

## High-Density Tungsten Based Metals

Mi-Tech high-density metals provide a unique combination of density, mechanical strength, machinability, corrosion resistance, and economy.



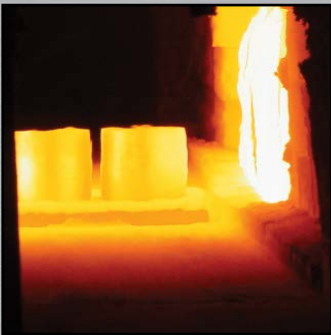
### Typical Properties\*

	HD17	HD17BB	HD17D	HD17.5	HD17.7 Diemitech®	HD18	HD18D	HD18.5
	90% W 6% Ni 4% Cu	90% W 6% Ni 4% Cu/ Fe	90% W 7% Ni 3% Fe	92.5% W 5.25% Ni 2.25% Fe	93% W Balance Ni Fe Mo	95% W 3.5% Ni 1.5% Cu	95% W 3.5% Ni 1.5% Fe	97% W 2.1% Ni .9% Fe
ASTM-B-777	Class 1		Class 1	Class 2	Super Chatter Free™	Class 3	Class 3	Class 4
Density Gms/cc	17	17	17	17.5	17.7	18	18	18.5
Density Lbs/cu. in.	.614	.614	.614	.632	.639	.650	.650	.668
Hardness Rockwell C	24	25	25	26	30	27	27	28
Ultimate Tensile Strength (PSI)	110,000	125,000	125,000	114,000	130,000	115,000	125,000	128,000
Yield Strength .2% offset (PSI)	90,000	88,000	88,000	90,000	90,000	85,000	90,000	85,000
Elongation (% in 1")	8	14	14	12	10	7	12	10
Proportional Elastic Limit (PSI)	45,000	52,000	52,000	46,000	60,000	45,000	44,000	45,000
Modules of Elasticity (PSI)	40 x 10 <sup>6</sup>	45 x 10 <sup>6</sup>	45 x 10 <sup>6</sup>	47 x 10 <sup>6</sup>	53 x 10 <sup>6</sup>	45 x 10 <sup>6</sup>	50 x 10 <sup>6</sup>	53 x 10 <sup>6</sup>
Coefficient of Thermal Expansion X 10 <sup>-6</sup> /°C (20-400°C)	5.4	4.8	4.8	4.6	4.5	4.4	4.6	4.5
Thermal Conductivity (CGS Units)	.23	.18	.18	.20	.27	.33	.26	.30
Electrical Conductivity (% IACS)	14	10	10	13	14	16	13	17
Magnetic Properties	HD 17 = NIL HD 17BB = Slightly Magnetic		Slightly Magnetic	Slightly Magnetic	Slightly Magnetic	NIL	Slightly Magnetic	Slightly Magnetic

\*Properties may vary according to size and shape of part.

Composition shown is typical and may change for manufacturing purposes or to meet physical and/or application requirements.

If non-magnetic material is required, it should be specified.



## Machining Tungsten Alloy

Our high-density tungsten alloy metal machines like gray cast iron. Typical hardness ranges from 24-32 Rc. Its low thermal expansion and other characteristics allow you to hold very close tolerances. Coolant is optional, and carbide tools are recommended in most cases.

**Turning** - Positive rake tooling is suggested. Seco triangle inserts TPG432 or TPG431 grade 883.

**Boring** - No rake or positive rake tooling is suggested. Seco CPMT grade 883.

**Roughing** - Cutting depth of .030" to .125" and .008" to .015" feed, at 200 to 300 SFM.

**Finishing** - .010" to .015" cutting depth and .004" to .010" feed at 250 to 400 SFM.

**Tapping** - Use high-speed steel, two flute plug spiral point taps. A light tapping fluid is recommended or vegetable oil mist. OSG Sossner premium Exotap is suggested.

**Drilling** - Carbide tooling is suggested. Increased clearance angles and automatic feeds are often used to avoid binding and seizing. Carbide drills will give a better tool life.

**Grinding** - Use aluminum oxide or silicon carbide wheels of medium hardness.

**Milling** - Premium uncoated end mills with a regular spiral made from micrograin carbide, such as SGS. Insert cutters; use square multi-edge or single edge cutters, such as Kennametal grade KC730. Also can use positive rake octagon cutters, such as Seco grade 883.

**Roughing** - Feeds of .007" to .015" per tooth at speeds of 200 to 400 SFM.

**Finishing** - Feeds of .003" to .010" per tooth at speeds of 300 to 700 SFM.

**Sawing or Cutting** - When sawing, use a bi-metal blade; blade pitch should be relative to the thickness of the material. Coarse blades can be run at low speeds, and finer blades run at higher speeds. Coolant can be used. Material can also be cut using high-speed abrasive cutoff wheels.

**Stress Relieving** - Stress relieving can be accomplished on machined parts. We suggest heating at 600°F in air for two hours and cool in air or in a protective atmosphere at 900°F for 30 minutes.

## Contact Us

If you need any further information, please do not hesitate to contact us at: 800-624-1895 (317-549-4290) or visit our website: [www.mi-techmetals.com](http://www.mi-techmetals.com)