



Guidance

Service of Hydrocarbon Refrigerant Equipment in a Retail Environment

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Guidance for the Service of Hydrocarbon Refrigerant Equipment in a Retail Environment

In order to support the increasing use of hydrocarbon refrigerants in retail refrigeration and air conditioning equipment the British Refrigeration Association issued this Guidance. It summarises best practice for the service and maintenance of retail systems which use hydrocarbon refrigerants to ensure engineers work safely.

Acknowledgement

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This document covers critical points service work on hydrocarbon (HC) refrigerant systems on retail sites. Information about the safe working environment is included as well as the following procedures:

- Leak testing
- Recovery
- Evacuation
- Un brazing and brazing
- Charging
- Component replacement.

Full procedures are not provided – the information outlines the critical points which differ from those for HFC refrigerants. The information is intended for engineers who are experienced at working with a range of refrigerants. It is recommended that engineers have an F Gas qualification and have attended an HC refrigerant safe handling course within the last three years. Details of suppliers of equipment, training and further information are provided at the end of this document.

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The safe working environment and PPE

HCs must only be handled in an area which:

- Is well ventilated
- Has no source of ignition within 3 m (a typical safe area when working on refrigeration systems).

If necessary forced ventilation must be introduced using a suitable fan assembly such as the Care Air. This has an Ex rated fan motor and a 5m cable which enables it to be switched on outside the safe work area.

When carrying out invasive work, or if a leak is suspected, the work area must be checked and monitored using an HC detector such as the Spygas. It is important that the detector cannot be zeroed out to background HC levels and alarms at 20% LFL.

Appropriate gloves and safety glasses must be worn when working with HC refrigerant and when brazing / un-brazing HC systems.

Equipment

Some standard tools and equipment can be used safely with HCs, including gauge manifold sets.

Most standard vacuum pumps can be safely used because usually the only potential source of ignition is the on / off switch. In addition, the HC discharged by the pump is usually safely dispersed and does not result in a flammable zone providing the pump is located in a well-ventilated area. The section on evacuation below shows how the hazard associated with the switch is avoided.

Standard recovery machines cannot be safely used to recover HCs and therefore must not be used. Unlike vacuum pumps there are several sources of ignition (e.g. on / off switches, relays, pressure switches). In addition, a leak would result in a flammable zone around the machine. These hazards cannot be avoided; therefore the correct recovery machine must be used as specified in the section on recovery.

Most electronic leak detectors used for HFC and HCFC leak detection are not safe and sensitive for use with HCs, so electronic detectors specifically for flammable gases (or leak detection spray) must be used, as described in the section on leak testing.

Leak testing

HC systems must be leak tested using a method that is safe and sensitive:

- Leak detection spray
- An electronic flammable gas detector such as the Kane-May CD100A.

If leaks cannot be found using these methods the remaining charge must be removed and the system leak tightness tested as specified in EN378, using nitrogen or nitrogen with a trace of helium or hydrogen.

Refrigerant recovery

- HC refrigerant must be recovered using a Care Saver recovery machine (a standard recovery machine for halocarbon type refrigerants must not be used).
- The recovery cylinder must be evacuated to remove air before it is first used with HC refrigerant.
- HC refrigerants must not be mixed with other types of refrigerant in a recovery cylinder.
- Recovery cylinders must not be filled with more than 45% of the HFC safe fill weight.
- The recovery cylinder must be labelled to show it contains a flammable substance.

Evacuation

The vacuum pump must be checked to ensure the on / off switch is the only source of ignition. If this is the case the vacuum pump can be safely used with HC refrigerant if the on / off switch is not used:

- The switch must be in the on position and the pump plugged into a socket outside the 3 m zone and controlled from this socket.
- The vacuum pump must be located in a well-ventilated area or outside.

Un-brazing and brazing

To safely un-braze joints:

- The area must be continuously monitored with a leak detector.
- There should be good natural or forced ventilation.
- The HC refrigerant must be recovered from the system (see recovery procedure).
- The recovery machine must be run for 5 minutes with the low pressure switch bypassed so the system is under vacuum and as much of the HC charge is removed from the system as possible.
- The system must be filled with oxygen free dry nitrogen to a pressure of 0.1 bar g.
- The system must be connected to the vent line, which must be open to atmosphere.
- The connections must be un-brazed as quickly as possible.

To safely braze joints:

- The area must be continuously monitored with a leak detector.
- There should be good natural or forced ventilation.
- When re-brazing connections, the system must be purged with dry nitrogen with at least one access point open to atmosphere to eliminate pressure build up.

Charging

- There should be good natural or forced ventilation.
- Refrigerant grade HC must be used.
- If charging lines are not evacuated they must be purged carefully (by opening then closing the cylinder valve before purging).
- Systems must not be over charged (the HC charge weight is approximately 45% the charge weight for an equivalent HFC system).
- The charge must be accurately weighed in when charging critically charged systems. The tolerance is typically $\pm 5\%$. Do not adjust refrigerant charges, always use the manufacturers indicated charge.

Component replacement

- Electrical devices and compressors must be replaced with **like for like** components.
- Sealed electrical boxes must be correctly re sealed before putting the system back into operation.
- Do not modify components or relocate components.

Further information

The safe application and handling of HCs	Cool Concerns Ltd	info@coolconcerns.co.uk
HC safe handling training	Cool Concerns Ltd BOC	info@coolconcerns.co.uk www.boconline.co.uk
Care Saver and Care Air	RDA	sales@rda-eng.com
Spygas (for monitoring working area)	R S Components	uk.rs-online.com
Kane-May leak detector (for leak detection)	RS Components	uk.rs-online.com
Refrigerant	A Gas BOC Harp International	www.agas.com www.boconline.co.uk www.harpintl.com
Safety Code of Practice for Refrigerating Systems Utilising A2 and A3 refrigerants	Institute of Refrigeration	www.ior.org.uk
Code of Practice for the Design and Manufacture of Refrigerated Cabinets running on HCs	British Refrigeration Association	www.feta.co.uk/bra
European standards covering the use of HC refrigerants, including EN378	British Standards	www.bsigroup.com

Remember
If you are unsure of anything - Do Not Proceed.
Stop work and ask the question!