

# X1NiCrMoCuN25-20-7 (6Mo / 254 SMO)

Mat. No. 1.4529 · Super-austenitic 6 % Molybdenum stainless steel

**Mat. No.:** 1.4529

**EN designation:** X1NiCrMoCuN25-20-7

**Trade name:** 254 SMO® (Outokumpu) · AL-6XN · Cronifer 1925 hMo

**ASTM/ASME equiv.:** Pipes: A/SA 312 N08926 / S31254 · Fittings: A/SA 403 WP926 · Flanges: A/SA 182 F926

**Key property:** Mo ~6.5 % + Cu + N – PREN > 40 – seawater-resistant – alternative to Duplex and Ni-base

**PREN value:** > 42 (highest class among austenitics)

**Temperature range:** –50 °C to +400 °C

**Standard:** EN 10216-5 · VdTÜV Merkblatt 488

**Delivery forms:** Elbows · Tees · Reducers · Caps · Flanges · Pipes

## 1 Material Equivalents & Comparable Grades

### International Equivalents

Standard / Region	Designation	Mat. No. / Grade	Note
EN	X1NiCrMoCuN25-20-7	1.4529	Current European designation
ASTM	A/SA 312 N08926	–	Pipes (N08926)
ASTM	A/SA 312 S31254	–	Pipes (254 SMO)
ASTM	A/SA 403 WP926	–	Fittings
ASTM	A/SA 182 F926	–	Flanges
UNS	N08926 / S31254	–	US material numbers
Trade name	254 SMO® (Outokumpu)	S31254	Most widely known trade name

### Alternative Materials

Material	Mat. No.	Relation to X1NiCrMoCuN25-20-7 (6Mo / 254 SMO)	When to use
904L (1.4539)	1.4539	Less Mo (4.5 %)	Less expensive if PREN ~33 is sufficient
Super Duplex 2507 (1.4410)	1.4410	Higher strength	When mechanical load dominant
Alloy 625 (2.4856)	2.4856	PREN > 70	When 6Mo insufficient

## 2 Chemical Composition

Values in mass percent (%). Standard: EN 10216-5.

6Mo type: Mo  $\geq$  6 %  $\rightarrow$  PREN > 40. N alloying increases yield strength and stabilises austenite. Cu improves resistance to reducing acids.

Element	Sym.	Min. (Heat)	Max. (Heat)	Max. (Prod.)	Function
Carbon	C	–	0.020	0.025	Very low C
Chromium	Cr	19.00	21.00	21.30	Passivation
Molybdenum	Mo	6.00	7.00	7.20	Pitting resistance – key difference vs. 904L
Nickel	Ni	24.00	26.00	26.50	Austenite stabiliser, SCC protection
Copper	Cu	0.50	1.50	1.70	Resistance to reducing acids
Nitrogen	N	0.150	0.250	0.270	Yield strength increase + austenite stabilisation

## 3 Mechanical Properties

### Room Temperature – Minimum Requirements

Solution annealed. Higher yield than 904L due to N alloying.

Property	Sym.	Unit	Min. Value	Note
Yield strength	Rp0.2	MPa	$\geq$ 300	N-alloyed, significantly higher than 316L
Tensile strength	Rm	MPa	650–850	–
Elongation	A	%	$\geq$ 35	–
Impact (–20 °C)	KV	J	$\geq$ 100	–
Hardness	HB	–	$\leq$ 230	–

### Elevated Temperature Yield Strength Rp0.2 in MPa (indicative values)

Temp.	100 °C	200 °C	300 °C	400 °C
Rp0.2 (MPa)	240	210	190	175

## 4 Physical Properties

Property	Sym.	20 °C	200 °C	400 °C	Unit
Density	$\rho$	8.00	7.89	7.77	g/cm <sup>3</sup>
Modulus of elasticity	E	195	182	167	GPa
Thermal conductivity	$\lambda$	12	15	18	W/(m·K)
Thermal expansion	$\alpha$	15.5	16.2	17.0	10 <sup>-6</sup> /K

## 5 Corrosion Behaviour

Medium / Environment	Notes	Rating
Seawater (flowing)	PREN > 42 – seawater-resistant even during stagnation	++
Hot concentrated chloride solutions	Significantly better than 316L and 904L	++
Sulphuric acid	Very good resistance	++
Phosphoric acid	Very good resistance	++
Stress corrosion cracking (SCC)	High Ni – outstanding protection	++
H <sub>2</sub> S service (NACE)	Suitable under NACE conditions	+
HCl (concentrated)	Borderline	o
Temperatures > 400 °C	Above operating limit	-

++ excellent

+ good

o limited

- not suitable

6Mo (1.4529) is the premium tier among austenitics. PREN > 40 exceeds Duplex 2205 (PREN ~35). Advantages over Duplex: no embrittlement at low temperatures, no sigma phase risk, better weldability.

## 6 Typical Applications

Industry / Plant	Typical Application	Operating Conditions
Seawater desalination	SWRO and evaporator piping	Continuous seawater contact
Offshore / subsea	Piping where Duplex reaches its limits	Aggressive Cl + H <sub>2</sub> S
Pulp & paper	High-Cl bleaching plants	PREN > 40 required
Chemical industry	Aggressive Cl + acids	Where 316L and 904L fail
Seawater cooling (coastal plants)	Coastal power plant piping	Alternative to CuNi at high Cl concentrations

## 7 Delivery Forms at Nirotec

Component	Standard (EN)	Standard (ASME/ASTM)	Note
Elbows	EN 10253-4	ASME B16.9 · A/SA 403 WP926	LR/SR, 90°/45°
Tees	EN 10253-4	ASME B16.9 · A/SA 403 WP926	Equal and reducing
Reducers	EN 10253-4	ASME B16.9 · A/SA 403 WP926	Concentric and eccentric
Caps	EN 10253-4	ASME B16.9 · A/SA 403 WP926	Ellipsoidal

<b>Flanges</b>	EN 1092-1	ASME B16.5 · A/SA 182 F926	On request
<b>Pipes</b>	EN 10216-5	A/SA 312 N08926	Seamless

## 8 Standards, Approvals & Codes

Standard / Code	Title / Application
EN 10216-5	Seamless stainless steel tubes
EN 10253-4	Butt-welding fittings
VdTÜV Merkblatt 488	6Mo technical delivery conditions
NACE MR0175 / ISO 15156	Sour service
PED 2014/68/EU	Pressure Equipment Directive
ASME B31.3	Process Piping

## 9 Fabrication Notes

### Weldability

Parameter	Requirement / Recommendation	Note
<b>Preheat</b>	Not required	Austenitic
<b>PWHT</b>	Solution annealing recommended for highly corrosive media	Optimises corrosion resistance of weld
<b>Filler</b>	ERNiCrMo-3 (Inconel 625-type)	Overalloyed filler – safest approach
<b>Process</b>	GTAW (preferred), GMAW	GTAW for best quality

- Delivery condition: Solution annealed
- 6Mo is heat-input-sensitive – control heat input strictly
- PMI at goods receipt – strongly recommended

## 10 Enquiry & Contact

For a project-specific quotation, please provide:

- Standard and execution (e.g. LR 90° elbow per EN 10253-4)
- Dimensions: DN / NPS and wall thickness or schedule
- Quantity and requested delivery date
- Documentation: EN 10204 Type 3.1 / 3.2, NDT, third-party inspection
- Any project-specific specifications or special requirements

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*All information is provided without warranty. Applicable standards and project specifications at time of order are authoritative.*