

Pure Tungsten and Tungsten Heavy Alloy Scrap Specification

Material category: Pure tungsten metal and tungsten heavy alloy

Pure tungsten metal scrap and tungsten heavy alloy scrap: elemental tungsten articles and liquid-phase-sintered tungsten-nickel alloys, distinct in composition and recovery route from cemented WC-Co carbide.

Pure tungsten metal and tungsten heavy alloy are tungsten-bearing materials that are chemically and structurally different from cemented carbide. They are grouped on one specification because they are frequently confused with each other and with WC-Co, and because getting that distinction right is the first commercial requirement of the stream.

Material description

Three materials in this family are routinely conflated, and they are not equivalent. Pure tungsten is the elemental metal: tungsten atoms with no carbon compound structure and no metallic binder phase. Tungsten heavy alloy is a two-phase composite in which tungsten grains are held in a ductile metallic matrix, most commonly nickel with iron or nickel with copper, produced by liquid-phase sintering. Cemented carbide (WC-Co) is a compound of tungsten and carbon cemented by cobalt, and it is a different chemical material from either of the above.

The difference is not academic. Pure tungsten and heavy alloy contain tungsten in metallic form; cemented carbide contains tungsten chemically bound as a carbide. That governs which processors can accept the material and by which route it re-enters the supply chain. A lot of heavy alloy sent to a carbide processor as 'tungsten scrap' is a mis-described lot, and a mixed drum containing all three is worse than either.

Typical material forms

- Pure tungsten: rod, bar, wire, sheet, plate and foil offcuts
- Pure tungsten: welding and TIG electrodes, including thoriated and rare-earth-doped types
- Pure tungsten: furnace elements, boats, crucible parts, shielding and high-temperature fixtures
- Pure tungsten: sputtering targets, target backing assemblies and semiconductor process parts
- Heavy alloy: counterweights, balance masses, aircraft and motorsport ballast
- Heavy alloy: radiation shielding blocks, collimator parts and medical shielding components
- Heavy alloy: anti-vibration boring bar bodies, tool holders and kinetic mass components

Specification table (typical characteristics)

Material category	Pure tungsten metal scrap and tungsten heavy alloy scrap (distinct from cemented WC-Co carbide)
Material form	Rod, bar, wire, sheet, foil, electrodes, furnace parts, targets; heavy alloy counterweights, shielding and machined components
Primary recoverable material	Tungsten in metallic form — not chemically bound as carbide
Binder / alloy considerations	Pure tungsten is elemental with no binder phase; heavy alloy uses a ductile nickel-iron or nickel-copper matrix. Matrix system and tungsten content vary by designation and lot; analysis available or agreed where applicable.
Common attachments	Bonded copper or aluminium backing plates, steel fixings, sleeves, housings and mounting hardware
Common contamination considerations	Cross-contamination with cemented carbide, plating and coatings, paint and potting compound, molybdenum and other refractory metals

Moisture considerations	Generally dry material; machining oil and coolant may be present on freshly generated offcuts
Evaluation method	Material-family identification by form and mechanical behaviour, supported by XRF screening where agreed; contractual figures require agreed sampling and analysis
Typical packaging	Steel drums or strong crates, palletised and strapped, heavy pieces blocked and secured
Lot segregation	Pure tungsten, tungsten heavy alloy and any carbide packed as separate, individually labelled fractions
Inspection availability	Third-party inspection can be arranged at the loading location; scope agreed contractually
Documentation	Commercial invoice, packing list identifying each material family, transport documents, plus any provenance, end-use or regulated-item documentation required for the lane

Evaluation considerations

- Clear separation of pure tungsten from tungsten heavy alloy, and of both from cemented carbide
- Whether the heavy alloy matrix system is nickel-iron or nickel-copper, where determinable
- Presence of bonded backing plates, copper, aluminium or steel fixings on the articles
- Surface condition — plating, coating, paint, weld deposit and oxidation from high-temperature service
- Whether welding electrodes are plain, thoriated or rare-earth doped
- Consistency of form across the lot and whether it originates from one manufacturing operation
- Provenance where the components come from regulated sectors such as shielding or defence-adjacent applications

Common contamination and deduction factors

- Cemented carbide pieces mixed into a pure tungsten or heavy alloy lot, or the reverse
- Copper or aluminium backing plates bonded to sputtering targets
- Steel and stainless fixings, sleeves, housings, threaded inserts and mounting hardware
- Nickel or chrome plating and other applied surface coatings
- Paint, lacquer, adhesive and potting compound on counterweights and shielding assemblies
- Molybdenum and other refractory metal parts collected from the same equipment
- Machining oil, coolant and swarf on freshly generated offcuts

Inspection and analysis

Screening in this stream is used first to answer a categorical question — is this piece elemental tungsten, heavy alloy, or carbide — before it is used to say anything quantitative. That categorical answer is usually clear from the elemental fingerprint: heavy alloy shows nickel with iron or copper alongside tungsten, while pure tungsten shows tungsten with minimal alloying elements. Carbon is not measurable by XRF, so cemented carbide is inferred from the cobalt signature and mechanical behaviour rather than read directly.

Quantitative statements need more than a screening reading. Plating, coatings, oxidation from high-temperature service and bonded backing plates all distort surface results, and the tungsten fraction of an assembly is not the same as the composition of the tungsten part within it.

- XRF cannot detect carbon, so it cannot directly confirm or exclude a carbide structure.
- Plating, coatings and oxide layers bias surface readings and should be removed at the reading spot.
- Bonded assemblies must be assessed as assemblies; a reading on the tungsten face says nothing about the backing plate weight.
- Screening indicates material family; contractual composition requires the sampling and analysis method the parties have agreed in writing.

Packaging and lot segregation

- Separate, clearly labelled packages for pure tungsten and for tungsten heavy alloy
- No carbide in either fraction; any carbide found is packed and described separately
- Steel drums or strong crates, palletised and strapped, within safe handling weight
- Heavy single pieces blocked and secured against movement inside the package
- Foil, wire and thin sheet packed to avoid dispersal and injury during handling
- Electrode type stated on the package label where welding electrodes are included

Customs classification

Tungsten metal scrap and tungsten alloy scrap can be described and classified differently from cemented carbide scrap. The applicable classification depends on the actual composition, the physical form of the goods as shipped, whether the article is an assembly with non-tungsten components, the destination country and the interpretation of the competent customs authority there.

Some items in this family attract requirements beyond tariff classification — thoriated welding electrodes and components originating from shielding or defence-adjacent applications are the common examples — and these can differ sharply between jurisdictions.

Nautica does not assign a definitive tariff code in advance for this stream. Importers should confirm classification, duty treatment, licensing and any regulated-item requirement with their customs broker or the competent customs authority 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.

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