

Titanium Scrap Specification — Commercially Pure Grades, 6Al-4V and Mixed Alloy Arisings

Material category: Titanium and titanium alloy scrap

Titanium and titanium alloy scrap: solids, plate and bar offcuts, forging arisings, turnings and fabrication rejects from commercially pure and alloyed titanium, traded lot by lot after identification and any agreed analysis.

Titanium scrap divides sharply between clean, identified aerospace and fabrication arisings and mixed, contaminated collections. This specification sets out the accepted forms, the alloy families, the identification limits that matter for interstitial elements, and the handling and packing discipline the material requires.

Material description

Titanium reaches the scrap market from aerospace and medical manufacturing, chemical process plant, marine and offshore hardware, and from the machining shops that work titanium bar, plate and forgings. Because titanium is expensive to produce from ore, the recycling chain is unusually attentive to cleanliness and identification: the intended destination of a clean, single-grade parcel is quite different from that of a mixed, contaminated one.

Two distinctions run through the whole stream. The first is commercially pure titanium against alloyed titanium. The second is solids against turnings — turnings carry cutting fluid, fines and a fire-safety profile that solids do not, and they are handled and packed as a separate material.

Typical material forms

- Plate, sheet and strip offcuts from fabrication, in identified grade lots where possible
- Bar ends, billet crops, forging flash and machined component rejects
- Pipe, tube, fittings and heat-exchanger elements from process and marine service
- Aerospace and medical manufacturing arisings in clean, documented condition
- Turnings, chips and borings, drained, packed separately and described as their own fraction
- Solids in used, anodised, coated or surface-oxidised condition, described accordingly

Specification table (typical characteristics)

Material category	Titanium and titanium alloy scrap (secondary raw material)
Accepted forms	Plate, sheet, bar ends, billet crops, forging arisings, pipe and tube, component rejects, turnings as a separate fraction
Typical alloy families	Commercially pure grades, alpha-beta alloys including the Ti-6Al-4V family, beta and near-beta alloys, corrosion-resistant Pd/Ru-bearing grades
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.
Interstitial elements	Oxygen, nitrogen, hydrogen and carbon are not measurable by handheld XRF; where they are commercially relevant they require agreed laboratory analysis
Identification	Non-magnetic, low density for strength, characteristic grinding spark; XRF on a clean surface for family placement
Critical contamination	Embedded steel or tungsten carbide tool fragments, mixed fines, free cutting fluid, heavy oxidation and burnt material

Turnings handling	Fire-risk material: closed metal containers, drained, kept dry, never packed with solids; transport classification confirmed per shipment
Exclusions	Radioactive or chemically contaminated returns, sealed or pressurised assemblies, unidentified mixed fines, burnt material
Typical packaging	Strapped bundles, boxes or bins for solids; closed steel drums for turnings; every package labelled by form, grade and net weight
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, stainless, nickel alloy and carbide tool fragments embedded in or mixed with the titanium
- Tungsten carbide inclusions from broken tooling, a recognised and serious concern in machining arisings
- Free cutting fluid, oil, coolant emulsion and water in turnings
- Grinding swarf, abrasive wheel debris and mixed fines of unknown origin
- Heavily oxidised, burnt or scaled material where the surface layer is a significant share of piece weight
- Paint, plating, anodised layers and bonded non-metallic attachments where they dominate the piece
- Radioactively or chemically contaminated service returns, sealed assemblies and pressurised components

Inspection and analysis

Screening establishes family: is this commercially pure titanium or an aluminium-vanadium alloy, and is there foreign metal in the parcel. It is done on a prepared surface, on a sample of pieces spread across the lot, and it is used to sort before packing.

It does not establish grade compliance. Interstitial content, which is what separates one commercially pure grade from another and governs acceptance in most melt applications, is a laboratory determination. Where a buyer's route depends on it, the analysis method and the sampling plan are agreed in the contract before shipment.

- 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.
- Detection of embedded carbide or steel fragments in turnings is a physical-separation and inspection problem, not something a surface reading resolves.

Customs classification

Customs classification for titanium-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.