

201

STAINLESS STEEL



Appliances
Architectural
Applications
Automotive Trim
Cooking Utensils

TYPE 201 is an austenitic, chromium-nickel-manganese stainless steel that was developed originally to conserve nickel. It provides similar properties to Type 301, and can be used in most of its applications. This alloy is non-magnetic in the annealed condition, but is magnetic when cold worked. The rate of work hardening is similar to Type 301, although Type 201 develops somewhat higher yield strength while retaining equal ductility when cold worked. Toughness at low temperatures is excellent.

Typical uses include appliances, restaurant equipment, cooking utensils, sinks, automotive trim, architectural applications such as windows and doors, railway cars, trailers and hose clamps.

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Specifications

Type 201 Stainless Steel is covered by the following specifications:

ASTM A240
ASTM A666

Composition	(wt %)
Carbon (C)	0.15 max.
Manganese (Mn)	5.50 – 7.50
Phosphorus (P)	0.060 max.
Sulfur (S)	0.0030 max.
Silicon (Si)	1.00 max.
Chromium (Cr)	16.0 – 18.0
Nickel (Ni)	3.50 – 5.50
Nitrogen (N)	0.25 max.
Iron (Fe)	Balance

AVAILABLE FORMS

Cleveland-Cliffs produces Type 201 in thicknesses from 0.010 – 0.187 in. (0.25 – 4.75 mm) and widths up to 48 in. (1219 mm). For other thicknesses and widths, inquire.

PHYSICAL PROPERTIES

Density, lbs/in. ³ (g/cm ³)	0.283 (7.81)
Electrical Resistivity, $\mu\Omega \cdot \text{in.}$ ($\mu\Omega \cdot \text{cm}$)	27.0 (68.5)
Thermal Conductivity, BTU/hr./ft. ² /°F W/(m·K)	
212 °F (100 °C)	9.4 (16.2)
932 °F (500 °C)	12.4 (21.4)
Coefficient of Thermal Expansion, in./in./°F ($\mu\text{m}/\text{m}/\text{K}$)	
32 – 212 °F (0 – 100 °C)	8.7×10^{-6} (15.7)
32 – 600 °F (0 – 315 °C)	9.7×10^{-6} (17.5)
32 – 1000 °F (0 – 538 °C)	10.2×10^{-6} (18.4)
32 – 1200 °F (0 – 649 °C)	10.5×10^{-6} (18.9)
32 – 1600 °F (0 – 871 °C)	11.3×10^{-6} (20.3)
Modulus of Elasticity, ksi. (MPa)	28.6×10^3 (197×10^3)
Magnetic Permeability, (H/m at 200 Oersteds)	Annealed 1.02
Specific Heat, BTU/lbs./°F (kJ/kg/K)	
32 – 212 °F (0 – 100 °C)	0.12 (0.50)
Melting Range, °F (°C)	2550 – 2650 (1399 – 1454)

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Tables

TABLE 1 – TYPICAL MECHANICAL PROPERTIES

UTS, ksi. (MPa)	0.2% YS, ksi. (MPa)	Elongation % in 2 in. (50.8 mm)	Rockwell Hardness, B
110 (758)	52 (360)	55	87

TABLE 2 – IMPACT STRENGTH

Izod V-Notch Rockwell ft-lbs. (J)	120 (163)
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TABLE 3 – COLD-WORKED PROPERTIES*

Condition	UTS, ksi. (MPa) min.	0.2% YS, ksi. (MPa) min.	Elongation % in 2 in. (50.8 mm)		Rockwell Hardness, C
			<0.015 in.	≥0.015 in.	
1/4-hard	125 (862)	75 (517)	25	25	30
1/2-hard	150 (1034)	110 (758)	15	18	35
3/4-hard	175 (1207)	135 (931)	10	12	37
Full-hard	185 (1276)	140 (965)	8	9	41

*Standard practice is to produce to either minimum tensile strength, minimum yield strength or minimum hardness, but not to combinations of these properties.

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Properties

CORROSION RESISTANCE

Type 201 should perform adequately as a replacement for Type 301 in most mild environments. The scaling resistance of Type 201 is less than that of Type 301. Type 201 resists destructive scaling up to about 1500 °F (816 °C), about 50 °F (28 °C) less than Type 301.

FORMABILITY

Type 201 can be fabricated by bench forming, roll forming and brake bending in much the same manner as Type 301. However, because of its higher strength, it may exhibit greater springback. This material can be drawn similarly to Type 301 in most drawing operations if more power is used and the hold-down pressure is increased.

WELDABILITY

The austenitic class of stainless steels is generally considered to be weldable by the common fusion and resistance techniques. Special consideration is required to avoid weld “hot cracking” by assuring formation of ferrite in the weld deposit. As with other chrome-nickel austenitic stainless steel grades where carbon is not restricted to 0.03% or below, the weld-heat-affected zone may be sensitized and subject to intergranular corrosion in some environments. This particular alloy is generally considered to have poorer weldability than the most common alloy of this stainless class, Type 304L. When a weld filler is needed, AWS E/ER 308 is most often specified. Type 201 is well known in reference literature and more information can be obtained in this way.

HEAT TREATMENT

Type 201 is not hardenable by heat treatment.

Annealing: Anneal at 1850 – 1950 °F (1010 – 1066 °C), then water quench or rapidly air cool. The annealing temperature should be kept as low as possible, consistent with the desired properties, because Type 201 tends to scale more than Type 301.

About Cleveland-Cliffs Inc.

Cleveland-Cliffs is the largest flat-rolled steel producer in North America. Founded in 1847 as a mine operator, Cliffs also is the largest manufacturer of iron ore pellets in North America. The Company is vertically integrated from mined raw materials and direct reduced iron to primary steelmaking and downstream finishing, stamping, tooling, and tubing. The Company serves a diverse range of markets due to its comprehensive offering of flat-rolled steel products and is the largest steel supplier to the automotive industry in North America. Headquartered in Cleveland, Ohio, Cleveland-Cliffs employs approximately 25,000 people across its mining, steel and downstream manufacturing operations in the United States and Canada.



CLEVELAND-CLIFFS INC.

200 Public Square
Suite 3300
Cleveland, OH 44114-2315
844.STEEL99 | 844.783.3599
clevelandcliffs.com

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