

# SAF 2507 Super Duplex Stainless Steel UNS S32750

## specification

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## UNS S32750 Specification

**Common Name:** Super Duplex Stainless Steel

**Material Grade:** UNS S32750

**Equivalent Standards:**

- ASTM A182 F53 (for forged flanges/fittings)
- ASTM A479 (bars), ASTM A790 (pipes), ASTM A240 (plates)
- EN 1.4410, X2CrNiMoN25-7-4
- ASME SA182 / SA479 / SA790

SAF 2507 (UNS S32750) super duplex stainless steel is composed of 25% chromium, 4% nickel, and 7% molybdenum and nitrogen. It features high strength and strong corrosion resistance, primarily used in chemical processing, petrochemical, and subsea equipment. It exhibits strong resistance to oxidizing substances, high thermal conductivity, and low thermal expansion coefficient. The high chromium, molybdenum, and nitrogen content endows it with excellent pitting and crevice corrosion resistance; its PREN value (calculated as  $\text{PREN} = [\text{Cr}\%] + 3.3[\text{Mo}\%] + 16[\text{N}\%] \geq 40$ , with higher PREN indicating better corrosion resistance under the same conditions, e.g., PREN = 42 for SAF 2507) is 42. Comparable standards include UNS S32750, DIN/EN 1.4410, and ASTM A240.

Main components: 25Cr-7Ni-4Mo-0.27N.

### Chemical Composition (% by weight)

Element	Min (%)	Max (%)
C	—	0.030
Mn	—	1.20
Si	—	0.80
P	—	0.035
S	—	0.020

Element	Min (%)	Max (%)
Cr	24.0	26.0
Ni	6.0	8.0
Mo	3.0	5.0
N	0.24	0.35
Fe	Balance	

### Mechanical Properties (Minimum)

Property	Value
Tensile Strength	$\geq$ 795 MPa (115 ksi)
Yield Strength (0.2%)	$\geq$ 550 MPa (80 ksi)
Elongation	$\geq$ 15%
Impact Toughness	$\geq$ 74 J at -46° C (typical)
Hardness	$\leq$ 300 HB
Ferrite Content	35% - 55% (typical)

### Corrosion Resistance Performance

Uniform corrosion: The high chromium and molybdenum content enables SAF 2507 to have strong resistance to organic acids (e.g., acetic acid) and inorganic acids (especially those containing chlorides). Compared to 904L, SAF 2507 shows stronger resistance to pitting and crevice corrosion in diluted chloride environments.

#### Localized corrosion:

The low carbon content and appropriate nitrogen addition effectively reduce the risk of carbide precipitation during thermal processing, thus minimizing susceptibility to intergranular corrosion. 316L is unsuitable for chloride environments as it may suffer from localized or uniform corrosion.

#### Pitting and crevice corrosion:

The dual-phase structure of SAF 2507 ensures strong resistance to pitting and crevice corrosion. Its high alloy content and austenite-ferrite balance enable it to withstand chloride concentrations up to 40% in oilfield environments. Test results (e.g., in 1M HCl solution

at 60° C) confirm its exceptional resistance, verified by ASTM G61 chemical technology standards.

## **Mechanical and Physical Properties**

**Mechanical properties:** SAF 2507 features high tensile strength, impact resistance, low thermal expansion coefficient, and high thermal conductivity. Avoid prolonged exposure above 300° C, as it may reduce toughness.

Forming characteristics:

Forming should be conducted within 1024 - 1230° C. Immediate solution annealing and water quenching are required post-forming to prevent microstructural changes.

### **Cold forming:**

Standard stainless steel forming methods apply, but higher forming forces are needed due to its higher yield strength and lower ductility compared to austenitic stainless steels. For cold deformations  $\geq 10\%$ , solution annealing and quenching are recommended. Cold rolling, stretching, and bending are more challenging; when rebound occurs, adjust forming parameters accordingly.

### **Heat Treatment**

Solution annealing (1025 - 1100° C) is mandatory after hot forming or cold forming, followed by immediate water or air cooling to maintain microstructure stability.

### **Welding Performance**

SAF 2507 offers excellent weldability. Recommended welding methods include SMAW (Shielded Metal Arc Welding), GTAW (Gas Tungsten Arc Welding), PAW (Plasma Arc Welding), FCAW (Flux-Cored Arc Welding), and SAW (Submerged Arc Welding). Use ER2594 filler metal (matching 2507) or E2594 welding rods to achieve a balanced dual-phase structure.

Preheating is unnecessary unless specified for thick sections.

Interpass temperature must not exceed 150° C to avoid microstructural degradation.

For single-pass welding, no post-weld cleaning is required. Use GTAW as the preferred welding method. For multi-pass welding without filler metal, GTAW or PAW is recommended. If post-weld cleaning is needed, use 5 - 38 kJ/in energy with GTAW/GMAW to preserve corrosion resistance.

Applications

Energy & petrochemical: Offshore platforms, heat exchangers, subsea equipment, fire-fighting systems.  
Chemical processing: High-pressure RO units, seawater desalination, industrial cleaning systems, absorption towers.  
General industries: Mechanical components requiring high strength, high corrosion resistance, and high pressure resistance

Applicable Product Forms & Standards

Product Form	Specification
Forged flanges	ASTM A182 F53
Bars & forgings	ASTM A479 / ASTM A182
Seamless pipes	ASTM A790, A928
Plates/sheets	ASTM A240
Weld fittings	ASTM A815