

## REFRACTORY METALS

Grade	RWMA Group B	Type	Density Gm./cc	Electrical Cond. % IACS	Rockwell Hardness	Ultimate Strength PSI	Cross Break Strength PSI
T-1W	Class 10	Copper Tungsten	12.6	53 - 60	72 - 82-B	63,000	110,000
T-3W			13.93	48 - 53	85 - 92-B	75,000	130,000
T-5W			14.18	46 - 52	88 - 95-B	85,000	140,000
T-10W	Class 11		14.8	42 - 50	94 - 100-B	90,000	150,000
T-20W	Class 12		15.12	41 - 52	98 - 107-B	95,000	160,000
T-30W			15.6	41 - 49	98 - 106-B	100,000	158,000
T-3W53 *		Copper Alloy	13.5	28 - 32	101 - 106-E	120,000	180,000
T-10W53 *		Tungsten	14.6	26 - 30	105 - 110-E	160,000	200,000
T-TC5		Copper Tungsten	11.27	42 - 50	90 - 100-B	70,000	140,000
T-TC10		Carbide	11.64	38 - 45	97 - 108-B	75,000	160,000
T-TC20			12.7	27 - 35	34 - 40-C	85,000	180,000
T-TC53 *		Copper Alloy Tungsten Carbide	12.6	18 - 23	40 - 50-C	150,000	220,000
T-G12		Silver Tungsten	11.8	50 - 60	50 - 65-B	35,000	65,000
T-G13		Carbide	12.2	45 - 55	70 - 85-B	40,000	90,000
T-G14			13.1	30 - 40	95 - 105-B	55,000	120,000
T-G17		Silver	10.1	45 - 50	80 - 90-B	60,000	135,000
T-G18		Molybdenum	10.2	50 - 55	70 - 80-B	45,000	110,000
T-20S		Silver Tungsten		48 - 53	90 - 100-B	70,000	130,000
T-35S				50 - 56	80 - 87-B	50,000	120,000
T-100W	Class 13	Tungsten	19.28	31	35 - 50-C	100,000	-
T-100M	Class 14	Molybdenum	10.2	32	88 - 98-B	100,000	-

\* Properties listed are those of fully heat treated material.

### COPPER TUNGSTEN ALLOYS - GENERAL INFORMATION

**TIPALLOY T-1W AND T-3W** - Copper Tungsten materials recommended as facings or inserts for projection welding electrodes and flash or butt welding dies where high electrical conductivity is desirable and a degree of malleability is necessary.

**TIPALLOY T-5W AND T-TC5** - Copper Tungsten alloys used primarily for projection welding dies where abrasion may be encountered and pressures are light.

**TIPALLOY T-10W** - Recommended as facings and inserts for flash and butt welding dies and general purpose projection welding electrodes. It may also be used as seam welder bearing inserts and facings for electro-forging dies. It is also recommended for spot welding steels having high resistance, such as stainless steel.

**TIPALLOY T-20W AND TC-10** - Specifically recommended for heavy duty projection welding electrodes and for die facings in electro-forming and electro-forging applications. Also suitable for die material for electrical upsetting of rivets and studs.

**TIPALLOY T-30W** - This Copper Tungsten, due to its greater hardness, offers increased wear resistance without loss of conductivity in projection welding dies, electrical upsetting, and cross wire welding.

**TIPALLOY T-3W53 AND T-10W53** - Copper Alloy Tungstens supplied in the full heat treated condition. When brazed to die backings, they should be heat treated to restore hardness.

**TIPALLOY T-TC20 AND T-TC53** - Copper Alloy Tungsten Carbide materials having good wear resistance and extreme hardness. All contours should be formed by grinding. Recommended for electro-forging and upsetting where high temperatures and heavy pressures are encountered.

**TIPALLOY T-100W** - An extremely hard Tungsten with low ductility that must be ground to contour. Used primarily when welding non-ferrous metals, such as copper to brass and copper to copper. Also used in electrical upsetting and for electro-forging electrodes.

**TIPALLOY T-100M** - Used primarily for welding or electro-brazing non-ferrous metals having relatively high electrical conductivity. Welding of copper and brass wires and copper wire braid to brass and bronze terminals are typical applications. Special procedures are generally required.