HASTELLOY® X

UNS N06002 · Ni–Cr–Fe–Mo alloy

High-temperature alloy for furnace and heat-processing components.

Alloy data sheet · technical reference

01 PRODUCT INTRODUCTION

X is a Ni–Cr–Fe–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 furnace parts · reformers · gas turbines · heat shields. Confirm the media, temperature, velocity, contaminants, code requirements and certified heat-treatment condition before selection.

02 WHY ENGINEERS SPECIFY THIS GRADE

Primary strength	High-temperature oxidation, carburization and thermal cycling
Application focus	furnace parts · reformers · gas turbines · heat shields
Family position	A heat-resistant Hastelloy grade; corrosion selection must include temperature and atmosphere.
Decision rule	Confirm media, temperature, velocity, contaminants and code requirements before purchase.

03 COMMON INDUSTRY USE

furnace parts · reformers · gas turbines · heat shields

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	20.5–23%
Molybdenum	8–10%	Tungsten	0.2–1%
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

A heat-resistant Hastelloy grade; corrosion selection must include temperature and atmosphere.

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® X / Alloy X
UNS / EN	UNS N06002 / Grade-specific EN designation
Product family	Ni–Cr–Fe–Mo alloy
Supply condition	Normally solution annealed unless specified otherwise

Mechanical & Corrosion Performance

Screening-level guidance for material selection and process review.

07 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		

08 CORROSION / TEMPERATURE PROFILE

Primary service	High-temperature oxidation, carburization and thermal cycling
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

09 APPLICATION-SPECIFIC GUIDANCE

Best fit	furnace parts · reformers · gas turbines · heat shields	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-435 · B-572 · B-626	Rod / bar	Grade-specific
Welded pipe	Grade-specific	Seamless tube	Grade-specific
Fittings	Grade-specific	ASME	Matching SB series
UNS designation	N06002	Product family	Ni–Cr–Fe–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.