

ATLB-2140: DOE RIGGING PRACTICES

Cuyahoga Community College

Viewing: ATLB-2140 : DOE Rigging Practices

Board of Trustees:

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Academic Term:

Spring 2019

Subject Code

ATLB - AIT-Construct/Hazard Material

Course Number:

2140

Title:

DOE Rigging Practices

Catalog Description:

Qualification course covering Department of Energy (DOE) regulations, the Occupational Safety and Health Administration (OSHA) rigging standards in Subpart H and CC and rigging inspection practices. A review of basic math concepts used for calculating areas, volumes, load weights and sling tension for safe hoisting of various load configurations is included.

Credit Hour(s):

2

Lecture Hour(s):

2

Requisites

Prerequisite and Corequisite

Departmental approval: admission to Laborer's apprenticeship program.

Outcomes

Course Outcome(s):

Discuss hoisting devices, including hardware and slings, respective functions and describe inspection procedures used in identifying equipment defects.

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. Identify OSHA equipment removal criterion for each type of sling.
2. Identify the parts of a hoisting hook assembly and explain the function of each.
3. List the different types of rigging hardware and discuss respective applications.
4. Describe different sling configurations and explain the application of each.
5. Identify and explain the permanent markings on synthetic slings and explain the meaning of each.

Course Outcome(s):

Apply the OSHA Rigging and Hoisting standard contained in Subparts H and CC covering work scope, ground conditions and power line safety including key terms and definitions.

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 key terms related to rigging and hoisting.
 2. Differentiate between a qualified rigger and qualified person as defined by OSHA.
 3. Explain the signal person classification and identify the duties performed.
 4. Discuss common errors occurring on jobsites that may result in rigging accidents.
 5. Discuss what is meant by a competent person and explain the respective duties of the position.
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Course Outcome(s):

Discuss the responsibilities of a signal person and, methods of communication and accepted signaling procedures.

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. Identify situations that warrant the use of a signal person.
 2. Identify different forms of communication between the signal person and the crane operator.
 3. Discuss the importance of good communication practices between the hoist operator and the signal person.
 4. Demonstrate the ability to apply accepted hand signals required for hoisting materials and equipment on construction sites.
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Methods of Evaluation:

1. Test
2. Quizzes
3. Class participation

Course Content Outline:

1. OSHA Subpart H and CC
 - a. Rigging equipment for material handling
 - i. Types
 - ii. Placement
 - iii. Housekeeping
 - b. Inspection procedures
 - i. Equipment defects
 - ii. Defect identification
 - c. Terms and definitions
 - i. Hoisting
 - ii. Rigging
 - d. Standards
 - i. Permanent markings
 - ii. Safe working loads
 - iii. Scope
 - iv. Alloy steel chains
 - v. Welded steel chain slings
 - vi. Hooks, rings, oblong links
 - vii. Shop hooks and links, makeshift fasteners
 - e. Wire rope
 - f. Cranes and derricks in construction
 - g. Competent Person
 - i. Experience
 - ii. Responsibilities
 - h. Qualified Rigger
 - i. Definition
 - ii. Duties
 - i. Competencies
 - i. Hand signaling
 - ii. Verbal skills
 - iii. Safety training

- iv. Decision making
 - v. Environmental awareness
2. Hoisting devices
- a. Slings
 - i. Wire rope
 - ii. Metal mesh
 - iii. Synthetic
 - iv. Chains
 - b. Components
 - i. Lifting grade chain
 - ii. Load binders and grab hooks
 - iii. Links and assemblies
 - iv. Chain hooks
 - v. Shackles
 - vi. Turnbuckles
 - vii. Hoist rings
 - c. Sling configurations
 - i. Single basket hitch
 - ii. Double basket hitch
 - iii. Double wrap basket hitch
 - iv. Choker
 - 1. Single
 - 2. Double wrap
 - v. Multi legged bridles
 - d. Sling identification
 - i. Material
 - ii. Length
 - iii. Lifting limitation
 - e. Removal criterion
 - i. Wire rope
 - 1. Broken strands
 - 2. Kinks
 - 3. Birdcage
 - 4. Abrasions
 - ii. Synthetic slings
 - 1. Red wearing thread
 - 2. Charring
 - 3. Cuts
 - 4. Missing tags
3. Signal person
- a. Requirements
 - i. Visual obstructions
 - ii. Coordination of operations
 - b. Communication
 - i. Hand signals
 - ii. Voice commands
 - 1. Radio
 - 2. Telephone
 - 3. Electronic device
 - c. Communication practices
 - i. Jobsite conditions
 - ii. Personnel
 - iii. Lifting equipment
 - d. Hand signaling
 - i. Boom in or out
 - ii. Travel
 - iii. Lifting
 - iv. Hoist
 - v. Stop

- vi. Emergency stop
- vii. Swing
- 4. Field rigging
 - a. Terminology
 - i. Rated capacity
 - ii. Safe working load
 - iii. Working load limit
 - iv. Sling
 - v. Hitch
 - vi. Competent person
 - vii. Qualified person
 - viii. Signal person
 - ix. Rigger
 - x. Center of gravity
 - xi. Sling tension
 - xii. Uniform load
 - xiii. Irregular load
 - b. Standard and engineered measurements
 - i. Standard
 - 1. Whole feet
 - 2. Inches
 - 3. Fractions of an inch
 - 4. Yards
 - ii. Engineered
 - 1. Whole feet
 - 2. Tenths of foot
 - 3. Hundreds foot
 - 4. Thousands
 - 5. Decimal
 - c. Decimal conversion applications
 - i. Calculations
 - 1. Linear measure
 - 2. Area
 - 3. Volume
 - ii. Load weight
 - iii. Center of gravity
 - iv. Sling tension
 - d. Angular measure and cylindrical calculations
 - i. Angular measure
 - 1. Sling angle
 - 2. Tension
 - ii. Cylindrical
 - 1. Load circumference
 - 2. Center of gravity
 - 3. Load weight
 - e. Geometric solids
 - i. Cylinder
 - ii. Rectangular
 - iii. Uniform
 - iv. Irregular
- 5. Calculations: load weights, center of gravity and sling tension
 - a. Uniform versus irregular load
 - i. Uniform
 - 1. Even weight distribution
 - 2. Equidistant center of gravity
 - 3. Load balance
 - ii. Irregular

1. Uneven weight distribution
2. Unbalanced load
3. Variable center of gravity
- b. Total load weight
 - i. Measurements
 1. Length
 2. Width
 3. Depth
 - ii. Material type
 - iii. Specific weight
 - iv. Calculation
 - v. Volume
- c. Center of gravity
 - i. Load moment
 1. Volume
 2. Material type
 3. Weight
 - ii. Suspended balance
- d. Sling angle
 - i. Relative importance
 1. Rated capacity limit
 2. Valance
 3. Failure
 - ii. Lifting load angle
- e. Sling tension
 - i. Safe angle
 1. 60°
 2. Failure limit
 - ii. Pythagorean theorem
 1. Attachment height
 2. Sling length
 3. Center of gravity location
- f. Safety concerns
 - i. Load drop
 - ii. Striking
 - iii. Worker safety
 - iv. Pinch points
 - v. "Struck-by" accidents
 - vi. Load damage
 - vii. Shock load
 - viii. Inspection

Resources

Pellow Engineering Services Inc. *"Bob's Rigging and Crane Handbook"*. first. Leawood, Ks. Pellow Engineering Services Inc., 2011.

MacDonald, J. *Rigging Equipment Maintenance and Safety Inspection*. first. McGraw Hill, NY,NY, 1997.

Resources Other

"PNNL Hoisting and Rigging Manual"

http://www.pnl.gov/contracts/hoist_rigging/slides.asp

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