

# ATPF-2145: AIR DISTRIBUTION AND PSYCHROMETRICS

## Cuyahoga Community College

**Viewing: ATPF-2145 : Air Distribution and Psychrometrics**

**Board of Trustees:**

2015-12-03

**Academic Term:**

Fall 2020

**Subject Code**

ATPF - Applied Ind Tech - Pipefitters

**Course Number:**

2145

**Title:**

Air Distribution and Psychrometrics

**Catalog Description:**

Course covers air quality, psychrometric and air distribution of heat systems with respect to the pipefitting industry. Properties of air and air pollutants, heat recovery and purification will also be discussed.

**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 the components of air distribution including various air duct carrying systems, related electrical circuits and controls and different mechanical equipment.

**Objective(s):**

1. List the different types of duct systems.
2. Define the terms associated with air quality and distribution.
3. Differentiate between air plenums and system branches.
4. Identify the components of insulated and extended ductwork.
5. Discuss the electrical concerns including Personal Protective Equipment (PPE), tool usage and power supplies with respect to circuits of air handlers and condensers.

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**Course Outcome(s):**

Discuss air quality in terms of comfort and describe various air pollutants and solutions used to purify interior and exterior environments.

**Objective(s):**

1. Describe the function and operation of a heat recovery ventilator.
2. Describe the operation of a filtration system and list the respective stages of a filtration process.
3. Define the terms used with respect to air quality and purification.
4. Explain how air quality is related to personal health.
5. List different air pollutants and their respective origins.
6. List different solutions related to air purification.

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**Course Outcome(s):**

Discuss the study of air in terms of function, density and humidification and describe the measurement of relative humidity.

**Objective(s):**

1. Define the terms used with respect to the study of air.
2. List the properties of air and describe the relative function of each.
3. Explain how the weight of air is determined.
4. Discuss the relationship of air temperature and humidity.
5. Differentiate between humidity and relative humidity.
6. Differentiate between wet and dry bulb temperatures.
7. Explain the function and operation of a sling psychrometer.

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**Methods of Evaluation:**

1. Participation
2. Quizzes
3. Homework
4. Final Exam

**Course Content Outline:**

1. Air distribution
  - a. Duct types
    - i. Flat/round
    - ii. Flex
  - iii. Insulated
  - iv. Extended
- b. Terminology
  - i. Psychrometric
  - ii. Duct
  - iii. Ventilation
  - iv. Humidification
  - v. Plenum
  - vi. System branch
- c. Air plenum
  - i. Main air distribution
  - ii. Mixing box
- d. System branch
  - i. Distribution
  - ii. Extended loops
  - iii. Perimeter ductwork
- e. Components
  - i. Fan
  - ii. Turning veins
  - iii. Filtration
  - iv. Damper
  - v. Reducer
  - vi. Grill
  - vii. Diffuser
- f. Electrical concerns
  - i. Limit switch
  - ii. Overload
  - iii. Short circuit
  - iv. Power supply

- 2. Air quality
- a. Terminology
  - i. Contaminates
  - ii. Purification
  - iii. Hard water
  - iv. Heat recovery ventilator

- v. Sling psychrometer
- vi. Atomizing humidifier
- b. Air quality and personal health
  - i. Allergies
  - ii. Respiratory
- c. Air pollutants
  - i. Stored fuel
  - ii. Asbestos
  - iii. Mold
  - iv. Dust mites
  - v. Carbon monoxide
- d. Pollutant origin
  - i. Mechanical rooms
  - ii. Second hand smoke
  - iii. Wet areas
  - iv. Coverings
    - i. Air purification solutions
      - 1. Ventilation
      - 2. Filtration
      - 3. Maintenance
      - 4. Humidification
    - ii. Heat recovery ventilator
      - 1. Recaptured energy
      - 2. System efficiency
      - 3. Green system
    - iii. Filtration system
      - 1. Stages
        - a. Initial
        - b. Constant
        - c. Back up
      - 2. Mechanical
      - 3. Electrical
      - 4. Ion generators
      - 5. Disposable
- 3. Air
  - a. Terminology
    - i. Density
    - ii. Air weight
    - iii. Bulb temperature
      - 1. Dry
      - 2. Wet
    - iv. Dew point
  - b. Properties
    - i. Oxygen
    - ii. Nitrogen
    - iii. Other
  - c. Weight of air
    - i. Pounds per cubic foot
    - ii. Purpose
      - 1. Air change
      - 2. Maintenance schedule
    - iii. Dalton's Law
  - d. Air temperature and relative humidity
    - i. Comfort zone
    - ii. Solutions
    - iii. Mold generation
    - iv. Static electricity
  - e. Bulb temperature

- i. Wet bulb
  - 1. Humidification
  - 2. Comfort zone
  - 3. Moisture content
  - 4. Saturation
- ii. Dry bulb
  - 1. Humidity control
  - 2. Differential
  - 3. Latent heat
  - 4. Sensible heat
- f. Relative humidity
  - i. Water vapor
  - ii. Weight of air
- g. Humidity
  - i. Saturation point
  - ii. Comfort
- h. Sling psychrometer
  - i. Function
    - 1. Moisture content
    - 2. Maintenance
  - ii. Operation
    - 1. Manual
    - 2. Time
    - 3. Rotational speed

## Resources

R. Jesse Phagan. *Applied Mathematics*. 4th edition. Goodheart-Wilcox Co./Tinley Park, IL, 2010.

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

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

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## 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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