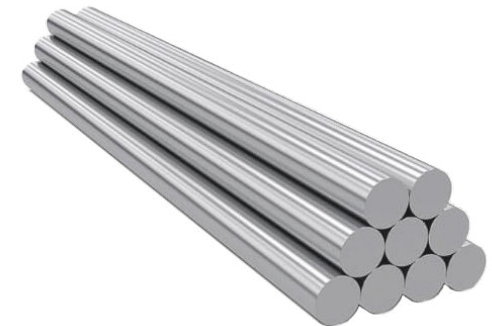


TUNGSTEN HEAVY ALLOY PRODUCTS

Elmet Technologies presses and sinters high quality tungsten heavy alloy (WHA) blocks, rods, and shaped parts. All material is made in the USA at Elmet's fully integrated facilities in Lewiston, Maine and Euclid, Ohio. Elmet has a large and growing inventory of standard molds and sizes that can be sold "rough as sintered" or machined to provide tighter tolerances. Sintered WHA blanks can be further rolled or swaged by Elmet to produce plates, sheets, and rods. Elmet also precision machines WHA parts for use as ballast weights, radiation shields, boring bars, ordnance components, and other components that require high density and good ductility.



ELMET TECHNOLOGIES TYPICAL PROPERTIES OF TUNGSTEN HEAVY ALLOYS:

PROPERTY	UNITS	K1700 ET90		K1701 ET90NM		K1750 ET92.5		ET92.5NM	ET93	K1800 ET95		K1801 ET95NM		K1850 ET97	
Tungsten content	(%)	90		90		92.5		92.5	93	95		95		97	
Density	(g/cm ³)	17.0		17.0		17.5		17.5	17.7	18.0		18.0		18.5	
	(lb/in ³)	0.61		0.61		0.63		0.63	0.64	0.65		0.65		0.67	
Hardness	(HRC)	≤ 32		≤ 32		≤ 33		≤ 33	≤ 33	≤ 34		≤ 34		≤ 35	
Ultimate Tensile Strength	(ksi)	≥ 110		≥ 94		≥ 110		≥ 94	≥ 110	≥ 105		≥ 94		≥ 100	
	(N/mm ²)= Mpa	≥ 758		≥ 648		≥ 758		≥ 648	≥ 758	≥ 724		≥ 648		≥ 689	
Yield Strength	(ksi)	≥ 75		≥ 75		≥ 75		≥ 75	≥ 75	≥ 75		≥ 75		≥ 75	
	(N/mm ²)= Mpa	≥ 517		≥ 517		≥ 517		≥ 517	≥ 517	≥ 517		≥ 517		≥ 517	
Elongation	(%)	≥ 5		≥ 2		≥ 5		≥ 2	≥ 5	≥ 3		≥ 1		Other	
Modulus of Elasticity	(psi × 10 ⁶)	45		40		46		47	47	48		45		50	
	(kN/mm ²)	310		280		320		327	327	330		310		345	
Magnetic Properties		slight		none		slight		none	slight	slight		none		slight	
Magnetic Permeability	(μ)	>1.05		≤ 1.05		>1.05		≤ 1.05	> 1.05	>1.05		≤ 1.05		>1.05	
Thermal Expansion Coefficient	(×10 ⁻⁶ /K) (20 °C–500 °C)	5.1		5.4		4.9		4.9	4.9	4.8		5		4.8	
Thermal Conductivity	(cgs)	0.2		0.23		0.24		0.24	0.24	0.27		0.32		0.26	
Electrical Conductivity	(% IACS)	11		14		12		12	12	15		16		16	
ASTM-T-21014, MIL-T-21014, AMS-T-21014	class	1		1		2		2	-	3		3		4	
ASTM B777	class	1		1		2		2	-	3		3		4	
AMS 7725	class	Class 1 Type 2		Class 1 Type 1		Class 2 Type 2		Class 2 Type 1	-	Class 3 Type 2		Class 3 Type 1		Class 4 Type 2	
Nominal Chemical Composition	Ni content, wt.%	5.1	7.0	6.7	8.9	3.89	5.3	6.7	5.6	2.6	3.5	3.4	4.4	1.25	2.1
	Fe content, wt.%	2.59	3.0	0.2	1.1	1.98	2.2	0.8	1.4	1.2	1.5	0.1	0.6	1.25	0.9
	Cu content, wt.%	1.95	-	2.6	-	1.48	-	-	-	0.95	-	1.37	-	-	-
	Co content, wt.%	0.1	-	0.2	-	0.1	-	-	-	0.21	-	0.01	-	-	-
	W content, wt.%	90.2	90.0	90.2	90.0	92.5	92.5	92.5	93.0	95.0	95.0	95.0	95.0	97.5	97.0

Other chemical compositions available on request.

All products comply with: DFARS 252.225-7001 Buy American Act; DFARS 252.225-7009 Specialty Metals; DFARS 252.225-7052 Magnet and Tungsten. All products are compliant with EU RoHS Directive 2015/863 and with Regulation (EC) No. 1907/2006 of The European Parliament and of the Council concerning the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). Mercury or mercury-containing compounds were not intentionally added or came in direct contact with hardware or supplies furnished under this purchase order. Pursuant to Section 1502 ("the Provision") of the Dodd-Frank Wall Street Reform and Consumer Protection Act ("Act") (Pub. L. 111-203, 124 Stat. 1376, July 21, 2010), also referred to as the "Conflict Minerals Act", Elmet Technologies only purchases "DRC conflict-free" minerals from smelters on the Conflict-Free Smelter Program (CFSP) Compliant Smelter list. Material free from radiation contamination.