

Molybdenum Scrap Specification — Pure Molybdenum, TZM and Moly-Bearing Arisings

Material category: Molybdenum and molybdenum alloy scrap

Molybdenum scrap: unalloyed molybdenum and molybdenum alloys such as TZM in sheet, plate, rod, boat, shield, electrode and machining form, traded lot by lot after identification and any agreed analysis.

Molybdenum arisings come from furnace hot zones, semiconductor and glass-melting equipment, electrode and target manufacture, and machining of mill products. This specification sets out how the material is described technically, how it is separated from the materials it is most often confused with, and what has to be agreed contractually rather than assumed.

Material description

Molybdenum is a refractory metal used where service temperatures, thermal conductivity or dimensional stability rule out steel and nickel alloys. In scrap form it arrives from three broad places: high-temperature furnace internals that have reached end of service, production scrap from the manufacture of mill products and components, and equipment removed during plant upgrades in the glass, solar, semiconductor and heat-treatment industries.

The stream is not chemically uniform. Unalloyed molybdenum, lanthanated and yttriated grades, TZM (titanium-zirconium-molybdenum) and molybdenum-copper or molybdenum-lanthanum composites all circulate under the loose commercial heading of 'moly scrap'. They behave differently in downstream processing, so identification matters more here than in commodity streams.

Typical material forms

- Sheet, plate, foil and strip offcuts from fabrication
- Rod, bar, tube and machined component rejects
- Furnace hot-zone parts: shields, heating elements, boats, racks and support structures
- Sputtering target backing plates and spent target remnants where the moly body is recoverable
- Electrodes, feedthroughs and glass-melting components
- Turnings, chips and solid machining offcuts, kept separate from solids
- Wire, mesh and thermocouple sheathing in clean, identified condition

Specification table (typical characteristics)

Material category	Molybdenum and molybdenum alloy scrap (secondary raw material)
Accepted forms	Sheet, plate, foil, rod, bar, tube, hot-zone parts, boats, shields, electrodes, machined rejects, turnings
Typical alloy families	Unalloyed molybdenum, TZM, lanthanated and yttriated grades; Mo-Cu and Mo-W composites evaluated separately
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	Density comparison against tungsten and stainless, magnetic behaviour, appearance on a ground clean spot, XRF or OES screening on prepared surfaces
Common contamination	Steel and stainless fixings, ceramic and refractory insulation, copper braid, plating, heavy oxide, oil and grinding residue

Exclusions	Radioactive or process-contaminated equipment, catalyst and chemical residues, moly-bearing ferroalloy, sealed pressurised assemblies
Preparation	Insulation and fasteners removed where practical; turnings drained and packed separately from solids
Typical packaging	Steel drums, boxes or banded pallets filled by weight, labelled by fraction and net weight
Inspection	Third-party inspection can be arranged at the loading location; scope and appointment agreed in the sales contract
Evaluation basis	Recoverable molybdenum content expected by the processing route, less non-moly attachments, contamination and handling burden
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

- Stainless steel, nickel alloy and mild steel fixings, frames, brackets and fasteners
- Ceramic insulators, refractory fibre, graphite felt and furnace insulation attached to hot-zone parts
- Copper braid, brazed joints, plating and cladding on feedthroughs and composite items
- Heavy oxidation and scale where it makes up a significant share of piece weight
- Cutting fluid, oil, grinding sludge and free moisture in turnings drums
- Radioactively contaminated or otherwise process-contaminated equipment, which is excluded from this stream
- Tungsten pieces mixed into a moly lot — these belong in the tungsten stream and are separated before evaluation

Inspection and analysis

Two distinct activities are both loosely called 'analysis' and should not be confused. Screening separates molybdenum from tungsten, stainless and nickel alloys and flags anomalies before packing; it is an operational tool. Contractual analysis establishes an agreed figure and requires a written sampling protocol, a named method and an accepted laboratory.

For molybdenum, prepare the surface before any reading: oxide, paint and machining residue distort results. Elements normally of interest are molybdenum, tungsten, titanium, zirconium, nickel, chromium, iron and copper — iron and chromium indicating steel carry-over, titanium and zirconium pointing to TZM, and copper indicating composite or clad material.

- 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 molybdenum-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.

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