ATPF-1055: EVAPORATORS, CONDENSERS, AND COMPRESSORS

Cuyahoga Community College

Viewing: ATPF-1055 : Evaporators, Condensers, and Compressors

Board of Trustees:
2015-12-03

Academic Term:
Spring 2019

Subject Code
ATPF - Applied Ind Tech - Pipefitters

Course Number:
1055

Title:
Evaporators, Condensers, and Compressors

Catalog Description:
Course covers the function and purpose of evaporators, condensers and compressors used in the refrigeration industry. Included is a discussion of the respective components and the respective operation with respect to each other and performance in the air cooling process.

Credit Hour(s):
2

Lecture Hour(s):
2

Requisites

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

Outcomes

Course Outcome(s):
Explain the function of evaporators in a refrigeration system, the heat exchange process, and the evaluation performance of the system.

Objective(s):
1. Define the terms associated with air cooling and chilled water systems.
2. Identify the different types of evaporators.
3. Describe the process of heat absorption using boiling and condensing temperatures of refrigerants.
4. Discuss the heat exchange characteristics of the evaporator.
5. Explain the differences between latent and sensible heat.
6. Explain how optimum performance of an evaporator is determined by superheat.

Course Outcome(s):
Discuss the purpose of a condenser and its components.

Objective(s):
1. Identify the parts of a standard condenser.
2. Describe the operation of a shell tube heat exchanger.
3. Describe the different types of head pressure controls and discuss the respective operations.
4. List the different types of condensers.
5. Discuss the purpose of condensers as related to the refrigeration industry.
6. Differentiate between water cooled and air cooled systems.

Course Outcome(s):

Discuss the purpose of various types of refrigeration compressors and identify their different components.

Objective(s):

1. Explain how compressors are used to increase the temperature and pressure of vapor refrigerant.
2. List the different types of compressors.
3. Identify the components of a standard compressor.
4. Differentiate between hermetically sealed and bolted compressors.
5. Explain how rotary compressors are used in conjunction with gear systems.
6. Discuss the operation of a scroll type compressor with respect to different spiral mechanisms.

Methods of Evaluation:

1. Class participation
2. Quizzes
3. Tests
4. Final exam

Course Content Outline:

1. Evaporators
    a. Terminology
        i. Chilled water
        ii. Heat change
        iii. Dehumidification
        iv. Boiling point
        v. Convection current
        vi. Thermostatic
        vii. Film factor
        viii. Saturated vapor
        ix. Starved coil
    b. Types
        i. Flooded
        ii. Dry
        iii. Low temperature
        iv. Natural convection
        v. Stamped
        vi. Finned tube
    c. Heat absorption
        i. Boiling temperature
        ii. Condensing
    d. Heat exchange
    e. Heat
        i. Latent
        ii. Sensible
    f. Super heat
        i. Vapor heat
        ii. Boiling point
        iii. Interpretation
2. Condensers
    a. Types
        i. Water cooled
        ii. Water
        iii. Tube within tube
    b. Purpose
        i. Heat exchanger
            1. Heat rejection from evaporator
            2. Coil heat dissipater
        ii. De-super heat

   iii. Condense
   iv. Sub-cool
c. Water cooled versus air cooled systems
d. Components
   i. Fan
   ii. Coil
   iii. Motor
e. Shell tube
   i. Refrigerant discharge
   ii. End sheets
f. Head pressure controls
   i. Fan cycling
   ii. Variable speed motor
   iii. Damper
   iv. Condenser flooding

3. Compressor
a. Purpose
   i. Vapor pump
   ii. Pressure increase
   iii. Suction pressure control
b. Types
   i. Reciprocating
   ii. Rotary
   iii. Screw
   iv. Scroll
   v. Centrifugal
c. Components
   i. Oil pump
   ii. Crankshaft
   iii. Piston and rod
   iv. Bearings
d. Hermetic versus bolted compressor
   i. Advantages
   ii. Disadvantages
   iii. Similarities
e. Rotary compressor and gears
   i. Tapered machined gear
   ii. Rotational operation
f. Scroll compressor
   i. Compression operation
   ii. Coil spring
   iii. Pressure protection

Resources

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

Althouse, Turnquist and Bracciano. *Modern Refrigeration and Air Conditioning.* 4th edition. Goodheart-Willcox Co., South Holland, Illinois, 1979.

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

Resources Other

http://www.free-ed.net/sweethaven/MechTech/Refrigeration/coursemain.asp?lesNum=4&modNum=1

http://physics.about.com/od/glossary/g/heat.htm

http://www.refrigerationbasics.com/1024x768/definitions1.htm

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