

ATSM-1090: HVAC CLEANING

Cuyahoga Community College

Viewing: ATSM-1090 : HVAC Cleaning

Academic Term:

Fall 2020

Subject Code

ATSM - Applied Ind Tech- Sheetmetal

Course Number:

1090

Title:

HVAC Cleaning

Catalog Description:

Covers the cleaning of various Heating Ventilation and Air Conditioning (HVAC) systems including methods, health and safety issues and restoration and remediation evaluations. Included are demonstrations and applications of cleaning procedures using required tools and equipment.

Credit Hour(s):

1

Lecture Hour(s):

1

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Sheet Metal Workers apprenticeship program.

Outcomes

Course Outcome(s):

Discuss the purpose of HVAC cleaning including occupant and environmental protection, the various types of HVAC systems and cleaning equipment and vacuum collection filtration.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. List and define the terms related to HVAC cleaning.
2. Review the historical perspective of HVAC cleaning.
3. Differentiate between air duct cleaning and system cleaning.
4. Discuss the purpose of air duct systems cleaning including occupant safety and environmental protection.
5. Identify the different types of HVAC systems, including residential and commercial, components and respective configurations.
6. Identify the different types of air systems cleaning equipment.
7. Discuss the practice of building occupant protection including project evaluation, containment strategies, and cross contamination.
8. Explain specific security issues and responsibilities with respect to individual projects.

Course Outcome(s):

Discuss HVAC cleaning procedures and methods, health and safety issues, restoration and cleaning evaluation, and demonstrate the ability to effectively clean ductwork and components and maintain the integrity of the system.

Essential Learning Outcome Mapping:

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

Objective(s):

1. List and explain the procedures and methods to be followed for effective HVAC Systems cleaning.
 2. Identify the health and safety issues related to worker safety during the cleaning process.
 3. Discuss the restoration and repair of the HVAC system and explain the evaluation of cleaning effectiveness process as prescribed in the work scope of the project.
 4. Evaluate HVAC equipment type and establish a vacuum and negative air pressure system for cleaning.
 5. Interpret construction drawings to locate ductwork locations and origin.
 6. Cut access panel and openings as required to enable effective cleaning.
 7. Assess HVAC system for presence of mold and remediate as required.
 8. Scrub ductwork using brushes, air whips, air pressure, hand tools and vacuum.
 9. Evaluate the HVAC system for cleanliness per scope of work.
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Methods of Evaluation:

1. Quizzes
2. Tests
3. Class participation
4. Skill demonstration

Course Content Outline:

1. HVAC: systems cleaning
 - a. Terminology
 - i. Indoor air quality
 - ii. Energy savings and comfort
 - iii. Equipment efficiency and life span
 - iv. Catastrophic events
 - v. NADCA National Air Duct Cleaning Association
 - vi. ACCA Air Conditioning Contractors of America
 - vii. ASHRAE American Society of Heating, Refrigeration, and Air Conditioning Engineers
 - viii. IICRC Institute of Inspection Cleaning and Restoration Certification
 - ix. Restoration
 - x. Microbiological contamination
 - xi. Trams scene cleanup
 - b. Historical perspective
 - i. Early HVAC
 1. Oil furnace
 2. Coal furnace
 3. Issues
 - a. Soot
 - b. Health
 - c. Cleanliness
 - ii. New technology
 1. Chemicals
 2. Electronics
 3. Training
 - c. Air duct cleaning versus system cleaning
 - i. Air duct
 1. Ducts
 2. Diffusers
 3. Registers
 - ii. System
 1. Duct, diffuser, registers
 2. Blowers
 3. Condensers
 4. Coils
 5. Filters
 6. General system

- d. Purpose
 - i. Air quality
 - ii. Energy savings and comfort
 - iii. Life span
- e. Air systems cleaning types
 - i. Residential
 - 1. Split
 - a. Outside condenser
 - b. Inside coil
 - 2. Evaporated
 - 3. Geothermal
 - 4. Configuration
 - a. Up flow
 - b. Down flow
 - c. Horizontal
 - d. Perimeter look
 - e. Radial perimeter
 - f. Trunk and branch
 - ii. Commercial
 - 1. Package units
 - 2. Built up
 - 3. PTAC packaged terminal air conditioner
 - 4. Configuration
 - a. Single zone
 - b. Multiple zone
 - c. Constant volume
 - d. Variable volume
 - e. Single path systems
 - f. Double path systems
- f. Cleaning equipment types
 - i. Vacuum collection devices
 - ii. Electric HEPA vacuum
 - iii. Gas driven vacuum
 - iv. Truck mounted vacuum
 - v. Air filtration devices
 - 1. Electric air compressors
 - 2. Gas driven air compressors
 - 3. HEPA vacuum: wet and dry
 - 4. Pressure washer
 - 5. Steam cleaner
 - 6. Agitation devices
 - 7. Hand tools
 - 8. Power tools
 - 9. Robotics
 - 10. Paint sprayer
 - 11. Fiber optics
 - 12. Miscellaneous
- g. Health and safety
 - i. Building occupant protection
 - 1. Scope of work
 - a. Project duration
 - b. Completion verification
 - c. Expected outcome
 - 2. Preparation and protection
 - ii. Project evaluation
 - 1. Protection of furnishings
 - 2. Occupant protection
 - 3. Hours of operation
 - 4. Fire and emergency exit procedures

5. Wash and decontamination facilities
6. Vehicle parking
7. Tenant notification
8. Signs and barricades
9. Placement and storage of cleaning equipment
- iii. Containment strategies
 1. Engineering controls
 2. Containment area
 3. Workspace isolation
 4. Barrier and pressure differentials
- iv. Cross contamination
 1. Equipment cleaning
 2. Condition of equipment
 3. Particle counting
 4. Smoke testing
- h. Security issues
 - i. Background check
 - ii. Alarm systems
 - iii. Off hour security
 - iv. Detectors, alarms and controls
2. HVAC cleaning: methods and procedure
1. Methods and procedure
 - a. Methods
 - i. Manual
 - ii. Mechanical
 1. Scrubbing equipment
 2. Vacuum system
 - iii. Procedures
 1. System assessment
 2. Cleaning process
 3. Evaluation
2. Health and safety issues
 - a. Occupational Safety and Health Administration OSHA
 - i. Housekeeping
 - ii. Electrical
 - iii. Respirator
 - iv. Personal protective equipment PPE
 - v. Environmental protection agency EPA
 1. Biological
 2. Biocides Antimicrobials
3. Restoration and repair
 - a. Restoration
 - i. Insulation replacement
 - ii. Encapsulation and coatings
 - iii. Remediation
 - iv. Repair
 1. Duct leakage
 2. Access points closures
 3. Component replacement
4. Vacuum and negative air
 - a. Vacuum
 - i. High Efficiency Particulate Air
 - ii. Zoning
 - iii. System type
 - iv. Job situation
 - v. Negative
 1. Pressure: negative 4
 2. Particulate removal
5. Construction drawings and documents

- a. Duct type
 - b. Terminals
 - c. Access
 - d. Room locations
 - e. Diffusers
 - f. Grills
6. Access panel and openings
- a. Existing “as built”
 - b. Job specific
 - c. Cleaning effectiveness
7. HVAC assessment and remediation
- a. Assessment
 - i. Accessibility
 - ii. Cleanliness
 - iii. Mold
 - iv. Remediation
 - 1. Restoration protocol
 - a. Insulation
 - b. Permanent closures of access points
 - c. Sheet Metal Air Conditioning Contractors National Association SMACNA standards
 - d. NADCA standards
 - e. ACCA standards
8. Ductwork scrubbing
- a. Hand tools
 - i. Sheet metal tools
 - ii. Sponges
 - iii. Fin comb
 - iv. Scraper
 - v. Brushes
 - vi. Power tools/equipment
 - 1. HEPA Vacuum
 - 2. Air whip
 - 3. Filtration system
 - 4. Pressure washer
 - 5. Fiber optics
 - 6. Paint sprayer
 - 7. Steam cleaner
9. Cleanliness evaluation
- a. Visual
 - b. NADCA standards
 - c. Surface comparison test
 - d. Microbial air samples
 - e. Adhesion testing
 - f. Coil cleanliness verification

Resources

International Training Institute. *HVAC Systems Cleaning and Restoration*. 2009. International Training Institute: Fairfax, Virginia, 2009. 2009.

National Air duct Cleaning Association, . *ACR the NADCA Standard* . current. National Air Duct Cleaners Association: Mt. Laurel, New Jersey, 2013. 2013.

Air Conditioning Contractors Association Systems. *ACCA Standard 6 Restoring the Cleanliness of HVAC S*. 2007 edition. Arlington, Virginia, 2007. 2007.

Resources Other

www.nadca.com (<http://www.nadca.com>)

www.acca.org (<http://www.acca.org>)

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