

UGINOX

18-7L

Very low carbon austenitic
stainless steels
with high mechanical properties and for cold working

European designation ⁽¹⁾
X2CrNiN18-7
1.4318
American designation ⁽²⁾
AISI 301L/301LN

(1) According to NF EN 10095

(2) According to ASTM A240

This grade is in accordance with:

- UGINE & ALZ Material Safety Data Sheet n°1: stainless steels (European Directive 2001/58/EC).
- European Commission Directive 2000/53/EC for end-of-life vehicles, and to Annex II dated 27 June 2002.
- PED (Pressure Equipment Directive) according to EN 10028-7 and AD2000W2 according to VD TÜV W494.
- NFA 36 711 Standard «Stainless steel intended for use in contact with foodstuffs, products and beverages for human and animal consumption» (non packaging steel).

Chemical composition

Mean values

Elements	C	Si	Mn	Cr	Ni	N
%	0.025	0.50	1.50	17.5	6.60	0.11

General characteristics

The principal features of **UGINOX 18-7L** are:

- very good mechanical properties in the annealed condition, improved by cold working
- good resistance to uniform corrosion
- very good resistance to intergranular corrosion
- excellent weldability

The mechanical properties of **UGINOX 18-7L** make it particularly suited for the fabrication of high strength welded structures.

Typical applications

- Railroad and transport equipment
- Building construction
- Mechanical and structural components

Product range

Forms: sheets, blanks, coils, strips, circles

Thicknesses: 0.4 to 10 mm

Width: according to thickness, consult us

Finish: cold rolled or hot rolled, depending on the thickness, tempered cold rolled consult us

Tensile properties

Annealed condition
According to NF EN 10002-1 (July 2001),

Specimen
Lo = 80 mm (thickness < 3 mm)
Lo = 5,65 √ So (thickness ≥ 3 mm)

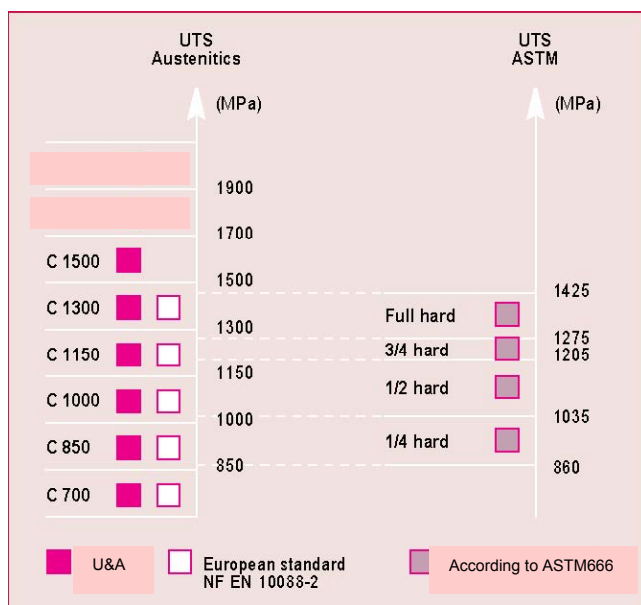
1 MPa = 1 N/mm²

	R _m ⁽¹⁾ (MPa)	R _{p0.2} ⁽²⁾ (MPa)	A ⁽³⁾ (%)
Annealed 2B ⁽⁴⁾	780	360	48
C 850 ⁽⁵⁾	850-1000 (900)	≥ 550 (580)	≥ 25 (35)
C 1000 ⁽⁵⁾	1000-1150 (1050)	≥ 750 (850)	≥ 18 (20)

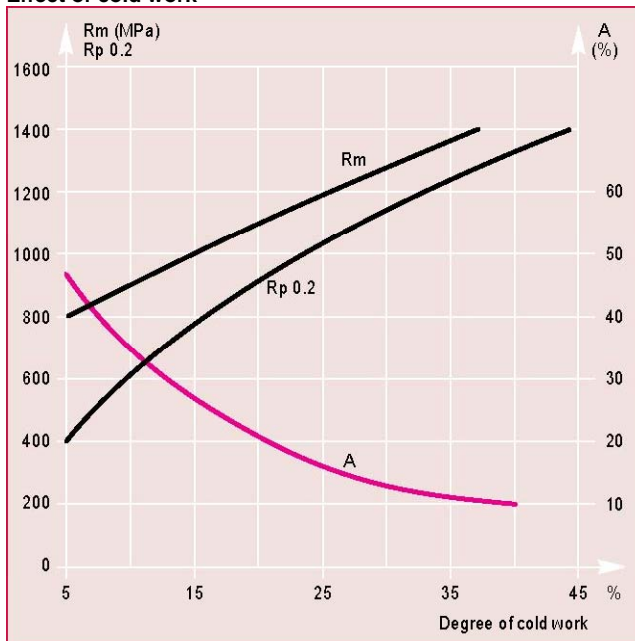
(1) Ultimate Tensile Strength (UTS) (2) Yield Strength (YS) (3) Elongation (A)
(4) Specimen perpendicular to the rolling direction (5) Specimen parallel to the rolling direction

Please consult us for other degrees of cold work (tempers)

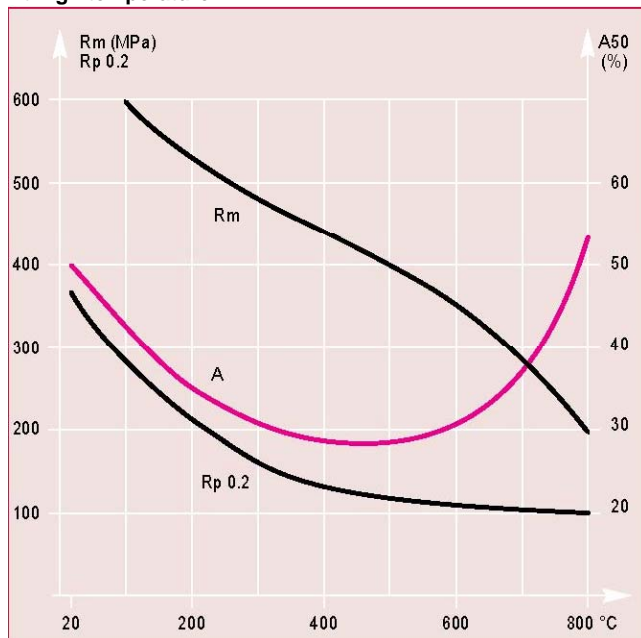
Correspondance between European and American standard Effect of cold work tempers



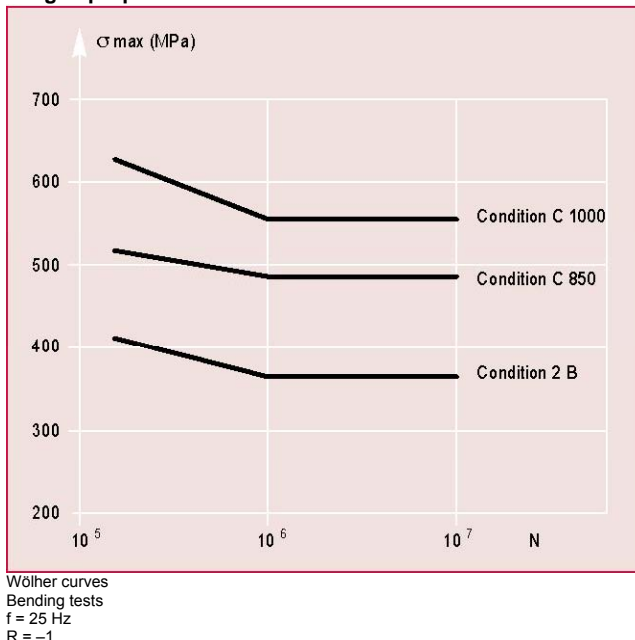
Effect of cold work



At high temperature



Fatigue properties



Wöhler curves
Bending tests
f = 25 Hz
R = -1

Corrosion resistance

UGINOX 18-7L has a good general resistance to wet corrosion and is especially recommended where there is a risk of intergranular corrosion. In particular, it meets the requirements of the standard tests defined by EN ISO 3651-2 (sensitizing treatments T1 and T2).

UGINOX 18-7L has good resistance to various acids, in particular to:

- phosphoric acid in all concentrations at ambient temperature
- nitric acid (36°Baumé) at all temperatures
- formic and lactic acids at ambient temperature
- dilute organic acids at ambient temperature.

Welding

Welding process	No filler metal	With filler metal		Shielding gas*
	Typical thicknesses	Thickness	Filler metal	
			Rod	Wire
Resistance Spot Seam	≤ 2 mm ≤ 2 mm			
TIG	< 1.5 mm	> 0.5 mm	ER 308 L (Si)	ER 308 L (Si)
PLASMA	< 1.5 mm	> 0.5 mm		ER 308 L (Si)
MIG		> 0.8 mm		ER 308 L (Si)
S.A.W		> 2 mm		ER 308 L
Electrode		Repairs	E 308 L	
Laser	< 5 mm			

No heat treatment is necessary after welding.

In order to fully restore the corrosion resistance of the metal, the welds must be mechanically or chemically pickled, then passivated. However, depending on the application, this operation may not be essential.

Forming

In the annealed condition, **UGINOX 18-7L** can be readily cold formed by all standard processes (bending, contour forming, drawing, etc.). However, due to its high strength and strong work hardening, powerful forming tools are required, and elastic springback is significant.

Bending test

Présentation	Sheet thickness (e)	Minimum transverse bending radius - r mini	
		120°	180°
Annealed 2B	all	-	0.5 e
C 850		1.5 e	-
C 1000		2.0 e	-

According to standard tests NFA 03.157 et NFA 03.158 (june 1978)

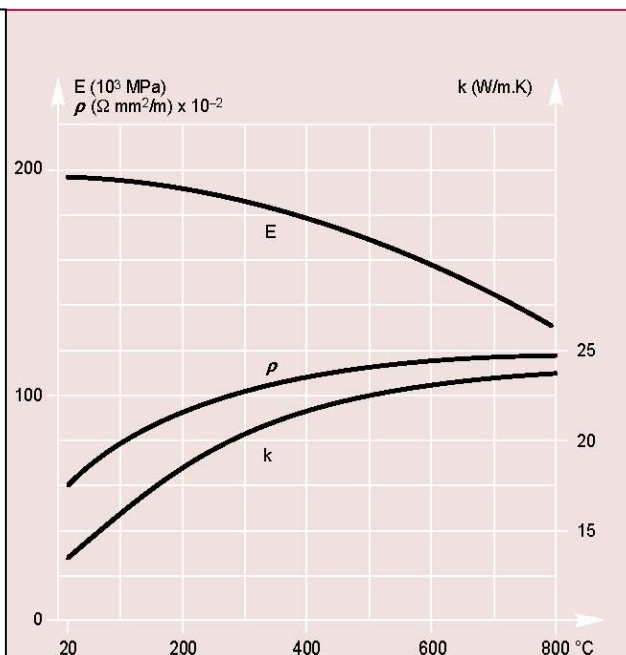
Erichsen test* (expansion)

Grade	European designation	AISI	Deflections
UGINOX 18-7L	1.4318	301 L	
- Recuit 2B			11.5 mm
- C 850			10 mm
- C 1000			8.5 mm

* on 0.8 mm thick sheet

Physical properties (cold rolled sheet - annealed)

Density	d	—	4 °C	79
Melting temperature		°C		1420
Specific heat	c	J/kg.K	20 °C	500
Thermal conductivity	k	W/m.K	20 °C	15
Mean coefficient of Thermal expansion	α	$10^{-6}/K$	20 - 100 °C 20 - 200 °C 20 - 300 °C	16.0 16.5 17.0
Electric resistivity	ρ	$\Omega \cdot \text{mm}^2/\text{m}$	20 °C	0.73
Magnetic permeability	μ	at 0.8 kA/m DC or top AC	20 °C	1.01
Young's modulus	E	$\text{Mpa} \cdot 10^3$	20 °C	200
Poisson's ratio			Annealed 2B C 1000	0.26 0.31



Heat treatment and finishing

Annealing

Water quench or air cool from 1050°C ± 25°C.

Polishing - brushing - buffing - satin finishing

No particular difficulty.

Pickling

Nitric-hydrofluoric acid mixture
(10% HNO₃ + 2% HF), at RT or 60°C.

Sulphuric-nitric acid mixture
(10% H₂SO₄ + 0,5% HNO₃) at 60°C.

Descaling pastes for weld zones.

Passivation

20-25 % HNO₃ solution at 20°C.

Passivating pastes for weld zones.

Head office:

UGINE & ALZ
5 rue Luigi CHERUBINI
F - 93210 LA PLAINE SAINT-DENIS CEDEX
www.ugine-alz.com

Sales information:

Tel: (33) 1 71 92 00 00
Technical information:
Tel: (33) 1 71 92 06 52
Fax: (33) 1 71 92 07 97