

Austenitic Stainless Steel

Aperam 301LN

Chemical Composition

Grades	C	Si	Mn	Cr	Ni	N
301LN	0.025	0.50	1.70	17.50	6.60	0.11

Typical values (%)

European designation	American designation
Type 1.4318 ⁽¹⁾ Very low carbon austenitic stainless steels with high mechanical properties and for cold working	Type 301LN ⁽²⁾ S30153
⁽¹⁾ According to EN10088-2 EN 10028-7 X2CrNiN18-7	⁽²⁾ According to ASTM A240 ASME SA-240

This grade complies with:

- > Aperam Stainless Europe - Safety Information Sheet for Stainless Steel
- > European Directive 2000/53/EC on end-of-life vehicles and later modifications
- > Standard NFA 36 711 "Stainless Steel intended for use in contact with foodstuffs, products and beverages for human and animal consumption (non packaging steel)"
- > Requirements of NSF/ANSI 51 edition international standard for "Food Equipment Materials" and with F.D.A. (United States Food and Drug Administration) requirements regarding materials used for food contact
- > European Parliament and of the Council regulation N° 1935/2004 of the of 27 October 2004, on materials and articles intended to come into contact with food (and repealing Directives 80/590/EEC and 9/109/EEC)
- > French regulatory paper dated 13 January 1976 relating to materials and articles made of stainless steel in contact with foodstuffs
- > PED (Pressure Equipment Directive), according to 2014/68/EU
- > CPR (Construction Products Regulation) according to 305/211/EU

Key Features

- > High mechanical properties that can easily be enhanced by work-hardening (temper-rolling)
- > Low carbon content offers excellent intergranular corrosion resistance, even after welding
- > Good resistance to uniform corrosion

Applications

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

Product Range

	Coils & Sheets
Thickness (mm)	0.5 up to 12
Width (mm)	up to 2,000
Finish	1D / 2D / 2B / 2H / Polished

Physical Properties

Cold rolled and annealed sheet

Density	d	kg/dm ³	23°C	7.9
Melting temperature	-	°C	Liquidus	1,445
Specific heat	c	J/kg.K	23°C	475
Thermal conductivity	k	W/m.K	23°C	15.1
Thermal diffusivity	D	10 ⁻⁶ m ² /s	23°C	4.03
Mean coefficient of thermal expansion	α	10 ⁻⁶ /K	20-200°C 20-400°C 20-600°C	17.6 18.4 18.4

Mechanical Properties

Annealed condition

In accordance with ISO 6892-1, part 1
Test sample perpendicular to rolling condition

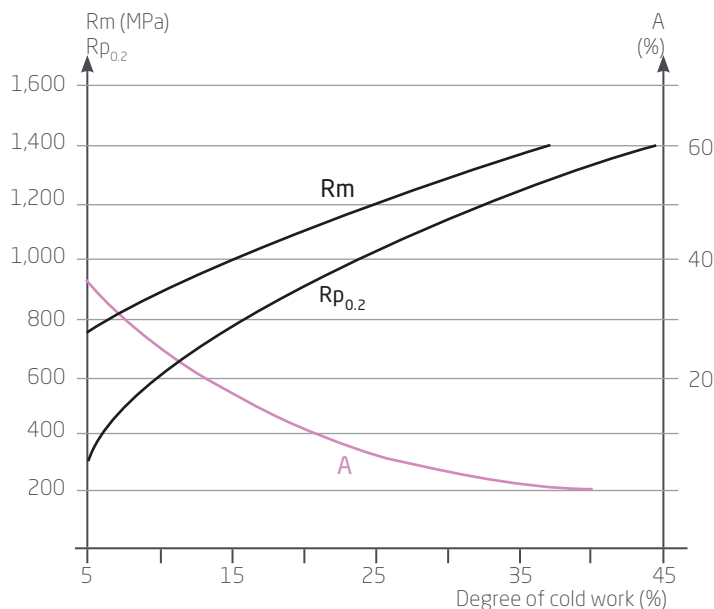
Grade	European designation	R _m ⁽¹⁾ (MPa)	R _{p0.2} ⁽²⁾ (MPa)	A ⁽³⁾ (%)
201LN	1.4371	730	370	52
304	1.4301	650	300	54
301 (17-7A)	1.4310	850	380	48
304L	1.4307	630	310	54
301LN	1.4318	760	350	48

Typical values | 1MPa = 1N/mm²
(¹) Ultimate Tensile Strength (UTS) | (²) Yield Strength (YS) | (³) Elongation (A)

Cryogenic tensile properties

Temp (°C)	301LN annealed			304L annealed		
	R _m (MPa)	R _{p0.2} (MPa)	A (%)	R _m (MPa)	R _{p0.2} (MPa)	A (%)
25	760	350	48	660	305	58
0	1,030	430	45	820	330	61
-25	1,080	435	33	950	360	46
-50	1,160	450	31	1,060	380	43
-100	1,420	565	28	1,260	400	37
-150	1,620	635	26	1,410	425	35

Effect of cold work



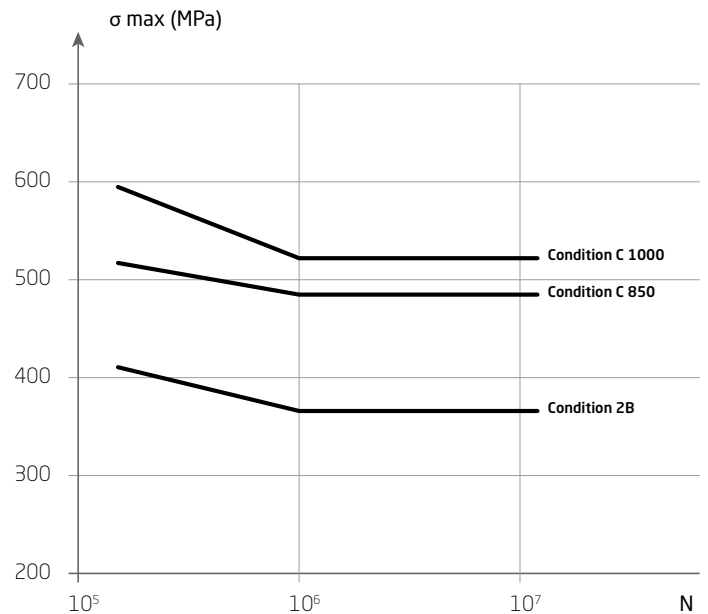
Mechanical properties in the work-hardened condition

Strain hardening (temper class)	R _m (MPa)	R _{p0.2} (MPa)	A (%)
C850	850 1,000	500 700	30 40
C1000	1,000 1,150	700 900	20 30

Fatigue properties

The elevated mechanical properties of our 301LN grade, which are obtained through work hardening, give this grade excellent fatigue resistance.

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



N = number of cycles
Indicative typical values. For more information, please contact us.

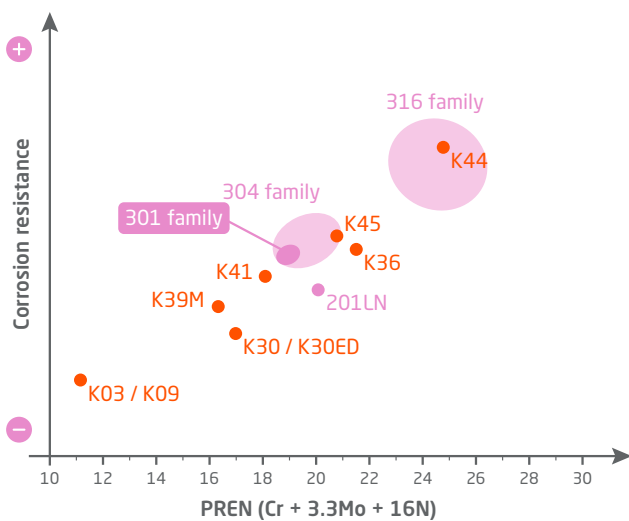
Corrosion Resistance

Our 301LN grade has 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 ISO 3651-2 (sensitizing treatments T1 and T2). It has a 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.

Pitting corrosion

Pitting potential (mV/SCE) in a NaCl 0.02M pH = 6.6 aerated environment at 23°C.



Forming

In the annealed condition, our 301LN grade can be readily cold formed using all standard processes (bending, contour forming, drawing, flow turning, etc.).

In the work-hardened state, due to its high strength, powerful forming tools are required, and elastic springback is significant.

Bending

Good bending capacity up to 180°, with very small bending radii for thicknesses below 0.8 mm. For work-hardened state, a higher bending radius might be required.

Presentation	Sheet Thickness (t)	Min. transverse bending radius (r mini)	
		120°	180°
Annealed 2B	all	-	0.5t
C850		1.5t	-
C1000		2.0t	-

According to ISO 7438

Stretching (Erichsen test)

Stretching behaviour is characterized by the dome height (h) of the Erichsen test (also known as Index 'EI').

Presentation	Erichsen Index (EI) (mm)
Annealed 2B	11.5
C850	10
C1000	8.5

Welding

Aperam 301LN grade is designed for welding operations. Low carbon limits the risk of intergranular corrosion and no heat treatment is required after welding. In order to fully restore the corrosion resistance of the metal, the welds must be mechanically or chemically descaled and then passivated and decontaminated.

Welding of work-hardened 301LN can significantly reduce mechanical properties in the weld, especially heat affected zone. Please contact us for guidelines.

Welding process	No filler material	With filler metal			Shielding gas
	Typical thicknesses	Thicknesses	Filler material		Hydrogen and nitrogen forbidden in all cases
			Rod	Wire	
Resistance: spot, seam	< 2 mm				
GTAW	< 1.5 mm	> 0.5 mm	ER 308L ⁽¹⁾	ER 308L ⁽¹⁾	Ar Ar + 5% H ₂ Ar + He Ar + 2 % N
PLASMA	< 1.5 mm	> 0.5 mm		ER 308L ⁽¹⁾	Ar Ar + 5% H ₂ Ar + He Ar + 2 % N
GMAW		> 0.8 mm		ER 308L ⁽¹⁾	Ar + 2% CO ₂ Ar + 2% O ₂ Ar + He
SAW		> 2 mm		ER 308L ⁽¹⁾	
SMAW		Repairs	ER 308L ⁽¹⁾		
Laser	< 5 mm				He Under certain circumstances: Ar N

⁽¹⁾ AWS A5.9 - ⁽²⁾ EN ISO 14343 - ⁽³⁾ EN 439

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 descaled and then passivated and decontaminated.

However, depending on the application, this operation may be not essential.

If there is a risk of intergranular corrosion, a solution annealing treatment at 1,050°C ±25°C must be carried out.

Heat Treatment and Finishing

Annealing

After cold forming (work hardening) and welding, using an annealing treatment for a couple of minutes at 1,050°C ±25°C followed by air cooling or water quenching restores the microstructure (recrystallization) and eliminate internal stresses.

Pickling

- > Nitric-Hydrofluoric acid mixture (10% HNO₃ + 2% HF) at ambient temperature or up to 60°C
- > Sulfuric-nitric acid mixture (10% H₂SO₄ + 0.5% HNO₃) at 60°C
- > Use descaling pastes for weld areas

Passivation

- > 20-25% HNO₃ solution (36° Baumé) at 20°C
- > Use passivating pastes for weld zones

Polishing

The surface of our 301LN grade is suitable for all kinds of polishing (grit, scotch-brite, electro polishing).

