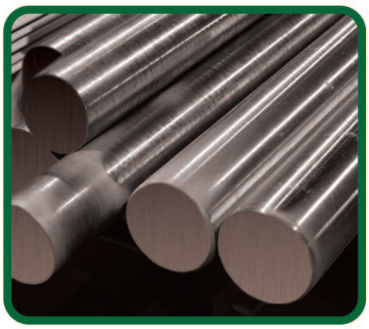
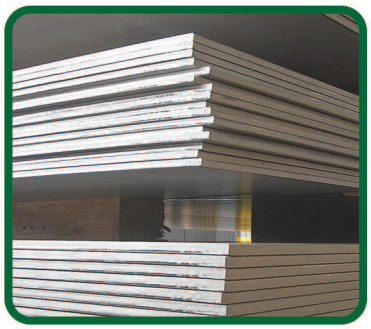
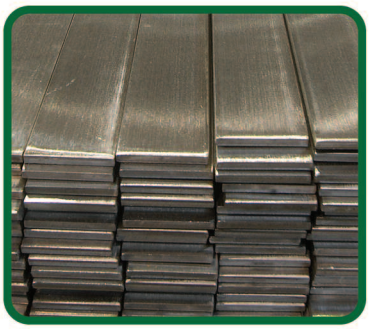
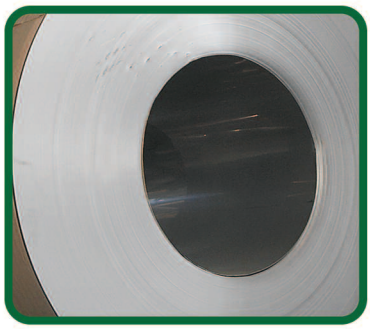
Duplex 2205 Specifications: UNS S32205/S31803

DUPLEX 2205 - UNS S32205/S31803

Penn Stainless inventory now includes Duplex 2205 (UNS S32205 / S31803), in sheet, sheet coil, plate, plate coil, round bar, processed flat bar and tubular products. Duplex 2205 is ideally suited for high-pressure and highly corrosive environments.

GENERAL PROPERTIES

Duplex 2205 is a two-phase, ferritic, austenitic 22% chromium, 3% molybdenum, 5 to 6% nickel alloyed stainless steel. It is the most widely used duplex stainless steel grade and is characterized by high yield strength, double that of the standard austenitic stainless steel grades. It also demonstrates good fatigue strength, as well as outstanding resistance to stress corrosion cracking, crevice, pitting, erosion, and general corrosion in severe environments.

APPLICATIONS

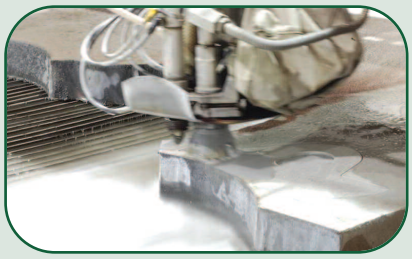
- Chemical processing, transport and storage – pressure vessels, tanks, piping, and heat exchangers
- Oil and gas exploration and processing equipment – piping, tubing, and heat exchangers
- Marine and other high chloride environments
- Effluent scrubbing systems
- Pulp and paper industry – digesters, bleaching equipment, and stock-handling systems
- Cargo tanks for ships and trucks
- Food processing equipment
- Biofuels plants

STANDARDS

ASTM/ASME .....A240 UNS S32205/S31803
EURONORM 1.4462 X2CrNiMoN 22.5.3
AFNOR.....Z3 CrNi 22.05 AZ
DIN .....W.Nr 1.4462

Penn Stainless can provide you with custom cut, sized and processed stainless product through any of our available processing methods:

- Shear Cutting
- Plasma Cutting
- HQ Plasma Cutting
- Dynamic Waterjet Cutting
- Saw Cutting
- Gauer Processing
- Machine Cutting
- Laser Cutting



Inventory:

- Sheet
- Sheet coil
- Plate
- Plate coil
- Round bar
- Processed flat bar
- Tubular products

CORROSION RESISTANCE

- Due to its high chromium, molybdenum, and nitrogen content, Duplex 2205 demonstrates superior corrosion resistant properties to 316 and 316L in most environments.
- Chromium, molybdenum, and nitrogen content also provide high resistance to pitting and crevice corrosion, even in oxidizing and acidic solutions.
- Resistant to chloride stress corrosion cracking and temperatures of up to about 302°F (150°C).
- The presence of ferrite provides for good performance of Duplex 2205 in caustic environments.

HEAT RESISTANCE

- Similar to other duplex stainless steels, Duplex 2205 has good oxidation resistance at high temperatures.
- Subject to embrittlement when exposed to temperatures above 572°F (300°C) even when exposed for short periods of time; Duplex 2205 is therefore not recommended for use above 572°F (300°C).

WELDING CHARACTERISTICS

- Possesses good weldability.
- Should not generally be welded without filler metal as this may result in excessive ferrite.

HEAT TREATMENT

- Annealing temperature range is 1868 to 2012°F (1020 to 1100°C).
- Cannot be hardened by heat treatment – but Duplex 2205 does work-harden.
- Special consideration is needed to compensate for a higher coefficient of thermal expansion to avoid warping and distortion.

PROCESSING / HOT FORMING

Most Duplex 2205 producers recommend a maximum hot forming temperature between 2010 and 2100°F (1100 to 1150°C). If the shape of the work piece is not compact, the edges may be significantly cooler than the bulk, and there is risk of cracking in the cooler regions.

PROCESSING / COLD FORMING

Duplex 2205 has shown good formability in a variety of fabrications. The high strength of Duplex 2205 can pose problems. Even when the equipment has sufficient power, allowance must be made for higher spring-back caused by the grade's high strength.

MACHINABILITY

Duplex 2205 is somewhat more difficult to machine than the 300 series austenitic stainless steels. Higher cutting forces are required and more rapid tool wear is typical. Some guidelines for machining are: A) Use powerful, rigid machines with extremely strong rigid mounting of tools and work piece, B) Minimize vibration by keeping the tool extension as short as possible, C) Use a nose radius on the tool, no longer than necessary, for carbides that have a sharp edge while still providing adequate strength, D) Design machining sequences to always provide for a depth of cut below the work-hardened layer resulting from the previous passes.

CHEMICAL PROPERTIES

	C	Mn	Si	P	S	Cr	Mo	Ni	N
2205 (S31803)	0.03 max	2.0 max	1.0 max	0.03 max	0.02 max	min: 21.0 max: 23.0	min: 2.5 max: 3.5	min: 4.5 max: 6.5	min: 0.08 max: 0.20
2205 (S32205)	0.03 max	2.0 max	1.0 max	0.03 max	0.02 max	min: 22.0 max: 23.0	min: 3.0 max: 3.5	min: 4.5 max: 6.5	min: 0.14 max: 0.20

MECHANICAL PROPERTIES

Grade	Tensile Strength ksi (min)	Yield Strength 0.2% ksi (min)	Elongation %	Hardness (HB) MAX
2205	90	65	25	217

PHYSICAL PROPERTIES

	Density lb_m/in^3	Electrical Resistivity mW•in	Thermal Conductivity (BTU/hr•ft•°F)	Heat Capacity BTU/lb_m•°F	Electrical Resistivity (in x 10^{-6})
at 68°F	0.278	27.6	**8.7**	**0.112**	33.5
at 212°F		**26.1**	9.2	0.119	35.4
at 392°F		25.4	9.8	0.127	37.4
at 572°F		24.9	**10.4**	**0.134**	39.4

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