

Stellite 21

UNS R30021

Co–Cr–Mo–Ni–C wear alloy

Tougher cobalt wear alloy for impact, cavitation, hot forging and valve service.

01 PRODUCT INTRODUCTION

Stellite 21 is a cobalt-chromium-molybdenum alloy with lower carbon than Stellite 6, giving a tougher matrix and a more moderate carbide fraction. It provides resistance to galling, cavitation, erosion and hot corrosion while tolerating impact and thermal shock better than harder cobalt grades. Typical applications include valve trim, hot-forging dies, extrusion tooling, turbine components and fluid-handling parts. Product form, casting or deposition route and final heat treatment must be identified because they influence hardness and wear behavior. Final selection should consider product form, manufacturing route, heat treatment, wear mechanism, temperature, stress and governing specification.

02 ENGINEERING POSITION

Core advantage	Impact, cavitation, erosion, galling and moderate hot wear
Applications	Valve trim · hot-forging dies · extrusion tooling · turbine parts · cavitation-resistant components
Material class	Co–Cr–Mo–Ni–C wear alloy

03 COMMON INDUSTRY USE

Industry focus	Valve trim · hot-forging dies · extrusion tooling · turbine parts · cavitation-resistant components
Design note	Separate cast, wrought, overlay and medical-grade product data.

Composition & Physical Data

04 CHEMICAL COMPOSITION

Co	Balance	Cr	26–29%
Mo	4.5–6%	Ni	2–3%
C	0.20–0.35%	Fe	≤ 3%
Si	≤ 2%	Mn	≤ 1.5%

05 PHYSICAL PROPERTIES

Density	Approx. 8.3 g/cm ³
Product route	Wrought / cast / deposited as identified
Data status	Typical reference; specification controls acceptance

06 MATERIAL IDENTITY

Common name	Stellite 21
UNS	R30021
Alloy family	Co–Cr–Mo–Ni–C wear alloy
Reference specs	UNS R30021 · cast, wrought or deposited product specification as applicable

Mechanical, Wear & Service Performance

07 MECHANICAL PROPERTIES

Strength basis	Product form, cold work, microstructure and heat treatment determine properties.
Acceptance	Use specification minimums for tensile, yield, elongation and hardness.

08 SERVICE PERFORMANCE

Primary service	Impact, cavitation, erosion, galling and moderate hot wear
Wear mode	Identify galling, abrasion, erosion, cavitation or fretting separately.
Corrosion	Review chlorides, sour media, hot gases and galvanic coupling.
Temperature	Use grade-specific hot hardness, creep and oxidation data.

09 APPLICATIONS

Typical use	Valve trim · hot-forging dies · extrusion tooling · turbine parts · cavitation-resistant components
Critical review	Confirm section size, surface finish, manufacturing route and inspection plan.

Fabrication, Joining & Heat Treatment

10 MACHINING & FORMING

Machining	Use rigid carbide-alloy practice; wear grades may require grinding.
Forming	Wrought grades require superalloy forming practice and work-hardening control.

11 JOINING GUIDANCE

Welding	Use qualified cobalt-alloy procedures and compatible filler metal.
Overlay	Control dilution, cracking, preheat and deposit thickness.
Cleanliness	Remove sulfur, grease, oxides and iron contamination.
Inspection	Use NDE and hardness checks appropriate to the product route.

12 HEAT TREATMENT

Processing route controls carbide distribution and hardness; specify casting, wrought product or overlay separately.

Quality control	Confirm procedure qualification, hardness, NDE and full traceability.
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Product Forms, Standards & Procurement

13 REFERENCE STANDARDS

Standards	UNS R30021 · cast, wrought or deposited product specification as applicable
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14 PRODUCT FORMS

Forms	Sheet · plate · bar · wire · castings · wear plate · overlay · custom parts
Route	Specify wrought, cast, HIP, deposited or medical-grade product

15 RFQ INFORMATION

Material	Stellite 21 · UNS R30021 · governing specification
Dimensions	Form, thickness, tolerances, length and quantity
Testing	Chemistry, tensile, hardness, NDE, microstructure and special tests
Documents	MTR, heat/lot traceability and compliance certificates

16 TECHNICAL DISCLAIMER

Values shown are nominal or typical references and may vary by product form, manufacturing route and heat treatment. They do not replace design calculations, wear testing, medical validation, applicable codes or the certified material test report.

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