Ontario Recreation Facilities Association

Building Community Since 1947

Developing a Comprehensive Registered Refrigeration Maintenance Program

VERSION 2.0

ISSUE DATE: JULY 2021

orfa.com

Ontario Recreation Facilities Association

Building Community Since 1947

ONTARIO RECREATION FACILITIES ASSOCIATION INC.
1 Concorde Gate, Suite 102, Toronto, Ontario M3C 3N6, Canada
Tel: 416-426-7062 Fax: 416.426.7385
info@orfa.com www.orfa.com

Background

As a benefit of membership, the Ontario Recreation Facilities Association Inc. (ORFA) offers the following resource to assist owners and operators of registered ice arena refrigeration plants. The document is designed to assist in developing a solid relationship between the refrigeration plant owner and the service contractor. As required under the Operating Engineers Regulation, it is the plant owner's responsibility to design the plant maintenance and repair schedule based on operation, age, known issues, owner's manuals, regulations and industry best practice.

Key Excerpt from the Ontario Operating Engineers Regulation

"maintenance" means the inspection, testing, service or repair of a unit, equipment, plant or installation to ensure that it is safe and that it meets the requirements of its design and this Regulation, and "maintain" has a corresponding meaning.

General Requirement for Compliance

2. (1) Every person engaged in an activity, use of equipment, process or procedure to which the Act and this Regulation apply shall comply with the Act and this Regulation (2) In subsection (1), "activity, use of equipment, process or procedure" includes, but is not limited to, design, construction, erection, modification, management, operation, service, maintenance and repair.

It should be expected that the owner/service contractor relationship is one of mutual respect with common goals of plant safety and maximum life-cycle. However, in the end, it shall be the owner's sole responsibility and ultimate accountability to prove diligence in safe operations.

Application

3. (2) This Regulation does not apply to, (a) a person who performs work in connection with a plant other than the actual operation of it.

By designing clear documentation on what work is expected in the annual and supplement service contractor visits, the plant owner will be better positioned to place requests for service proposals; while ensuring that any transfer between refrigeration contractors leaves no gaps in repairs or maintenance.

Table 6 - Maintenance Program

Located at the back of the Regulation are several Tables that provide additional direction to plant owners and operators based on type of system and design.

The following information is considered essential for all plant owners and operators to be aware of and comply with as required.

"Failing to provide a plant Certificate of Qualification" prescribed refrigeration compressor maintenance and service program to a standard prescribed by the refrigeration compressor manufacturer will result in the suspension of unattended status and the attendance of a certified Operating Engineer/Operator will be required, to the requirements of a guarded plant, until the prescribed maintenance and service requirements are attained."

In addition, the ORFA strongly recommends that all registered ice arena refrigeration plants develop and maintain detailed asset management plans that clearly identifies the age, condition and expected life-cycle of all refrigeration plant equipment. This information must form part of the plants maintenance planning activities, as well as the overall facilities budgetary capital planning processes. The http://orfa.com/rfam tool will assist owners in this responsibility.

ORFA members are invited to submit additional information to improve this document at: info@orfa.com

Introduction

The [INSERT COMMUNITY NAME HERE] hereby referred to as the "owner" is obligated under the Operating Engineers Regulation (OER) to be in a contractual relationship with a recognized refrigeration contractor. As the refrigeration contractor is considered the expert in in maintenance and upkeep of this type of equipment, the relationship between the corporation and the refrigeration contractor must be managed with due diligence. The "owner" shall carefully consider all recommendations from the refrigeration contractor in respect to plant, worker and public safety. From time to time, the "owner" will tender for services. This shift in service provider requires that a detailed schedule of maintenance and upkeep be coordinated and logged. The following document will guide the relationship between the "owner" and the refrigeration contractor service provider.

Terms and Conditions for Refrigeration Contractor Services

#		☑
1.	The refrigeration contractor shall not attend the facility or conduct any work without permission from the "owner".	
2.	The refrigeration contractor shall provide to the "owner" an update of mileage and mechanic hourly rates, as well as any other fees for services by January 31st of each year – failing to complete this shall have the previous years rates applied until December 31st.	
3.	The refrigeration contractor shall update the "owner" on any changes to regulatory compliance under the Operating Engineers Regulation, Occupational Health and safety Act and the B-52 Mechanical Refrigeration Code or industry best practices.	
4.	The "owner" has adopted the ORFA Suggested Guidelines for Refrigeration Plant Maintenance document and shall work with the refrigeration contractor to implement all recommendations outlined in the resource.	
5.	The refrigeration contractor shall supply a refrigeration mechanic with no less than 5-years of ice arena refrigeration experience and that is trained specifically in the maintenance of all equipment found in the refrigeration plant.	
6.	The refrigeration contractor shall be responsible to ensure that the mechanic provided is current with all necessary training related to the work being performed. This will include, but not limited to: ▪ WHMIS and/or hazardous material handling ▪ First Aid ▪ Working at heights ▪ Working alone ▪ Emergency Preparedness	
7.	The refrigeration contractor is responsible to provide all necessary Personal Protective Equipment (PPE) and ensure that it is in proper working condition and worn as required.	
8.	On behalf of the registered plant "owner", and as part of the annual maintenance review, the refrigeration contractor shall identify and conduct all recommended or necessary manufacturer maintenance and service recommendations specific to compressors, flooded chiller and air/water cooled condenser. The refrigeration contractor shall immediately advise the "owner" of any equipment, pipe or other related matter that may be cause for a safety concern.	
9.	The refrigeration contractor shall complete in detail, any repairs, adjustments, testing or equipment replacement in the plant room maintenance log book.	
10.	Any high-risk work that may result in a primary or secondary leak or emergency must be pre-discussed with the "owner" to confirm that an adequate response plan is in place.	

Registered Refrigeration Plant Planned Maintenance Program

As part of the regulatory obligation of the owner to ensure that compliance is being met, the following shall be considered the minimum for annual review, inspection and maintenance by the refrigeration contractor mechanic.

#	**The Refrigeration Mechanic shall:**	Mechanic Initials
	ADMINISTRATION	
1.	Conduct a complete inspection of the refrigeration plant room and equipment to identify possible safety concerns. Ensure all egress points are open and functioning properly. Any identified items must be corrected prior to any work being performed.	
2.	Review all log book entries and confirm that no abnormal operational readings have occurred, and that staff are completing log book entries in a manner that provides clear and precise information to assist in the maintenance and upkeep of the plant.	
3.	Confirm that all necessary documents and/or information are posted as required, and remain in good condition: ▪ Plant certification ▪ TSSA contact information ▪ Refrigeration contractor contact information ▪ Emergency contact information ▪ Emergency procedures and evacuation plans are in place ▪ All doors are posted with the required information ▪ All piping is correctly labelled and/or colour coded	
	COMPRESSORS	
4.	Perform all required lockout pressure tests and disconnections of the system. To detect potential risk of valve packings, sight glass gaskets, or flange joints that may have "dried out" creating weeping leaks, perform regular soap tests once a charge to the refrigeration system is in place.	
5.	Safely purge compressors, remove oil and dispose of in compliance of Regulation 347.	
6.	Remove water from oil coolers and clean the system.	
7.	Remove oil from filter and clean filter.	
8.	Remove heads and sump covers – clean gaskets face and remove all old gasket material.	
9.	Clean suction and discharge valve cages, top of pistons and cylinders, head covers, nameplate covers and flanges.	
10.	Clean crankcases.	
11.	Inspect and check for piston play.	
12.	Install new springs and valves.	
13.	Check uploader condition, clean and lubricate.	
14.	Replace oil in crankcase.	
15.	Lubricate compressor motor.	
	CONDENSER	
16.	Remove spray eliminators and confirm water spray patterns – clean nozzles as required.	
17.	Visually inspect unit to confirm no leaks – repair as required.	
18.	Clean sump tank.	
19.	Drain and clean remote sump tank.	
20.	Visually inspect fan belt – replace at any sign of wear.	
21.	Lubricate blower shaft bearing.	
22.	Visually check pumps for condition and leaks.	
23.	Replace any leaking bearing assemblies.	

24.	Replace any worn or broken pump couplings and coupling ends.	
25.	Lubricate bearing assembly and bearing.	
	CHILLER	*Initials*
26.	Ensure primary refrigerant is properly charged.	
27.	Ensure oil drain valve functions properly, emergency relief valve is present, and plug is installed.	
	SAFETY DEVICES	
28.	Start refrigeration plant and test all safety devices. They will include, but no limited to: ▪ Chiller high pressure cut-out ▪ Low oil pressure cut-outs ▪ Low pressure cut-outs ▪ High pressure cut-outs ▪ Guarded control – audible and visual alarms ▪ High discharge temperature cut-out ▪ Emergency shut-off switches – inside and outside of room ▪ Conduct a full calibration analysis and generate a report of the ammonia alarm equipment alarm set points and sensor condition	
29.	Check dates on all system relief valves to ensure they remain intact and correctly dated.	
30.	Inspect and confirm exhaust fan function.	
	SECONDARY REFRIGERANT SYSTEM	
31.	Brine tank level.	
32.	Conduct a visual header inspection. Open purge valves to confirm no air is present.	
33.	Ensure the secondary refrigerants in both the arena floor and heating floor system is at their proper levels with no air is detected in the system, that it is at the recommended viscosity and that the rust inhibitor meets the recommended levels.	
34.	Ensure the brine pumps are firmly mounted and that the motor and pump couplings are properly aligned.	
35.	Confirm that the refrigeration room has no water leaks and that no visible forms of deterioration is present.	
36.	Collect a secondary refrigerant sample and confirm proper pH level and all other required characteristics are present and that there is no primary refrigerant in the secondary.	
	ELECTRICAL	
37.	Ensure the that all electrical connections are tightened in the main panel prior to start-up.	
38.	Conduct amperage and voltage tests on all motors.	
39.	Confirm that GFCI equipment in the room is functioning properly.	
	GENERAL ROOM CONDITION	
40.	Confirm that all plant equipment pressure gauges are in proper working order and that gauge markings are legible.	
41.	Confirm that plant room condition and housekeeping meet's current industry standards.	
42.	Ensure the that all piping is safe and serviceable.	
43.	Confirm lighting levels inside the room are acceptable.	
44.	Ensure the that all valve packing is in place and no leaks are detected.	
	OTHER	
45.	Conduct a detailed review of the dehumidifier performance and confirm that it is performing as designed.	

Capital Asset Investment Planning

The "owner" is committed to ongoing capital improvements with all community assets. To assist in these efforts, the following information shall be reviewed annually.

#	Capital Item	Life Expectancy	Current Life Cycle Age	Estimated Cost of Replacement	Notes
1.	Plant Room Roof				
2.	Condenser				
3.	Compressor #1				
4.	Compressor #2				
5.	Arena Brine Pump				
6.	CC. Brine Pump				
7.	Under Slab Heating Brine Pump				
8.	Chiller				
9.	Main Electrical Panel				
10.	Compressor #1 Motor				
11.	Compressor #2 Motor				
12.	Brine expansion tank				
13.	Condenser water tank				
14.	Dehumidifier #1				
15.	Dehumidifier #1				
16.	Ammonia Alarm				

Sample Registered Refrigeration Plant Room Safety Fact Sheet

1. The refrigeration plant room is registered with the Technical Standards and Safety Authority (TSSA) and is governed by the Operating Engineers Regulation and the CSA B52 Mechanical Refrigeration Code. Copies of both documents are contained in the plant rooms operational and training manual.

2. The refrigeration plant room is considered an "unattended guarded" plant which means that the equipment is constantly being monitored by various safety devices, alarms and controls.

3. Plant operators are sanctioned to monitor the plants gauges, fluid levels and over all operations while making detailed log book entries – no plant adjustments or maintenance is to occur without prior approval from facility supervisory staff.

4. The plant is an ammonia (primary) and brine (secondary) refrigerant system. Ammonia is present inside the room in both a liquid and vapour state. Brine always remains as a liquid. All operators must read the Safety Data Sheet (SDS) for both ammonia and brine.

5. Prior to entering the plant room, operators will check the ammonia gas detector situated outside the plant room to ensure the reading is below 1ppm.

6. Required PPE must be worn.

7. The plant room ventilation system must be activated.

8. Each operator shall place the back of their hand on both doors to confirm the door is not warm/hot due to fire – if safe – enter. NEVER prop these doors open.

9. The operator shall immediately go to the emergency egress doors and check that they will open easily. If not – leave the room and find why the doors will not open.

10. Caution that water or oils may be on the floor.

11. Operators are warned that equipment will start without warning and as such, feet and hands should never be placed near any component or piece of equipment inside the room.

12. The plants electrical system is 600v. Never attempt to open the main electrical panel or conduct any electrical repairs.

13. There are a variety of safety controls inside that guard the plant – operators are permitted to reset these devices "once". Should the system fail again, and small repairs cannot be made to clear the problem, the operator must contact supervisory staff for direction.

14. Should the ammonia alarm be activated – operators must not enter the room. Activate the facilities general fire alarm system and begin to clear the building.

15. All log book entries must be made in pen. It is an offence to falsify any plant reading. If no reading is available place the letter Z in the box to indicate "no reading was taken".

16. Plant policy is to take no less than 2-readings every 8-hour shift. If any reading is cause for concern – more readings and observations should be taken (if safe to do so). Operators should contact supervisory staff any time they feel the plant may be operating outside standard operating levels or is malfunctioning.

17. Housekeeping the plant room is every operator's responsibility. Floors must be kept clean and safe while oils and garbage should not accumulate inside the room.

18. All plant operators must familiarize themselves on the location and function of the emergency eyewash and deluge shower. A clear path to these safety devices must always be available.

19. Locate the fire extinguisher. Know how to use it.

20. Review and know the plant room emergency response plan.

Registered Refrigeration Plant Room Emergency Plan

The plant operator's primary objective in emergency situations is human safety.

1.1 Types of Plant Room Emergencies

Can include a sudden unforeseen event which requires action to correct and protect lives, or property, and the environment. It may include fire, explosion or toxic material release, an electrical failure, security breach or a natural event. This document is designed to assist facility staff in preparing to manage or mitigate the effects of an emergency.

1.2 Operator Response

Operators should never attempt to deal with an emergency when they do not clearly understand the situation. Operators must accept that small leaks and fires can quickly expand increasing risk. If safe to do so, start ventilation, open doors or activate a fire extinguisher. Press the remote emergency plant stop button.

1.3 Public Safety

Plant operators must immediately warn users or the general public of any possible or existing danger(s) by activating the facilities alarm system. Once activated 911 must be contacted. Begin to clear the building with no persons being allowed back inside until the Fire Chief or their designate gives the "all clear". Remember that during an emergency, people must have clear, simple, practical instructions to follow.

1.4 EMS

Operators are expected to meet EMS at the front of the building and advise them of the situation, as well as the location of cleaning supplies, fossil fuels, or any other toxic, noxious gas or other potential risk. Operators are expected to offer their full cooperation to all emergency services.

1.5 Contact Corporate Supervisory Staff

As soon as reasonable possible, contact the facility supervisory staff and provide an update to the situation.

1.6 Corrective Action Plan

Senior community staff will formulate a plant room entry and correction plan in partnership with local EMS officials and the plant room refrigeration contractor.

1.7 Plant Room Re-Entry

Operators are not to attempt entry into the room until supervisory staff have updated them on the cause of the emergency and have reviewed staff's response to the emergency to confirm proper action was taken.

1.8 Governing Authority Contact

The Corporations CAO will direct who will contact all applicable governing agencies. They may include, but not be limited to: Technical Standards and Safety Authority, Ministry of Labour, Ministry of Environment, Electrical Safety Authority, and insurance carrier.

1.9 Additional ORFA Resources

Additional resources may be found at: http://orfa.com/Refrigeration-Plant-Operations