ASTM B161 UNS N02201 (Nickel 201) Seamless Pipe – Technical Specification

ASTM B161 is the standard specification for **Nickel (UNS N02200) and Nickel (UNS N02201)** seamless pipes used in **corrosion-resistant, high-temperature,** and **high-purity** applications. **Nickel 201 (UNS N02201)** is the **low-carbon version** of Nickel 200, designed to prevent embrittlement in high-temperature service.

1. Material Grade

Grade	UNS Number	Description
Nickel 201	N02201	Low carbon commercially pure nickel (≤0.02% C)

2. Size Range

Parameter	Range
Outside Diameter (OD)	6 mm – 250 mm (1/8" – 10")
Wall Thickness	SCH 5S – SCH XXS or custom
Lengths	Single (5–6m), Double (10–12m), or Custom cut lengths

3. Chemical Composition (%)

Element	Max (%)
Nickel (Ni)	≥ 99.0
Carbon (C)	≤ 0.02
Iron (Fe)	≤ 0.40
Manganese	≤ 0.35
Silicon	≤ 0.35
Copper	≤ 0.25
Sulfur	≤ 0.01

🧪 4. Mechanical Properties

Condition and Size	Tensile Strength, min, psi (MPa) - Low-Carbon Nickel (UNS N02201)	Yield Strength (0.2% offset), min, psi (MPa) - Low-Carbon Nickel (UNS N02201)	Elongation in 2 in. or 50 mm (or 4 D), min, % - Low-Carbon Nickel (UNS N02201)
Annealed: 5 in. (127 mm) and under outside diameter	50 000 (345)	12 000 (80)	35
Annealed: Over 5 in. (127 mm) in outside diameter	50 000 (345)	10 000 (70)	40
Stress-Relieved: All sizes	60 000 (415)	30 000 (205)	15

Mechanical Properties^(A) of Small - Diameter and Thin - Wall Tube (Converter Sizes)

Condition	Tensile Strength, psi (MPa)	Yield Strength (0.2% offset), min, psi (MPa)	Elongation in 2 in. or 50 mm, min, %
Nickel UNS N02200 - Annealed^B,C,D,E,F	75 000 (515) max	15 000 (105)	33
Nickel UNS N02200 - Half - hard^C	80 000 (550) min	40 000 (275)	12
Nickel UNS N02200 - Full hard^D	95 000 (655) min	75 000 (515)	4
Low - Carbon Nickel UNS N02201 - Annealed^B	70 000 (480) max	12 000 (85)	35
Low - Carbon Nickel UNS N02201 - Half - hard^C	75 000 (515) min	30 000 (205)	12
Low - Carbon Nickel UNS N02201 - Full hard^D	80 000 (550) min	65 000 (450)	4

Permissible Variations for Small - Diameter and Thin - Wall Tube (Converter Sizes)

Specified Outside Diameter, in. (mm)	Outside Diameter		Inside Diameter		Wall Thickness, %	
	Plus	Minus	Plus	Minus	Plus	Minus
Under 3/32 (2.4)	0.002 (0.05)	0	0	0.002 (0.05)	10	10
3/32 to 5/16 (2.4 to 4.8), excl	0.003 (0.08)	0	0	0.003 (0.08)	10	10
5/16 to ½ (4.8 to 12.7), excl	0.004 (0.10)	0	0	0.004 (0.10)	10	10
½ to 1¼ (12.7 to 31.8), incl	0.005 (0.13)	0	0	0.005 (0.13)		

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5. Temperature Suitability

- Nickel 201 is suitable for service up to **1230° F (665° C)**
- Preferred in environments where **carbon embrittlement** or **graphitization** of Nickel 200 can occur

6. Testing & Inspection Requirements

Test Type	Standard/Test Method
Visual & Dimensional	ASTM B161 Requirements
Hydrostatic Test	Mandatory unless otherwise stated
Non-Destructive Testing	Eddy Current / Ultrasonic (if specified)
Tensile & Flattening Test	As per ASTM B161
Chemical Analysis	ASTM E1473 / E354 / E62
Certification	EN 10204 3.1 / 3.2

7. Surface Finish & Packaging

- **Finish**: Bright annealed, pickled, or polished
- **End Options**: Plain end, beveled end, or threaded
- **Packing**: Plastic caps, bundles, wooden boxes or seaworthy export packaging

8. Marking Requirement

Each pipe shall be legibly marked with:

- Manufacturer’s name or trademark
- ASTM B161
- UNS N02201
- Size and Schedule
- Heat number or lot number

9. Common Applications

- Caustic soda production
- Food and beverage equipment
- Aerospace fuel and hydraulic lines
- Electrical and marine systems
- Chemical reactors and heat exchangers