INCONEL® 602CA

UNS N06025 · W.Nr. 2.4633

Ni–Cr–Fe–Al–C alloy

Exceptional oxidation and carburization resistance for extreme furnace service to about 1200°C.

01 PRODUCT INTRODUCTION

INCONEL alloy 602CA is a high-carbon nickel-chromium-iron alloy strengthened by chromium carbides and engineered to form a protective chromia-alumina scale. High chromium supports oxidation resistance, aluminum improves scale stability, and controlled additions of titanium, zirconium and yttrium promote oxide adhesion during thermal cycling. The alloy is used in heat-treatment furnaces, chemical vapor deposition equipment, calcining systems, radiant tubes and petrochemical process hardware where carburization, oxidation and creep act together. The final engineering choice should also consider product form, heat-treatment condition, joining method, design temperature, loading mode and the governing ASTM, AMS or ASME requirement.

02 ENGINEERING POSITION

Core advantage	Oxidation, carburization, thermal cycling and creep in furnace atmospheres to about 1200°C
Applications	Heat-treatment furnaces · CVD equipment · calcining systems · radiant tubes · petrochemical furnace hardware
Material class	Ni–Cr–Fe–Al–C alloy

SELECTION NOTE **Confirm product form, heat treatment, design code, temperature and actual process chemistry before final specification.**

03 SOURCE BASIS

Primary source	Special Metals INCONEL® alloy 602CA technical bulletin
Identity	UNS N06025 · W.Nr. 2.4633

Composition & Physical Data

Official limiting composition and typical physical constants.

04 CHEMICAL COMPOSITION

WEIGHT %

Ni	Balance	Cr	24.0–26.0%
Fe	8.0–11.0%	Al	1.8–2.4%
C	0.15–0.25%	Ti	0.10–0.20%
Zr	0.01–0.10%	Y	0.05–0.12%

SOURCE CONTROL Composition values are taken from the official Special Metals technical bulletin; use the governing ASTM/AMS specification for purchase acceptance.

05 TYPICAL PHYSICAL PROPERTIES

ROOM TEMPERATURE

Density	Approx. 7.9 g/cm³	Melting range	Approx. 1330–1370°C
Specific heat	Approx. 450 J/kg·°C at room temperature	Magnetism	Low permeability
Condition	Annealed / treated	Data status	Typical, not acceptance

06 MATERIAL IDENTITY

Common name	INCONEL® alloy 602CA
UNS / W.Nr.	N06025 / 2.4633
Alloy family	Ni–Cr–Fe–Al–C alloy
Product data	ASTM B435 / B572-type nickel alloy product requirements · EN 10095 / customer specifications

ACCEPTANCE RULE Chemical and physical reference data do not replace the certified material test report or purchase specification.

Mechanical & Service Performance

Condition-dependent performance and service-selection guidance.

07 MECHANICAL PROPERTIES

Mechanical properties depend on product form, section size and heat treatment; use the governing specification and certified test report for acceptance.

08 SERVICE PERFORMANCE

Primary service	Oxidation, carburization, thermal cycling and creep in furnace atmospheres to about 1200°C
Corrosion basis	Nickel supports corrosion resistance; chromium supports oxidation; Mo/Nb/Al contributions depend on grade.
Temperature	Use grade-specific code allowables, creep data and heat-treatment condition.
Welded service	Review filler metal, heat input, post-weld condition and service environment.

09 TYPICAL APPLICATIONS

Industries	Heat-treatment furnaces · CVD equipment · calcining systems · radiant tubes · petrochemical furnace hardware
Critical review	Verify chloride SCC, oxidation, carburization, sulfidation, fatigue and creep as relevant.

IMPORTANT

Official bulletin values are representative. Critical service requires code compliance, certified material data and, where appropriate, corrosion or qualification testing.

Fabrication, Welding & Heat Treatment

Process controls needed to preserve the intended alloy condition.

10 FORMING & MACHINING

Cold forming	Use nickel-alloy tooling practice and account for work hardening.
Hot working	Use the grade-specific hot-working window from the applicable technical bulletin.
Machining	Rigid setup, sharp tooling, positive feed and adequate coolant are recommended.

11 WELDING GUIDANCE

Processes	GTAW, GMAW and SMAW may be used with qualified procedures.
Filler metal	Select the matching grade-specific filler and verify service compatibility.
Heat input	Control interpass temperature, dilution and unnecessary reheating.
Cleanliness	Remove oil, grease, oxides and iron contamination before welding.

12 HEAT TREATMENT

Normally supplied solution annealed. Avoid heat treatments that impair carbide distribution or protective-scale formation; verify the product-specific solution treatment.

QUALITY CONTROL — **Confirm WPS/PQR, heat-treatment records, NDE, surface cleaning and full heat-number traceability.**

Product Forms, Standards & Procurement

A practical specification and quotation checklist.

13 REFERENCE STANDARDS

ASTM B435 / B572-type nickel alloy product requirements · EN 10095 / customer specifications

14 COMMON PRODUCT FORMS

Forms	Plate · sheet · strip · bar · wire · pipe · tube · fittings · forgings
Condition	Annealed, solution treated or age hardened as required by grade and specification

15 RFQ INFORMATION

Material	INCONEL® 602CA · UNS N06025 · governing ASTM/AMS/ASME specification
Dimensions	Form, OD/ID, wall or thickness, tolerances, length and quantity
Testing	Chemistry, tensile, hardness, PMI, NDE and customer-specific tests
Documents	EN 10204 3.1 MTR, heat traceability and compliance certificates

16 TECHNICAL DISCLAIMER

Values shown are from the cited official technical bulletin or are clearly identified as condition-dependent guidance. They may vary by product form, thickness and heat treatment. The purchase specification, applicable design code and certified material test report control final acceptance.

Official source	Special Metals technical bulletin: INCONEL® alloy 602CA