ENGINEERING
TOMORROW

Instructions

Brazing for large and medium compressor connectors

1 – Introduction

The refrigeration and air conditioning industries depend on brazed copper tubes as a leak-proof carrier for pressurized refrigerant. The common approach to brazing copper to copper or copper to steel is to use filler metal (usually copper alloy). Torch brazing with oxygen/fuel gas (acetylene in most cases) is the standard practice in heating these connections. Large and medium scroll compressors connectors are made of steel copper coated, which benefit to prevent corrosion and facilitate adhesion during brazing operation.

2 - Methods and requirements

As per standards practice in the refrigeration industry, Danfoss Commercial Compressor recommends the use of high silver cadmium free solder alloy and flux (added or flux coated rods). The bests are 40%, 45%,and 56% silver rods. A minimum content of 34% Ag (Silver) is recommended by Danfoss.

The significant silver content in these brazing alloys will help the brazing operation, providing an excellent fluidity and a limited heating temperature. It will also bring a good resistance to corrosion, a proper elongation compatible with system vibration, and good behavior under thermal variation improving the strength of connection and limiting fractures and refrigerant leaks. (Crucial with A2L and A3 refrigerants).

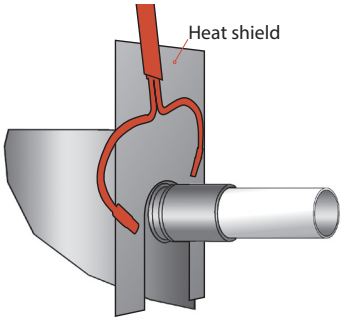
⚠ The use of self-flux alloys (as phosphorous alloys) is not recommended by Danfoss. This type of brazing requires a higher working temperature, that may overheat the connectors, damaging the thin layer of copper, resulting in phosphides creation and joint zone embrittlement.

System cleanliness :

Circuit contamination possible cause	Requirement
Brazing and welding oxides	During brazing, flow nitrogen through the system.
Particles and burrs	Remove any particles and burrs generated by tube cutting and hole drilling.
Moisture and air	Use only clean and dehydrated refrigeration grade copper tubing. Opened compressor must not be exposed to air more than 20 minutes to avoid moisture captured by oil.

3 - Brazing procedure

- Brazing operations must be performed by qualified personnel.
- Make sure that no electrical wiring is connected to the compressor.
- To prevent compressor shell and electrical box overheating, use a heat shield and/or a heat-absorbent compound.
- Clean up connections with degreasing agent. No trace of grease should remain into or around the fittings.
- Flow nitrogen through the compressor during the brazing operation.
- It is recommended to use double-tipped torch using acetylene to ensure a uniform heating of connection.
- For discharge connections brazing time should be less than 2 minutes to avoid NRVI damages if any.
- To enhance the resistance to rust, a varnish on the connection is recommended.



⚠ Before eventual un-brazing of the compressor or any system component, the refrigerant charge must be removed and the installation vacuumed to ensure that no refrigerant is remaining diluted into the oil (especially with A2L/A3 refrigerants).

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