ATPF-2115: ELECTRIC HEAT

Cuyahoga Community College

Viewing: ATPF-2115 : Electric Heat

Board of Trustees:
2015-12-03

Academic Term:
Spring 2019

Subject Code
ATPF - Applied Ind Tech - Pipefitters

Course Number:
2115

Title:
Electric Heat

Catalog Description:
Introductory course covering electric heat devices including hydronic boilers and controls that regulate equipment operation and safety. Included are service technician repair and preventative maintenance guidelines.

Credit Hour(s):
1

Lecture Hour(s):
1

Requisites

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

Outcomes

Course Outcome(s):
Describe the operation of electrical devices, identify the types and explain the purpose of the different controls.

Objective(s):
1. List the different types of electrical heating devices.
2. Identify the various types of automatic controls and contactors that maintain operation sequence.
3. Explain the operation of electric hydronic boilers and discuss its efficiency with respect to other heating types.
4. Discuss the operation of electric hydronic boilers and explain the pumping process through the various thermal components.
5. Differentiate between unit contactors and thermostats.

Course Outcome(s):
Demonstrate the ability to troubleshoot mechanical problems and perform preventative maintenance.

Objective(s):
1. Explain the function of sequencer in identifying existing mechanical problems.
2. Identify the different mechanical failures common to electric heat producing devices.
3. List the procedural steps followed in performing preventative maintenance operations
4. Explain how the ammeter is used to diagnose service problems.
5. Differentiate between heating appliance malfunctions and central electrical heating systems breakdowns.

Methods of Evaluation:
Class participation, quizzes, tests and final exam;

Course Content Outline:

1. Electric heat producing devices
   a. Types
      i. Base board
      ii. Unit
      iii. Central appliances
   b. Controls
      i. Thermostats
      ii. Sequencer
      iii. Contactor
   c. Controller function
      i. Heat anticipator
      ii. Heat element activation
      iii. Stage heating
   d. Hydronic boiler
      i. Operation
         1. Heating element
         2. Pump and piping high temperature termination
      ii. Pumping process
         1. Thermal components
         2. Circulation
         3. Heat exchange
      iii. Contactors
         1. Equipment activation
         2. Relay operation
         3. Coil
      iv. Thermostat
         1. Heat control
         2. Heat anticipator
         3. Bimetal
2. Troubleshooting and preventative maintenance
   a. Mechanical problems
      i. Open disconnects
      ii. Open fuse/breakers
      iii. High temperature fuse link
      iv. Wiring
      v. Heating element failure
   b. Preventative maintenance
      i. Customer service guidelines
         1. Professionalism
         2. General appearance
         3. Communication
      ii. Procedures
         1. Wiring
         2. Filtration
         3. Lubrication
         4. Part/equipment replacement
   c. Ammeter
      i. Function
      ii. Diagnosis
         1. Min/max amperage
         2. Voltage operation
         3. Continuity
   d. Malfunctions
      i. Heating appliances
         1. Element
         2. Line voltage
      ii. Central heating systems
         1. Contactors
         2. Relays

3. Coils
4. Belts
5. Bearings
6. Heat exchanger

iii. Sequencer
1. Contacts
2. Problem diagnosis
3. Part/equipment replacement

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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