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PRODUCT DATA SHEET
Grade 409
Stainless Steels

UNS S40900

Grade 409 is a corrosion resisting ferritic steel of intermediate chromium content. It resists corrosion strongly compared to carbon steel, and is used as an alternative to carbon steel in mildly challenging environments where its higher resistance to corrosion and high temperature oxidation give an advantage. Its use is limited to thin sections, up to about 2 mm, as it is difficult to achieve structurally sound welds in thicker sections. The grade is widely used in automotive exhaust systems.

Chemical Composition (ASTM A240)

	Chromium	Nickel	Carbon	Manganese	Silicon	Sulphur	Phosphorus	Titanium
Minimum	10.50 %	-	-	-	-	-	-	6 x C %
Maximum	11.75 %	0.50 %	0.08 %	1.00 %	1.00 %	0.030 %	0.045 %	0.75 %

Mechanical Properties (ASTM A240)

	0.2% Proof Stress MPa	Tensile Strength MPa	Elongation %	Hardness HRB	Hardness HV
Minimum	205	380	20		
Maximum				80	(153)
(Typical)	(240)	(415)	(25)	(70)	(140)

Equivalent Specifications

Country	Specification	Steel	Equivalence to ASTM A240
USA	ASTM A240	409	Exact
Australia	AS1449	409	Exact
Europe	EN10088	X2CrTi12	Low carbon version, mechanical properties differ
Japan	JIS G4305	No equivalent	

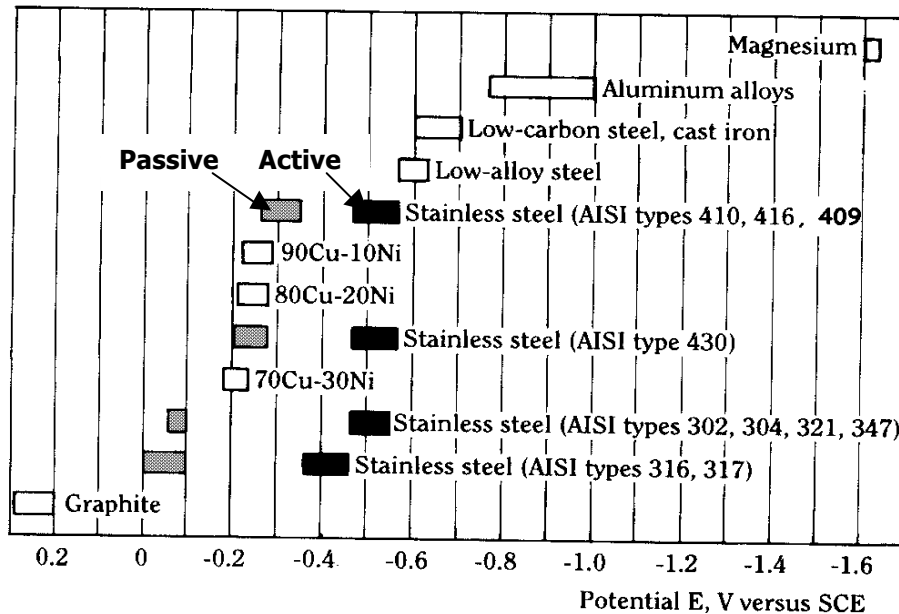
Typical Applications Automotive exhaust systems, furnace components, agricultural equipment, disc brake webs, heat exchanger tubing, brick trays. This utility stainless is one of the most widely used grades, due to the large volume used in automotive exhaust systems.

Description Grade 409 is a titanium stabilised ferritic stainless steel containing about 11% chromium, which is the minimum amount for the formation of the passive surface film which gives stainless steels their corrosion resistance. The grade is ferritic at all temperatures and hence cannot be strengthened by heat treatment. It suffers grain growth in the heat affected zone during welding at high heat input, which gives low strength and brittle fracture behaviour at room temperature. It has useful high temperature strength and oxidation resistance for use in mildly corrosive furnace atmospheres such as brick kilns. The grade is rarely used in structural applications. It has similar strength and ductility to the most common ferritic stainless steel, grade 430. Titanium stabilisation results in minimal susceptibility to sensitisation, intergranular corrosion, and 475°C embrittlement.

Available as: Sheet, coil and strip, HF and GTAW/GMAW welded tubes and pipes. Limited stocks are held as this alloy is generally used for projects and original equipment manufacture.

Finishes: 2B (cold rolled and skin passed).

Corrosion Resistance: Chromium has a powerful effect in reducing the corrosion rate of ferritic steels, forming a passive layer in mildly corrosive environments. Grade 409 resists thickness loss in many environments, such as automotive exhaust acids, marine atmospheres, brick kiln atmospheres, but may form a light surface rust film. It should not be used in decorative applications unless painted. The figure compares the corrosion potential of grade 409 with carbon steels and austenitic stainless steels in flowing seawater. Grade 409 is intermediate in resistance (409 is not recommended for use in seawater as stagnant conditions are likely to cause failure by pitting corrosion).



Heat Resistance: Grade 409 has good resistance to scaling in intermittent service up to about 700°C, and up to about 600°C in continuous service. Creep strength is better than plain carbon steels, but inferior to austenitic stainless steels (figure 3). Susceptibility to 475°C embrittlement is minimal, but sigma phase may form after long exposures at high temperature.

Physical Properties

Property	Range of Application	Value	Unit
Density		7,800	Kg/m ³
Modulus of Elasticity	Tension	200	GPa
Poisson's Ratio		0.30	
Coefficient of Thermal Expansion	0 – 100°C	11.7	x 10 ⁻⁶ /°C
	0 – 315°C	12.0	
	0 – 540°C	12.4	
Thermal Conductivity	100°C	24.9	W/m.°C
Specific Heat	0 – 100°C	460	J/kg.°K
Electrical Resistivity	20°C	570	n? .m

Pressure Vessels: AS1210-1997 Pressure Vessels does not specifically allow the use of grade 409, and this grade is not recommended for use in pressure applications due to the difficulty in achieving a sound structural weld.

Cryogenic Properties: Grade 409 becomes embrittled at temperatures below about 0°C, and is not recommended for use at cryogenic temperatures.