# Cobalt Alloy Scrap Specification — Stellite-Type, Superalloy and Hardfacing Arisings

Material category: Cobalt and cobalt alloy scrap

Cobalt and cobalt alloy scrap: solids, castings, wear components, turnings and hardfaced items from cobalt-base wear and high-temperature alloy families, evaluated lot by lot after identification and any agreed analysis.

Cobalt-base scrap reaches the market as worn wear parts, valve and pump components, turbine hardware, prosthetic and dental alloy arisings, and hardfaced steel components where a cobalt overlay sits on a steel substrate. This specification describes the material technically and sets out why cobalt lots are evaluated by alloy family and dilution rather than by a single headline percentage.

## Material description

Cobalt is rarely used as a pure metal in engineering service. Almost all cobalt-bearing scrap is an alloy in which cobalt is the base or a major constituent, combined with chromium, tungsten, molybdenum, nickel and carbon in ratios chosen for wear resistance, hot strength or corrosion behaviour. The commercial consequence is that a cobalt lot is really a collection of alloy families, and the family determines both the recovery route and the value.

Typical industrial sources are valve trim and seats, pump and compressor wear parts, hot-section turbine components, saw tips and hardfacing overlays, chemical process hardware, and manufacturing arisings from companies that machine cobalt-base bar and castings.

## Typical material forms

- Solid cobalt-base castings, valve seats, trim, bushings and wear rings
- Bar ends, forged blanks and machining offcuts from cobalt-base production
- Turnings, chips and grinding solids where the alloy family is identified and the material is drained
- Worn wear components in used, eroded or cracked condition
- Hardfaced steel components where a cobalt-base overlay is present, packed as a separate fraction
- Prosthetic, dental and medical-device alloy arisings from manufacturers, in clean production condition

## Specification table (typical characteristics)

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| **Material category** | Cobalt and cobalt alloy scrap (secondary raw material) |
| **Accepted forms** | Castings, valve trim, wear components, bar ends, machining offcuts, turnings, hardfaced items as a separate fraction |
| **Typical alloy families** | Co-Cr-W wear alloys (Stellite-type), Co-Cr-Mo alloys, cobalt-base superalloys; cobalt-bearing nickel-base grades traded as nickel-base |
| **Composition** | Chemistry is grade-dependent. This page does not state a guaranteed composition: alloy family, element ranges and any deleterious-element limits must be confirmed for the specific lot by material identification, XRF or OES analysis, mill certificates where available, or an agreed inspection before shipment. |
| **Identification** | Hardness and non-magnetic behaviour, XRF or OES screening on a prepared surface, supporting documentation where available |
| **Hardfacing** | Hardfaced steel components are mostly steel by weight; packed, described and evaluated as a separate fraction on an agreed basis |
| **Common contamination** | Steel substrates and fittings, stainless and nickel parts, seals and gaskets, grinding and abrasive residue, coating and refractory residue |

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| **Exclusions** | Radioactive, medically contaminated or hazardous service returns; cemented carbide; sealed or pressurised assemblies |
| **Preparation** | Fractions separated and labelled; turnings drained; loose non-cobalt hardware removed where practical |
| **Typical packaging** | Steel drums or lidded bins, palletised and strapped, filled by weight and labelled by fraction |
| **Inspection** | Third-party inspection can be arranged at the loading location; scope and appointment agreed in the sales contract |
| **Documentation** | Commercial invoice, packing list and transport documents; mill certificates or analysis where they exist and have been agreed; waste-shipment and customs documentation as required by the specific trade lane |

## Common contamination and deduction factors

- Steel substrates and steel bodies attached to hardfaced components
- Stainless and nickel alloy parts mixed into a cobalt fraction
- Bolts, pins, gaskets, seals, springs and non-metallic fittings still assembled to components
- Cutting fluid, oil, grinding sludge and abrasive wheel debris in turnings and grinding fractions
- Refractory, ceramic coating and thermal-barrier residue on turbine hardware
- Radioactively contaminated, medically contaminated or otherwise hazardous service returns, which are excluded
- Cemented carbide pieces, which belong to the tungsten carbide streams and are separated out

## Inspection and analysis

Screening on cobalt-base material is used to assign a piece to a family — cobalt-chromium-tungsten, cobalt-chromium-molybdenum, nickel-base with cobalt — and to detect steel substrates hiding under an overlay. It is reliable for that purpose on a clean, prepared surface and unreliable for anything finer.

Contractual analysis is a different exercise. On hardfaced or clad material a surface reading is systematically misleading, because it reads the overlay rather than the piece. Where such material is contractually significant, the parties should agree a destructive or melt-based sampling method rather than relying on surface screening.

- Handheld XRF reads a small surface area of the piece it is pointed at; scale, paint, plating, coatings, oxide and machining residue all bias that reading.
- Handheld instruments read alloying elements well but are weak or blind on light elements — carbon in particular — so they cannot separate grades that differ mainly by carbon content.
- A reading on one piece is not a lot average. Mixed-grade lots require representative sampling across packages, layers and size fractions before a figure is treated as commercially meaningful.
- Screening results are used to sort and to open a price discussion. Contractual figures require the sampling protocol, laboratory method and acceptance criteria the parties have agreed in writing.

## Customs classification

Customs classification for cobalt-bearing secondary material depends on the actual composition and physical form of the goods, on whether the material is solid scrap, turnings, powder or residue, on the destination country and on how the competent authority in that jurisdiction interprets the material description.

Mixed-grade and mixed-family lots can create additional classification complexity, because the description of the goods on the invoice and packing list must reflect what is actually shipped rather than the best fraction in the load.

Nautica does not assign a definitive tariff code in advance for this stream. Buyers and importers should confirm the applicable classification, duty treatment and any import licensing or waste-shipment obligation with their own customs broker or the competent customs authority for the destination before contracting.

## Documentation

Commercial invoice, packing list, transport documents and any customs, waste-shipment or licensing documentation required for the specific trade lane. Documentary requirements are confirmed per shipment and per destination.

## Commercial and specification disclaimer

This document describes typical characteristics of a secondary raw material stream. Scrap of this type is heterogeneous by nature: composition, alloy or binder content, contamination and recoverable content vary between lots and within a single lot.

Nothing on this page constitutes a guaranteed specification, a warranty of composition, a declaration of purity or an offer capable of acceptance. Guaranteed specifications, tolerances, sampling protocol, analysis method, acceptance criteria, deduction mechanics and rejection rights exist only where they are written into the signed sales contract between buyer and seller for a specific lot.

Where a buyer requires assured values, those values must be defined contractually and verified by an agreed inspection or analysis procedure before shipment.

This document states typical material characteristics only. It is not a guaranteed specification, a warranty of composition, a certificate of analysis or an offer capable of acceptance.