ATPF-1135: REFRIGERATION APPLICATIONS AND ICE MACHINES

Cuyahoga Community College

Viewing: ATPF-1135 : Refrigeration Applications and Ice Machines

Board of Trustees:
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Academic Term:
Spring 2019

Subject Code
ATPF - Applied Ind Tech - Pipefitters

Course Number:
1135

Title:
Refrigeration Applications and Ice Machines

Catalog Description:
Refrigeration course discussing various refrigeration types and conditions for proper application. Also included are defrost methods for walk-in equpment, ice machines operation and product harvest and equipment service procedures.

Credit Hour(s):
2

Lecture Hour(s):
2

Requisites

Prerequisite and Corequisite
Departmental approval: admission to Pipefitter's apprenticeship program.

Outcomes

Course Outcome(s):
Differentiate between the various types of refrigeration equipment and systems and choose the best application for the respective condition.

Objective(s):
1. List the different types of refrigeration equipment.
2. Describe various defrost methods.
3. Select the best equipment to use based on operating costs and longevity.
4. Identify different refrigeration conditions.
5. Describe the refrigeration enclosures used for walk-in coolers.
6. Explain how dissipated heat from coolers is recycled to provide auxiliary heat sources.

Course Outcome(s):
Describe various refrigeration defrost methods with respect to walk-in applications and discuss vending machines and mullion heat.

Objective(s):
1. List various walk-in refrigeration applications.
2. Differentiate between specialty display cases using cool and freeze cycles.
3. Describe the different frost cycles.
4. Describe the operation of vending machines as stand-alone units used for cooling and freezing.
5. Describe mullion heat and explain the circuitry used with respect to closed display cases.

Course Outcome(s):

Describe the equipment used to manufacture different types of ice and micro-processors that control ice sensors and water levels.

Objective(s):

1. Describe the operation of ice making machines and explain how ice is formed.
2. List the different types of manufactured ice.
3. Explain how ice shapes are produced.
4. Explain the operation of ice sensors in the refrigeration process.
5. List the specific functions of microprocessors.
6. Explain how water levels are maintained in ice making equipment.

Course Outcome(s):

Demonstrate the ability to service refrigeration enclosures and specialty equipment.

Objective(s):

1. Analyze existing conditions with respect to malfunctioning refrigeration equipment.
2. Identify possible causes for refrigeration equipment failure.
3. Differentiate between high side and low side pressure circuit problems and electrical malfunctions.
4. Evaluate refrigeration systems using the respective micro-processor to determine proper sequence of operation.
5. Connect respective refrigeration gauges to determine proper pressures at low and high side circuits.
6. Repair or replace defective refrigeration components and confirm the properly charged system.

Methods of Evaluation:

1. Quizzes
2. Tests
3. Final exam

Course Content Outline:

1. Refrigeration equipment, systems and conditions
    a. Equipment types
        i. Condensers
        ii. Compressors
        iii. Evaporators
    b. Systems
        i. Low temperature cooling
        ii. Medium temperature cooling
        iii. Single evaporator
        iv. Multiple evaporator
    c. Conditions
        i. Frozen applications
        ii. Low temperature/non-frozen
    d. Defrost methods
        i. Electric
        ii. Air cooled ambient
        iii. Internal heat
        iv. External heat
    e. Longevity and operating costs
    f. Walk-in coolers
        i. Purpose
        ii. Function
        iii. Insulating components
        iv. Operation
2. Defrost methods and specialty applications
    a. Defrost cycles
        i. Internal heat
        ii. External heat
        iii. Coil de-icing
    b. Vending machines

    i. Stand- alone units
    ii. Cooling-freezing
  c. Mullion heat
    i. Condensation control
    ii. Controls
      1. Electrical
      2. Defrost
  d. Walk-in refrigeration units
    i. Permanent
    ii. Knock down
    iii. Application
      1. Storage
      2. Temperature control
      3. Condensate removal
  e. Specialty cases
    i. Cooling cycles
      1. Product preservation
      2. Temperature maintenance
    ii. Freeze cycle
    iii. Types
      1. Open
      2. Closed
3. Ice machines and microprocessors
  a. Ice machine types
    i. Size
    ii. Cube description
  b. Ice formation
    i. Water flow
    ii. Evaporator plate
  c. Types of ice
    i. Square
    ii. Half moon
    iii. Round
    iv. Hollow
  d. Ice production
    i. Refrigerant cooling
    ii. Water travel
    iii. Plate cooling
    iv. Limit control
    v. Harvest cycle
  e. Microprocessor
    i. Components
      1. Set point potentiometer
      2. Temperature sensor
      3. Voltage controller
      4. Circuitry
      5. Thermistor
    ii. Function
      1. Temperature control
      2. Water pump
      3. Defrost cycle
      4. Voltage sensor
  f. Water level
    i. Controls
    ii. Floats
    iii. Maintenance
4. Service/troubleshooting

a. Malfunctioning refrigeration equipment
    i. Existing conditions
        1. Temperature
        2. Voltages
        3. Equipment rotation
    ii. Refrigeration equipment
        1. Thermostat
        2. Connections/wiring
        3. Fans/motors
b. Pressure circuitry
    i. High side pressure
        1. Refrigerant levels
        2. Thermo expansion valve
    ii. Low side pressure
        1. Under charged system
        2. Refrigerant flow
c. Microprocessor
    i. Evaluation
    ii. Data analysis
    iii. Sequence of operations
    iv. Solutions
d. Refrigeration gages
    i. Pressures
        1. High
        2. Low
    ii. Recharge systems
    iii. Gage manifold
e. Charged system
f. Components
    i. Repair
    ii. Replacement
g. Analysis
    i. Practical applications
    ii. Theoretical solutions

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Resources

United Association Training Department. *HVAC/R Training.* Current edition. International Pipe Trades Training Committee, Inc., Washington, D.C., 2006.

Thomas W. Frankland. *Pipe Trades.* current edition. Glencoe/McGraw-Hill, New York, New York, 1969.

Althouse, Turnquist and Bracciano. *Modern Refrigeration and Air Conditioning.* 4th edition. Goodheart-Willcox Co., South Holland, Illinois, 1969.

Resources Other

1. http://www.free-ed.net/sweethaven/MechTech/Refrigeration/coursemain.asp?lesNum=4&modNum=1
2. http://physics.about.com/od/glossary/g/heat.htm
3. http://www.refrigerationbasics.com/1024x768/definitions1.htm

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