

AISI 431 / UNS S43100 / DIN 1.4057 Iron Chrome Martensitic Stainless Steel

GNEE has over 18 years of experience in manufacturing 431 stainless steel and is dedicated to providing reliable stainless steel solutions to customers worldwide. We adhere to the principles of superior quality, stability, reliability, and customer satisfaction. Please feel free to contact us at info@gneestainless.com; we are always ready to assist you.

What is AISI 431 material?

AISI 431 is a heat-treatable martensitic stainless steel known for its high strength, excellent toughness after heat treatment, and good corrosion resistance, especially in marine and petroleum environments, making it ideal for high-stress parts like aerospace fittings, marine shafts, high-strength fasteners, and valve components. It contains 15-17% Chromium and 1.25-2.50% Nickel, balancing hardness with corrosion resistance for demanding mechanical .

What is the ASTM 431 equivalent to?

431 stainless steel or 4057 or 1.4057 is a very common used martensitic stainless steel grade. This grade is written as 1.4057 or X17CrNi16-2 according to EN norm and it is written as UNS S43100 according to UNS norm. This grade is similar to 420, 630 and 1.4418 grades in some properties.

What are the differences between SS 431 and SS 304?

The main difference is that 304 excels in corrosion resistance and formability, while 431 offers higher strength and hardness through heat treatment. SS 304 is an austenitic, non-magnetic stainless steel with excellent corrosion resistance and ductility, making it ideal for general-purpose applications such as kitchenware. SS 431 is a martensitic stainless steel, which is magnetic, and is known for its high strength, hardness (especially after heat treatment), and toughness, making it ideal for mechanical parts such as shafts and pumps. Although its corrosion resistance is not as good as 304 under some conditions, it is superior to other martensitic stainless steel grades.

AISI 431 Chemical composition

Chemical Composition (Typical)

Element	Limits	
	min	max
Carbon	0.000	0.200
Manganese	0.000	1.000
Phosphorus	0.000	0.400
Sulphur	0.000	0.300
Silicon	0.000	1.000
Chromium	15.000	17.000
Nickel	1.250	2.500
Iron	Remainder	

AISI 431 Mechanical Properties

Mechanical Properties (Typical)

Parameter	Value
Yield 0.2 % (Mpa/Nmm ²), Min	635
Tensile (Mpa/Nmm ²), Min	850
Elongation (% in 50MM), Min	11
Reduction Area(%), Min	--
Hardness (BHN), Max	302*

* Hardened Condition "T"

Physical Properties

Parameter	Value
Density (Kg/m ³)	7750
Elastic Modulus (Gpa)	205
*Co-eff of Expansion ($\mu\text{m}/\text{m}/^\circ\text{C}$)	10.5
*Thermal Condc. (W/m.K)	25
Electric Resistivity (n Ω .m) 25°C	800

*Note : @500°C

Corrosion Data

AISI 431 has highest corrosion resistance in 400 series martensitic stainless steel though not as high as Austenitic steel. It offers highest corrosion resistance in Hardened & Tempered condition. Passivation is recommended for finished products to retain the corrosive resistance.

Equivalent Grade Designation

AISI 431
SUS 431
En57
UNS S43100
EN-DIN 1.4057
X20CrNi 16 2
AFNOR Z20CN17.2M
BS 431S29
GOST 14Ch17N2

Alloy 431 Data Sheet

Available Product Forms

Round, Square, Hexagon & Flat Bars
Seamless / Welded Pipes
Seamless / Welded Tubes
Hot & Cold Rolled Plates & Sheets
Forged Bars
Forged Flanges
Butt-Weld Pipe Fittings
Socket-Weld/Forged Pipe Fittings
Machined Components

Common Manufacturing Specifications

ASTM A176, ASTM A268, ASTM A276, ASTM A314, ASTM A473, ASTM A511, ASTM A815, QQ S763, QQ S766, ASME SA268, ASTM A580, FED QQ-S-763, FED QQ-S-766, MIL SPEC MIL-S-862, SAE J405 (51446), ASME SA176, ASME SA268, ASME SA276, ASME SA314, ASME SA473, ASME SA511, ASME SA815

Alternate to Alloy

AISI 304, AISI 316, XM-19, 17-4 PH, are good alternatives.

Applications & Industries

Pumps & Shafts
Aircraft Components
General Industrial parts
Fasteners - Bolts, Nuts etc
Valve & Chemical container components
Marine components