outokumpu
high performance stainless steel

Core 201/4372

EN 1.4372, ASTM TYPE 201 / UNS S20100

General characteristics

Core 201/4372 is a low-nickel stainless steel with properties approaching Core 301/4310 but with a higher work hardening coefficient.

Core 201/4372 is an austenitic stainless steel, which belongs to the family of the austenitic low nickel CrMn stainless steels, in which manganese replaces a part of the nickel that is normally alloyed to CrNi standard grades. It is the basic product of the CrMn stainless steel family. Due to its high nitrogen content, Core 201/4372 has increased mechanical strength and shows a high degree of work hardening on mechanical deformation.

The corrosion resistance of the austenitic CrMn grades is usually slightly below the corrosion resistance of the austenitic CrNi standard grades. Core 201/4372 is used in applications where a combination of high mechanical strength and good formability as well as corrosion resistance is needed. Due to its tendency to work hardening, Core 201/4372 can absorb an increased amount of energy during deformation. It can be delivered in the temper rolled condition with different strength levels.

Typical applications

- Household appliances
- Kitchen utensils
- Sinks
- Doors and windows
- Railroad cars

Products & dimensions

Cold rolled products, available dimensions (mm)

Surface finish		Coil / Strip		Plate / Sheet	
		Thickness	Width	Thickness	Width
2B	Cold rolled, heat treated, pickled, skin passed	0.33-3.58	12-1524	0.33-3.58	18-1524
2D	Cold rolled, heat treated, pickled	0.63-2.78	914-1524	0.63-2.78	914-1524
2E	Cold rolled, heat treated, mech. desc. pickled	0.33-3.58	12-1524	0.33-3.58	18-1524
2F	Cold rolled, heat treated, skin passed	0.33-3.58	12-1524	0.33-3.58	18-1524

2G	Ground	0.53-3.58	12-1524	0.53-3.58	18-1524
2H	Work hardened	0.31-3.58	12-1300	0.31-3.58	18-1300
2K	Satin finish	0.53-3.58	12-1524	0.53-3.58	18-1524
2R	Cold rolled, bright annealed	0.33-1.22	12-1300		

Continous hot rolled products, available dimensions (mm)

Surface finish		Coil / Strip		Plate / Sheet	
		Thickness	Width	Thickness	Width
1D	Hot rolled, heat treated, pickled	2.54-9.52	400-1524	2.54-9.52	400-1524

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	**0.05**	**6.6**	**16.1**	**3.6**		**0.08**	
ASME II A SA-240	≤0.15	5.5-7.5	16.0-18.0	3.5-5.5		≤0.25	
ASTM A240	≤0.15	5.5-7.5	16.0-18.0	3.5-5.5		≤0.25	
ASTM A666	≤0.15	5.5-7.5	16.0-18.0	3.5-5.5		≤0.25	
EN 10028-7	≤0.15	5.5-7.5	16.0-18.0	3.5-5.5		0.05-0.25	
EN 10088-2	≤0.15	5.5-7.5	16.0-18.0	3.5-5.5		0.05-0.25	
EN 10088-4	≤0.15	5.5-7.5	16.0-18.0	3.5-5.5		0.05-0.25	

Corrosion resistance

Core 201/4372 has excellent corrosion resistance in solutions of many halogen-free organic and inorganic compounds over a wide temperature and concentration range. It can withstand many organic and sufficiently diluted mineral acids depending on the temperature of the solution. Core 201/4372 may suffer from uniform corrosion in mineral acids and hot strong alkaline solutions.

In aqueous solutions containing halogenides, e.g. chlorides or bromides, pitting and crevice corrosion may occur depending on halogenide concentration, temperature, pH-value, concentration of oxidizing compounds and crevice geometry, if applicable. The resistance against pitting and crevice corrosion of Core 201/4372 is, however, slightly lower than that of the basic austenitic CrNi standard grades. For short periods, for instance when cooking in stainless steel dishes, Core 201/4372 can tolerate even relatively high chloride concentrations. The presence of corrosion inhibiting or accelerating compounds like transition metal ions or organic compounds may influence the corrosion behavior of Core 201/4372.

Core 201/4372 is prone to chloride-induced stress corrosion cracking at temperatures over about 50 °C depending on the applied stress and the chloride concentration in the environment. Prior cold deformation of the structure under load increases the risk of stress corrosion cracking.

Core 201/4372 can be used for indoor and outdoor applications in rural areas and urban environments where chloride contamination is low. The best material performance is typically reached with the help of adequate design, correct post-weld treatment, and regular cleaning during use (if applicable).

For more information on corrosion resistance, please refer to the Outokumpu Corrosion Handbook or contact our corrosion experts.

Pitting corrosion resistance		Crevice corrosion resistance
PRE	CPT	CCT
17	<10	<0

Pitting Resistance Equivalent (PRE) is calculated using the following formula: PRE = %Cr + 3.3 x %Mo + 16 x %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

Mechanical properties

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

The mechanical properties of the available products in soft annealed condition at room temperature are given in the table below. Moderate strengths can be reached at elevated temperatures (~550 °C/1022 °F). Temperatures for excessive scaling are close to 850 °C/1562 °F. This grade, along with other austenitic corrosion-resistant steels, exhibits very high ductility and high elongation to fracture. It is not susceptible to brittle fracture in the solution annealed condition.

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)	**430**	**475**	**775**	**65**				
ASTM A240	≥ 310		≥ 655			≤ 100HRB	≤ 241	
ASTM A666	≥ 310		≥ 655					
EN 10028-7	≥ 350	≥ 380	680 - 880	≥ 45				
EN 10088-2	≥ 350	≥ 380	680 - 880	≥ 45				
EN 10088-4	≥ 350	≥ 380	750 - 950	≥ 45				

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)								
ASTM A240	≥ 310						≤ 241	
EN 10028-7	≥ 330							
EN 10088-2	≥ 330							
EN 10088-4	≥ 350							

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)	**375**	**405**	**705**	**40**				
EN 10028-7	≥ 330	≥ 370	680 - 880	≥ 40				
EN 10088-2	≥ 330	≥ 370	680 - 880	≥ 40				
EN 10088-4	≥ 330	≥ 370	750 - 950					

[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

The physical properties of the available products are given in the table below

The crystal structure is austenitic, and therefore the material is non-magnetic in the soft annealed condition. The crystal structure becomes slightly magnetic when deformed.

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
7.8	200		15		0.70	No

Fabrication

Formability

Formability is good, but the forces needed and the elastic return is bigger compared to carbon steels and grade 1.4301 / AISI 304. Core 201/4372 is suitable for demanding forming operations as well as bending, and drawing due to its high elongation to fracture. Work hardening is pronounced. Sensitivity to delayed cracking after demanding forming processes may be observed, e.g. when deep drawing ratio is close to 2.0 and residual tensile stresses are present. Typically Mn-alloyed grades have a slightly lower surface reflectivity compared to the CrNi-grade 4301. This can lead to the need for increased material removal in further polishing and brushing processes.

Welding

Core 201/4372 has excellent weldability and is suitable for the full range of conventional welding methods (like MMA, MIG, MAG, TIG, SAW, LBW, or RSW), except gas welding.

Core 201/4372 has about 50% higher thermal expansion and lower heat conductivity compared to carbon steels. This means that larger deformation and higher shrinkage stresses may result from welding. In thin sections, autogenous welding may be used. In thicker section, low carbon containing Core 201/4372 is recommended. To ensure that the weld metal properties (e.g. strength and corrosion resistance) are equivalent to those of the parent metal, matching or slightly overalloyed fillers should preferably be used. The recommended filler metals are 19 9 L, 18 8 Mn, or 23 12 L.

Post-weld heat treatment is generally not required. In special cases with high risks of stress corrosion cracking or fatigue, stress relief treatment may be considered.

In order to fully restore the corrosion resistance of the weld seam, the weld discoloration should be removed by pickling and passivation.

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
ASME SA-240M Code Sect. II. Part A	TYPE 201 / UNS S20100
ASTM A240/A240M	TYPE 201 / UNS S20100
ASTM A666	TYPE 201 / UNS S20100
EN 10028-7, PED 2014/68/EU	1.4372
EN 10088-2	1.4372
EN 10088-4	1.4372

Contacts & Enquiries

Contact your nearest sales office

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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