

420

STAINLESS STEEL



Cutlery

Dental Instruments

Scissors

Straight Edges

Surgical Instruments

TYPE 420 is a martensitic stainless steel that provides corrosion resistance similar to Type 410, plus increased strength and hardness. It is magnetic in both the annealed and hardened conditions. Maximum corrosion resistance is attained only in the fully-hardened or fully-hardened and stress relieved condition. It is seldom used in the annealed condition.

Applications requiring good corrosion resistance and high hardness are ideal for this alloy. The alloy is not normally used at temperatures exceeding 800 °F (427 °C) due to rapid softening and loss of corrosion resistance.

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Product Description

METRIC PRACTICE

Type 420 sheet and strip are covered by the following specifications

- AMS 5506
- ASTM A176

Composition		(wt %)
Carbon	(C)	0.15 max.
Manganese	(Mn)	1.00 max.
Phosphorus	(P)	0.040 max.
Sulfur	(S)	0.030 max.
Silicon	(Si)	1.00 max.
Chromium	(Cr)	12.00 – 14.00

AVAILABLE FORMS

Type 420 is produced in coils and cut lengths in thicknesses from 0.015 – 0.25 in. (0.38 – 35 mm) and widths up to and including 26 in. (660 mm).

Values shown in this bulletin were established in U.S. customary units. The metric equivalents may be approximate.

PHYSICAL PROPERTIES

Density, lbs/in ³ . (g/cm ³)	0.28 (7.74)
Electrical Resistivity, $\mu\Omega \cdot \text{in.}$ ($\mu\Omega \cdot \text{cm}$) 70 °F (21 °C)	21.71 (55)
Thermal Conductivity, BTU/hr./ft.°F (W/m/K) 212 °F (100 °C)	14.4 (24.9)
Coefficient of Thermal Expansion, in./in./°F ($\mu\text{m}/\text{m} \cdot \text{K}$) 32 – 212 °F (0 – 100 °C) 32 – 1200 °F (0 – 649 °C)	5.7 x 10 ⁻⁶ (10.2) 6.8 x 10 ⁻⁶ (12.1)
Modulus of Elasticity, ksi. (MPa)	29.0 x 10 ³ (200 x 10 ³)
Specific Heat, BTU/lbs./°F (kJ/kg·K) 32 – 212 °F (0 – 100 °C)	0.11 (0.46)

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TABLE 1 – TYPICAL ANNEALED ROOM TEMPERATURE MECHANICAL PROPERTIES

UTS, ksi. (MPa)	0.2% YS, ksi. (MPa)	Elongation % in 2 in. (50.8 mm)	Rockwell Hardness, B
85 (586)	45 (310)	25	88

CORROSION RESISTANCE

Type 420 resists corrosion in both mild industrial and rural atmospheres, as well as fresh water, some dilute organic acids, crude oil, gasoline and other comparable corrosive media. Like Type 410, Type 420 should be used in the hardened or hardened-and-stress-relieved condition in order to maximize its corrosion resistance. In the as-annealed condition this grade will result in poor corrosion performance and is not recommended.

FORMABILITY

If annealed for maximum softness, Type 420 can be moderately drawn and formed.

WELDABILITY

The martensitic class of stainless steels has limited weldability due to its hardenability. Special consideration is required to avoid cold cracking by preheating to 550 °F (260 °C). Post-weld heat treatment should be considered to achieve required properties. This particular alloy is generally considered to have poorer weldability than the most common alloy of this stainless class, Type 410. A major difference is higher carbon content for this alloy, which requires both preheat and post-weld heat treatment. When a weld filler is needed, AWS E/ER 420, Cleveland-Cliffs 410 NiMo and Cleveland-Cliffs 309L are most often specified. Type 420 is well-known in reference literature, and more information can be obtained this way.

HEAT TREATMENT

Annealing: For maximum softness, heat uniformly to 1500 – 1650 °F (816 – 899 °C) and cool slowly in the furnace.

Process Annealing: Heat to 1350 – 1450 °F (732 – 788 °C), air cool.

Hardening: Preheat, then heat to 1800 – 1950 °F (982 – 1066 °C), soak at temperature and air cool or quench in warm oil.

Stress Relieving: Heat at 300 – 800 °F (149 – 427 °C) for 1 to 3 hours, cool in air or quench in oil or water.

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.