Braze a refrigeration tube coil assembly

Objective  Braze brass fitting with o-ring to various diameters of copper tube.

Material  Various copper tubes ranging from 3/8" to 7/8" diameter and 2-3' long, female brass fittings with o-ring, silver solder rings and glass beaker.

Temperature  1300 °F (704 °C)

Frequency  283 kHz for the 3/8" (9.6mm) diameter copper tube
            250 kHz for the 7/8" (19.8mm) diameter copper tube

Equipment  • Ambrell 10 kW induction heating system, equipped with a remote workhead containing two 1.5 µF capacitors for a total of 0.75 µF
            • An induction heating coil designed and developed specifically for this application.

Process  A three turn 1.5" ID helical coil is used to heat the junction of the 3/8" (9.6mm) dia. copper tube and brass fitting. The brass fitting is placed on a ceramic mandrel in a beaker of water and half of the fitting is submerged in the water to protect the o-ring from melting. Heat is applied for 30 seconds, making the solder ring flow evenly creating a strong aesthetically pleasing bond without overheating the fitting. The 7/8" (19.8mm) dia. copper tube is brazed with a slightly larger three turn coil.

Results/Benefits  Induction heating provides:
            • Ability to direct heat only to the required zone
            • Coil size and geometry allows for easy loading and unloading of finished parts
            • Ability of coil to be used with water bath process allows for stability of the o-ring
Brass fitting partially submerged in water bath