Air Conditioning & Heat Pump Institute

REDUCING LEAKAGE FROM AIR CONDITIONING UNITS BY REPLACING FLARED CONNECTIONS

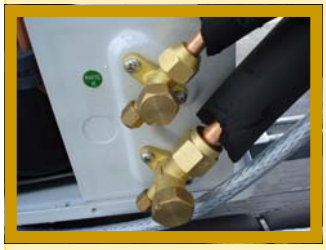
Many split air conditioning systems are supplied with flared connections on both the indoor air handler and outdoor unit.. Increasingly manufacturers are moving away from supplying equipment with flared connections as they carry a relatively high risk of refrigerant leakage can be avoided on existing or new equipment by either:

- **Removing the flares and access points on the indoor unit and directly brazing the connections**
- **Using machined flare adaptors on the pipe work to the outdoor unit.**

This procedure has been documented to promote the removal of flare connections where possible.

Outdoor unit connections

Most outdoor units are fitted with flared service valves, to reduce the risk of leakage from these flare connections it is suggested that 'machined flare adaptors' are used on the end of the site installed pipe work to connect to these valves.



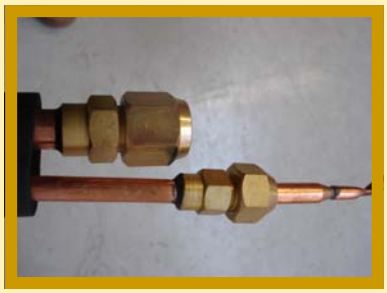
Flared service valves

Machined flare adaptor

Care should be taken to ensure that the copper gasket is installed correctly and that the flare adaptor is tightened to the correct torque using a torque wrench spanner. These machined flare adaptors can also be used on the indoor unit if there is not sufficient space to remove the flared connections and braze directly onto the stubs.

The following considerations should be taken into account if you decide to remove a flare connections on the indoor unit in order to replace them with brazed joints:

- The work should be carried out in a dry, well ventilated area and appropriate risk assessments should have been carried out.
- It is preferable to conduct this process in a workshop prior to installation where possible.



Flared joint to be removed

Unit after removal of flared connection - stubbs ready for brazing

Components removed

Replacing flared connections

- Any existing insulation material should be removed from the pipe stubs.
- This process should only be carried out where there is more than 75mm of pipe protruding from the unit. Less than this may be insufficient for brazing a section on to it. Ensure you have let the nitrogen holding charge in the air handler go prior to cutting the flare unions off.
- Care should be taken as some wall mount units have a strainer located close to the flare. The equipment warranty may be affected if the strainer is damaged or removed. It may be necessary to cut the strainer out and replace it with a new one.
- Cables, insulation and plastic parts which could be affected by the heat or the flame during brazing
- must be protected, either directly or through conduction-shielding and the use of a wet rag, heat-sink compound or flame retardant gel.
- If the pipe is to be swaged do not use percussion type of tube expander (e.g. Swage Punch) as this could result in damage to the coil connections. Use only an expander swager and remember to anneal the copper stubs beforehand.
- Ensure that the pipe work is wet rag wrapped on the air handler side to ensure that excessive heat does not conduct into the coil or to associated materials connected to it.
- Oxygen Free Nitrogen must be purged through the pipe during brazing to prevent oxidization.

Access points and prevention of leakage

- Sufficient access should be provided to the system to allow it to be processed and checked.
- Service and shut off valves have a potential for leakage at the valve stem, gauge ports and connection to the system.
- Capped Schrader valves have few potential leak points.
- They should be securely capped, preferably with a hexagonal nut which can be tightened with a spanner.
- Hexagonal nut cap rather than knurled caps should be used.

Typical knurled cap

Hexagonal nut cap (preferred to reduce potential leakage)

Based on material provided by Scott Gleed of Ceilite Air Conditioning, Cool Concerns Ltd and the REAL Zero project

Design considerations to minimise the risk of leakage

The quality of pipe work and connections has a major impact on the future leak potential of systems. The type of joints used to connect pipes and components and how pipe is supported are fundamental to reducing the potential for leakage. The Real Zero project has provided training for leak reduction specialists, guides, tools and a website www.realzero.org.uk . There is a lot that can be done at the design stage to minimize leakage. The key is to design the pipe work carefully (to avoid stress related failures) and to use connections that remain leak free in all modes of operation. This approach does require attention to detail and may involve a small amount of extra capital cost. However, the extra investment will pay off if the plant remains free of leaks.

Some of the key points of a specification to minimize leakage including minimising the quantity of refrigeration in the system, using as few connections as possible, brazing to a high standard, adequate pipework support and vibration elimination.

Note: Nothing in this good practice guidance note is designed to conflict with manufacturers' recommended practice or installation instructions. Installers are advised to contact the manufacturer of the equipment prior to commencement of this process to ensure that warranties will not be affected by such a process. This process should only be carried out by a competent technician in consultation with manufacturers and equipment owners instructions.

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