

# Ultra 317L

EN 1.4438, ASTM TYPE 317L / UNS S31703

## General characteristics

Mo alloyed austenitic grade with higher corrosion resistance than “316L”, e.g. used in the chemical processing industry.

## Typical applications

- Chemical tankers
- Pulp and Paper equipment
- Condenser tubes and heat exchanger tubes
- Equipment for the petrochemical industry
- Flue-gas desulfurization equipment

## Products & dimensions

### Cold rolled products, available dimensions (mm)

Surface finish		Coil / Strip		Plate / Sheet	
		Thickness	Width	Thickness	Width
2E	Cold rolled, heat treated, mech. desc. pickled	0.50-4.99	36-2070	0.50-4.99	300-2070
2H	Work hardened	0.50-2.50	36-1350		

### Continuous hot rolled products, available dimensions (mm)

Surface finish		Coil / Strip		Plate / Sheet	
		Thickness	Width	Thickness	Width
1D	Hot rolled, heat treated, pickled	5.00-10.00	96-2070	5.00-10.00	300-2070
1E	Hot rolled, heat treated, mech. desc.	3.00-4.76	80-1390	3.00-4.76	400-1350

### Quarto plate products, available dimensions (mm)

Surface finish		Coil / Strip		Plate / Sheet	
		Thickness	Width	Thickness	Width
1D	Hot rolled, heat treated, pickled			5.00-50.00	400-3200

## Chemical composition

The chemical composition may vary slightly between different product standards. The required standard will be fully met as specified on the order.

The chemical composition is given as % by weight.

	C	Mn	Cr	Ni	Mo	N	Other
<b>Typical</b>	<b>0.02</b>		<b>18.2</b>	<b>13.7</b>	<b>3.1</b>		
ASME II A SA-240	≤0.030	≤2.00	18.0-20.0	11.0-15.0	3.0-4.0	≤0.10	
ASTM A240	≤0.030	≤2.00	18.0-20.0	11.0-15.0	3.0-4.0	≤0.10	
EN 10028-7	≤0.030	≤2.00	17.5-19.5	13.0-16.0	3.0-4.0	≤0.10	
EN 10088-2	≤0.030	≤2.0	17.5-19.5	13.0-16.0	3.0-4.0	≤0.10	
EN 10088-3	≤0.030	≤2.00	17.5-19.5	13.0-16.0	3.0-4.0	≤0.10	
EN 10088-4	≤0.030	≤2.0	17.5-19.5	13.0-16.0	3.0-4.0	≤0.10	
IS 6911	≤0.030	≤2.00	18.0-20.0	11.0-15.0	3.0-4.0	≤0.10	

## Corrosion resistance

For more information, see Outokumpu Corrosion Handbook.

Pitting corrosion resistance		Crevice corrosion resistance
PRE	CPT	CCT
28	33±3	<0

PRE Pitting Resistant Equivalent calculated using the formula:  $PRE = \%Cr + 3.3 \times \%Mo + 16 \times \%N$

CPT Corrosion Pitting Temperature as measured in the Avesta Cell (ASTM G 150), in a 1M NaCl solution (35,000 ppm or mg/l chloride ions).

CCT Critical Crevice Corrosion Temperature is the critical crevice corrosion temperature which is obtained by laboratory tests according to ASTM G 48 Method F

## Mechanical properties

The mechanical properties of the available products are given in the table below.

Cold rolled coil and sheet	R <sub>p0.2</sub> MPa	R <sub>p1.0</sub> MPa	R <sub>m</sub> MPa	Elongation <sup>1)</sup> %	Impact strength J	Rockwell	HB	HV
<b>Typical (thickness 1 mm)</b>								
ASME II A SA-240	≥ 205		≥ 515				≤ 217	
ASTM A240	≥ 205		≥ 515			≤ 95HRB	≤ 217	
IS 6911	≥ 205		≥ 515			≤ 95HRB	≤ 217	

Hot rolled coil and sheet	R <sub>p0.2</sub> MPa	R <sub>p1.0</sub> MPa	R <sub>m</sub> MPa	Elongation <sup>1)</sup> %	Impact strength J	Rockwell	HB	HV
<b>Typical (thickness 4 mm)</b>								
ASME II A SA-240	≥ 205		≥ 515				≤ 217	
ASTM A240	≥ 205		≥ 515				≤ 217	
IS 6911	≥ 205		≥ 515			≤ 95HRB	≤ 217	

Hot rolled quarto plate	R <sub>p0.2</sub> MPa	R <sub>p1.0</sub> MPa	R <sub>m</sub> MPa	Elongation <sup>1)</sup> %	Impact strength J	Rockwell	HB	HV
<b>Typical (thickness 15 mm)</b>	<b>300</b>	<b>340</b>	<b>610</b>	<b>50</b>				
ASME II A SA-240	≥ 205		≥ 515			≤ 95HRB	≤ 217	
ASTM A240	≥ 205		≥ 515			≤ 95HRB	≤ 217	
EN 10028-7	≥ 220	≥ 260	520 - 720	≥ 40				
EN 10088-2	≥ 220	≥ 260	520 - 720	≥ 40				
EN 10088-4	≥ 220	≥ 260	520 - 720	≥ 40				
IS 6911	≥ 205		≥ 515			≤ 95HRB	≤ 217	

Wire rod	R <sub>p0.2</sub> MPa	R <sub>p1.0</sub> MPa	R <sub>m</sub> MPa	Elongation <sup>1)</sup> %	Impact strength J	Rockwell	HB	HV
<b>Typical</b>	<b>260</b>	<b>280</b>	<b>580</b>	<b>50</b>				

<sup>1)</sup>Elongation according to EN standard:

A<sub>80</sub> for thickness below 3 mm.

A for thickness = 3 mm.

Elongation according to ASTM standard A<sub>2</sub> or A<sub>50</sub>.

## Physical properties

Data according to EN 10088, EN 10095 or typical values.

Density	Modulus of elasticity	Thermal exp. at 100 °C	Thermal conductivity	Thermal capacity	Electrical resistance	Magnetizable
kg/dm <sup>3</sup>	GPa	10 <sup>-6</sup> /°C	W/m°C	J/kg°C	μΩm	
8.0	200	16,0	14	500	0.85	

## Fabrication

### Cold forming

4438 can be readily formed and fabricated by a full range of cold working operations. It can be used in heading, drawing and bending. Any cold working operations will increase the strength and hardness of the material and may leave it slightly magnetic. Work hardening is accentuated by the partial transformation of the austenite phase of the material to hard martensite. For more information contact Avesta Research Centre.

### Welding

4438 can be readily welded by a full range of conventional welding methods such as:

Shielded metal arc welding (SMAW)

Gas tungsten arc welding, TIG (GTAW)

Gas metal arc welding, MIG (GMAW)

Flux-cored arc welding (FCAW)

Plasma arc welding (PAW)

Submerged arc welding (SAW)

Subsequent passes may cause precipitates of secondary phases in the weld metal. For this reason a low heat input and a maximum interpass temperature of 100°C should be used.

# Standards & approvals

The most commonly used international product standards are given in the table below.

Standard	Designation
ASME SA-240M Code Sect. II. Part A	TYPE 317L / UNS S31703
ASTM A240/A240M	TYPE 317L / UNS S31703
EN 10028-7, PED 2014/68/EU	1.4438
EN 10088-2	1.4438
EN 10088-3	1.4438
EN 10088-4	1.4438
IS 6911, AMENDMENT NO. 2	ISS 317 L

## Contacts & Enquiries

Contact your nearest sales office

[www.outokumpu.com/contacts](http://www.outokumpu.com/contacts)

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