ELKONITE® is the registered trade mark of CMW used to identify a group of metal compositions whose elements consist basically of the refractory metals tungsten, molybdenum and tungsten carbide combined with copper. Combinations of these elements produce dense, hard metals of superior wear resistance and strength at elevated temperatures, coupled with good thermal and electrical conductivity. The mechanical and physical properties of the ELKONITE® materials make them particularly suitable as the die inserts and facings for volume projection welding, flash and butt welding, electrical upsetting, electroforging and mash welding applications.

ELKONITE® material is also used successfully as facing on spot welding electrodes where heat balance or mechanical wear resistance are required. The initial premium cost of ELKONITE® material is offset by lower production cost per weld due to long die life and less electrode dressing time. The high stability of ELKONITE® material insures uniform heating and prevents misalignment, resulting in a higher quality weld.

Typical Physical and Mechanical Properties of CMW® Refractory Based Materials

CMW GRADE	Type of Material	Class #	R.W.M.A. Group B Material	Hardness Rockwell	Electrical Conductivity %I.A.C.S.	Ultimate Tensile Strength, psi	Cross Breaking Strength psi
ELKONITE® 1W3	Tungsten-Copper	10	10.74450	77 B	53	63,000	110,000
ELKONITE® 3W3	Tungsten-Copper		—	90 B	50	75,000	130,000
ELKONITE® 5W3	Tungsten-Copper		—	95 B	48	85,000	140,000
ELKONITE® 10W3	Tungsten-Copper	11	11.74400	98 B	45	90,000	150,000
ELKONITE® 30W3	Tungsten-Copper	12	12.74350	103 B	41	98,000	170,000
ELKONITE® 3W53	Tungsten-Copper Alloy		—	105 B	30	120,000	180,000
ELKONITE® 10W53*	Tungsten-Copper Alloy		—	109 B	28	160,000	200,000
ELKONITE® TC5	Tungsten Carbide-Copper		—	94 B	45	70,000	140,000
ELKONITE® TC10	Tungsten Carbide-Copper		—	100 B	42	75,000	160,000
ELKONITE® TC20	Tungsten Carbide-Copper		—	37 C	30	85,000	180,000
ELKONITE® TC53*	Tungsten Carbide-Copper Alloy		—	47 C	18	150,000	220,000
ELKON® 100W	Tungsten	13	13.74300	39 C	30	150,000	200,000
ELKON® 100M	Molybdenum	14	14.42300	90 B	30	80,000	120,000
ANVILOY® 1150**	Tungsten-Nickel-Iron-Molybdenum		—	34 C	13	140,000	280,000

Note: All properties shown are TYPICAL and should not be used for specifications
* Properties are in fully heat treated condition
** Hardness is 56 HRA at 1475 ^{O}F (800^{O}C)

TYPICAL USES

ELKONITE® 1W3 and **3W3** alloys are generally used for flash and butt welding die inserts where higher electrical and thermal conductivity is necessary and where a degree of malleability is desirable. These materials are also used (as a radius faced electrode) for spot welding low conductivity ferrous metals such as stainless steel.

ELKONITE® 5W3 and **TC5** alloys are normally used for light duty projection welding dies where welding pressures are not extreme.

ELKONITE® 10W3 alloy is used for electrode and die inserts in most flash and butt welding dies and for projection welding dies where welding pressures are moderate. It is also used for light electrical upsetting, electroforging dies and seam welder bushing inserts.

ELKONITE® 30W3 and **TC10** alloys are recommended for volume projection welding dies where the pressures involved are relatively high. Electrical upsetting of non-ferrous metals and low carbon steel is usually accomplished by the use of such ELKONITE® materials as die facings. Cross-wire welding of large diameter wire and rod is accomplished with such ELKONITE® materials.

ELKONITE® 3W53 and **10W53** are heat treatable grades of ELKONITE® materials supplied in the fully heat treated condition. If silver brazed to a die backing, such ELKONITE® materials should be heat treated after brazing. These harder grades are used primarily for electroforging and electrical upsetting dies, where temperatures and pressures are comparatively high.

ELKONITE® TC20 and **TC53** materials are extremely hard and wear resistant. ELKONITE® TC20 material, while somewhat difficult to machine, may be machined using carbide tipped tools. ELKONITE® TC53 material is a heat treatable grade of such high hardness that machining operations are impractical and the material must be ground. Such ELKONITE® materials are customarily used for special applications of electrical upsetting and electroforging.

ELKON® 100W is extremely hard and its ductility is relatively low. It cannot be machined but may be ground to the required shape. It does not alloy appreciably with nonferrous materials and is used for cross-wire welding of metals such as copper and brass. It is also used for electrobrazing electrode material and for some electrical upsetting operations.

ELKON® 100M is used principally for electrobrazing electrode material and for cross-wire welding of nonferrous metals. It is not as hard as ELKON® 100W material and may be machined or drilled to fit the parts to be joined. A typical application of this material, as an electrode, is the welding or brazing of braided or solid copper conductors to ferrous or nonferrous terminals, lugs or fittings.

ANVILOY® 1150 material is used in electrobrazing applications where heat balance is important. The ANVILOY® 1150 material also has good anti-sticking qualities and good high temperature abrasion and hardness properties. The oxidation resistance of materials is excellent up to 1100^{O}F.