Super Duplex 2507

Super Duplex 2507 is a high-performance stainless steel designed for exceptional corrosion resistance and high mechanical strength. With approximately 25% Cr, 7% Ni, 4% Mo, and nitrogen, 2507 offers outstanding resistance to chloride pitting, crevice corrosion, and stress-corrosion cracking. It maintains high strength across a wide temperature range but should not be used at prolonged temperatures above 570–600°F.

Standards & Designations

- **UNS**: S32750
- **NACE**: ISO 15156 / MR0175 compliant
- **EN / W. Nr.**: 1.4410 / X2CrNiMoN25-7-4
- **ASTM/ASME**: A240 (plate), A276 (bars)

Corrosion Resistance: delivers outstanding corrosion resistance due to its high chromium, molybdenum, and nitrogen content, providing exceptional performance in both organic and inorganic acids, especially those containing chlorides. It offers superior resistance to pitting and crevice corrosion, supported by a PREN value around 42, significantly outperforming standard duplex and austenitic grades in aggressive chloride environments.

Heat Treatment:

- **Full anneal**: heat-treated exclusively through **solution annealing**, which restores phase balance, removes detrimental intermetallic, and ensures optimal corrosion resistance and toughness.
- **Process anneal**: Super Duplex stainless steels do not use a traditional process-anneal cycle like austenitic or ferritic grades. When cold deformation exceeds typical limits (around 10–20% depending on the reference), the material must be returned to the solution-annealed condition to restore ductility and microstructural balance.
- **Hardening**: cannot be hardened by heat treatment.

Welding:

- **Machining**: More challenging due to high strength; use rigid tooling, slower speeds, and carbide tools for best results.
- **Forming**: Requires higher forming forces; heavy cold work (>10–20%) requires solution annealing to restore ductility.
- **Welding**: Good weldability with controlled heat input; use **E2594/ER2594** fillers and keep interpass temps below **300°F (149°C)**.

The list of applications for this general-purpose grade is very extensive and includes:

- offshore platforms
- heat exchangers
- pulp & paper digesters
- chemical processing equipment
- high-strength mechanical parts
- marine and seawater handling components
- structural and industrial applications
- desalination

A.I.S.I. Analysis	Grade	C	Mn	Si	P	S	Cr	Ni	Mo	N
	2507	.030 max	1.20 max	.80 max	.035 max	.020 max	24.0 to 26.0	6.0 to 8.0	3.0 to 5.0	0.24 to 0.35

Typical Mechanical Properties - Annealed	Yield Strength .2% Offset psi	Ultimate Strength psi	Elongation % in 2"	Impact Charpy (ft. – lbs)	Elastic modulus (psi)
	80,000	116,000	15	74	29×10^6 psi

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Other Properties	Density (lb/in^3)	Melting Range	Electrical Resistivity at 68^{0}F (μΩ-cm)	Thermal Expansion 32^0 – 212^{0}F (In/In/^{0}F×10^{-6})
	0.282	2570–2660°F	0.80	7.2-7.8