BRAZING FOR AIR CONDITIONING AND REFRIGERATION

Learn guidelines to select the most suitable process for joining copper and copper alloy components in air conditioning and refrigeration system. Discover cost effective installation methods that are also clean and debris free.

Learn brazing, proper procedures for flaring, swaging and leak testing techniques, while ensuring safety and standard compliance.

Brazing depends on the ability of the filler metal to penetrate, by capillary attraction, small gaps between the metal surfaces to be joined. Under suitable conditions, the brazing alloy wets and bonds by surface diffusion alloying to form a strong joint. It is important to ensure that the joint preparation takes full advantage of the capillary penetration of the molten filler alloy.

This class stresses the proper Nitrogen purging through an air conditioning or a refrigeration system that will reduce copper oxidation. This process will reduce compressor failure rates and reduce the moisture inside a system. Ester oil that is in the HFC refrigerant system will breakdown at 50 ppm of moisture in the oil. In a vacuum of 250 microns, the moisture in the ester oil is still above 80 ppm of moisture. This will cause an increase in the acid in a system.

CLASS FORMAT:

Lab + classroom

The participant is able to "learn-by-doing" in the course; this knowledge can be transferred to the workplace.

STANDARD CLASS SIZE:

NTT recommends a class of 12 participants to obtain the best results.

NTT PROVIDES:

- 3 days on-site hands-on instruction
- Flaring and swaging tools
- Brazing rods
- Classroom consumables
- Completion certificates
- Shipping and all instructor fees and travel expenses

CLIENT PROVIDES:

- Shop with adequate space for students and demonstration
- Pipe, acetylene torches, heat shields, nitrogen, regulators, personal protective equipment
- Projection screen, white board and/or flip chart(s)

NTT Training

800.922.2820 | www.NTTInc.com

BRAZING FOR AIR CONDITIONING AND REFRIGERATION

COURSE AGENDA

SELECTION OF A JOINING PROCESS

- Bolting and riveting
- Adhesive bonding

SOLDERING

- Recommended solder fluxes for engineering materials
- Copper, solid or plates, tin-bronzes, gunmetals
- Copper-nickel alloys
- Copper-aluminium alloys (aluminium bronzes)
- Gilding metals (CuZn10 and CuZn20)
- Commercial brasses (CuZn30 and CuZn40)
- Soft solder filler metals
- Resistance soldering
- Brazing and silver soldering
- Brazing in six easy steps
- Brazing copper tube to brass and other copper alloys

BRAZING PROCESS

- Basic principles
- Brazing filler metals
- Copper-silver alloys
- Copper-phosphorus-silver alloys
- Joint design, clearance overlap
- Brazing alloy pre-placement
- Physical and metallurgical factors
- The coppers
- Alloys heavily cold-worked, or with high softening temperatures
- Precipitation-hardening copper alloys
- Alloys containing aluminium, lead, tellurium or sulphur

THE BRONZE WELDING PROCESS

- Filler metals
- Joint design
- Pre-weld and Inter-run cleaning
- Jigging and backing techniques
- Preheating and Inter-run temperatures
- Process applications

COPPER

- Copper alloys
- Copper-silicon alloys (silicon bronzes)
- Copper-aluminium alloys (aluminium bronzes)
- Copper-nickel alloys (cupro- nickels)
- Copper-tin alloys (phosphor bronzes and gunmetals)
- Copper-zinc alloys (brasses and nickel- silvers)

WORK-HARDENING AND PRECIPITATION-HARDENING

- Joining and repairing castings
- Copper-based casting alloys
- General principles, joint design and preparation
- Selection of filler metals
- Metallurgical behavior of cast alloys
- Copper aluminium alloys
- High tensile brasses
- Gunmetals and tin bronzes

METALLURGICAL FACTORS IN JOINING DISSIMILAR METALS

- Copper to steel
- Copper nickel to steel
- Aluminium bronzes to steel
- Copper to aluminium
- Copper and alloys to other copper alloys
- Copper to copper-nickel
- Copper to aluminium bronze
- Aluminium bronze to copper nickel