UNSS31254/1.4547/ASTM A182 F44 Technical Datasheet

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Super Austenitic Stainless Steel Alloy

ASTM A182 F44 is a super austenitic stainless steel, also known as UNS S31254 or 254 SMO. This grade contains high levels of molybdenum (6%), nickel, and chromium, offering outstanding resistance to pitting, crevice corrosion, and chloride - induced stress corrosion cracking.

Material UNS S31254 (and the other specifications listed below) is described as a 6% Mo superaustenitic stainless steel.

- The steel combines moderate mechanical strength (typically over 300 MPa yield strength) and high ductility with excellent corrosion resistance in seawater and a variety of industrial environments.
- Typically, the alloy has a PREn (Pitting Resistance Equivalent) of 42 - 44, which ensures that the resistance to pitting corrosion is high. In addition, the steel provides good resistance to crevice corrosion.
- Ambient and subzero temperature notch ductility is very good.

These attributes mean that this high molybdenum stainless steel can be used successfully as an alternative to 300 series austenitic stainless steels (such as type 316) in applications where higher mechanical strength and/or enhanced resistance to pitting and crevice corrosion is required.
This alloy possesses a lower yield strength than that of duplex stainless steel (and much lower than that of super duplex stainless steel).

Equivalent grade of S31254

UNS	EN	ASTM	Other
S31254	1.4547 (X1CrNiMoN20-18-7)	F44	254 SMO

Chemical Composition (UNS S31254)

Chemical Composition (weight %) (EN 10088-3 1.4547)

	C	Mn	Si	S	P	Cr	Ni	Mo	N	Cu	PREn
min						19.50	17.50	6.00	0.18	0.50	40.00
max	0.020	1.00	0.70	0.010	0.030	20.50	18.50	7.00	0.25	1.00	

* PREn = Cr % + 3.3Mo% + 16N%

UNS S31254 A182 F44 Mechanical Properties

- **Tensile Strength (Ultimate - UTS)**: Typically 650 - 850 MPa (minimum often around 690 MPa in some references)
- **0.2% Proof Strength**: Usually ≥ 300 MPa (minimum around 310 MPa in some cases)
- **Elongation**: ≥ 35.00%
- **Reduction in Area**: ≥ 50.00%
- **Hardness**: Max 260 HB (Brinell hardness),

Physical Properties

Property	Value
Density	8.0 kg/dm³
Modulus of Elasticity at 20° C	195 GPa
Mean Coefficient of Thermal Expansion (20-100° C)	16.5 × 10^{-6} K^{-1}
Thermal Conductivity at 20° C	14 $W \cdot m^{-1} \cdot K^{-1}$
Specific Thermal Capacity at 20° C	500 $J \cdot kg^{-1} \cdot K^{-1}$
Electrical Resistivity at 20° C	0.85 $\Omega \cdot mm^2 \cdot m^{-1}$

Availability

Bar, forgings, sheet, plate, pipe, tube, closed die forgings, flanges and welding consumables.

Related Standard Designations

- **ASTM Standards**:
    - ASTM A182 F44 is commonly associated with UNS S31254, used for forged or rolled alloy - steel and stainless - steel pipe flanges, forged fittings, and valve components.
    - ASTM A240: Covers chromium and chromium - nickel stainless - steel plate, sheet, and strip for pressure vessels and other applications.
    - ASTM A269: For seamless and welded austenitic stainless - steel tubing for general service.
    - ASTM A312: Specifies seamless and welded austenitic stainless - steel pipe.
    - ASTM A469: Deals with seamless austenitic stainless - steel boiler, superheater, heat - exchanger, and condenser tubes.
- **EN Standard**: EN 10088 - 3 1.4547 (Grade X1CrNiMoN20 - 18 - 7)
- **Other Standards**: NORSOK MDS R11 to R15, R17 & R18;

- NACE MR01 - 75 (latest revision) / ISO 15156 which are relevant for materials in specific corrosive environments like those in the oil and gas industry.

Fabrication - Related Standards

- **Welding**: When welding UNS S31254, filler materials such as AWS A5.14 ERNiCrMo - 3 and alloy 625 are recommended, and electrodes should match AWS A5.11 ENiCrMo - 12.
- **Heat Treatment**: Annealing is typically performed at 1149 - 1204 °C (2100 - 2200 °F) followed by water quenching. It's noted that temperatures should not exceed this range to avoid scaling and reduced workability, and post - process annealing can help re - attain maximum corrosion resistance. Cold reduction is the main way to harden this steel as it doesn't respond well to traditional heat treatment for hardening.

Machinability / Welding

The machining and welding of this grade of super austenitic stainless steel presents no particular problems. Guidance notes are available upon request.