



**Instructor:** \_\_\_\_\_

**Contact:** \_\_\_\_\_

**Required Text:** PanGlobal Refrigeration Plant Operator 4<sup>th</sup> Edition

## **COURSE DESCRIPTION**

The Refrigeration Operator for Recreation Facilities – Level I and Level II courses are designed for individuals responsible for operating and maintaining refrigeration class ice plants in recreation facilities such as ice arenas and curling rinks. This course will prepare participants to write the Province of Manitoba Power Engineer Refrigeration Class exam.

This intensive course follows the course outline developed by the Canadian Standardization of Power Engineer Examinations Committee (SOPEEC) and utilizes the PanGlobal Training Systems Ltd.

Refrigeration Plant Operator text. Students will receive training in the following key areas:

- Act, Regulations and Codes
- Administration
- Elementary Science
- Safety
- Environmental
- Principles of Refrigeration
- Refrigeration Equipment & Components
- Refrigeration Controls & Instrumentation
- Electrical
- Refrigeration System Operation and Maintenance

Upon successfully completing both Level I and Level II, students will have the knowledge needed to

write the provincial refrigeration class power engineer exam. Participants will be given a 900 credit toward the required 1,800 hours of practical experience needed to write the Province of Manitoba Power Engineer Refrigeration Class exam.

Note: While every effort will be made to ensure students achieve success when writing the Province of Manitoba Power Engineer Refrigeration Class exam, the Instructor, Recreation Connections Manitoba and Recreation and Regional Services are not responsible for administration of this exam.

All enquiries regarding the provincial exam should be forwarded to Inspection and Technical Services  
Manitoba.



## **OBJECTIVES**

- Locate information relating to the staffing, operation, maintenance, inspection, and testing of the refrigeration plant and its equipment using reference material
- Understand the dangers associated with the operation of a refrigeration plant and the precautions to be taken to minimize or prevent such dangers
- Demonstrate an understanding of refrigeration fundamentals
- Demonstrate an understanding of compressors
- Demonstrate an understanding of the controls and accessories
- Demonstrate an understanding of condensers and cooling towers
- Demonstrate an understanding of evaporators and cooling coils
- Demonstrate an understanding of operation and maintenance
- Demonstrate a basic understanding of electricity
- Demonstrate an understanding of air conditioning
- Perform basic refrigeration calculations

## **METHODS OF INSTRUCTION**

*Class time will be divided into different combinations of the following: lecture, small and large group discussion, quizzes, workshops, video analysis*

## **CONDUCT**

Participate respectfully. Avoid interrupting the class, cell phones shall be on silent/vibrate. Arrive 10 min. prior to start of class with required materials.

Recreation Manitoba is committed to supporting respect for all persons in the classroom and assisting students to learn in a non-threatening environment. Additionally, any student needing special accommodation in this course due to a documented disability is asked to bring this to the attention of the Education Coordinator upon registration. Coordinator when registering.



## LEVEL 1 GRADES

An overall grade of 65% is required to pass the Recreation Manitoba Level 1 Refrigeration Course. Daily tests are weighted as follows:

Test Values	% of final mark
Pre-course assignment	Not graded
Test #1 ( /20)	10%
Test #2 ( /30)	10%
Test #3 ( /50)	15%
Test #4 ( /50)	15%
Level 1 Exam (100)	50%

## LEVEL 2 GRADES

Test Values	% of final mark
Pre-course assignment	Not graded
Test #1 Level 2 ( /30)	10%
Test #2 Level 2 ( /30)	10%
Test #3 Level 2 ( /50)	15%
Test #4 Level 2 ( /50)	15%
Level 2 Exam (100)	50%

**LEVEL 1 COURSE SCHEDULE**

	<b>Quiz 1 Legislation &amp; Safety</b>	<b>Quiz 2 Refrigeration Science</b>	<b>Quiz 3 Refrigeration Systems</b>	<b>Quiz 4 Energy, Absorption, Ammonia Systems</b>
8:30	Introduction			
9:00	review pre-course assignment	Introduction to Basic Mechanics		
9:30	Jurisdictional Legislation Codes and Standards		Refrigeration Basics	Energy usage (Efficiency Manitoba)
10:00				Trouble Analysis
10:30				
11:00	<i>Morning Break</i>	<i>Morning Break</i>	<i>Morning Break</i>	<i>Morning Break</i>
11:30	Introduction to Plant Safety Programs	Force, Work, Pressure, Power and Energy	Compression Refrigeration Systems	Absorption Refrigeration Systems
12:00				Course Review
12:30	<i>Lunch Break</i>	<i>Lunch Break</i>	<i>Lunch Break</i>	<i>Lunch Break</i>
13:00	Handling of Dangerous Materials	Introduction to Thermodynamics	Refrigeration System Control and Operation	Ammonia Refrigeration Safety
13:30	Plant Fire Safety			
14:00	<i>Afternoon Break</i>	<i>Afternoon Break</i>	<i>Afternoon Break</i>	<i>Afternoon Break</i>
14:30	Fire Extinguishing Methods and Equipment Refrigeration Plant Safety	Heat Transfer and Heat Exchangers	Refrigeration System Operation and Maintenance	Plant Tour
15:00				
15:30	Daily Review	Daily Review	Daily Review	Daily Review

**Level 1 FINAL**

**LEVEL 2 COURSE SCHEDULE**

8:30					
9:00	Introduction	Quiz 1 Plant Communications	Quiz 2 Electricity & Pumps	Quiz 3 Water Treatment & HVAC	Quiz 4 HVAC & Lubrication
9:30	Review Level 1	Introduction to Electricity	Cooling Tower and Condenser Water Treatment	Psychrometric Properties of Air	Trouble Analysis
10:00			Recirculating System Water Treatment	Application of the Psychrometric Chart	
10:30		<i>Flex</i>	Condensers and Cooling Towers		
11:00	Morning Break	Morning Break	Morning Break	Morning Break	Morning Break
11:30	Introduction to Energy Plant Piping Systems	DC Motor Torque	Conditioning the Air	Cooling Systems and Combination Systems	Course Review
12:00		AC Motor	Humidification	Heat Gains and Losses, and Heat Recovery Methods	
12:30	Lunch Break	Lunch Break	Lunch Break	Lunch Break	Lunch Break
13:00	Introduction to Energy Plant Valves	Types of Pumps	Fans for Air Distribution	HVAC Control Strategy	Check in & Registration
	Energy Plant Sketching	Pump Operation and Maintenance	Ventilation & Filtration	Plant Tour	
13:30					
14:00	Afternoon Break	Afternoon Break	Afternoon Break	Afternoon Break	
14:30	Plant Communications	Introduction to Compressors	HVAC duct systems	Lubrication Principles	<b>ITS EXAM</b>
15:00	Plant Maintenance and Administration	Compressor Operation and Maintenance	psychrometric properties of air	Bearings & Lubrication	
15:30	Daily Review	Review Electricity & Pumps	Review Water treatment & HVAC	Refrigeration Systems review	



## **EXAM POLICY**

Only materials approved for use during the exam may be brought into the examination room and are subject to review by the examiner. The following material will be allowed during a Power Engineer Exam:

- ASME Codes, excluding Sections VI and VII
- CSA B51, CSA B52
- Steam Tables, Reference Tables
- Provincial Acts/Regulations
- Four Figure Tables and Constants
- (this is the PanGlobal Academic Supplemental Handbook of Formulae and Constants, Steam Tables and Refrigeration Tables)
- Drawing Instruments as required

All examination candidates are required to produce Photo Identification at each exam sitting.