



STAINLESS GROUP

High performance Alloys - Medical - Aerospace - Microtechnics - Motorsport - Industry

1.4057

AISI 431

X17CRNI16.2

UNS S43100

GENERALITIES

Grade 1.4057 is a martensitic steel with good corrosion resistance in moderately aggressive environments and high mechanical properties after hardening with a hardness up to 46HRC. It is generally produced in air (EAF+AOD) but chemistry can be modified to improve machinability and cleanliness can be improved using ESR remelted process to increase corrosion resistance.

Stainless has several sources in stock as well as different formats or product states to best suit your processing needs. This product can also be made to measure or cut into slabs by our service centres.

APPLICATIONS

Due to its corrosion resistance and high hardness in the hardened condition, the grade is used in the manufacture of medical instruments, cutlery, chemistry, defense or food industry. The material is available in the annealed condition as well as in the QT (quenched and tempered) condition.

STANDARDS AND DESIGNATIONS

Numerical designations:

W. Nr 1.4057 – AISI 431- UNS S43100

Standards:

NF S 94-090 - ASTM F 899 – NF EN 10088-3 – ASTM A276

Brands:

UGI4057®, APX®,...

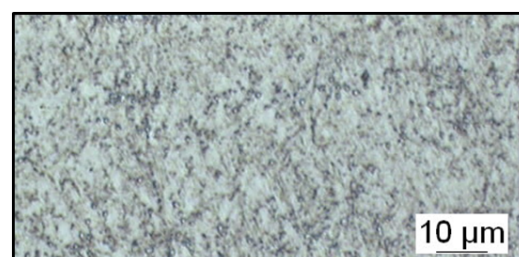
TYPICAL CHEMICAL ANALYSIS (mass %)

	Carbon	Manganese	Phosphorus	Sulfur	Silicium	Chrome	Nickel	Cobalt ⁽¹⁾	Iron
MIN	0.12	---	---	---	---	15.0	1.25	---	BALANCE
MAX	0.20	1.0	0.040	0.030	1.0	17.0	2.50	0.10	

(1) Cobalt content limited to 0,10% is available for medical applications.

METALLURGY

The melting processes combined with the transformation processes allow a homogeneous microstructure to be obtained. In the processed state, the microstructure consists of martensite and undissolved carbides (see photo below):



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PHYSICAL PROPERTIES AT 20°C

Density.....	7.7 g.cm ⁻³ .
Coefficient of thermal expansion (between 20 et 200°C).....	10,5 x 10 ⁻⁶ m/m.°C
Young's modulus.....	.210 x 10 ³ MPa
Thermal conductivity.....	25 W.m ⁻¹ .K ⁻¹

Ferromagnetic grade that can be magnetized

MECHANICAL PROPERTIES OF THE BARS

The grade can be offered in the annealed or QT (quenched and tempered) temper with the following properties:

Delivery temper	UTS (Mpa)	YS 0.2% (MPa)	E5d%	HBW
Annealing	---	---	---	< 330
QT 800	800-1000	>650	>7	---
QT 880	880-1080	>690	>12	---

PROCESSIES

Forgeability

The grade can be hot forged in the temperature range 950/1180°C.

Polishability

Polishable grade in the treated condition with a structure consisting of martensite and carbides. The laser marking can lead to a reduction in corrosion resistance, especially in the event of overheating.

Typical heat treatments

Hardening is carried out from 1000/1050°C followed by tempering from 180°C, avoiding the 400-600°C zone.

CORROSION RESISTANCE

The grade has good resistance to general corrosion in the treated condition (46HRC). Its resistance to corrosion in non-chloride environments is even better when the surfaces are polished, pickled and passivated. Corrosion resistance is strongly degraded in the annealed condition or after welding, which needs to be highly controlled. If the grade is optimized for machinability with a higher sulfur content, corrosion resistance will be reduced. 1.4057 corrosion resistance is higher than 1.4021 or 1.4028 corrosion resistance.

STANDARD SHAPE

- Round bars in annealed or QT condition depending on the diameter - Peeled or ground surface
- Customized flat bars, rolled or cutted from forged blocks (consult us)
- Other formats: please contact us

The information, data and photos presented in this document are given in good faith and for information purposes only. If you need more precise data, our technical department is at your disposal. t.turpin@stainless.eu