outokumpu
high performance stainless steel

Dura 410/4006

EN 1.4006, ASTM TYPE 410 / UNS S41000

General characteristics

Low hardness martensitic grade. Corrosion resistant in water and steam. Mainly supplied as plate or long product for mechanical engineering applications (e.g. valves, axles, pump parts).

Typical applications

- Valves, axles, pump parts and nozzles
- Shears and surgical instruments
- Wear resistant surfaces

Products & dimensions

Chemical composition

The chemical composition is shown in the table below.

The chemical composition is given as % by weight.

	C	Mn	Cr	Ni	Mo	N	Other
Typical	**0.12**		**12.0**				
ASME II A SA-240	0.08-0.15	≤1.00	11.5-13.5	≤0.75			
ASTM A240	0.08-0.15	≤1.00	11.5-13.5	≤0.75			
EN 10088-2	0.08-0.15	≤1.5	11.5-13.5	≤0.75			
EN 10088-3	0.08-0.15	≤1.5	11.5-13.5	≤0.75			
EN 10088-4	0.08-0.15	≤1.5	11.5-13.5	≤0.75			

Corrosion resistance

For more information, see Outokumpu Corrosion Handbook.

Pitting corrosion resistance		Crevice corrosion resistance
PRE	CPT	CCT
12	<10	<0

PRE Pitting Resistant Equivalent calculated using the formula: PRE = %Cr + 3.3 x %Mo + 16 x %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	$R_{p0.2}$ MPa	$R_{p1.0}$ MPa	R_m MPa	Elongation[1)] %	Impact strength J	Rockwell	HB	HV
Typical (thickness 1 mm)								
ASME II A SA-240	≥ 205		≥ 450				≤ 217	
ASTM A240	≥ 205		≥ 450			≤ 96HRB	≤ 217	
EN 10088-2			≤ 600	≥ 20				

Hot rolled coil and sheet	$R_{p0.2}$ MPa	$R_{p1.0}$ MPa	R_m MPa	Elongation[1)] %	Impact strength J	Rockwell	HB	HV
Typical (thickness 4 mm)								
ASME II A SA-240	≥ 205		≥ 450				≤ 217	
ASTM A240	≥ 205		≥ 450				≤ 217	
EN 10088-2			≤ 600	≥ 20				

Hot rolled quarto plate	$R_{p0.2}$ MPa	$R_{p1.0}$ MPa	R_m MPa	Elongation[1)] %	Impact strength J	Rockwell	HB	HV
Typical (thickness 15 mm)	**300**	**360**	**560**	**30**				
ASME II A SA-240	≥ 205		≥ 450				≤ 217	
ASTM A240	≥ 205		≥ 450				≤ 217	

Wire rod	$R_{p0.2}$ MPa	$R_{p1.0}$ MPa	R_m MPa	Elongation[1)] %	Impact strength J	Rockwell	HB	HV
Typical	**340**	**430**	**580**	**30**				

[1)]Elongation according to EN standard:
A_{80} for thickness below 3 mm.
A for thickness = 3 mm.
Elongation according to ASTM standard $A_{2"}$ or A_{50}.

Physical properties

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

Density kg/dm^3	Modulus of elasticity GPa	Thermal exp. at 100 °C 10^{-6}/°C	Thermal conductivity W/m°C	Thermal capacity J/kg°C	Electrical resistance µΩm	Magnetizable
7.7	215	10,5	30	460	0.60	Yes

Fabrication

Welding

The microstructure of 4006 comprises tempered martensite and some carbide.The steel is normally not considered to be weldable, but if thinner gauges are occasionally welded, the use of low-hydrogen methods (MAG or TIG) is to be preferred to avoid cold cracking. Any electrodes used must be of the basic type. The martensitic steels must be preheated to temperatures above MS (typically 250-400ºC). The interpass temperature should be in the same range. The heat input should not be too high or too low (0.5-1.5 kJ/mm).
Austenitic fillers are most commonly used. This avoids the post weld heat treatment that is necessary when compositionally matched filler is used.Much depends on the composition of the steel and the degree of restraint used. When there is no preheating, post weld heat treatment is necessary. However, it may be possible to weld very thin gauges without preheating.

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 410 / UNS S41000
ASTM A240/A240M	TYPE 410 / UNS S41000
EN 10088-2	1.4006
EN 10088-3	1.4006
EN 10088-4	1.4006

Contacts & Enquiries

Contact your nearest sales office

www.outokumpu.com/contacts

Working towards forever.

We work with our customers and partners to create long lasting solutions for the tools of modern life and the world's most critical problems: Clean energy, clean water and efficient infrastructure. Because we believe in a world that lasts forever.

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