

ATLB-2680: GAS DISTRIBUTION WORKER

Cuyahoga Community College

Viewing: ATLB-2680 : Gas Distribution Worker

Board of Trustees:

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Academic Term:

Spring 2019

Subject Code

ATLB - AIT-Construct/Hazard Material

Course Number:

2680

Title:

Gas Distribution Worker

Catalog Description:

Coverage of gas pipeline installations for commercial and residential applications including proper pipe handling, fusion and placement, and site preparation and restoration. Additionally, all safety regulations as prescribed by OSHA(Occupational Safety and Health Administration), MUTCD (Manual On Uniform Traffic Control Devices) and ODOT (Ohio Department of Transportation), for general public, environmental and worker safety will be addressed with demonstration of these procedures and student applications.

Credit Hour(s):

7

Lecture Hour(s):

7

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Laborer's apprenticeship program.

Outcomes

Course Outcome(s):

Discuss the respective subparts of the OSHA construction standard and the General Duty Clause and examine the roles of the employer and employee with respect to jobsite safety and health.

Objective(s):

1. Review the history of OSHA and explain the General Duty Clause as it pertains to worker protection and rights.
2. Identify and define key terms related to the CFR 1926 OSHA standard.
3. Differentiate between OSHA and NIOSH.
4. Examine the various subparts of the construction standard.
5. Compare the roles of the employer and employee with respect to jobsite safety and health.
6. Discuss and explain how Focus Four relates to jobsite injuries.

Course Outcome(s):

Interpret the Manual of Uniform Traffic Control Devices (MUTCD)to properly select channelized devices, place signage, layout tapers and establish device spacing.

Objective(s):

1. Calculate the length of taper as prescribed in the MUTCD standard and determined by speed limits and roadway type.
2. Establish device spacing determined by posted speed limits and or work zone tangents.
3. Analyze roadway situations to determine the proper cone sizes, barrels, tubular markers and barricades to channelize traffic during highway maintenance and construction.
4. Evaluate roadway types to establish proper signage based upon size of sign and height above roadway, spacing and methods of mounting.
5. List and define the various types of roadway tapers.

Course Outcome(s):

Identify the characteristics of safe flagging operations personnel including conduct and attention to detail.

Objective(s):

1. Apply the safety regulations as prescribed in the MUTCD manual including equipment and best locations of flagging operations.
2. List the different types of flagging equipment and apparel.
3. Describe personality traits required for flagging crew members.
4. Discuss the respective details of flagging operations including attentiveness and alertness.
5. Identify distractions on the worksite that may impact the safety of the workers and motorists.

Course Outcome(s):

Discuss the First Aid and CPR applications for work related emergencies including care and liabilities and perform the relative treatment for each.

Objective(s):

1. List and define the terms related to First Aid and CPR.
2. Explain the importance of emergency preparedness including care, communication and liabilities for emergency patient care.
3. Recognize signs and symptoms of heart attack and describe the care for heart attack victims.
4. Recognize choking and breathing emergencies and identify causes and provide the required treatment for each.
5. Demonstrate the ability to perform emergency First Aid and CPR procedures on affected workers.
6. Recognize and respond to common injuries including open wounds, burns, muscle, bone and joint injuries, and head, neck, and spinal injuries.
7. Recognize and respond to common environmental emergencies including heat and cold related illnesses and poisoning.

Course Outcome(s):

Discuss all aspects of trenching safety, including personal protection equipment and preventative procedure that are required for worker safety.

Objective(s):

1. Identify soil types and conditions.
2. List the different types of trench worker protection.
3. Select the proper type of preventative measures to safe guard against trench failure.
4. Identify safety measures for special installation including traffic vibrations, foundations, and soil moisture content.
5. Provide means of access and regress into and out of trench.

Course Outcome(s):

Discuss the various natural gas pipeline systems including the different pipe grades and uses and identify the safety standards for protection of the general public, environment, and property as prescribed by the United States Department of Transportation. (USDOT).

Objective(s):

1. Identify and define the terms related to gas distribution systems.
2. List the different natural gas systems used for commercial, industrial, and residential supply.
3. Discuss the properties of natural gas including physical and chemical.
4. Interpret construction drawings and job specifications to select the correct grade and size of polyethylene pipe relative to maximum operating pressure and existing pipe densities.
5. Identify the regulations as prescribed by the USDOT with respect to protection of the general public, environment, and property.

Course Outcome(s):

Demonstrate the ability to install gas pipe including proper joining of pipe and fittings and apply safety procedures as prescribed by the USDOT.

Objective(s):

1. Identify and define the terms related to gas distribution systems.
2. Select the tools and equipment required for installation of natural gas pipe.
3. Fuse pipe together using manual butt fusion procedures
4. Join gas pipe using proper techniques for mechanical, electro and hydraulic fusions.
5. Safely operate tools and equipment used for pipe and pipe fitting installations
6. Employ bracing and clamping techniques to ensure acceptable joining of pipe and pipe fittings.

Course Outcome(s):

Demonstrate the ability to properly install gas distribution piping including excavation, bedding, and pipe containment and restore existing job site to original site condition.

Objective(s):

1. Describe and discuss the methods employed in the cutting and removal of concrete and asphalt using specialized equipment including gas powered saws and pneumatic percussion tools.
 2. Discuss DOT regulations covering safe trenching operations including required clearance and pipe cover with respect to new and existing utilities.
 3. Install gas distribution pipe tapping tee, service line and riser with meter valve and perform pressure tests for bleed-off.
 4. Employ safe practices for backfilling and soil compaction surrounding gas service lines.
 5. Restore disturbed concrete and asphalt paving to original condition in accord with local building standards.
 6. Adhere to governing standards and home owner requirements for restoration of original landscaping and property condition.
 7. Discuss the placement of gas line markers and install informational signage as required by the gas service operator and the DOT.
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Methods of Evaluation:

1. Tests
2. Quizzes
3. Class participation

Course Content Outline:

1. OSHA General Duty Clause and Roles
 - a. History
 - i. Williams-Steiger Act (1970)
 - ii. Past incidents
 1. 1911 Triangle shirtwaist factory
 2. 1968 Consol Energy incident
 - b. General Duty Clause
 - i. Requirements
 1. Employer
 2. Employee
 - ii. Worker protection
 - c. Terminology
 - i. General Duty Clause
 - ii. Worker safety
 - iii. Vertical standard
 - iv. Horizontal standard
 - v. Safe work environment
 - vi. Subparts
 - vii. Qualified person
 - viii. Competent person
 - ix. Personal Protective Equipment
 - x. Fall protection
 - xi. Hazard communication
 - xii. Focus Four
 - xiii. Respiratory protection
 - xiv. Struck-by
 - xv. Caught in between
 - xvi. Whistle blower
 - d. OSHA vs NIOSH
 - i. OSHA Enforcement: Department of Labor
 - ii. NIOSH Investigation: Department of Health and Human Services
 - e. CFR 1926 Subparts
 - i. Regulations
 - ii. Outline format
 - iii. Competent person
 - iv. References other safety organizations

- v. Compliance and enforcement
- vi. Vertical and horizontal standards

f. Roles

- i. Employer
 - 1. Safe work place
 - 2. Provide training
 - 3. Record keeping
 - 4. Violation citation
- ii. Employee
 - 1. Adherence to safety policy
 - 2. Required training
 - 3. Whistle blower protection

g. Focus Four

- i. Falls
- ii. Electrocutation
- iii. Struck by

2. MUTCD

a. Federal Highway Administration

- i. State version
- ii. Federal application

b. Traffic control

c. Channelized devices

- i. Cones
- ii. Barrels
- iii. Barricades
- iv. Tubular markers

d. Roadway types

- i. Interstate high speed
- ii. Rural
- iii. Urban

e. Signs

- i. Warning
- ii. Regulatory
- iii. Guide
- iv. Proper spacing

f. Tapers

- i. Flagger
- ii. Merging
- iii. Shoulder
- iv. Shifting
- v. Downstream

g. Taper length calculations

- i. Length = (Lane Width x Speed Limit
- ii. Length = (Lane Width x (Speed Limit)²) ÷60

h. Device spacing

- i. Speed limit
- ii. Tangent of work zone
- iii. Requirements

3. Flagging

a. Safety regulations

- i. MUTCD
- ii. Equipment
- iii. Location
- iv. Apparel

b. Flagging equipment

- i. Stop/slow paddle
- ii. Flag
- iii. Flashlight
- iv. Cones

- c. Personality traits
 - i. Courtesy
 - ii. Decision makers
 - iii. Respect
 - iv. Control
 - v. Attentive
 - d. Worksite distractions
 - i. Pedestrians
 - ii. Co workers
 - iii. Radios and phones
 - iv. Noise
4. 1st aid/CPR
- a. Terminology
 - i. EMS
 - ii. Lacerations
 - iii. Burns
 - iv. Shock
 - v. Stroke
 - vi. Heat exhaustion
 - vii. Heat stroke
 - viii. Hypothermia
 - ix. Frost bite
 - x. Cardiac arrest
 - xi. Blood borne pathogens
 - xii. P.P.E.
 - xiii. Breathing barriers
 - xiv. Poison
 - xv. CPR
 - xvi. First aid
 - xvii. Choking
 - xviii. Anaphylaxis shock
 - xix. Asthma
 - xx. Diabetes
 - xxi. Insulin
 - xxii. Seizure
 - xxiii. Closed wound
 - xxiv. Avulsion
 - xxv. Tourniquet
 - xxvi. Sprain
 - xxvii. Strain
 - xxviii. Dislocation
 - xxix. Fracture
 - xxx. Contusion
 - xxxi. Supine position
 - b. Emergency preparations
 - i. Care
 - 1. Medical supplies
 - 2. Training
 - 3. Assessment
 - ii. Communication
 - 1. Contact number
 - a. EMS
 - b. Fire
 - c. Police
 - d. Hospital
 - e. Family
 - 2. Victim interview
 - 3. Protocol

- iii. Liabilities
 - 1. Consent to provide care
 - 2. Care beyond training
 - 3. Good Samaritan law
- c. Shock
 - i. Signs and symptoms
 - 1. Confusion
 - 2. Skin tone
 - a. Pale
 - b. Ashen
 - c. Cool, moist
 - 3. Nausea
 - 4. Rapid breathing
 - 5. Excessive thirst
 - 6. Rapid heart beat
 - ii. Patient care
 - 1. Supine position
 - 2. Bleed control
 - 3. Body temperature control
 - 4. Fast
 - 5. Monitor condition
- d. Heart attack versus cardiac arrest
 - i. Heart attack
 - 1. Signs and symptoms
 - a. Chest pain
 - b. Transgression pain
 - c. Dizziness
 - d. Breathing difficulty
 - e. Nausea
 - f. Skin color
 - g. Profuse sweating
 - h. Anxiety
 - i. Fatigue
 - 2. Causes
 - a. Blood flow interruption
 - b. Lack of oxygen
 - ii. Cardiac arrest
 - 1. Signs and symptoms
 - a. Lack of heart beat
 - b. Ineffective beat
 - c. Abnormal rhythm
 - 2. Causes
 - a. Abnormal electrical impulse
 - b. Electric shock
 - c. Heart muscle death
 - 3. Care for victim
 - a. 911
 - b. Position victim
 - c. Loosen clothing
 - d. Aspirin
 - e. CPR
- e. Choking and breathing emergencies
 - i. Causes
 - 1. Food
 - 2. Foreign objects
 - 3. Liquid
 - ii. Treatment
 - 1. Back blow
 - 2. Abdominal thrust

- f. First aid/CPR application
 - i. Assess scene
 - ii. Check victim
 - iii. 911
 - iv. Care
- g. Common injuries
 - i. Open wounds
 - ii. Closed wounds
 - iii. Burns
 - iv. Amputations
 - v. Bone and joint
 - vi. Head, neck, and spinal
 - vii. Treatment
 - 1. Bandages
 - 2. Pressure
 - 3. Splints
 - 4. Dressing
 - 5. Tourniquet
 - 6. Cooling
 - 7. Restraints
- h. Environmental emergencies
 - i. Heat
 - 1. Cramp
 - 2. Exhaustion
 - 3. Stroke
 - ii. Cold
 - 1. Hypothermia
 - 2. Frost bite
 - iii. Poisoning
 - 1. Insect, wildlife, plant
 - 2. Toxic vapor gas
 - 3. Household products
 - 4. drugs
- 5. Safety
 - a. Soil
 - i. Identification
 - ii. Conditions
 - b. Equipment
 - i. Trench box
 - ii. Hydraulic shores
 - iii. Timber shore
 - c. Preventative measures
 - i. Bank sloping
 - ii. Trench encumbrances
 - d. Special considerations
 - i. Water
 - ii. Vibrations
 - 1. Traffic
 - 2. Equipment
 - iii. Shear planes
 - e. Egress
 - i. Ladders
 - ii. Ramp
 - iii. Distances
- 6. Natural Gas Pipeline
 - a. Terminology
 - i. Polyethylene
 - ii. Standard dimension ration
 - iii. Iron pipe size

- iv. Wall thickness
- v. Copper tubing size
- vi. Natural gas
- vii. Electro fusion
- viii. Butt fusion
 - ix. Mechanical fittings
 - x. Electrofusion central processing unit (CPU)
 - xi. Manual butt fusion carriage assembly
- xii. Slab depth
- xiii. Pipe scraper
- xiv. Pipe facer
- xv. Heater plate
- xvi. Hydraulic butt fusion
- xvii. Tapping tee
- xviii. Stab fitting
- xix. Excess flow valve
- b. Natural gas system
 - i. Transportation
 - ii. Distribution
 - iii. Service
- c. Properties of natural gas
 - i. Flammable limits
 - 1. Upper explosive limit 15%
 - 2. Lower explosive limit 5%
 - ii. Carbon
 - iii. Hydrogen
 - iv. Relative weight
 - v. Colorless
 - vi. Odorless
 - vii. Tasteless
 - viii. Non toxic
- d. Construction drawing/specifications
 - i. Pressure
 - 1. Maximum allowance
 - 2. Test
 - ii. Materials
 - 1. Pipe
 - a. Density
 - b. Dimension ratio
 - c. Manufacturer data
 - 2. Fittings
 - 3. Valves
 - 4. Equipment
 - 5. Bedding
 - 6. Tracer wire
 - 7. Backfill material
 - iii. Bury depth
 - iv. Depth of cover
 - v. Protection from weather
 - vi. Location
 - vii. Installation requirements
 - viii. Purging standard
 - ix. Joining procedure
 - 1. Valve location
 - 2. Meter location
 - 3. Lateral
 - 4. Existing utilities

- 5. Penetration
- 6. Grade
- e. USDOT Regulations
 - i. General public
 - 1. Awareness/notification
 - 2. Detection
 - 3. Communication protocol
 - ii. Environment
 - 1. Damage prevention
 - 2. Waterways
 - 3. Vegetation
 - 4. Atmosphere
 - iii. Property
 - 1. Explosion
 - 2. Oxygen displacement
 - 3. Disruption of service
 - iv. USDOT Title 49 part 192 Transportation of Natural Gas
 - 1. Distribution line valves
 - 2. Design pressure
 - 3. Valve installation
 - 4. Qualification program
 - 5. Record keeping
 - 6. Plastic pipe
 - 7. Qualifying joining procedures
 - 8. Qualifying personnel
 - 9. Inspection of joints
 - 10. Pipe design
 - 11. Design limitations
 - 12. Maximum operating pressure
 - 13. Odorizing
 - 14. Tapping under pressure
 - 15. Purging
 - 16. Meter, service regulators, service line
 - 17. Damage prevention
 - 18. Emergency plans
 - 19. Public awareness
 - 20. Integrity management plan
 - 21. Patrol
 - 22. Leakage
 - 23. Reinstatement tests
 - 24. Deactivator
 - 25. Valve maintenance
 - 26. Accidental ignition
- 7. Joining procedures
 - a. Tools and equipment
 - i. Tools
 - 1. Hand tools
 - a. Scraper
 - b. Marker
 - c. Measuring device
 - d. Utility knife
 - e. Clamps
 - f. Hacksaw
 - g. Pyrometer
 - h. Torque wrench
 - i. Flashlight
 - 2. Power tools

- a. Facer
- b. Saws all
- c. Impact wrench
- ii. Equipment
 - 1.

Resources

LIUNA Training and Education Fund. *"Asphalt Safety"*. current. 37 Deerfield Road, Pomfret Center, Connecticut 06259, 2007.

LIUNA Training and Education Fund. *"Asphalt Patching and Repair"*. current. 37 Deerfield Road, Pomfret Center, Connecticut 06259, 2007.

LIUNA Training and Education Fund. *"Site Prep for Concrete Placement"*. current. 37 Deerfield Road, Pomfret Center, Connecticut 06259, 2008.

Resources Other

1. "Poly Pipe Heat Fusion" video series
2. "Excavation Safety" PowerPoint
3. "Service Line Installation Overview" video series
4. <https://www.aga.org/how-does-natural-gas-delivery-system-work>
5. <https://www.eia.gov> › Natural Gas › About US Natural Gas Pipelines
6. <https://www.thebalance.com>

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