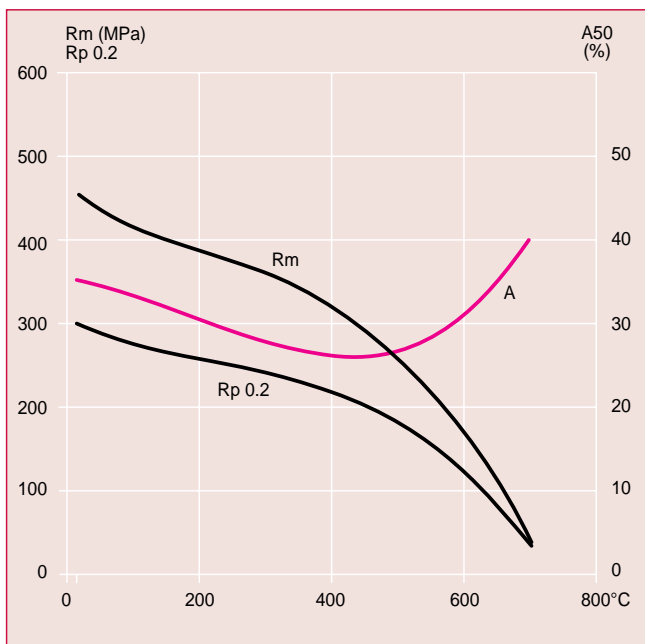
1 MPa = 1 N/mm²

	Rm ⁽¹⁾ (MPa)	Rp 0.2 ⁽²⁾ (MPa)	A ⁽³⁾ (%)	Brinell hardness
Annealed	450 (1)	300 (1)	30 (1)	≤ 78

(1) Mean values

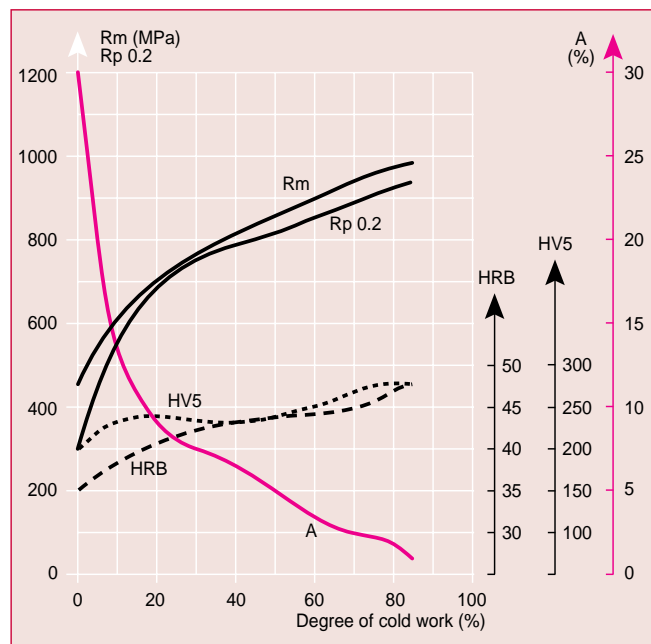
(1) Ultimate Tensile Strength (UTS)
(2) Yield Strength
(3) Elongation (EI)

At high temperature



(typical values)

Effect of cold work



Corrosion resistance

UGINOX F 17 T extends the range of applications of UGINOX F 17. The stabilization of carbon and nitrogen confers good resistance to intergranular corrosion. Furthermore, titanium also ties up sulfur, leading to improved resistance to pitting corrosion. Like all ferritic stainless steels, UGINOX F 17 T is insensitive to stress corrosion cracking. The corrosion resistance of welds is similar to that of the base metal.

UGINOX F 17 T has good resistance to mineral acids (HNO₃), cold dilute organic acids and cold oxidizing and alkaline salt solutions. It also has good resistance to atmospheric corrosion, high temperature oxidation and hot water.

After cleaning with chloride containing reagents, thorough rinsing is essential.

Welding

Welding process	No filler metal Typical thicknesses	With filler metal			Shielding gas*
		Thickness	Filler metal		
			Rod	Wire	
Resistance - spot - seam	≤ 2 mm ≤ 2 mm				
TIG	< 1.5 mm	> 0.5 mm	W. Nr 1.4370 ER 308 L (Si) ER 316 L (Si)	W. Nr 1.4370 ER 308 L (Si) ER 316 L (Si)	Argon Argon + helium
PLASMA	< 1.5 mm	> 0.5 mm		W. Nr 1.4370 ER 308 L (Si) ER 316 L (Si)	Argon Argon + helium
MIG		> 0.8 mm		W. Nr 1.4370 ER 308 L Si ER 316 L Si	Argon + 2 % CO ₂ Argon + 2 % O ₂ Argon + 2 % CO ₂ + helium
S.A.W.		> 2 mm		ER 308 L ER 316 L	
Electrode		Repairs	E 308 L E 316 L		
Laser	< 5 mm				Helium In certain conditions, argon

* Hydrogen and nitrogen forbidden in all cases

Mechanical properties of welds

(GTAW process without filler metal).

Comparison with UGINOX F 17, 18-10 L and 18-9 E

EN 10088.2	Grade	AISI	Weld joint*			Rupture
			Rm (MPa)	Rp 0.2 (MPa)	A (%)	
1.4016	UGINOX F 17	430	500	340	15	BM
1.4510	UGINOX F 17 T	430 Ti	450	300	25	BM
1.4306	UGINOX 18-10 L	304 L	600	300	35	BM
1.4301	UGINOX 18-9 E	304	630	300	35	FZ

* Typical values for transverse tensile tests in the as-welded condition. Results obtained at room temperature after grinding flat a 2 mm thick weld.

** BM = base metal,
FZ = fusion zone

In the above example, since rupture occurs in the base metal, the Rm and Rp 0.2 can be taken equal to those in the base metal. Only the elongation falls.

No heat treatment is necessary after welding. The welds must be mechanically or chemically descaled, then passivated (decontaminated).

Forming

UGINOX F 17 T can be readily cold formed by all standard processes (bending, contour

forming, drawing, etc.). Most deep drawing operations can be performed in a single pass.

Swift test (drawing)

Grade	European designation	AISI	LDR* (0.8 mm thick sheet)
UGINOX F 17	1.4016	430	2.05-2.10
UGINOX F 17 T	1.4510	430 Ti	2.15-2.20
UGINOX 18-9 E	1.4301	304	1.95-2.00

* Limiting drawing ratio

Erichsen test (expansion)

Grade	European designation	AISI	Erichsen deflection (0.8 mm thick sheet)
UGINOX F 17	1.4016	430	8.7
UGINOX F 17 T	1.4510	430 Ti	9.6
UGINOX 18-9 E	1.4301	304	11.5

Heat treatment and finishing

Annealing

At 825°C after cold working.

Pickling

Nitric-hydrofluoric acid mixture (10 % HNO₃ + 2% HF).

Descaling pastes for weld zones.

Passivation

20-25 % HNO₃ solution at 20°C.

Passivating pastes for weld zones.

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