

ATPF-2165: ALL WEATHER SYSTEMS

Cuyahoga Community College

Viewing: ATPF-2165 : All Weather Systems

Board of Trustees:

2015-12-03

Academic Term:

Spring 2019

Subject Code

ATPF - Applied Ind Tech - Pipefitters

Course Number:

2165

Title:

All Weather Systems

Catalog Description:

Basic refrigeration course covering the concepts and operation of year round air conditioning systems including reverse cycle refrigeration and heat pumps. In addition, open and closed pump systems and effects on water quality will be covered.

Credit Hour(s):

2

Lecture Hour(s):

2

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Pipefitter's apprenticeship program.

Outcomes

Course Outcome(s):

Discuss concepts of year round air conditioning systems and explain air flow and voltage supplies with respect to add-on systems.

Objective(s):

1. Describe three typical year round air conditioning types.
2. List various ways of conditioning air.
3. Determine air flow for heating and cooling systems.
4. Describe two control voltage power supplies used on add-on systems.
5. Expand the concepts of add-on and packaged air conditioning.

Course Outcome(s):

Describe the operation of reverse cycle refrigeration and four way valves with respect to heat pumps.

Objective(s):

1. Explain the concepts of coefficient of performance and auxiliary heat.
2. Discuss the control sequence of an air to air heat pump system.
3. Discuss ways to increase heat pump efficiency.
4. Outline preventative maintenance procedures for heat pump operations.
5. Explain the operation of reverse cycle refrigeration.
6. Explain the function and operation of heat pump system components.
7. List heat sources commonly used in heat pump systems.
8. Discuss the efficiency determinate of a heat pump.

Course Outcome(s):

Discuss open and closed loop geothermal heat pump systems and explain the effects of water quality on loop systems and configurations.

Objective(s):

1. Discuss the function of geothermal heat systems.
2. List and identify the terms related to geothermal systems.
3. Differentiate between open and closed systems.
4. Explain the effects of water quality on geothermal heat pumps.
5. Describe series and parallel configurations in geothermal heat pump systems and list advantages and disadvantages of each.

Methods of Evaluation:

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

Course Content Outline:

1. Year round air conditioning
 - a. Types
 - i. Gas
 - ii. Oil
 - iii. Heat pump
 - b. Conditioning air methods
 - i. Heated
 - ii. Cooled
 - iii. Humidified
 - iv. Cleaned
 - c. Air flow
 - i. Determination
 1. Room size
 2. Geographical
 - ii. Requirements
 1. Heating
 2. Cooling
 3. Direction
 - iii. Movement
 - d. Air flow control
 - i. Volume/dampers
 - ii. Motor pulleys
 - iii. Multi-speed motors
 - e. Voltage power supplies
 - i. Low voltage transformers
 - ii. 40v transformers
 1. Fan relays
 2. Compressor contactor
 - f. Add-on air conditioning
 - i. System upgrades
 - ii. Air distribution/duct sizes
 - g. Packaged air
2. Heat pump
 - a. Operation
 - i. Reverse cycle
 - ii. Air to air
 - iii. Water to air
 - iv. Ground/water to air
 - v. Solar assisted
 - b. Functions

- i. Heat laden vapor
- ii. Economical
- iii. Efficient
- c. Heat sources
 - i. Gas
 - ii. Electricity
 - iii. Ground water
- d. Efficiency determinates
 - i. Metering device
 - ii. Electronic sensors
 - iii. Billing cycles
- e. Coefficient of performance
 - i. Efficiency
 - ii. 3.5 to 1
 - iii. Ambient air dependency
- f. Air to air control sequence
 - i. Space temperature
 - ii. Defrost cycle
 - iii. Indoor fan
 - iv. Outdoor fan
 - v. Compressor
 - vi. Auxiliary heat
 - vii. Emergency heat
- g. Preventative maintenance procedures
 - i. Defrost cycle
 - ii. Parts failure
 - iii. Equipment malfunction
 - iv. Continuous cycle
 - v. Reinforcement charge

3. Geothermal heat pump systems

- a. Types
 - i. Open loop
 - ii. Closed loop
 - iii. Water source
 - iv. Air source
- b. Function
 - i. Energy conservation
 - ii. Efficiency
 - iii. Economical
 - iv. Ecologically compatible
- c. Terminology
 - i. Earth coupled
 - ii. Open loop
 - iii. Closed loop
 - iv. Counter flow
 - v. Polyethylene
 - vi. Water hammering
 - vii. Dry well
 - viii. Heat exchanger
 - ix. Pressure tank
- d. Open loop system
 - i. Water heat transfer medium
 - ii. Residential/commercial
- e. Closed loop system
 - i. Ground loop
 - ii. Air loop
- f. Water quality effects
 - i. Water supply
 - ii. Corrosion

- iii. Blockages
- iv. Counter flow
- g. Series configuration

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, 1979.

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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