

August 2021

GUIDELINES FOR CARE AND OPERATION OF MECHANICAL REFRIGERATION SYSTEMS CONTAINING AMMONIA

Information Paper IP-BPV-2021-08-02

This information paper is formatted with the intent that it may be posted in a mechanical refrigeration room for the operator reference.

The owner is responsible for the proper care and safe operation of a mechanical refrigeration plant as used in ice arenas and curling rinks. The guideline below should be carried out by a responsible person who has the necessary skills and knowledge. For refrigeration systems with a capacity greater than 45 tonnes, the operator shall have an operator's licence issued by TSASK.

It is to be noted that the manufacturer's instructions for the operation and maintenance of the pressure equipment shall be followed. In addition to the manufacturer's instructions, the following guideline can be used. If there is a conflict between this guideline and the manufacturer's instructions of the pressure equipment, the manufacturer's instructions take precedence.

1. SAFETY

- a) Training on the equipment at hand. Recommended certification of operators, contact Saskatchewan Parks and Recreation Association (SPRA) for more information
- b) Have on hand and understand Material Safety Data Sheets (MSDS) for all the chemicals in the operating plant
- c) Operating ranges (Pressure and Temperature) for all equipment (pressure equipment, piping, vessels) (rotating equipment)
- d) Calibrated ammonia gas detectors
- e) Exhaust fans in good operating condition
- f) Familiar with the refrigerant in the system
- g) Familiar with the brine/circulating solution
- h) Emergency procedures posted outside of the mechanical room

2. PERSONAL PROTECTIVE EQUIPMENT (Suggested)

- a) Gas Mask or Air Pak
- b) Length of rope
- c) First Aid Kit
- d) First Aid knowledge
- e) Water hose
- f) Safety glasses, face shield, goggles
- g) Gloves
- h) Communication device and contact person available

3. DAILY

- a) Complete and log checks a minimum of twice per day:
 - Brine temperature and pressure
 - Compressor(s) discharge temperature and pressure
 - Compressor suction pressure
 - Oil level and pressure
 - Refrigerant level
 - Brine level
 - Hour meters
 - Outside temperature
- b) Check for ammonia refrigerant leaks
- c) Keep plant room clean and tidy (no combustibles)

- d) Audible checks of belts and couplers
- e) Check condenser fan operation
- f) Check condenser pump operation
- g) Check brine pump operation
- h) Check room exhaust fan operation
- i) Log all personnel entering the mechanical room.

4. MONTHLY

- a) Check brine pH (refer to manufacturer's specification)
- b) Check condenser belts
- c) Check condenser air passages
- d) Check condenser for leaks
- e) Check water bleed off from condenser
- f) Check compressor oil supply/quantity reserve
- g) Check all motors (visual and audible)
- h) Check compressor oil for discoloration and contamination
- i) Check compressor drives (electric motors)
- j) Drain oil from chiller and compare to oil consumption

5. END OF SEASON SHUTDOWN

- a) Pump ammonia refrigerant back to the receiver
- b) Lock out all electrical supply to prime movers to avoid accidental start-up
- c) Close and tag suction and discharge valves to the compressor(s)
- d) Drain oil from the compressor(s) and sample for contaminants
- e) Sample the brine and check for contaminants and pH
- f) Do not leave any part of the system open to the atmosphere
- g) Check operating hours for overhaul schedule and component replacement
- h) Service pressure relief valves every five years.

6. PRE-SEASON STARTUP

- a) Add oil to the compressor(s). Refer to manufacturer's procedures
- b) Check crankcase heaters
- c) Vent all air and non-condensable from the system
- d) Change system filters
- e) Sample the brine and check for contaminants
- f) Check all belts and couplings. Replace as required
- g) Check all refrigerant detectors and system interlocks
- h) Check exhaust fan(s)
- i) Spin pump shafts and compressor shafts to ensure free to operate
- j) Check pump and compressor coupling alignments
- k) Check electrical disconnects and fuse assemblies for arching and hot spots
- l) Look for oil leaks and brine leaks
- m) Ensure that all safety equipment is available and in good condition
- n) Check and clean condenser spray nozzles

7. SAFE PRACTICE

- a) DO NOT operate equipment that is suspected to be leaking failed
- b) DO NOT isolate liquid refrigerant within suspected failed/leaking equipment
- c) DO NOT isolate secondary coolant systems without pressure relief

REFERENCES

- CSA B52
- ABSA: AB-615 Guidelines for Care and Operation of Mechanical Refrigeration Systems Containing Ammonia

To report an incident visit: www.tsask.ca