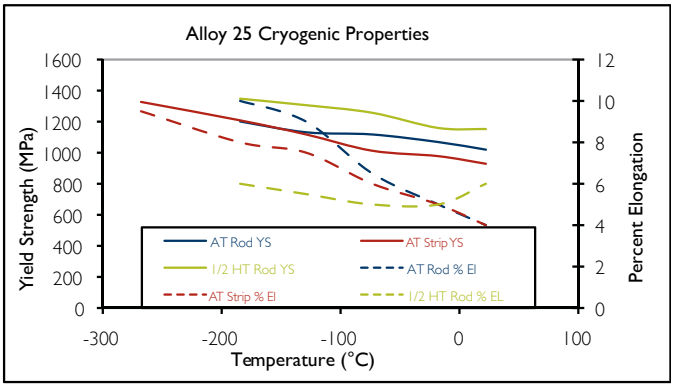
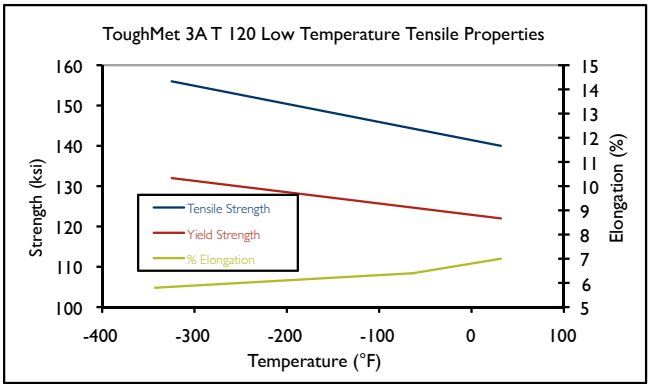
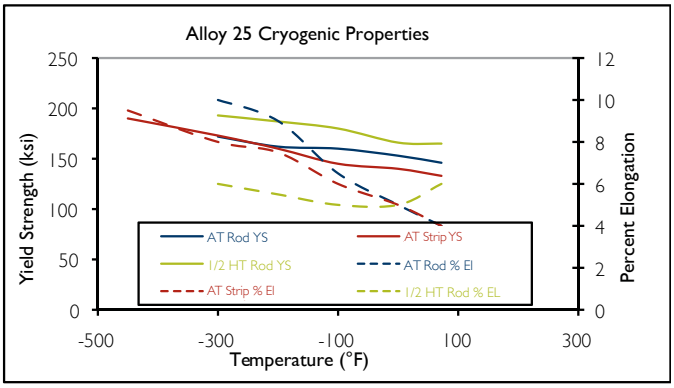
Cryogenic Properties

Cryogenic Behavior

Copper beryllium is used in liquid hydrogen and liquid oxygen due to its ability to maintain strength and toughness in cryogenic conditions. Copper alloys have no ductile to brittle transition temperature, as do many high strength steels. In fact, the strength of both copper beryllium and copper nickel tin tends to increase as the temperature drops. Furthermore, copper beryllium even tends to increase in ductility at lower temperatures.







Other Attributes

Reflectivity – Copper beryllium polishes readily to an optical mirror surface. Because of its color, this surface reflects light efficiently, especially in the infrared spectrum. Reflectivity, machinability and dimensional stability lead to its use in mirrors, particularly where centrifugal or other stresses are present.

Dimensional Stability – Besides increasing hardness and strength age hardening can relieve stress in copper beryllium. This results in high dimensional stability during machining or stamping. A conventional stress relief that does not alter strength, and various stabilizing thermal treatments are used.

Spark Resistance – One of the oldest and best known uses for copper beryllium is in hand tools for industrial processes where a spark is not permissible. A hot, copper rich particle dislodged on impact, cools rapidly and does not ignite. In addition to spark resistance, copper beryllium and ToughMet® have the hardness to provide lasting durability.

Special Surface Treatments – Surface modification of copper beryllium creates several unique possibilities. An oxide formed at high temperature greatly increases secondary electron emission. Various techniques have been used for local hardening. Laser and electron beam techniques have produced various surface states, ranging from localized solution annealing to glazing. Coatings have been applied for increased emissivity, hardening or appearance.

Appearance – The golden luster of high strength alloys and the coral tinted gold of the high conductivity alloys give copper beryllium an attractive appearance. ToughMet® 3 has a gold tinted silver appearance These alloys are polished and waxed or lacquered for application as decorative components.