

1.3964,  
X2CrNiMnMoNNb21-16-5-3,  
S20910, XM-19

Discover the properties of [XM-19](#) ([1.3964](#), [X2CrNiMnMoNNb21-16-5-3](#), [S20910](#)) stainless steel, including chemical composition, mechanical performance, welding, and global equivalents.

## Applications

- Aerospace components
- Chemical processing equipment
- Marine fasteners & valves
- Nuclear reactor parts
- High-strength structural applications

## Equivalent or Similar Grades - Chemical Composition

Element (%)	<b>XM-19 (S20910)</b>	<b>X2CrNiMnMoNNb21-16-5-3 (EN)</b>	<b>1.3964 (DIN)</b>
<b>Carbon (C)</b>	≤0.06	≤0.06	≤0.06
<b>Chromium (Cr)</b>	20.5-23.5	20.5-23.5	20.5-23.5
<b>Nickel (Ni)</b>	11.5-13.5	11.5-13.5	11.5-13.5
<b>Manganese (Mn)</b>	4.0-6.0	4.0-6.0	4.0-6.0
<b>Molybdenum (Mo)</b>	1.5-3.0	1.5-3.0	1.5-3.0
<b>Nitrogen (N)</b>	0.20-0.40	0.20-0.40	0.20-0.40
<b>Niobium (Nb)</b>	0.10-0.30	0.10-0.30	0.10-0.30
<b>Silicon (Si)</b>	≤1.0	≤1.0	≤1.0
<b>Phosphorus (P)</b>	≤0.045	≤0.045	≤0.045
<b>Sulfur (S)</b>	≤0.030	≤0.030	≤0.030

## Mechanical Properties

Property	<b>XM-19 (S20910)</b>	<b>X2CrNiMnMoNNb21-16-5-3</b>	<b>1.3964</b>
<b>Tensile Strength (MPa)</b>	690-895	690-895	690-895
<b>Yield Strength (0.2% Offset, MPa)</b>	≥415	≥415	≥415
<b>Elongation (% in 50mm)</b>	≥30	≥30	≥30
<b>Hardness (Rockwell B)</b>	≤100 HRB	≤100 HRB	≤100 HRB

## High-Temperature & Creep Performance

- **Oxidation Resistance:** Good up to 925°C (1697°F).
- **Creep Strength:** Superior to standard 300-series stainless steels due to nitrogen strengthening.

## Physical Properties

Property	Value
Density (g/cm³)	7.9
Melting Range (°C)	1400-1450
Thermal Conductivity (W/m·K at 20°C)	15
Electrical Resistivity (Ω·m)	$0.85 \times 10^{-6}$
Magnetic Permeability	Non-magnetic (annealed)

## Heat Treatment

- **Solution Annealing:** 1050-1150°C (1922-2102°F), followed by rapid cooling (water or air).
- **Stress Relieving:** Not typically required but can be done at 400-600°C (752-1112°F).

## Processing Performance

### Fabrication & Welding

- **Machinability:** Similar to 304/316 but harder; use carbide tools.
- **Welding:** Excellent weldability via TIG, MIG, or SAW. No preheating required.