

# HASTELLOY® B-3

UNS N10675 · Ni–Mo alloy

Enhanced thermal stability for severe reducing-acid service.

Alloy data sheet · technical reference

## 01 PRODUCT INTRODUCTION

B-3 is a Ni–Mo alloy developed for demanding industrial service. Its alloy balance is tuned to the dominant corrosion or temperature mechanism listed below. Low-carbon chemistry and controlled fabrication help preserve performance after welding; final suitability still depends on the complete process environment. The grade is commonly considered for hydrochloric acid · chemical reactors · heat exchangers. Confirm the media, temperature, velocity, contaminants, code requirements and certified heat-treatment condition before selection.

## 02 WHY ENGINEERS SPECIFY THIS GRADE

|                   |                                                                                           |
|-------------------|-------------------------------------------------------------------------------------------|
| Primary strength  | Reducing acids across elevated-temperature process equipment                              |
| Application focus | hydrochloric acid · chemical reactors · heat exchangers                                   |
| Family position   | Designed to improve thermal stability compared with earlier B-series grades.              |
| Decision rule     | Confirm media, temperature, velocity, contaminants and code requirements before purchase. |

## 03 COMMON INDUSTRY USE

hydrochloric acid · chemical reactors · heat exchangers

DISCLAIMER

Typical reference content; use the certified MTR and governing specification for final acceptance.

# Composition & Physical Data

Nominal chemistry and typical physical reference values.

## 04 CHEMICAL COMPOSITION

WEIGHT %

|            |                     |          |                     |
|------------|---------------------|----------|---------------------|
| Nickel     | Balance             | Chromium | 1–3%                |
| Molybdenum | 27–32%              | Tungsten | 1.5–3%              |
| Iron       | Balance of balance  | Cobalt   | Grade dependent     |
| Carbon     | Low carbon          | Silicon  | Controlled low Si   |
| Manganese  | Specification limit | Vanadium | Specification limit |
| Phosphorus | Specification limit | Sulfur   | Specification limit |

METALLURGICAL  
LOGIC

Designed to improve thermal stability compared with earlier B-series grades.

## 05 TYPICAL PHYSICAL PROPERTIES

APPROX. 20–25°C

|                   |                      |               |                    |
|-------------------|----------------------|---------------|--------------------|
| Density           | Grade dependent      | Melting range | Grade dependent    |
| Elastic modulus   | Approx. 200 GPa      | Poisson ratio | Approx. 0.30       |
| Thermal cond.     | Approx. 10 W/m·K     | Specific heat | Approx. 430 J/kg·K |
| Thermal expansion | Approx. 11–14 µm/m·K | Condition     | Solution annealed  |

## 06 MATERIAL IDENTITY

|                  |                                                       |
|------------------|-------------------------------------------------------|
| Common name      | Hastelloy® B-3 / Alloy B-3                            |
| UNS / EN         | UNS N10675 / Grade-specific EN designation            |
| Product family   | Ni–Mo alloy                                           |
| Supply condition | Normally solution annealed unless specified otherwise |

# Mechanical & Corrosion Performance

Screening-level guidance for material selection and process review.

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MECHANICAL PROPERTIES

SOLUTION ANNEALED

|                  |                                                                                |                |                         |
|------------------|--------------------------------------------------------------------------------|----------------|-------------------------|
| Tensile strength | Specification dependent                                                        | Yield strength | Specification dependent |
| Elongation       | Specification dependent                                                        | Hardness       | Product-form dependent  |
| Design caution   | Use code-approved allowable stresses; typical values are not design allowables |                |                         |

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CORROSION / TEMPERATURE PROFILE

|                  |                                                                                     |
|------------------|-------------------------------------------------------------------------------------|
| Primary service  | Reducing acids across elevated-temperature process equipment                        |
| Oxidizing media  | Review chromium level and oxidizing contaminants before selection                   |
| Reducing media   | Review molybdenum level, acid concentration and temperature                         |
| Localized attack | Assess pitting, crevice, SCC and weld-zone exposure separately                      |
| Temperature      | Check strength, oxidation, carburization and thermal cycling at service temperature |

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APPLICATION-SPECIFIC GUIDANCE

|                  |                                                         |                  |                      |
|------------------|---------------------------------------------------------|------------------|----------------------|
| Best fit         | hydrochloric acid · chemical reactors · heat exchangers | Selection mode   | Screening candidate  |
| Welded equipment | Review procedure                                        | Critical service | Lab / field data     |
| High temperature | Check atmosphere                                        | Mixed chemistry  | Case-specific review |

IMPORTANT

Published corrosion tables are screening tools. Critical service should be supported by testing or documented field experience.

# Fabrication, Welding & Heat Treatment

Practical guidance for maintaining alloy performance after fabrication.

## 10 FORMING & MACHINING

|              |                                                                                   |
|--------------|-----------------------------------------------------------------------------------|
| Cold forming | Use rigid setups and account for rapid work hardening where applicable            |
| Hot working  | Follow grade-specific temperature windows and avoid prolonged reheating           |
| Machining    | Use sharp tooling, stable feed and adequate coolant to avoid work-hardening glaze |

## 11 WELDING GUIDANCE

|              |                                                                             |
|--------------|-----------------------------------------------------------------------------|
| Processes    | GTAW / TIG, GMAW / MIG and SMAW may be applicable by grade and product form |
| Filler metal | Select matching filler metal for the specific grade and service             |
| Heat input   | Control interpass temperature and unnecessary reheating                     |
| Cleanliness  | Remove oil, grease, oxides and iron contamination before welding            |
| Inspection   | Confirm WPS / PQR, NDE and final surface condition                          |

## 12 HEAT TREATMENT & FINISHING

|                 |                                                                                |
|-----------------|--------------------------------------------------------------------------------|
| Solution anneal | Use grade- and product-specific temperature and cooling practice               |
| Post-weld use   | As-welded acceptance depends on grade, geometry, service and code requirements |
| Surface finish  | Remove heat tint and restore a clean passive surface                           |

QUALITY CONTROL

Confirm filler metal, weld qualification, NDE, cleaning and traceability requirements before production.

# Product Forms, Standards & Procurement

A practical checklist for quotation, specification and incoming inspection.

## 13 COMMON PRODUCT STANDARDS

|                 |                            |                |                    |
|-----------------|----------------------------|----------------|--------------------|
| Plate / sheet   | ASTM B-333 · B-626 · B-622 | Rod / bar      | Grade-specific     |
| Welded pipe     | Grade-specific             | Seamless tube  | Grade-specific     |
| Fittings        | Grade-specific             | ASME           | Matching SB series |
| UNS designation | N10675                     | Product family | Ni–Mo alloy        |

## 14 AVAILABLE PRODUCT FORMS

|               |                                                                                 |
|---------------|---------------------------------------------------------------------------------|
| Forms         | Plate · sheet · strip · bar · pipe · tube · fittings · forgings                 |
| Customization | Cut lengths, machined components and fabricated assemblies available by inquiry |

## 15 RFQ INFORMATION

|            |                                                                      |
|------------|----------------------------------------------------------------------|
| Material   | Alloy / UNS designation and governing ASTM or ASME specification     |
| Dimensions | Product form, OD / ID, wall or thickness, tolerances and quantity    |
| Condition  | Solution annealed condition, surface finish and straightness         |
| Testing    | Chemistry, tensile, hardness, PMI, NDE and customer-specific testing |
| Documents  | EN 10204 3.1 MTR, heat traceability and compliance certificates      |

## 16 TECHNICAL DISCLAIMER

The values in this data sheet are typical or specification-level references and may vary by product form, thickness, heat treatment and governing standard. They do not replace engineering design calculations, corrosion testing, applicable codes or the certified material test report.