

STAINLESS STEEL PLATE, SHEET & COIL 430 Technical Data

Summary

430 is a low-carbon plain chromium ferritic stainless steel. The steel has good corrosion resistance in mildly corrosive environments and good resistance to oxidation at elevated temperatures. In the annealed condition the steel is ductile, does not harden excessively during cold work and can be formed using a large variety of roll forming or mild stretch-bending operations, as well as the more common drawing and bending processes.

The steel has limited weldability and should not be used in the as welded condition for dynamic or impact loaded structures. Being a ferritic material, 430 is liable to brittle fracture at sub-zero temperatures, and cannot be used in cryogenic applications. As the steel does not contain nickel or molybdenum, it is cheaper than any of the 300 series steels.

Typical Applications

430 is a simple corrosion and heat-resisting grade and finds application in areas where mildly corrosive conditions occur or where scaling resistance at moderate temperatures is required. Typical applications include: Automotive trim, architectural applications such as industrial roofing and wall cladding, kitchen utensils, sinks, washing machine parts and industrial pipe and tube. Materials handling equipment in the mining and sugar industry. Heat resisting applications up to 759°C.

Chemical Composition

Analysis %	C	Mn	P	S	Si	Cr
ASTM A 240	0.12 max	1.0 max	0.045 max	0.03 max	1.0 max	16.0-18.0
Typical	0.05	0.7	0.021	0.024	0.6	17

Typical properties in the annealed condition

The properties quoted in this publication are typical of mill product and unless indicated should not be regarded as guaranteed minimum values for design purposes. For these purposes refer to the relevant specification.

1. Mechanical properties at room temperature

	Typical	Minimum
Tensile Strength, MPa	530	450
Proof Strength, 0.2 % , MPa	360	205
Elongation (Percent in $L_0=5.65 S_0$) MPa	25	22
Hardness	160	-

2. Properties at elevated temperatures

Short time elevated temperature tensile strength

Temperature, °C	300	400	550	650	750
Strength, MPa	450	430	220	120	50

Creep data

Stress for a creep rate of 1% in 10 000 h

Temperature, °C	550	600	650	700	750
Stress, MPa	50	30	15	5	3

Recommended maximum service temperature

(Oxidising Conditions)

Continuous Service 750 °C

Intermittent Service 850 °C

Note: Service in the temperature range 425 -525 °C for over 100 hours will cause the steel to be brittle on cooling to room temperature.

3. Corrosion resistance

3.1 Aqueous

Temperature °C	20						80					
Concentration, % mass	1	5	10	20	80	100	1	5	10	20	80	100
Sulphuric Acid	2	2	2	2	2	1	2	2	2	2	2	2
Nitric Acid	0	0	0	0	1	2	0	0	0	1	1	2
Phosphoric Acid	0	0	2	2	1	0	0	0	2	2	1	1
Acetic Acid	0	0	1	1	1	0	0	2	2	2	2	0

Key: 0 = resistant - corrosion rate less than 100 m/year
 1 = partly resistant - corrosion rate less than 1000 m/year
 2 = non resistant - corrosion rate more than 1000 m/year

3.2 Atmospheric

The performance of 430 compared with other metals in various environments is shown in the following table. The corrosion rate is based on a 10 year exposure.

Environment	Corrosion Rate (um/year)		
	430	Aluminium-3S	Mild Steel
Rural	0.0025	0.028	4.3
Marine	0.0381	0.424	25.7
Marine-Industrial	0.0406	0.546	37.1

Welding

430 has adequate weldability for many applications. However it is prone to embrittlement in the weld/haz. The fatigue properties of 430 in the welded condition are poor and it is not recommended for applications where applied tensile or impact loading will be experienced.

Thermal Processing

1. Annealing

Annealed 430 is in the softest and most ductile condition, and may be used for cold-working operations. The annealing temperature range is 760°C followed by cooling in air.

2. Stress relieving

Stress relief after welding is not usually required, although 200-300°C is the recommended stress relieving temperature range.

3. Hot working

Initial forging and pressing temperature range: 1100 - 1150°C

Finishing temperature: below 750°C

Avoid extended holding times above 1000°C as excessive grain growth takes place, which severely reduces ductility

Note: Soaking times to ensure uniformity of temperature are longer for stainless steels than for carbon steels. Use up to 1/2 times the time employed for the same thickness of mild steel.

Cold Working

430 can readily be fabricated by cold working. Typical operations include bending, forming, deep drawing and upsetting