

Brazing brass bellow assemblies for pneumatic regulators

Objective Brazing a series of brass bellow assemblies for pneumatic regulators

Material Four different assemblies:

1. flange 3.62" (91.9mm) dia, threaded stud .74" (18.8mm) x 2" (50.8mm) (brazing)
2. bonnet sub assembly 1.89" (48mm) dia, 1.75" tall (44.5mm) (brazing 3 joints simultaneously)
3. bonnet sub assembly to bellows assembly 1.125" (28.6mm) OD x 4.14" (105.2mm) tall (soldering)
4. flange to flange 3.62" (91.9mm) dia x 1.36" (34.5mm) tall (brazing)

Temperature 460 °F (238 °C) soldering, 1200 °F (648 °C) brazing

Frequency 130, 92, 145 & 127 kHz

Equipment

- Ambrell 15 kW induction heating system, equipped with a remote workhead containing three 1.5µF capacitors for a total of 4.5µF
- An induction heating coil designed and developed specifically for this application.

Process There are four different brazing/soldering applications and each one requires a different coil. The coils range from a single turn to a three turn helical coil.

Application #1 (flange and threaded stud) requires a three turn helical coil and 90 seconds to complete the braze.

Application #2 (bonnet sub assembly with three joints) requires a three turn helical coil and 120 seconds to braze the three joints

Application #3 (bonnet sub assembly and bellow assembly) requires a two turn coil and 20 seconds to flow the solder preform.

Application #4 (flange to flange) requires a single turn helical coil and rotation of the part to uniformly heat the part and braze the joint. Heat cycle is 60 seconds

- Narrative**
- Customer is currently using a flame to braze/solder these parts and manufacture approx. 600 total parts per month. They are not looking to increase their production but are looking for a repeatable and reliable process. These are aircraft parts and must be leak tested. The customer is looking to improve their rejection rate, reduce scrap and labor and improve profitability.

Results/Benefits Induction heating provides:

- Rapid localized heating only where needed
- Creates clean, controllable joints
- Non-contact, energy efficient heat without flame
- Even distribution of heating



Application # 1



Application # 2



Application # 3



Application # 4