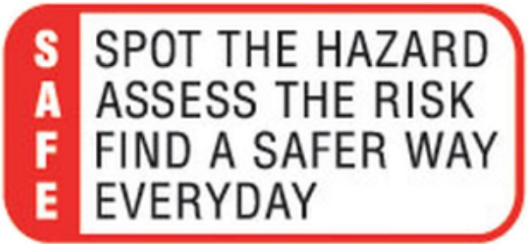
Prepared By:	Simon Young	**Copy No.:**	1
Title:	Technical Author		
Reviewed by:	Carl Edwards	**Authorised by:**	Malcolm Coates
Title:	HSQE Advisor	**Title:**	HSQE Manager
Date of Issue:	15/08/2019	**Review Date:**	N/A
Reference No.:	Evacuation of Refrigeration Systems Utilising Ammonia	**Version No.:**	01
Supersedes:	Evacuation of Refrigeration Systems Utilising Ammonia	**Version No.:**	E

Amendment No.	Section No.	Page No.	Paragraph No.	Date	Amended By



Risk Element

- Electric shocks from connection of electrical equipment or damage to trailing electrical leads;
- Uncontrolled escape of refrigerant.

Precautions to Eliminate/Reduce Risk

- Use only 110V electrical equipment or 240V equipment fitted with residual current circuit device were site procedures permit. Protect trailing leads, use only equipment that is in a safe working order and has been Portable Appliance Tested with a current valid label;
- Engineers x 2 to wear correct personal protective for chemical protection. Nitrile or neoprene gloves, goggles, boots, coveralls with escape mask ready;
- Ensure refrigerant cylinder(s) are secured;
- Barrier off the area to prevent unauthorised access. Use warning signs with contact information.

Action in an Emergency

- Electric shock switch off and disconnect electrical equipment from supply;
- Escaping refrigerant isolate leak if without risk, ventilate area. Inform site supervisor.

Safe Working Method

The purpose of the evacuation is to remove all moisture, air and other non-condensables from the system, leaving it in a dry condition, prior to charging the system with refrigerant.

On the successful completion of a pressure test or leak test, the inert gases should be released from the system though a suitable vent to a safe place, and preparations should be made to evacuate and dehydrate the system. A vacuum pump of the gas ballast type should be selected for the size of the system to be evacuated.

The vacuum pump should be tested for effective operation and then connected to both the high and low pressure sides of the system. In order to achieve the best efficiency from the vacuum pump, the connecting pipe or hose from the pump to the system should be the largest size possible and kept to a minimum length.

- A suitable vacuum gauge should be connected to the system at the furthest point from the vacuum pump to determine a suitable vacuum at this point;

  NOTE: A standard compound pressure gauge should not be used, as this will not be sufficiently accurate.
- Before commencing the evacuation of the system, checks should be made to ensure there are no isolated areas of the system;
- Some components may need to be left electrically powered and should be labelled accordingly;
- To ensure a satisfactory evacuation of the system, a vacuum of not greater than 2mm Hg Mercury needs to be observed;
- On satisfactorily obtaining the required vacuum, isolate the pump from the system before switching off, and break vacuum on the system with the refrigerant;
- This procedure should be carried out in accordance with the appropriate COSHH Assessment information and with reference to J & E Hall's Environmental management Procedures.

  NOTE: A perfect vacuum is 0 microns (29.92 in Hg) and will never be achieved! So strictly speaking we only ever achieve a partial vacuum in a refrigeration system.

Vacuum Levels

To eliminate as much moisture and non-condensable gases as is practical from the system the vacuum level should be as low (deep) as possible.

Aim to achieve lower than:

- 500 microns (29.90 Hg) on new systems;
- 1000 microns (29.88 Hg) on existing systems.

Failure to Achieve or Hold a Vacuum

When the required vacuum has been achieved, check that the vacuum does not rise when the system is isolated from the pump. The pressure should not rise by more than 2% of the vacuum achieved.

For example, for a new system you have evacuated to 500 (29.90 Hg) microns, the vacuum should rise to more than 2%.

If the required vacuum cannot be achieved, this is either because there is a leak or because there is still moisture in the system or because there is a problem with the vacuum pump:

- It is not in good condition;
- The vacuum pump oil needs changing;
- There is insufficient oil in the pump;
- The gas ballast valve is open;
- It does not have sufficient flow rate for the system.

If the required vacuum cannot be held this is likely to be for one of the following reasons:

- There is a leak:
    - In this case the pressure will rise continuously when the pump is isolated;
    - The leak could be at one of the connections between the vacuum pump and the system;
    - The leak could be on the system. Leaks should have been identified during the strength and leak tightness test procedure.
- There is still moisture in the system you just need to extend the evacuation period;
- There is still refrigerant dissolved in the compressor oil. In this case the pressure will rise and plateau when the pump is isolated.

This page intentionally blank.