TUNGSTEN ALLOYS

Radiation Shielding and High Density Materials for Well Logging Instrumentation Launching New Solutions with Refractory Metals

ELMET
TECHNOLOGIES

FABRICATED TUNGSTEN ALLOYS ENHANCE OIL AND GAS DRILLING

Elmet Technologies' high tech materials, technologies and development expertise are producing value added solutions for the high performance demands of the oil and gas drilling industry.

As one of the world's leading producers of refractory metals such as tantalum, niobium, molybdenum and tungsten,Elmet Technologies' tungsten alloys has become an essential material for a wide variety of applications including balance weights, radiation protection, vibration absorbers, heat transfer and drilling bars. It has the highest melting point of any metal and its high density is equaled only by gold, platinum, and a few other rare and expensive metals.

PROTECTING DATA LOGGING INSTRUMENTATION

The radiation shielding properties of tungsten alloy materials are excellent for use in fabricating products to enclose data logging instrumentation and isotopes, essential to locating oil and gas deposits. By shielding the instrumentation and personnel from radiation it dramatically improves the performance of the data logging.

Elmet Technologies' tungsten alloy products enhance real-time data logging while optimizing the drilling performance, improve rates of drilling stability and reduce the cost and time of searching for these vital resources. In addition, Elmet Technologies' tungsten alloy products shield the gamma camera and sensors from the grueling work of drilling through the earth's layers.

SINKER BARS

The high density of tungsten alloys, which is critical to the radiation shielding, are also extremely beneficial for sinker bar applications. These high density weights or series of weights are attached to the down hole logging tool assemblies in order to add the extra weight to help the tool properly descend through the heavy borehole fluids.

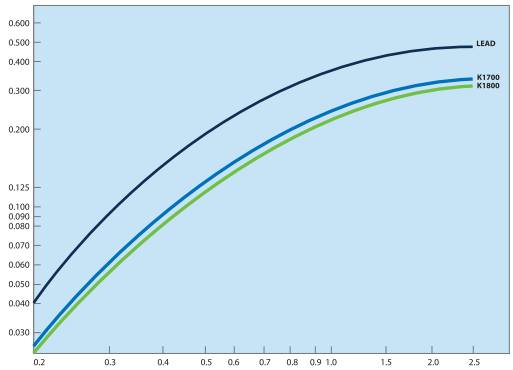
MECHANICAL PROPERTIES

Mechanical properties of tensile strength, ductility and hardness plus other elemental metals, create a family of tungsten alloy materials that have found wide acceptance where a concentrated mass is required in a limited space. Tungsten alloys guarantee the strength and stability needed for the tough oil and gas drilling process.

Tungsten alloys are economically fabricated by powder metallurgy techniques and routinely machined by conventional methods. Elmet Technologies' tungsten alloy products are delivered both as a semi finished product for further processing by the customer or in accordance with the customer's drawing as a finished machined component. To meet the specific applications of our customers, we recommend the delivery of the finished machined product.

TUNGSTEN'S RADIATION ABSORPTION EFFICIENCY

The absorption of x-ray and gamma radiation is in direct proportion to the density of the shielding material. Tungsten high density composites are more than 1.5 times as effective as lead and provide extremely efficient protection, particularly where space is limited.



Gamma Ray Energy (MeV)
RADIATION ABSORPTION EFFICIENCY

TYPICAL PROPERTIES

K1700 to K1850 materials provide a solution in a wide range of applications requiring concentrated weight or density in a limited space. These lead-free parts meet legal requirements and recommendations to protect the environment.

ALLOY DESIGNATION		K1700	K1701	K1750	K1800	K1801	K1850
Tungsten content	(%)	90	90	92.5	95	95	97
Density	(g/cm^3)	17	17	17.5	18	18	18.5
	(lb/in^3)	0.61	0.61	0.63	0.65	0.65	0.67
Hardness	(Rc)	23	22	24	25	24	26
Ultimate Tensile Strength	(psi)	125,000	110,000	125,000	125,000	110,000	120,000
	(N/mm^2)	860	760	860	860	760	830
Yield Strength	(psi)	85,000	80,000	90,000	90,000	85,000	95,000
	(N/mm^2)	590	550	620	620	590	660
Elongation	(% in 1 inch)	12	4	10	8	2	6
Modulus of Elasticity	($psi \times 10^6$)	45	40	46	48	45	50
	(kN/mm^2)	310	280	320	330	310	345
Magnetic Properties		slight	none	slight	slight	none	slight
Magnetic Permeability		> 1.05	< 1.05	> 1.05	> 1.05	> 1.05	> 1.05
Thermal Expansion Coefficient	(×10-6/0 °C) (200 °C – 5000 °C)	5.1	5.4	4.9	4.8	5.0	4.8
Thermal Conductivity	(cgs)	0.20	0.23	0.24	0.27	0.32	0.26
Electrical Conductivity	(% IACS)	11	14	12	15	16	16
AMS-T-21014	class	1	1	2	3	3	4
AMS-T-21014	class	1	1	2	3	3	4

Tungsten alloys exceed requirements of the following specifications: AMS-T-21014, ASTM B777 AND AMS 7725.
Elmet Technologies' tungsten alloy materials can be designed and fabricated to the customer's specifications.

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ELMET TECHNOLOGIES
1560 Lisbon Street • Lewiston, Maine 04240

P +1.207.333.6100

sales@elmettech.com
www.elmettechnologies.com