

TUNGSTEN HEAVY ALLOYS

(WHA) – ASTM B 777 CLASS 1-4



Refractory Metals and Alloys

Description

These alloys contain elements such as nickel, copper and iron. With engineering properties similar to steel, they are easy to machine and can be plated or painted to enhance their corrosion protection. The materials are around 50% denser than lead enabling a higher concentration of mass in a limited area.

AKA: Mallory 1000, Densalloy, Fansteel 77, Densimet

Applications

Industrial applications: aircraft control surfaces, helicopter rotor systems, ship ballasts, crankshaft balancing, turbine balancing, racing chassis weights, gyroscope rotors, inertial energy storage systems. **Radiation shielding components:** nuclear testing equipment, X-ray apparatus, nuclear energy and its applications, storage of energetic radiation emitters, collimators, shielding blocks, oil well logging instrumentation.

Industrial tooling: boring bars, toolholders with long overhangs, shanks for grooving tools and carbide inserts, grinding spindles and turning spindles, turning and milling draw-in arbors, disk-blade holders for gear-shaping machines, extension shanks, reamer holders.

PHYSICAL PROPERTIES	Class 1 Magnetic	Class 1 Non Magnetic	Class 2	Class 3 Magnetic	Class 3 Non Magnetic	Class 4
Density (g/cm ³)	17	17	17.5	18	18	18.5
Electrical conductivity (%IACS)	11	14	12	15	16	16
Thermal conductivity (cgs)	0.20	0.23	0.24	0.27	0.32	0.26
Coefficient of thermal expansion (20°C-500°C) (x 10 ⁶ /K)	5.1	5.4	4.9	4.8	5.0	4.8

MECHANICAL PROPERTIES	Class 1 Magnetic	Class 1 Non Magnetic	Class 2	Class 3 Magnetic	Class 3 Non Magnetic	Class 4
Tensile strength (Mpa)	860	760	860	860	760	830
Yield strength (Mpa)	590	550	620	620	590	660
Modulus of elasticity (Kn/mm ²)	310	280	320	330	310	345
Elongation (%)	12	4	10	8	2	6
Hardness (Rc)	23	22	24	25	24	26
Magnetic properties	Slight	Non	Slight	Slight	Non	Slight
Magnetic permeability (μ)	>1.05	<1.05	>1.05	>1.05	<1.05	>1.05

CHEMISTRY (%)	Class 1 Magnetic	Class 1 Non Magnetic	Class 2	Class 3 Magnetic	Class 3 Non Magnetic	Class 4
Ni	7	6	5.25	3.5	3.5	2.1
Co	-	-	-	-	-	-
Fe	3	-	2.25	1.5	-	9
Cu	-	4	-	-	1.5	-
W	90	90	92.5	95	95	97

FORMS AVAILABLE:



Sheet



Bar

All information is presented in good faith and based on published details. Nicofe Ltd is not responsible for the accuracy of this information or the suitability of the material for a particular application.

SPECIFICATIONS

ASTM B777

AMS 7725

MIL-T-21014

CHEMISTRY

Magnetic



Non Magnetic



28 Nickel Ni 58.6934	27 Cobalt Co 58.933	26 Iron Fe 55.847
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More than just metal

We're one of Europe's leading suppliers of premium quality refractory metals and alloys, soft magnetic alloys, and controlled expansion alloys. We hold a large stock of UK-certified, materials, all with full chain custody. With a deep technical understanding, comprehensive workshop facilities, and top accreditations, we help our customers get more from their materials.

Knowledge and advice

Our team understands exactly how our products are made, how they will behave in different situations, and how they should perform. Their knowledge and expertise helps save time, effort and cost by ensuring that all materials are sourced, processed and tested to perform in the most effective way.

We partner with leading academic institutions and scientific organisations that add value to our service and help develop solutions to the challenges impacting our customers. We're keen to share these unique insights in order to deliver practical operational improvements.

Workshop and machining

Our purpose-built facilities are centred around a fully equipped workshop designed to address almost any customer request:

- CNC Proturn RLX 1630 lathe for high precision rod and bar processing
- Saws to cut bars, plate and billets from Ø 2mm to Ø 270mm
- Guillotines for sheet and coil
- Grinding machinery
- De-coiler to check for imperfections before shipping
- Coil handling equipment to inspect product before dispatch
- Water jet and laser cutting
- Heat treatments

Quality control

All orders are fully tested before shipping. Our state-of-the-art metrology lab features:

- Micrometers, verniers and gauges for all applications
- Surface roughness tester
- Straightness and roundness testing apparatus
- Magnetometers for measuring inductance, coercive and saturation
- Capabilities for evaluating properties such as CTE, tensile and elongation.

Best practice

We are committed to continuous improvement, reflected in our achievement of internationally-recognised industry accreditations. These are the foundation of best practice and provide you with solid assurances of competence and integrity:

- **AS9120** certified – a top aerospace industry award.
- **Green Mark level 1** accreditation – an environmental certification that supports greater sustainability.
- **JOSCAR** (the Joint Supply Chain Accreditation Register) accredited – an award that helps to streamline procurement processes.
- **Cyber Essentials** certified – a government-backed programme that provides security assurance of a supplier's digital infrastructure.



Discover how we can **optimise** operational performance

Contact chris@nicofe.com



Nicofe Materials

Unit 8D, Torr View, Torr Quarry Industrial Estate, East Allington, Totnes TQ9 7QQ

01548 858770 | sales@nicofe.com | www.nicofe.com