

ASTM A312 UNS S31254 (254 SMO) Stainless Steel Pipe Specification

UNS S31254, Grade 254 SMO is a very high end austenitic stainless steel and cost effective substitute for high nickel and titanium alloy. Alloy 254 SMO is substantially stronger than the common austenitic grades, with strength nearly twice that of 300 series stainless steel.

Standard Overview

- **Specification:** ASTM A312 / ASME SA312
- **Grade:** UNS S31254 (254 SMO)
- **Type:** Austenitic Stainless Steel
- **Form:** Seamless and Welded Pipes
- **Applications:** Marine, offshore, chemical processing, pulp & paper, heat exchangers, desalination

Dimensional Specifications

Parameter	Specification
Outside Diameter (OD)	1/8" to 24" (6.35 mm to 610 mm)
Wall Thickness	Sch 5s to Sch XXS, as per ASME B36.19 / B36.10
Length	Single Random, Double Random, Custom Cut
Pipe Ends	Plain End (PE), Beveled End (BE), Threaded

Chemical Composition (%) - UNS S31254 / 254 SMO

Element	Content (%)
Chromium (Cr)	19.5 - 20.5
Nickel (Ni)	17.5 - 18.5
Molybdenum (Mo)	6.0 - 6.5
Nitrogen (N)	0.18 - 0.22
Carbon (C)	≤ 0.020
Manganese (Mn)	≤ 1.00
Silicon (Si)	≤ 0.80
Phosphorus (P)	≤ 0.030

Element	Content (%)
Sulfur (S)	≤ 0.010
Iron (Fe)	Balance

Mechanical Properties (Room Temperature)

Property	Value
Tensile Strength	≥ 650 MPa
Yield Strength (0.2%)	≥ 300 MPa
Elongation	$\geq 35\%$
Hardness (Brinell)	≤ 223 HBW
Impact Toughness	Excellent
Density	8.0 g/cm ³
Melting Range	1320 - 1390° C

Heat Treatment Requirements

- **Solution Annealing** at 1150 - 1200° C followed by rapid cooling.
- **No post-weld heat treatment** required, but welding must be done using high-nickel filler metals for corrosion resistance.

Testing & Inspection

- **Tensile Test** as per ASTM A370
- **Hardness Test** (Brinell or Rockwell)
- **Hydrostatic or NDT Testing**
- **Flattening and Bending Test** (if applicable)
- **PMI (Positive Material Identification)**
- **Visual and Dimensional Inspection**

Marking Requirements

Each pipe must be marked with:

- ASTM A312 / UNS S31254 / Heat No.
- Size, Schedule, Manufacturer Name
- Country of Origin

Delivery Condition

- Pipes are delivered in **annealed and pickled** or **bright annealed** condition.
- Ends are **protected with plastic caps**, and pipes are bundled or boxed.

Application of UNS S31254 Seamless Pipes.

- Offshore Oil & Gas
- Seawater Cooling & Desalination Plants
- Chemical & Petrochemical Processing
- Food & Pharmaceutical Equipment
- Pulp and Paper Industry
- Heat Exchangers and Condensers

