

Forta 316/4401

EN 1.4401, ASTM TYPE 316H / UNS S31609

General characteristics

A normal-carbon, molybdenum-alloyed stainless steel that is widely used for various applications with higher than average corrosion resistance requirements. Forta 316/4401 is strengthened with temper rolling for applications that require specific strength.

Typical applications

- Chemical tanks

Products & dimensions

Cold rolled products, available dimensions (mm)

Surface finish		Coil / Strip		Plate / Sheet	
		Thickness	Width	Thickness	Width
2H	Work hardened	0.05-6.00	3-1530	0.25-6.00	100-1530

Chemical composition

The typical chemical composition for this grade is given in the table below, together with composition limits given for the product according to different standards. The required standard will be fully met as specified on the order.

The chemical composition is given as % by mass.

	C	Mn	Cr	Ni	Mo	N	Other
Typical	0.04		17.2	10.1	2.1		
ASTM A240	≤0.08	≤2.00	16.0-18.0	10.0-14.0	2.00-3.00	≤0.10	
ASTM A240	0.04-0.10	≤2.00	16.0-18.0	10.0-14.0	2.00-3.00		
ASTM A666	≤0.08	≤2.00	16.0-18.0	10.0-14.0	2.00-3.00	≤0.10	
EN 10028-7	≤0.07	≤2.00	16.5-18.5	10.0-13.0	2.00-2.50	≤0.10	
EN 10088-2	≤0.07	≤2.0	16.5-18.5	10.0-13.0	2.0-2.5	≤0.10	
EN 10088-3	≤0.07	≤2.00	16.5-18.5	10.0-13.0	2.0-2.5	≤0.10	

EN 10088-4	≤0.07	≤2.0	16.5-18.5	10.0-13.0	2.0-2.5	≤0.10	
IS 6911	≤0.08	≤2.00	16.0-18.0	10.0-14.0	2.00-3.00	≤0.10	
IS 6911	0.04-0.10	≤2.00	16.0-18.0	10.0-14.0	2.00-3.00		

Corrosion resistance

Pitting corrosion resistance		Crevice corrosion resistance
PRE	CPT	CCT
24	20±2	<0

Pitting Resistance Equivalent (PRE) is calculated using the following formula: $PRE = \%Cr + 3.3 \times \%Mo + 16 \times \%N$
Corrosion Pitting Temperature (CPT) as measured in the Avesta Cell (ASTM G 150), in a 1M NaCl solution (35,000 ppm or mg/l chloride ions).

Critical Crevice Corrosion Temperature (CCT) is obtained by laboratory tests according to ASTM G 48 Method F

For a more detailed description of their corrosion resistance properties in different environments see Outokumpu Corrosion Handbook.

Mechanical properties

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

Cold rolled coil and sheet	R _{p0.2} MPa	R _{p1.0} MPa	R _m MPa	Impact strength J	Rockwell	HB	HV
Typical (thickness 1 mm)	300	325	630				
ASTM A240	≥ 205		≥ 515			≤ 217	
ASTM A240	≥ 205		≥ 515		≤ 95HRB	≤ 217	
EN 10028-7	≥ 240	≥ 270	530 - 680				
EN 10088-2	≥ 240	≥ 270	530 - 680				
EN 10088-4	≥ 240	≥ 270	530 - 680				
IS 6911	≥ 205		≥ 515		≤ 95HRB	≤ 217	
IS 6911	≥ 205		≥ 515		≤ 95HRB	≤ 217	

Hot rolled coil and sheet	R _{p0.2} MPa	R _{p1.0} MPa	R _m MPa	Impact strength J	Rockwell	HB	HV
Typical (thickness 4 mm)	300	350	600			170	
ASTM A240	≥ 205		≥ 515			≤ 217	
ASTM A240	≥ 205		≥ 515			≤ 217	
EN 10028-7	≥ 240	≥ 270	530 - 680				
EN 10088-2	≥ 240	≥ 270	530 - 680				
EN 10088-4	≥ 240	≥ 270	530 - 680				
IS 6911	≥ 205		≥ 515		≤ 95HRB	≤ 217	
IS 6911	≥ 205		≥ 515		≤ 95HRB	≤ 217	

Hot rolled quarto plate	R _{p0.2} MPa	R _{p1.0} MPa	R _m MPa	Impact strength J	Rockwell	HB	HV
Typical (thickness 15 mm)	260	300	570				
ASTM A240	≥ 205		≥ 515		≤ 95HRB	≤ 217	

ASTM A240	≥ 205		≥ 515		≤ 95HRB	≤ 217	
EN 10028-7	≥ 220	≥ 260	520 - 670				
EN 10088-2	≥ 220	≥ 260	520 - 670				
EN 10088-4	≥ 220	≥ 260	520 - 670				
IS 6911	≥ 205		≥ 515		≤ 95HRB	≤ 217	
IS 6911	≥ 205		≥ 515		≤ 95HRB	≤ 217	

Wire rod	R _{p0.2} MPa	R _{p1.0} MPa	R _m MPa	Impact strength J	Rockwell	HB	HV
Typical	190	220	500				

¹⁾Elongation according to EN standard:

A₈₀ for thickness below 3 mm.

A for thickness = 3 mm.

Elongation according to ASTM standard A₂^o or A₅₀.

Physical properties

Physical properties according to EN 10088 are shown below.

Density	Modulus of elasticity	Thermal exp. at 100 °C	Thermal conductivity	Thermal capacity	Electrical resistance	Magnetizable
kg/dm ³	GPa	10 ⁻⁶ /°C	W/m°C	J/kg°C	μΩm	
8.0	200	16.0	15	500	0.75	No

Fabrication

More detailed information concerning welding procedures can be obtained from the Outokumpu Welding Handbook, available from our sales offices.

Standards & approvals

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

Standard	Designation
ASTM A240/A240M	TYPE 316H / UNS S31609; TYPE 316H / UNS S31609
ASTM A666	TYPE 316H / UNS S31609
EN 10028-7, PED 2014/68/EU	1.4401
EN 10088-2	1.4401
EN 10088-3	1.4401
EN 10088-4	1.4401
IS 6911, AMENDMENT NO. 2	ISS 316; ISS 316H

Contacts & Enquiries

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