

# ATPF-1360: HYDRONIC HEATING AND COOLING

## Cuyahoga Community College

**Viewing: ATPF-1360 : Hydronic Heating and Cooling**

**Board of Trustees:**

2012-06-28

**Academic Term:**

Spring 2019

**Subject Code**

ATPF - Applied Ind Tech - Pipefitters

**Course Number:**

1360

**Title:**

Hydronic Heating and Cooling

**Catalog Description:**

A study of hydronic heating and cooling systems used by pipefitters and service technicians in the construction industry. Course includes a discussion of various systems, equipment sizing, air control and installation techniques. Course includes a discussion of various systems, equipment sizing, air control and installation techniques and factors that affect chilled water equipment.

**Credit Hour(s):**

2

**Lecture Hour(s):**

2

### Requisites

**Prerequisite and Corequisite**

Departmental approval: admission to Pipefitter's apprenticeship program.

### Outcomes

**Course Outcome(s):**

1. Identify the systems common to hydronic heating and cooling.

**Objective(s):**

1. 1. List the various piping systems.
2. 2. Distinguish between the different return water systems.
3. 3. Differentiate between the various control systems.
4. 4. Describe the respective valves and valve operations used in hydraulics.

---

**Course Outcome(s):**

2. Categorize the pipe and equipment sizes required for hydronic systems.

**Objective(s):**

1. 1. Calculate the respective heat-loss factors due to varying pipe sizes.
2. 2. Establish correct boiler and tank capacities for compression and expansion systems.
3. 3. Determine proper pump requirements needed for in line and floor mounted centrifugal pumps.

---

**Course Outcome(s):**

3. Analyze various factors affecting chilled water equipment.

**Objective(s):**

1. 1. Demonstrate the operation of fan coil units used for distribution.
2. 2. Differentiate between rotary, reciprocating and screw type compressors.

---

**Course Outcome(s):**

4. Install hydronic heating and cooling systems.

**Objective(s):**

1. 1. Interpret mechanical and shop drawings.
2. 2. Select materials and equipment required for installation.
3. 3. Locate and install control systems.
4. 4. Install hydronic heating and cooling piping and equipment.

---

**Methods of Evaluation:**

1. Quizzes
2. Tests
3. Class participation

**Course Content Outline:**

1. Hydronic heating and cooling systems
  - a. Series loop
    - i. Cost advantages
    - ii. Comfort
    - iii. Applications
  - b. One pipe
    - i. Temperature control
      1. Automatic
      2. Manual
    - ii. Zoning
    - iii. Two pipe
      1. Direct return
      2. Reverse operations
    - iv. Three pipe
      1. Hot water
      2. Chilled water
      3. Common returns
      4. Seasonal change over
    - v. Four pipe
      1. Independent piping
        - a. Boiler or converted hot water
        - b. Chilled water
        - c. Control valves
          - i. Single seated valves
          - ii. Double seated
          - iii. Three way valves
  2. Sizing
    - a. Equipment
      - i. Boilers
      - ii. Tanks
      - iii. Pumps
      - iv. Pipes
    - b. Boilers
      - i. Capacity
      - ii. Ratings
        1. Gross
        2. Net
    - c. Tanks
      - i. Compression
      - ii. Expansion
    - d. Pumps

- i. In line
- ii. Floor mounted
- iii. Pump charts
- e. Pipe
  - i. Equivalent lengths
  - ii. Capacity
  - iii. Pressure drops
    - 1. Resistance
    - 2. Riser considerations
- 3. Factors affecting chilled water equipment
  - a. Fan coil units
    - i. Operation
    - ii. Distribution
  - b. Compressors
    - i. Rotary
    - ii. Screw
    - iii. Reciprocating
  - c. Heat transfer
    - i. Conventional systems
    - ii. Cooling towers
- 1. Installation
  - a. Drawing interpretation
    - i. Mechanical
    - ii. Shop
  - b. Material and equipment selection
  - c. Control systems
    - i. Location
    - ii. Installation
  - d. Shop projects

---

## Resources

United Association. *Hydronic Heating and Cooling*. Current. United Association Annapolis Md., 2011.

---

Chris Langley and Andrew Sacks. *Steam and Hot Water Primer*. Current. LAMA Books Sleepy Hollow Ave Hayward CA, 2005.

---

Frederick M. Steingress Daryl R. Walker. *Low Pressure Boilers*. existing. LAMA BOOKS Hayward, Ca, 2005.

---

John Siegenthaler. *Modern hydronic heating for residential and light commercial buildings*. 2nd. Cengage Learning Stamford, Conn, 2003.

---

## Resources Other

[www.hydronicpros.com/](http://www.hydronicpros.com/) -

[chchydronics.com/](http://chchydronics.com/)

[www.hydronicseng.com/](http://www.hydronicseng.com/) -

Top of page

Key: 573