

UNS N10675 (commonly known as Hastelloy B-3) is a high-performance nickel-molybdenum alloy renowned for its exceptional resistance to corrosion, thermal stability, and mechanical strength in extreme environments. Widely used in aerospace, chemical processing, and energy industries, this alloy combines versatility with durability. Below is a comprehensive guide to its composition, properties, and industry standards, optimized for search engines and technical clarity.

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## 1. Chemical Composition

UNS N10675 is primarily composed of nickel (65% minimum) and molybdenum (27–32%), with controlled additions of chromium, iron, cobalt, and other elements to enhance specific properties.

. Key components include:

- Nickel (Ni): Base element providing corrosion resistance and high-temperature stability.
- Molybdenum (Mo): Enhances resistance to reducing acids (e.g., hydrochloric acid) and pitting corrosion.
- Chromium (Cr): 1–3% for improved oxidation resistance.

- Iron (Fe): 1–3% to balance mechanical properties.
- Minor Elements (Co, W, Mn): Optimize thermal stability and ductility

This composition ensures superior performance in acidic and high-temperature environments compared to earlier alloys like Hastelloy B–2

### Hastelloy B3 Chemical Composition

**Nominal composition (weight - %) acc. VdTÜV sheet 517, ASTM B-333**

	Ni	Cr	Fe	C	Mn	Si	Cu	Mo	Co	Al	W
Min.	Bal.	1.0	1.0					27			
Max.		3.0	3.0	0.01	3.0	0.1	0.2	32	3.0	0.05	3

## 2. Key Properties

### A. Corrosion Resistance

- Reducing Acid Resistance: Excels in hydrochloric, sulfuric, acetic, and phosphoric acids at all concentrations and temperatures
- Oxidation Limitations: Avoid use in oxidizing media (e.g., nitric acid) or environments with ferric/cupric salts, which accelerate corrosion

### B. Thermal and Mechanical Performance

- High-Temperature Stability: Maintains ductility and strength up to 1,000°C, ideal for heat exchangers and reactors

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### C. Fabrication Properties

- Weldability: Compatible with TIG, MIG, and resistance welding
- Machinability: Requires specialized tools and lubricants for optimal surface finish

### . Hastelloy B3 Mechanical Requirements

Material and Condition	Maximum Section Thickness, in. (mm)	Tensile Strength, min, ksi (MPa)	Yield Strength, 0.2 % Offset, min, ksi (MPa)	Elongation in 2 in. or 50 mm or 4 <i>D</i> , min, %
Nickel-molybdenum alloy UNS N10675, solution annealed	...	110 (760)	51 (350)	40

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### 3. Industry Standards

UNS N10675 complies with stringent international standards, ensuring reliability across applications:

- ASTM Standards:
    - B333 (plate, sheet, strip)
    - B335 (bar)
    - B622 (seamless tubing)
  - ASME Certification: Approved for pressure vessel use (Section VIII, Division 1)
  - Military Standards: Meets Chinese military (GJB) specifications for aerospace and defense applications
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## 4. Applications

UNS N10675 is indispensable in industries requiring resistance to extreme conditions:

- Chemical Processing: Reactors, piping, and valves for acid handling
- Aerospace: Turbine blades, combustion chambers, and exhaust systems
- Energy: Nuclear reactors and high-pressure boilers

- - Marine Engineering: Offshore platforms and desalination plants
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## 5. Surface and Heat Treatment

- Surface Finishing: Acid washing, polishing, or 噴砂 to remove oxides and enhance corrosion resistance
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  - Heat Treatment:
    - Solution Annealing: 1,150–1,200°C followed by rapid cooling to optimize ductility
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    - Stress Relief: 900–1,100°C to minimize fabrication-induced stresses
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