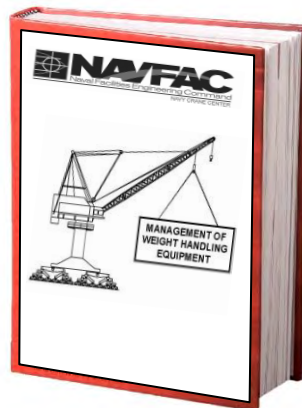




Navy Crane Center



NAVFAC P-307 Training

CONTRACTOR CRANE AWARENESS WEB BASED TRAINING INSTRUCTOR GUIDE NCC-CCA-03

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INTRODUCTION

Welcome

Welcome to Contractor Crane Awareness.

Introduction

Contractor Crane Awareness is designed to acquaint personnel who write or administer Navy contracts and work involving weight handling equipment with NAVFAC P-307 and industry requirements for contractors and provide a knowledge base on which to build upon with on-the-job experience.

Topics covered include equipment types and terminology, responsibilities, operations, requirements, documentation, and accident identification and reporting.

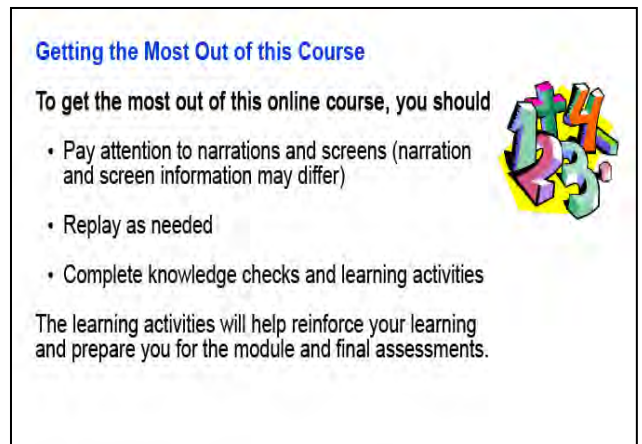
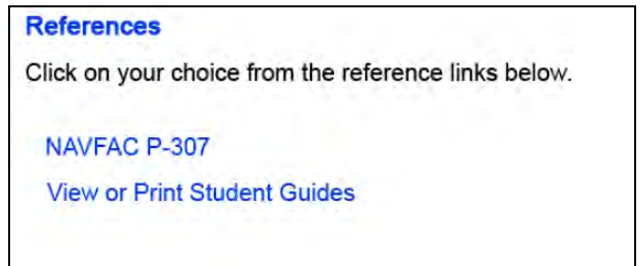
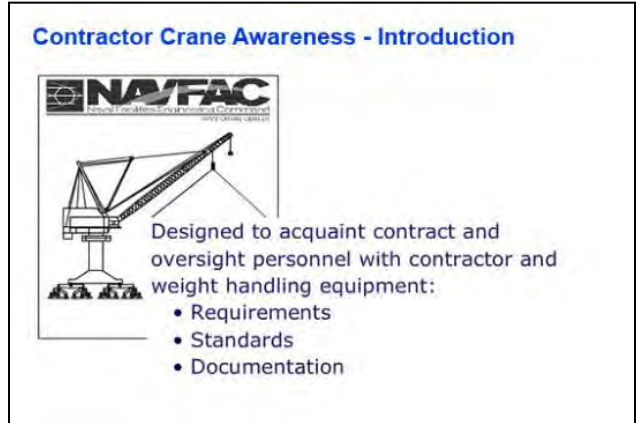
This course is not totally inclusive of all requirements. Please review NAVFAC P-307 and other documents pertinent to your work for specific and up-to-date requirements.

References

A copy of the NAVFAC P-307 and Student Guides are available on the Navy Crane Center website:
<https://ncc.navfac.navy.mil/Popular-Links>

Getting the Most Out of this Course

To get the most out of this training, pay close attention to the narrations and information provided on each screen. There may be information in the narration that is not shown on the screen. And vice versa, there may be information on the screen that is not contained in the narration. Replay narrations and screen content as often as needed by clicking on the topic title or the tab title as applicable. Complete all knowledge checks and module quizzes to help reinforce your understanding of the material covered.



Navigating the Course

As you navigate through this course, you will find several helpful tools and features that will facilitate your learning. This interactivity enables you to easily navigate and access various training aids and tools using the following buttons: The navigation buttons (top right) look like arrow heads and allow you to move forward to the next screen or back to the previous screen by clicking on the arrowhead pointing to the right or left, respectively. The 'pause' and 'continue' buttons (top right) allow you to pause and continue (or start) the course or module. The 'exit' button (top right) closes the module and returns you to the main module menu. The 'view and hide narration' links (lower right on the content screen) allow you to view and/or hide a text version of the audible narration.

Navigating the Course

Interactive navigation features help to:

- facilitate your learning
- access various learning tools

Buttons include:

- the **navigation buttons** which allow you to move to the next or previous screen
- the **pause and continue** buttons which stop and start the course
- the **exit** button which closes the module
- the **view narration** link which allows you to view a text version of the audible narration

Knowledge Checks

These courses use various types of questions to help you retain the material presented. As you proceed through each topic, you will be asked questions in the form of knowledge checks. The knowledge checks will help you prepare for the module quizzes and final exam. Question types include Fill in the Blank, Drag and Drop, Multiple Choice - Single Answer, Multiple Choice - Multiple Answer, and True/False.

Knowledge Checks

- Most topics contain **Knowledge Checks**
- Knowledge checks will help you prepare for module quizzes and the final exam
- The questions asked during the presentation and on the exam will be in the form of:
 - Fill in the Blank
 - Drag and Drop
 - Multiple Choice - Single Answer
 - Multiple Choice - Multiple Answer
 - True/False

Exam Directions

When taking exams, keep the following in mind. Some questions require multiple answers and have check boxes next to the choices. Single answer questions have circles next to the choices. If you score less than 80% on a module quiz, review the necessary content, then return to retake the quiz. You can go back and review any content prior to taking a quiz or final exam. You can review and change your answers any time before you select the "Score Exam" button. A score of 80% or higher is required to pass.

Exam Directions

Read each question carefully and select the best answer or answers.

- Multiple answers - square check boxes
- Single answer - round check circles
- If you score less than 80% on a module quiz, review the necessary materials and return to take the quiz
- Review any topic or module prior to taking a quiz or final exam
- Final exam answers may be changed any time prior to selecting the "Score Exam" button
- A score of 80% or higher is required to pass the final exam

Accident Examples

The following screens show some examples of contractor crane accidents. While not all crane rigging gear accidents are this extreme, all accidents involving weight handling equipment at Naval facilities are taken seriously. Contractors are required to investigate and report all weight handling accidents (crane and/or rigging accidents), near misses, and unplanned occurrences, and identify casual information to develop meaningful corrective actions to prevent similar events from recurring.

Crane Accident History - Accident Example #1

The following un-narrated screens show some examples of contractor crane accidents.



This crane overturned while traveling. The rotate lock was not properly engaged for travel and when a tire dipped into a depression in the road, the counterweight caused the machinery house to rotate to the low side, and ultimately resulted in the overturned crane.

Crane Accident History - Accident Example #2



A contractor's crane was overloaded and overturned while lifting a Navy owned crane. The white bottles in the photo contain propane. The silver bottles contain liquid oxygen. The translucent drum contains waste oil. The 440-volt shore power cables on the right were damaged and sparking. Imagine what could have happened!

Crane Accident History - Accident Example #3



This crawler crane was overloaded while using a pile driver attachment.

Crane Accident History - Accident Example #4



This crane was overloaded and fell from the flight deck of an aircraft carrier where it was lowering buckets of shot into the trailer. The operator jumped clear of the crane before it went over.

Crane Accident History - Accident Example #5



This crane also overturned while traveling. The rotate lock was not engaged.

Crane Accident History - Accident Example #6



Here, a civilian contractor was moving a 175-ton crane with the boom partially extended. The crane house began a slow rotation clock-wise. The operator saw the bed of the truck begin to tilt, stopped the crane, and attempted to lower the outriggers.

Crane Accident History - Accident Example #7



This crane overturned while lifting pre-cast concrete panels. The crane was working on soft ground with a lack of proper cribbing.

Crane Accident History - Accident Example #8



Shown here is another accident that occurred while lifting pre-cast concrete panels. The load contacted the boom, causing the boom to fall.

Crane Accident History - Accident Example #9



The scene the morning after a construction tower crane collapsed due to a foundation problem. One person was killed and several buildings were damaged.

Crane Accident History - Accident Example #10



This 19-story crane broke away from an apartment tower while being prepared for jumping. During the lifting of the climbing assembly or section, the rigging failed, causing the section to fall and damage the building ties and the crane to fall. Six construction workers, including the crane operator were killed, along with a tourist visiting the city.

Crane Accident History - Accident Example #11



During preparations for jumping a construction tower crane, a 20-foot long tower section of the crane plummeted 30 floors at the site of a high-rise condominium, killing two workers and smashing into a home that the contractor used for storage. Five other workers were injured.

Crane Accident History - Accident Example #12



This construction tower crane collapsed, smashing into a high-rise apartment building, killing 2 people and injuring two others.

Crane Accident History - Accident Example #13



A contractor employee was operating a boom truck to lift a scissor lift. The crane was overloaded and structural failure of the jib occurred. The load fell approximately six feet to the ground and sustained extensive damage. The operator was not familiar with the crane capacities and load charts.

Accident Causes

Most crane accidents occur due to personnel error. Accidents have occurred due to personnel operating cranes that are not equipped with properly functioning safety devices such as load indicating devices and boom length indicators.

In some cases, accidents occurred when rigging sketches or lift plans were available but not followed or were changed without approval. Overloads have occurred because operators were unaware of load weights. Accidents have occurred because critical lifts were not identified as such or because cranes were set up on poor soil or foundation conditions.

Operating cranes with obvious deficiencies such as bent or damaged booms, defective welds, or heavy corrosion has resulted in accidents. Operating mobile cranes on barges without tying the crane down to the barge has also contributed to several accidents.

Feedback

Upon completion of the training, or at any time during the training, please feel free to provide feedback to Navy Crane Center on how to improve or better deliver this presentation. Include suggestions such as: Current WHE accidents, near misses, and trends (with narratives and pictures); Content changes, additions, and deletions; Other topics; Clarifications, corrections, and delivery methodologies. Contact information is provided on the screen and in the student guide. You can come back to this screen at any time prior to passing the final exam. After passing the final exam, the course will roll up, your information will go to “My Transcripts,” and the course content will no longer be available. However, you may still refer to the student guide for contact information, or you can go to the Navy Crane Center’s training web page and provide feedback via the links found there.

Accident Causes

Personnel error is the most common cause of crane accidents.

Other causes include:

- Operating cranes not equipped with required safety devices or safety devices not functioning properly
- Lift plans or rigging sketches not followed or changed without approval
- Operators unaware of load weights
- Critical lifts not identified as such
- Cranes set up on poor soil/foundation conditions
- Booms with obvious bent/damaged lacings, defective welds, or heavy corrosion
- Mobile cranes not tied down to the barge

Feedback

Please provide feedback to the presenter and/or Navy Crane Center on how to improve or better deliver this presentation. Include suggestions such as:

- Current WHE accidents, near misses, trends (with narratives and pictures)
- Content change suggestions (i.e., additions, deletions, modifications)
- Other topics
- Clarifications, corrections
- Delivery methodologies

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Ready to Begin

You are now ready to begin your training. Navigate back to the main module menu, select the next module, and begin your training. Good luck.

Completion

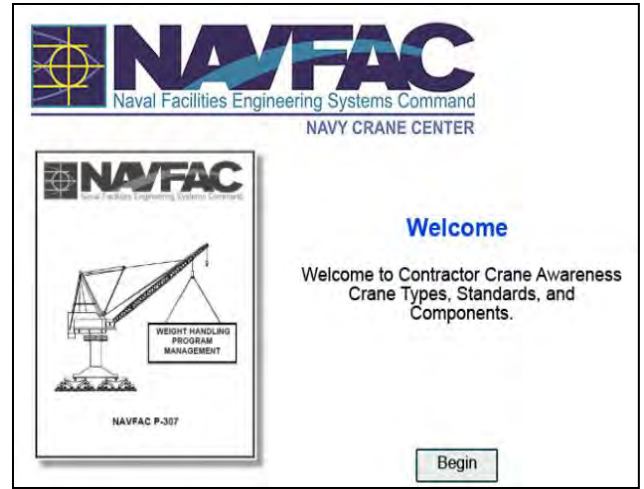
You are now ready to begin your training.

Click on the exit button to return to the main module menu, then select and highlight a module title by clicking on it; finally click where indicated to launch the lesson.

CRANE TYPES, STANDARDS, AND COMPONENTS

Welcome

Welcome to Contractor Crane Awareness: Crane Types, Standards, and Components.

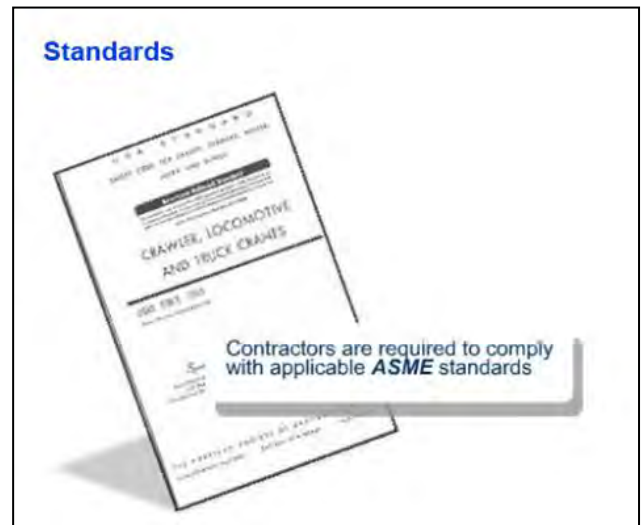


Standards

Contractors operating cranes within naval facilities are required to comply with NAVFAC P-307 Section 11 (Contractor and Other Non-Navy Owned Weight Handling Equipment) and specific activity regulations pertaining to crane safety and operation. Contractors are also required to comply with the applicable ANSI or ASME standards discussed in this module.

ASME B-30 standards are written and maintained by the American Society of Mechanical Engineers to establish crane safety standards.

For cranes, machines, and rigging equipment at naval activities in foreign countries, the cranes, machines, and rigging equipment shall comply with the appropriate host nation safety standards.



Mobile Cranes

ASME B30.5 covers mobile cranes including commercial truck-mounted cranes, wheel-mounted cranes with single or multiple control stations, crawler cranes, and locomotive cranes.

Mobile cranes consist of a fixed or telescoping boom, machinery house or power plant, and one or more operator stations mounted on a mobile frame, base, or platform. The platform, also known as the carrier, may be on rails, wheeled, or crawler treads for travel.

Mobile cranes are the most common type of crane used by contractors at naval installations. The next screen shows an example of a mobile crane and the main components.

Mobile Cranes

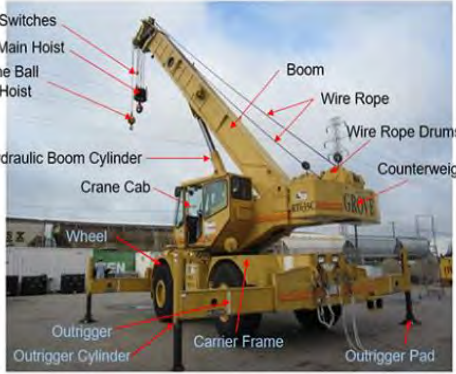


- ASME B30.5 covers mobile cranes
- Mobile Cranes include:
 - Commercial truck-mounted cranes
 - Wheel-mounted cranes
 - Crawler cranes
 - Locomotive cranes

Mobile Crane Components

Shown here is a rough-terrain mobile crane with a telescoping boom.

Mobile Crane Components



Weighted Limit Switches
Main Hoist
Headache Ball or Whip Hoist
Boom
Wire Rope
Wire Rope Drums
Counterweight
Hydraulic Boom Cylinder
Crane Cab
Wheel
Carrier Frame
Outrigger
Outrigger Cylinder
Outrigger Pad

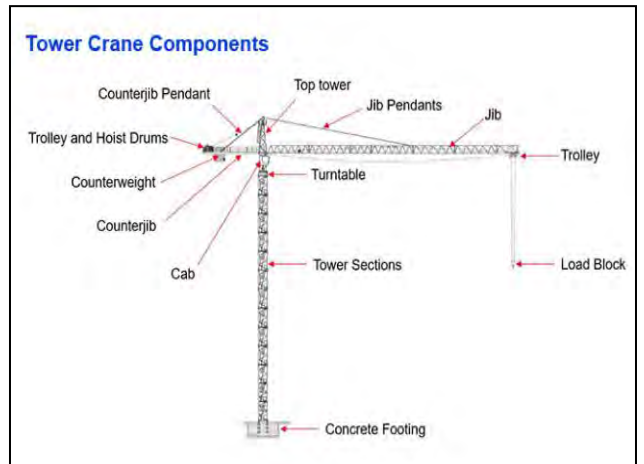
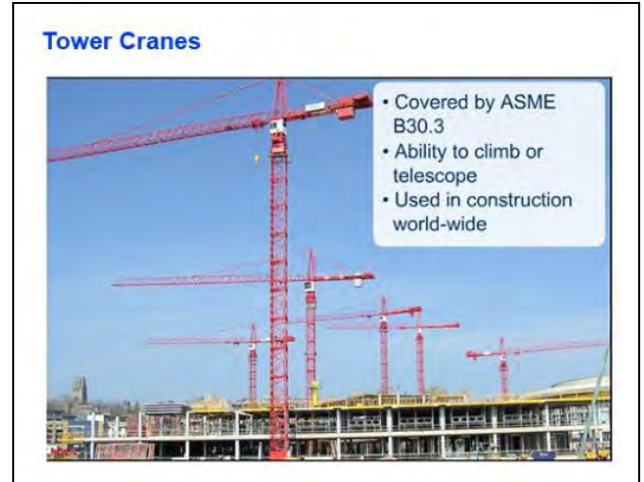
Tower Cranes

Tower cranes are covered by ASME B30.3. A construction tower crane is a hammerhead, luffing, or other type of tower crane that is regularly assembled and disassembled for use at various sites. It is usually characterized by the ability to climb or telescope (raise or lower by adding or subtracting tower sections).

Tower cranes may also be permanently mounted at one location. The configuration usually remains unchanged during the entire installation period. Tower cranes are very popular in construction world-wide. Self-erecting tower cranes are covered by ASME B30.29.

Tower Crane Components

Tower cranes are very safe when properly operated. Most tower crane accidents occur during assembly or disassembly. Jumping, the process of adding or removing sections in order to achieve the required height, is another process where accidents occur. It is vital that OEM guidelines and requirements are followed in this process.



Floating Cranes

Floating cranes are covered under ASME B30.8. Floating cranes consist of a rotating superstructure, power plant, operating machinery, and boom mounted on a barge or pontoon. As required by NAVFAC P-307, floating cranes and barge-mounted mobile cranes require a third party certification from an OSHA accredited organization, a wind speed indicating device, and a marine type list and trim indicator readable in one-half degree increments.

Note: Third party certification is not required at Navy activities in foreign countries.

Floating Cranes



- Floating cranes are covered under ASME B30.8
- NAVFAC P-307 requires a third party certification, a wind speed indicating device, and a marine type list and trim indicator

Note: Third party certification is not required at Navy activities in foreign countries.

Additional Crane Types

Additional crane types used by contractors include commercial truck mounted cranes; articulating boom cranes, mobile or stationary including ammunition handling truck/cranes; pedestal-mounted commercial boom assemblies (fixed length and telescoping types) attached to stake trucks, trailers, flatbeds, barges, or railcars, or stationary mounted to piers, etc.; and hydraulic telescoping boom cranes (stationary or barge-mounted).

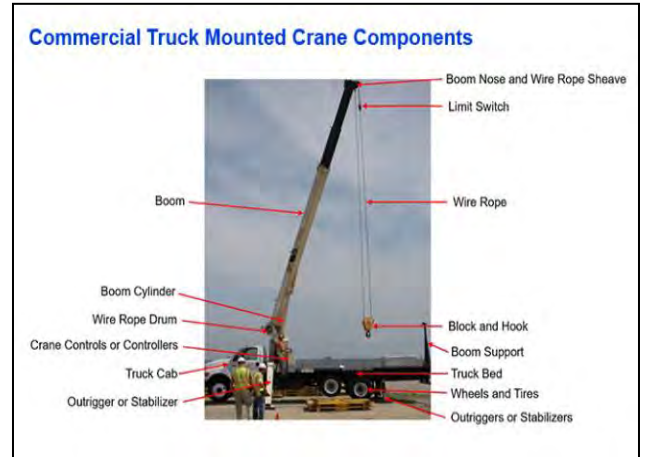
Additional Crane Types

- Commercial truck mounted cranes
- Articulating boom cranes (mobile or stationary)
- Pedestal-mounted commercial boom assemblies (fixed length and telescoping types)
- Other hydraulic telescoping boom cranes (stationary or barge-mounted)



Crane Components

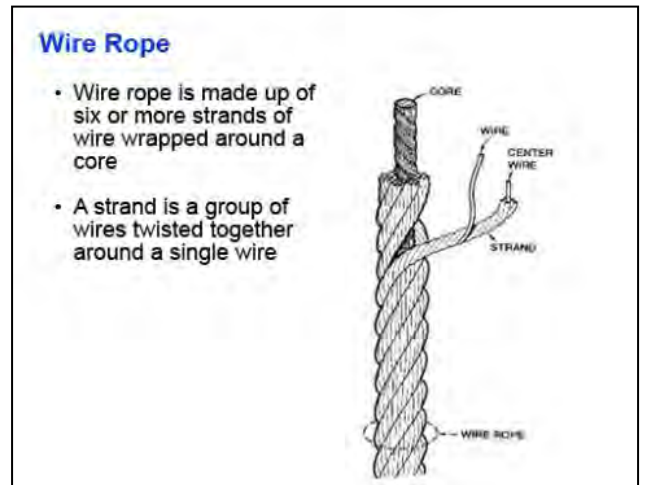
Shown here is a commercial truck mounted crane with a telescoping boom.



Wire Rope

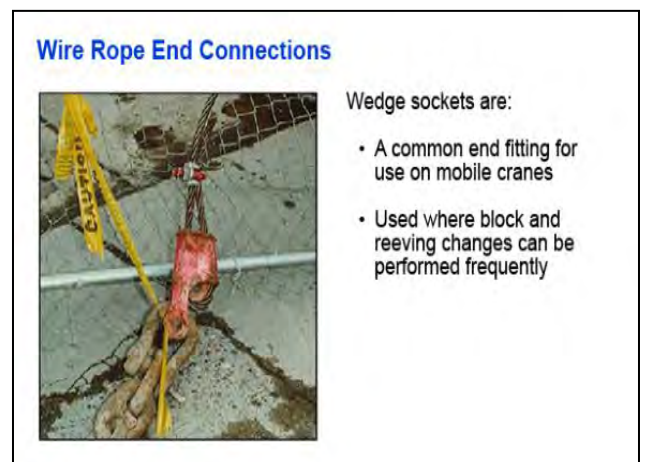
Wire rope used in crane operations is a highly specialized precision product adaptable to a wide variety of operational uses and conditions. To meet the specified requirements of different types of service, wire rope is designed and manufactured in a variety of constructions and grades. Typically, wire rope is made up of six or more strands of wire wrapped around a core. A strand is a group of wires twisted together around a single wire.

Remember to use the proper terminology when describing a suspected wire rope condition.



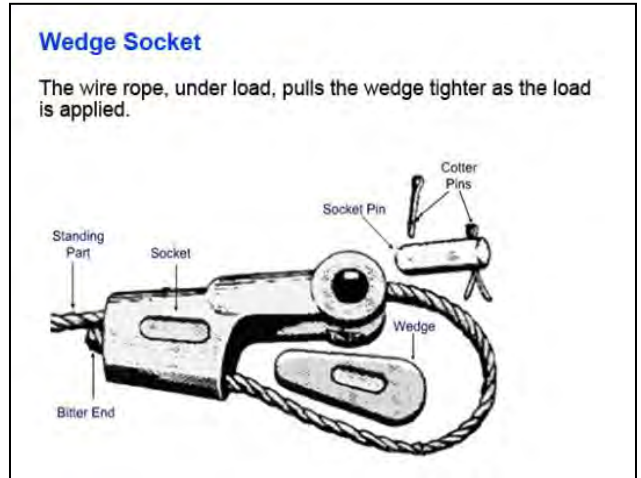
Wire Rope End Connections

Wedge sockets are the most common end fitting for use on mobile cranes where block and reeving changes may be frequently performed. Poured sockets, either zinc spelter or synthetic resin, are popular where the block configuration is normally unchanged. Note the improper attachment of the wire rope clip attaching the dead end to the live end of the wire rope on this wedge socket.



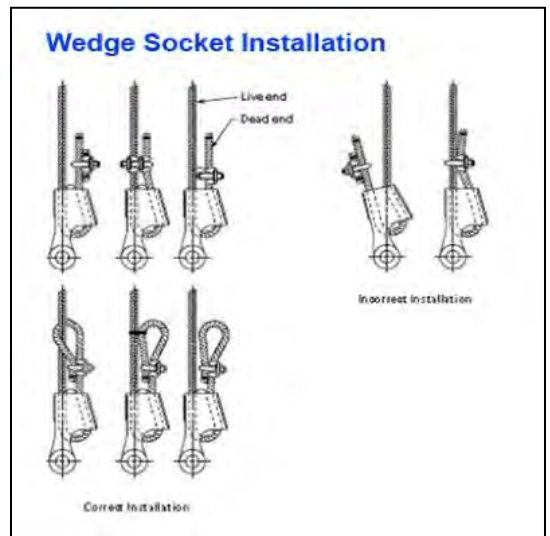
Wedge Socket

This diagram of a wedge socket helps to illustrate how the wire rope, under load, will pull the wedge tighter as a load is applied.



Wedge Socket Installation

These illustrations from ASME B30.5 show some correct and incorrect wedge socket installations.



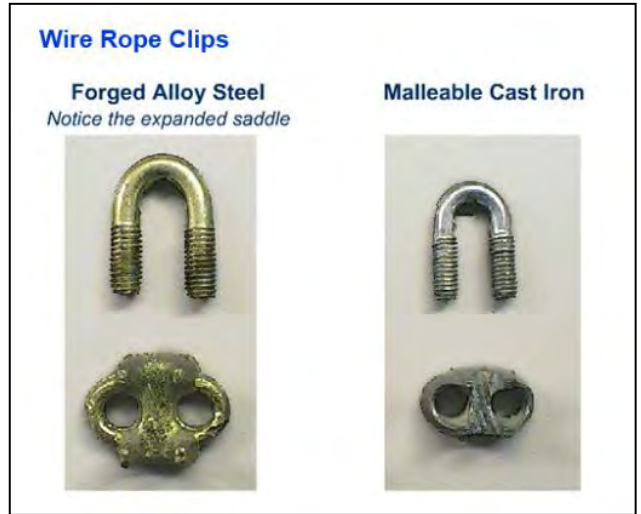
Other Wedge Socket Arrangements

The products shown here may be used to secure the dead end of the wire rope. The product on the right may actually be used to secure the dead end of the wire rope to the live end. Standard wire rope clips shall not be used for this purpose.



Wire Rope Clips

Drop-forged steel wire rope clips may be used where required for securing wire rope on cranes. Malleable cast iron clips shall not be used. The wire rope clip on the left is drop-forged from alloy steel. Notice the expanded saddle. The clip on the right is malleable cast iron.



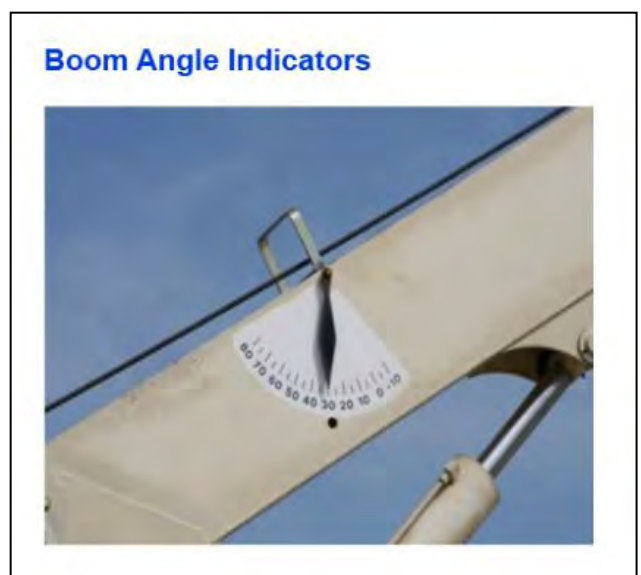
Improper Installation

This illustration shows that malleable cast iron clips were used where drop-forged steel clips are required.



Boom Angle Indicators

Some boom angle indicators are simple, weighted, mechanical, devices. They should be checked daily as part of the crane operator's daily pre-operational check.



Another Type

This illustration shows a different type of boom angle indicator found on some mobile cranes.

Boom Angle Indicators - Another Type



Load Moment Indicators (LMI's)

A load moment indicator (or LMI) aids the crane operator in determining how much weight may be lifted in any crane configuration. The weight of the load being lifted is calculated by the load moment indicator by using sensors and crane operator inputs. The load moment indicator is intended to be used as an aid to operation and should never be relied upon to replace the OEM capacity charts and the good judgment of the crane operator.

If either the sensors or the operator supplied inputs are not accurate, the results could be catastrophic.

Load Moment Indicators (LMI)



Crane Level Indicators

Mobile crane capacity chart values are based on the crane being level in all directions. When the operator's cab-mounted level indicator is centered, the crane should be level within 1 degree, but only if the level indicator is properly installed and calibrated. A crane that is out of level by as little as 3 degrees may lose 50% of its capacity.

Crane Level Indicators

Mounted in operator's cab



Knowledge Check

1. **Select the best answer.** What is the ASME B30 standard contains the requirements for mobile cranes?
 - A. ASME B30.1
 - B. ASME B30.2
 - C. ASME B30.5
 - D. ASME B30.9

2. **Select the best answer.** What is the ASME B30 standard that provides the requirements for tower cranes?
 - A. ASME B30.2
 - B. ASME B30.3
 - C. ASME B30.5
 - D. ASME B30.9

3. **Select the best answer. True or False:** Malleable cast iron wire rope clips can be used to secure wire rope end connections on cranes.
 - A. True
 - B. False

4. **Select the best answer.** What is the ASME B30 standard that contains the requirements for floating cranes?
 - A. ASME B30.1
 - B. ASME B30.2
 - C. ASME B30.5
 - D. ASME B30.8

REQUIREMENTS AND RESPONSIBILITIES

Welcome

Welcome to Contractor Crane Awareness: Requirements and Responsibilities.



Contracting Officer Responsibilities

The contracting officer shall include the minimum requirements of NAVFAC P-307 Paragraph 11.1 in contracts, ensure compliance with contract requirements, provide oversight of contractor crane and rigging operations, and provide oversight of contractor accident investigations and corrective actions.

The degree of oversight shall be based upon the risk to personnel and property; however, oversight shall be performed at least once, and the minimum periodicity shall be not more than every 30 days. When critical lifts are involved, oversight periodicity shall be not more than every 14 days. Appendix P Figure P-2 provides a checklist that shall be used during oversight of contractor crane and rigging operations. Copies of Appendix P Figure P-2 shall be kept on file for one year.

For construction contracts, except for the accident notification and reporting requirements of NAVFAC P-307 Paragraphs 11.1.h and 11.1.i, contractors must follow UFGS-01 35 26 and USACE EM 385-1-1 in lieu of Paragraphs 11.1.a through 11.1.m.

Contracting Officer Responsibilities

The contracting officer shall:

- Include the minimum requirements of NAVFAC P-307, paragraph 11.1, in contracts
- Ensure compliance with contract requirements
- Provide oversight of contractor crane and rigging operations
- Provide oversight of contractor accident investigations and corrective actions
- For construction contracts, except for the accident notification and reporting requirements of NAVFAC P-307 paragraphs 11.1.h and 11.1.i, contractors must follow UFGS-01 35 26 and USACE EM385-1-1 in lieu of paragraphs 11.1.a through 11.1.m

Accident Notification and Reporting

The contracting officer shall notify the host activity of any Weight Handling Equipment accident upon notification by the contractor. Additionally, the contracting officer shall notify the Navy Crane Center by e-mail of an accident involving a fatality, in-patient hospitalization, overturned crane, collapsed boom, or any other major damage to the crane or adjacent property as soon as possible, preferably within 8 hours of notification by the contractor. For all other accidents, notify the Navy Crane Center as soon as practical but no later than three working days after the accident.

The contracting officer shall provide the Navy Crane Center and host activity a copy of every accident and near miss report regardless of severity, upon receipt from the contractor, designate a local representative if the office is not in the local area to ensure compliance with these requirements, and sign all crane and rigging accident and near miss reports to indicate that they are satisfied that the contractor's investigation and corrective actions are sufficient.

Contractor Requirements

Contractors are required to comply with the following regulations, standards and requirements:

NAVFAC P-307 (Section 11); U.S. Army Corps of Engineers (USACE) EM-385-1-1 and UFGS-01 35 26 (for NAVFAC contracts); ASME B30 standards for cranes and rigging equipment; applicable OSHA regulations (29 CFR 1926 for cranes/multi-purpose machines used in construction, demolition, or maintenance, 29 CFR 1915 for cranes/multi-purpose machines used in shipbuilding, ship repair, or shipbreaking, and 29 CFR 1917 for cranes/multi-purpose machines used in cargo transfer); applicable ANSI and ASSE standards; and host activity regulations pertaining to crane safety and operation. At naval activities in foreign countries, cranes, machines, and rigging equipment shall comply with the appropriate host nation safety standards.

Accident Notification and Reporting

The contracting officer shall:

- Notify the host activity and the Navy Crane Center of any WHE accident upon notification by the contractor
- Provide the Navy Crane Center and host activity a copy of every accident and near miss report



Contractor Requirements

Contractors are required to comply with the following regulations, standards, and requirements:

- NAVFAC P-307
- USACE EM 385-1-1 and UFGS-01 35 26 (for NAVFAC contracts)
- ASME B30 standards
- OSHA 29 CFR 1926 (for construction contracts)
- OSHA 29 CFR 1915 (for ship repair contracts)
- OSHA 29 CFR 1917 (for cargo transfer)
- Applicable ANSI and ASSE Standards
- Host activity regulations pertaining to crane safety and operation

Contracting officers and/or contracting officer representatives should be familiar with these requirements when crane or applicable operations will be performed.

The contracting officer and/or contracting officer representatives should be familiar with these requirements when crane or applicable operations will be performed.

Certificate of Compliance

Contractors operating cranes or multi-purpose machines, material handling equipment (MHE), or construction equipment used to lift loads suspended by rigging gear are required to complete the Certificate of Compliance found in NAVFAC P-307 Appendix P-1. For construction contracts, the Certificate of Compliance found in EM 385-1-1 shall be used.

This certificate is to be signed by the appropriate contractor company official and shall be posted on each crane or alternate machine brought onto Navy property (or in the contractor’s onsite office for rigging operations).

The certificate of compliance states and the company official certifies that the noted crane or alternate machine and all rigging gear conform to applicable OSHA regulations (host nation regulations for naval activities in foreign countries) and applicable ASME B30 or other standards, the operator or operators have been trained and are qualified for the operation of the noted crane(s) or alternate machine(s), all safety devices and operator aids are enabled and functioning properly and the operators have been trained not to bypass safety devices and operator aids during lifting operations, the operators, riggers, and company officials are aware of the actions required in the event of an accident as specified in the contract, signal persons used in construction work are qualified in accordance with 29 CFR 1926.1428, riggers are qualified in accordance with NAVFAC P-307, Paragraph 11.1.k, and all personnel working on the job site have been trained to not stand under a load or in the fall zone of a suspended load unless specifically allowed by USACE EM 385-1-1.

The contracting officer reviews the certificate for accuracy, ensuring that the company official and title are identified, and that the completed and signed certificate is posted on each crane or alternate machine.

Certificate of Compliance

APPROVED FOR CONSTRUCTION OF CRANE OR ALTERNATE MACHINE USED TO LIFT
OPERATION IN (CLASSIFIED) NAVAL VESSEL OR SHIPWAKE

CERTIFICATE OF COMPLIANCE

This certificate is to be signed by the contractor company official who certifies that the crane or alternate machine, material handling equipment (MHE), or construction equipment used to lift loads suspended by rigging gear conform to applicable OSHA regulations (host nation regulations for naval activities in foreign countries) and applicable ASME B30 or other standards, the operator or operators have been trained and are qualified for the operation of the noted crane(s) or alternate machine(s), all safety devices and operator aids are enabled and functioning properly and the operators have been trained not to bypass safety devices and operator aids during lifting operations, the operators, riggers, and company officials are aware of the actions required in the event of an accident as specified in the contract, signal persons used in construction work are qualified in accordance with 29 CFR 1926.1428, riggers are qualified in accordance with NAVFAC P-307, Paragraph 11.1.k, and all personnel working on the job site have been trained to not stand under a load or in the fall zone of a suspended load unless specifically allowed by USACE EM 385-1-1.

COMPANY OFFICIAL SIGNATURE: _____ DATE: _____

COMPANY OFFICIAL TITLE: _____

POST ON CRANE (OR ALTERNATE MACHINE)

BY CRANE OR VEHICLE: _____

DATE: _____

The Certificate of Compliance is completed by the contractor and is used to certify the following:

- That the crane, or machine, and the rigging equipment meet applicable OSHA and ANSI/ASME regulations
- That all of its crane safety devices are enabled and functioning properly, personnel have been trained not to stand under a load, and operators have been trained to not bypass safety devices
- That the operator is qualified and trained for the operation of the crane or machine to be used
- That the operators, riggers and company officials are aware of the actions required in the event of an accident
- That signal persons and riggers are qualified to perform work

Contractor Accidents

In the event of a contractor accident, the contractor shall notify the contracting officer as soon as practical but no later than four hours after any WHE accident. Secure the accident site and protect evidence until released by the contracting officer. Conduct an accident investigation to establish the root cause or causes of any WHE accident, near miss, or unplanned occurrence. Crane operations shall not proceed until the cause is determined and corrective actions have been implemented to the satisfaction of the contracting officer. Provide the contracting officer a report for an accident or near miss within 30 days using the appropriate form provided in NAVFAC P-307, Section 12 consisting of a summary of circumstances, an explanation of causes, photographs (if available), and corrective actions taken.

Contractor Accident Responsibilities

In the event of an accident, the contractor shall:

- Notify the contracting officer as soon as practical, but no later than 4 hours after the accident
- Secure the accident site
- Conduct an investigation to establish the root cause(s)
- Provide a report to the contracting officer within 30 days



Host Activity Responsibilities

The host activity shall ensure contracts contain the requirements in NAVFAC P-307 Section 11, concur with the contracting officer's oversight plan, ensure that the oversight plan is being carried out, and provide oversight of contractor accident and near miss investigations and corrective actions.

Host Activity Requirements

The host activity shall:

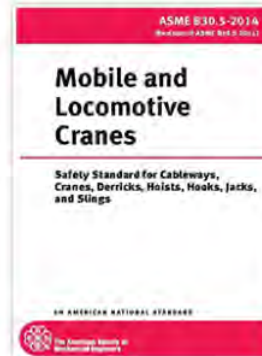
- Ensure contracts contain the requirements in NAVFAC P-307 Section 11
- Concur with the contracting officer's oversight plan
- Ensure the oversight plan is being carried out
- Provide oversight of contractor accident and near miss investigations

Contractor Crane Requirements

Contractor cranes must comply with applicable ASME B30 standards. Contract personnel should be familiar with project specific B30 standards including B30.3 Tower cranes; B30.5 Mobile cranes; B30.8 Floating cranes; and B30.22 Articulating boom cranes. Mobile cranes are widely used by contractors; therefore, knowledge of B30.5 is particularly important.

Contractor Crane Requirements

Contractor cranes must comply with applicable ASME B30 standards and requirements.




Additional Floating Crane Requirements

In addition to ASME B30.8 requirements, floating cranes and barge-mounted mobile cranes require a third-party certification from an OSHA accredited organization (or a third-party certification from a state accredited organization for those states with OSHA approved state plans), a load indicating device, a wind speed indicating device, and a marine type list and trim indicator readable in one-half degree increments. Third party certification is not required for floating cranes and barge-mounted mobile cranes at Navy activities in foreign countries.

Additional Floating Crane Requirements

In addition to meeting ASME B30.8 requirements, floating cranes and barge-mounted mobile cranes require the following:

- A third party certification from an OSHA accredited organization
- A load indicating device
- A wind speed indicating device
- A marine type list and trim indicator



Multi-purpose Machines

Multi-purpose machines, Material Handling Equipment (MHE), and construction equipment used to lift loads suspended by rigging equipment require proof of authorization from the machine Original Equipment Manufacturer (OEM) that the machine is capable of making lifts of loads suspended by rigging equipment. Written approval from a qualified registered professional engineer, after a safety analysis is performed, is allowed in lieu of the OEM's approval. The contractor must demonstrate that the equipment is properly configured to make such lifts and is equipped with a load chart.

Multi-Purpose Machines

Multi-purpose machines, Material Handling Equipment (MHE), and construction equipment used to lift loads suspended by rigging, require the following:

- Proof of authorization to lift suspended loads from the machine OEM
- The contractor must demonstrate proper configuration to make such lifts
- A load chart for the machine

Hooks

Hooks used on cranes, hoists, other machines, and rigging gear shall have self-closing latches, or the throat opening shall be "moused" (secured with wire, rope, heavy tape, etc.) or otherwise secured to prevent the attached item or rigging equipment from coming free of the hook under a slack condition.

Hook Requirements

Hooks on cranes, hoists, other machines, and rigging gear shall have self-closing latches or shall be "moused"



Critical Lift Plan

A critical lift plan is required for each of the following lifts: lifts over 75 percent of the capacity of the crane, hoist, or other machine (lifts over 50 percent of the capacity of a barge-mounted mobile crane's hoists) at any radius of lift; lifts involving more than one, crane, hoist, or other machine; lifts of personnel (lifts of personnel suspended by rigging equipment from multi-purpose machines, MHE, or construction equipment shall not be permitted); lifts made in the vicinity of overhead power lines; erection of cranes; lifts of submerged or partially submerged objects; lifts involving binding conditions; lifts of hazardous materials; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks.

Critical Lifts

A critical lift plan is required for the following lifts:

- Lifts over 75 percent of the capacity of the crane, hoist, or other machine
- Lifts involving more than one crane, hoist, or other machine
- Lifts of personnel
- Lifts made in the vicinity of overhead power lines
- Erection of cranes
- Lifts of submerged or partially submerged objects
- Lifts involving binding conditions
- Lifts of hazardous materials
- Lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks

Critical Lift Plan (EM 385-1-1)

For construction contracts governed by EM385-1-1 requirements, the following lift types require a critical lift plan. Critical lifts are defined as: lifts involving hazardous materials (e.g., explosives, highly volatile substances); hoisting personnel with Load Handling Equipment (LHE); lifts made with more than one LHE; lifts where the center of gravity could change; lifts made when the load weight is 75% of the rated capacity of the LHE load chart or more (not applicable to gantry, overhead or bridge cranes); lifts without the use of outriggers using rubber tire load charts; lifts using more than one hoist on the same LHE; lifts involving Multiple Lift Rigging (MLR) Assemblies or other non-routine or technically difficult rigging arrangements; lifts involving submerged loads (Exception: lifts that were engineered to travel in guided slots throughout the lift and have fixed rigging and/or lifting beams, i.e., intake gates, tailgates/logs); lifts out of the operator's view (Exception: if hand signals used by a signal person in view of the operator or radio communications are available and in use, load does not exceed two tons, and is determined a routine lift by the lift supervisor; load tests; when land-based LHE mounted on barges, pontoons or other means of flotation are required to travel while lifting the load; and any lift the operator believes should be considered critical.

Critical Lift Plan Requirements

A critical lift plan shall include the following as applicable: The size and weight of the load to be lifted including crane (or other machine) equipment and rigging equipment that add to the weight. The OEM's maximum load capacities for the entire range of the lift shall also be provided. The lift geometry, including the crane position, boom length and angle, height of lift, and radius for the entire range of the lift. A rigging plan, showing the lift points, rigging equipment, and rigging procedures. The environmental conditions under which lift operations are to be stopped. For lifts of personnel, the plan shall demonstrate compliance with the requirements of 29 CFR 1926.1431. For barge mounted mobile cranes, barge stability calculations

Critical Lifts (EM 385-1-1)

EM 385-1-1 defines critical lifts as:

- Lifts involving hazardous materials
- Hoisting personnel
- Lifts made with more than one Load Handling Equipment (LHE)
- Lifts where the center of gravity could change
- Lifts made when the load weight is 75% of the rated capacity of the LHE load chart or more
- Lifts without the use of outriggers using rubber tire load charts
- Lifts using more than one hoist on the same LHE
- Lifts involving Multiple Lift Rigging (MLR) Assemblies or other non-routine or technically difficult rigging arrangements
- Lifts involving submerged loads
- Lifts out of the operator's view
- Load tests
- When land-based LHE mounted on barges, pontoons, or other means of flotation are required to travel while lifting the load
- Any lift the operator believes should be considered critical

Critical Lift Plan

A critical lift plan shall include the following as applicable:

- The size and weight of the load, equipment, and rigging equipment
- The lift geometry or configuration
- A rigging plan
- Environmental conditions under which lift operations are to be stopped
- For lifts of personnel, demonstrate compliance with the requirements of 29 CFR 1926.1431
- For barge-mounted mobile cranes, barge stability calculations, barge list and trim, and load charts based on list and trim
- For lifts in the vicinity of overhead power lines, demonstrate compliance with 29 CFR 1926.1408 - 1411

identifying crane placement/footprint; barge list and trim based on anticipated loading; and load charts based on calculated list and trim specific to the barge the crane is mounted on. For lifts in the vicinity of overhead power lines, the plan shall demonstrate compliance with 29 CFR 1926.1408 through 1411.

For Navy activities in foreign countries, follow host nation requirements as applicable in lieu of the CFR's.

Tower Crane Requirements

The following additional documentation is required for contracts involving tower cranes: foundation design and requirements; installation instructions; assembly and disassembly instructions including climbing/jumping instructions if applicable; operating manual, limitations, and precautions; and periodic inspection and maintenance requirements. For tower cranes at Navy activities in foreign countries, the tower cranes shall comply with the appropriate host nation safety standards and industry consensus safety standards.

Tower Crane Requirements

The following additional documentation is required for tower cranes:

- Foundation design and requirements
- Installation instructions
- Assembly and disassembly instructions
- Operating manual, limitations, and precautions
- Periodic inspection and maintenance requirements


Required Documentation (EM 385-1-1)

EM 385-1-1 requires that the following documents be kept on the crane or Load Handling Equipment (LHE) when operated: a copy of the operating manual developed by the manufacturer for the specific make and model of equipment; a copy of the load-rating chart; a durable load chart with legible letters and figures shall be readily available to the operator at the control station; the crane log book; and all inspections, test, maintenance and repairs for the LHE.

Required Documents (EM 385-1-1)

EM 385-1-1 requires that the following documents be kept on the crane or other machine when operated:

- A copy of the operating manual
- A copy of the load rating chart
- A durable load chart readily available to the operator at the control station
- The crane log book
- Inspections, tests, maintenance, and repair records



Telecommunication Towers

Base mounted drum hoists used in communication tower work shall comply with TIA-1019, TIA-222G, ASME B30.7, and 29 CFR 1926.552 and 29 CFR 1926.553.

When used for hoisting personnel, base mounted drum hoists shall comply with OSHA Instruction CPL 02-01-056; National Association of Tower Erectors standard "Base Mounted Hoist Mechanism Design Use Standard for Lifting Personnel While Working on Telecommunication Structures"; ANSI/ASSE A10.22; and ASME B30.23.

Additional requirements that apply to contracts involving work on telecommunication towers or with personnel hoists on telecommunication towers include: the use of a pickup truck or any other equipment besides a base mounted drum hoist for hoisting materials and/or personnel is prohibited.

Rough-terrain forklifts, bulldozers, and similar equipment may be utilized for towing and anchorage purposes of guys. The use of such equipment for trolley/tag and load lines is prohibited.

Rigging gear utilized in communication tower work shall comply with the applicable ASME/OSHA standards. Operator, signal person, and rigger qualifications shall be in accordance with OSHA standards and NAVFAC P-307 Section 11.

Telecommunications Towers

The following requirements apply to contracts involving work on telecommunication towers:

- Base mounted drum hoists shall comply with TIA-1019, TIA-222G, ASME B30.7, and 29 CFR 1926.552 and 1926.553
- When used for hoisting personnel, base mounted drum hoists shall comply with OSHA Instruction CPL 02-01-056, National Association of Tower Erectors standard "Base Mounted Hoist Mechanism Design Use Standard for Lifting Personnel While Working on Telecommunication Structures", ANSI/ASSE A10.22, and ASME B30.23
- The use of a pickup truck for hoisting materials and/or personnel is prohibited
- Rough-terrain forklifts, bulldozers, and similar equipment may be utilized for towing and anchorage purposes of guys
- Rigging gear utilized shall comply with the applicable ASME/OSHA standards
- Operator, signal person, and rigger qualifications shall be in accordance with OSHA standards

Knowledge Check

1. **Select the best answer.** Who is responsible for including the requirements of NAVFAC P-307 Paragraph 11.1 in contracts?
 - A. the commanding officer
 - B. the contracting officer
 - C. the contractor
 - D. the load test director

2. **Select the best answer to fill in the blank.** When critical lifts are being performed, the minimum oversight periodicity shall be no more than _____ days?
 - A. one
 - B. seven
 - C. fourteen
 - D. thirty

3. **Select the best answer.** Which of the following is used to document oversight of contractor crane and rigging operations for non-construction work?
 - A. Certificate of Compliance (Figure P-1)
 - B. Contractor Crane or Rigging Operation Checklist (Figure P-2)
 - C. EM 385-1-1
 - D. NAVFAC P-307

4. **Select the best answer.** What form is required to be completed, signed by the contractor company official, and posted on each crane or alternate machine used to lift loads suspended by rigging gear?
 - A. Certificate of Compliance (Figure P-1)
 - B. Certificate of Load Test and Inspection
 - C. Contractor Crane or Rigging Operation Checklist (Figure P-2)
 - D. Operator's Daily Checklist

5. **Select the best answer to fill in the blank.** The contractor is required to notify the contracting officer as soon as practical, but no later than _____ hours after any Weight Handling Equipment (WHE) accident.
 - A. one
 - B. two
 - C. four
 - D. twenty-four

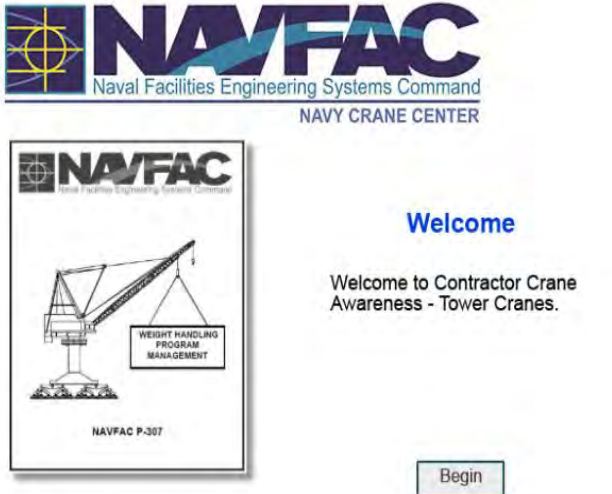
6. **Select the best answer. True or False:** Word of mouth from a contractor official is adequate for verification that a multi-purpose machine or construction equipment is authorized to lift a load suspended by rigging equipment.
 - A. True
 - B. False

7. **Select the best answer.** What type of crane requires a third-party certification from an OSHA accredited organization?
- A. floating crane
 - B. mobile crane
 - C. overhead electric traveling (OET) crane
 - D. portal crane
8. **Select the best answer. True or False:** Hooks used on cranes, hoists, other machines, and rigging gear shall have self-closing latches, or the throat opening shall be “moused.”
- A. True
 - B. False
9. **Select the best answer.** What is required to be completed by the contractor prior to performing a lift that is over 75 percent of the capacity of a crane or hoist at any radius?
- A. a critical lift plan
 - B. a critical lift request form
 - C. complex lift briefing
 - D. contractor crane or rigging operation checklist (Figure P-2)
10. **Select the best answer. True or False:** A pickup truck may be used for hoisting materials on a telecommunications tower.
- A. True
 - B. False

TOWER CRANES

Welcome

Welcome to Contractor Crane Awareness: Tower Cranes.



The image shows a digital welcome screen for the NAVFAC Navy Crane Center. At the top left is the NAVFAC logo (Naval Facilities Engineering Systems Command) and the text 'NAVY CRANE CENTER'. Below the logo is a smaller version of the logo and a diagram of a tower crane with a sign that says 'WEIGHT HANDLING PROGRAM MANAGEMENT'. The text 'NAVFAC P-307' is at the bottom of the diagram. To the right of the diagram, the word 'Welcome' is written in blue. Below that, the text 'Welcome to Contractor Crane Awareness - Tower Cranes.' is displayed. At the bottom right, there is a 'Begin' button.

Introduction

Tower Cranes are very popular in building construction worldwide. Here we will discuss required documentation, assembly, testing, maintenance, inspection, and operation. Construction Tower Cranes are covered by ASME B30.3.

Tower Crane Requirements



- Documentation
- Assembly
- Testing
- Maintenance
- Inspection
- Safe Operation

Documentation

NAVFAC P-307 requires the following information in contracts where tower cranes will be utilized: Foundation design and requirements; installation instructions; assembly and disassembly instructions including climbing/jumping instructions if applicable; operating manual, limitations, and precautions; and periodic inspection and maintenance requirements.

For tower cranes at Navy activities in foreign countries, the tower cranes shall comply with the appropriate host nation safety standards and industry consensus safety standards.

Documentation

NAVFAC P-307 requires the following information in contracts where tower cranes will be utilized:

- Foundation design and requirements
- Installation instructions
- Assembly and disassembly instructions
- Operating manual, limitations, and precautions
- Periodic inspection and maintenance requirements

Foundation

A correctly designed and constructed foundation is essential for the safe assembly and operation of the tower crane. The foundation design must consider local site conditions, soil bearing pressures, and tower crane foundation loading forces for the specific crane configuration to be assembled. All bolts used must meet the quality specified by the manufacturer and be torqued to the crane manufacturer's specified torque value.

Material/Equipment should not be stored on the crane foundation. Boundary off the area to keep material and vehicles out and prevent potential damage to the crane.

Installation Instructions

When cranes are erected or dismantled, written instructions shall be developed by the manufacturer or qualified person and shall be available at the site. Crane erection and dismantling shall be performed under the direct supervision of a designated person.

Installation instructions shall provide wind restrictions/limitations; tower (mast) height limitations based on several wind velocity levels for out-of-service conditions; Locations where tower (mast) sections have sufficient strength for internal climbing wedging and external Climbing collar installation; Anchorage arrangements for cranes to be installed on fixed bases; and Crane component weights and dimensional data.

Installation

The bolt connection surfaces between the foundation anchors, the base-tower section, and other tower sections; and all bolt holes must be free of dirt, paint, and any other foreign material as required by the manufacturer. Only manufacturer specified bolts/fasteners should be used.

All parts of high-strength threaded connections must be cleaned and visually inspected prior to installation. This applies in particular to the threads of nuts, bolts, and screws, the seating of nuts on bolts, and the transition between the shanks and

Foundation Design and Requirements

The foundation design must take into account:

- Local site conditions
- Soil bearing pressures
- Tower crane foundation loading forces for the specific crane configuration to be assembled

Material/Equipment should not be stored on the crane foundation

- Boundary off the area

Installation Instructions

- Written instructions shall be developed by the manufacturer and shall be available at the site
- Crane erection and dismantling shall be performed under the direct supervision of a designated person
- instructions shall include: wind restrictions, height limitations, locations for climbing collar installation, anchorage arrangements, and crane component weights and dimensional data

Installation

- Bolt connection surfaces must be free of dirt, paint, and any other foreign material as required by the manufacturer
- Only manufacturer specified bolts/fasteners should be used
- All high-strength threaded connections must be cleaned and inspected prior to installation
- Only approved/proper equipment shall be used for installation



heads. Threaded fasteners, including nuts, with any sign of rust on its shank or threads must not be used (light surface rust of no visible peeling or flaking is acceptable). In fact, any nut, bolt, or screw showing any sign of damage at all must be rejected. Only approved/proper equipment should be used for installation (e.g., calibrated).

Note: Failure to torque to the manufacturer's specified torque value is extremely dangerous and could lead to an accident resulting in property damage, serious injury or loss of life.

Bolting Assemblies

Review manufacturer requirements for bolting assemblies and installation. The manufacturer's procedure must be followed. Lubrication of bolting assemblies should be performed per manufacturer requirements. All tower bolting assemblies at each connection must be torqued/tensioned as required by the manufacturer. Impact wrenches are not allowed to be used to torque or install bolts. The pictures shown are bolts that were found during inspection of a slew ring on a 450-foot high 2003 Tower Crane, subsequent to the tower crane failures in New York in 2008. The inspector found the bolts by tapping them. The top right photo shows a broken bolt found in the slew ring. The bottom right photo shows a loose bolt that was found. Note that the damage to this bolt matches that of the broken bolt.

Bolting Assemblies

- Review manufacturer requirements for bolting assemblies and installation
- All bolting assemblies at each connection must be tensioned as required by the manufacturer
- Impact wrenches are not allowed



Assembly and Disassembly

When cranes are assembled/disassembled, detailed written instructions by the manufacturer or qualified person and a list of the weights of each sub-assembly to be assembled/disassembled shall be at the site. Assembly and dismantling shall be performed under the supervision of a qualified person.

Wind velocity should not exceed the limit set by the manufacturer or 20 mph at the crane superstructure if no such limit has been set. A climbing schedule should be prepared in advance of the installation.

Written climbing instructions should be kept at the site, and all climbing operations shall be performed under the supervision of a qualified person. Manufacturer requirements/instructions must be followed. Before climbing, the crane shall be balanced in accordance with the manufacturer requirements.

Assembly and Disassembly

- Detailed written assembly and climbing instructions by the manufacturer shall be at the site
- Wind velocity should not exceed the limit set by the manufacturer, or 20 mph if no such limit has been set



Assembly and Disassembly 2

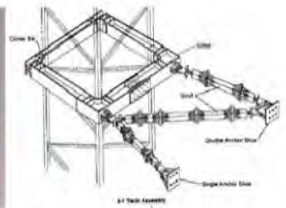
Slings and lifting accessories should be selected and arranged to avoid damaging or marring crane members during assembly and dismantling. Check manufacturer requirements for vertical tower misalignment tolerances.

During climbing operations, the tower crane **must not** be slewed/rotated nor used or operated in any way which is not part of the climbing operation. Check manufacturer requirements for guide section (if applicable) location and/or removal requirements prior to operation of the crane. The guide section may have to be lowered (climbed down to the bottom of the tower) or removed.

Tie-in assemblies may be used to provide a structural attachment between the crane tower and an adjacent structure. If tie-in assemblies are used, check manufacturer requirements for installation procedures and wind speed maximum requirements during installation.

Assembly and Disassembly (Continued)

- Slings and lifting accessories should be arranged to avoid damaging the crane
- Check requirements for vertical tower misalignment
- During Climbing, the crane must not be used or operated if not part of the climbing operation
- Check requirements for tie-in assemblies



Visual Inspection

Before crane components are assembled, they shall be visually inspected for damage from shipping and handling. Dented, bent, torn, gouged, or otherwise damaged structural members shall not be assembled until repaired in accordance with the manufacturer's or a qualified person's instructions, or replaced.

Before reusing bolts, pins, or other connection parts, they should be inspected for condition. Visible cracks, difficulty in threading a nut by hand or visible necking down of the shank are indications of yielding or damage and reason for rejection.

Before initial use and before each climb, load bearing members of the climbing and support system shall be inspected. Defects impairing the ability of a member to support load shall be repaired, or the member replaced.

The manufacturer shall furnish operation and maintenance information.

Inspection and Documentation

Prior to initial use, all new, reinstalled, altered, or extensively repaired cranes shall be inspected by a qualified person. In addition, an operational and load test should also be performed.

A visual examination of the crane by the operator or other designated person shall be performed daily prior to operation and periodically as required by the manufacturer. Records shall be kept of apparent external conditions to provide a basis for continuing evaluation.

Cranes used for construction require a shift, monthly, and annual inspection. Inspections must be documented and maintained for a minimum of 12 months or the life of the contract, whichever is longer. High strength bolts used in connections and at the slewing bearing shall be checked for proper tension (torque) at intervals recommended by the manufacturer.

Inspection Requirements

- Before crane components are assembled, they shall be visually inspected for damage
- Before reusing bolts, pins, or other connection parts, they should be inspected for condition
- Before initial use, and before each climb, load bearing members of the climbing and support system shall be inspected



Inspection and Documentation

- Prior to use, all new, reinstalled, altered, or extensively repaired cranes shall be inspected by a qualified person
- A visual inspection of the crane shall be performed daily prior to operation, and periodically as required by the manufacturer
- Cranes used in construction require a shift, monthly, and annual inspection
- High strength bolts used in connections and at the slewing bearing shall be checked for proper tension (torque) at intervals recommended by the manufacturer
- Inspection records shall be available for review

Inspection records which include the date of inspection, signature of the person performing the inspection, and the serial number or other identifier of the crane that was inspected shall always be available for review.

Testing

EM 385-1-1 requires the following: Written reports of tests showing test procedures and confirming the adequacy of repairs or alterations shall be maintained with the crane and hoisting equipment or at the onsite project office.

A Qualified Person (QP) shall conduct operational tests in accordance with ANSI/ASME and the manufacturer's recommendations. If the manufacturer has no procedures, the requirements in Section 16, as a minimum, must be performed. Load tests shall be performed under the direction of a qualified person in accordance with appropriate ASME standards and the manufacturer's recommendations.

Inspection and Documentation

- Prior to use, all new, reinstalled, altered, or extensively repaired cranes shall be inspected by a qualified person
- A visual inspection of the crane shall be performed daily prior to operation, and periodically as required by the manufacturer
- Cranes used in construction require a shift, monthly, and annual inspection
- High strength bolts used in connections and at the slewing bearing shall be checked for proper tension (torque) at intervals recommended by the manufacturer
- Inspection records shall be available for review

Maintenance and Lubrication

The contractor shall furnish crane operation and maintenance information. A preventive maintenance program based on the crane manufacturer's recommendations should be established. Dated records should be kept available. Replacement parts should ordinarily be obtained from the original equipment manufacturer. Replacement parts shall be at least equal to the original manufacturer's specifications. All moving parts of the crane, for which lubrication is specified, should be regularly lubricated. Care should be taken to follow manufacturer's recommendations as to points of lubrication, maintenance of lubricant levels, and types of lubricant to be used.

Maintenance and Lubrication

- The contractor shall furnish crane operation and maintenance information
- A preventive maintenance program based on the crane manufacturer's recommendations should be established and records kept available
- Replacement parts should ordinarily be obtained from the original manufacturer and shall be at least equal to the original manufacturer's specifications
- All moving parts of the crane, for which lubrication is specified, should be regularly lubricated

Maintenance Documentation

The following information should be provided by the manufacturer of the crane: maintenance requirements and recommendations including proper settings, adjustments, and functioning of all mechanical drives and systems and identification of those members or locations that require periodic observation or testing; repair instructions including specific welding procedures; and design characteristics affecting safety.

Maintenance Documentation

The following information should be provided by the manufacturer of the crane:

- Maintenance requirements and recommendations
- Repair instructions
- Design characteristics affecting safety

Safe Operation

Cranes required to weathervane when not operated or out-of-service shall be installed with clearance for boom (jib) and superstructure to swing through a full 360-degree arc without striking any fixed object or other weather-vaning crane. The crane operator must remain in the operator’s cab during lifting and climbing operations. The operator shall be familiar with the equipment and its proper care. All controls shall be tested by the operator at the start of a new shift. If any controls do not operate properly, they shall be adjusted or repaired before operations are begun.


Safe Operation

- Cranes required to weathervane when not operated/out-of-service shall be installed with clearance for boom (jib) and superstructure to swing through a full 360 degree arc without striking any fixed object or other weathervaning crane
- The crane operator must remain in the operator’s cab during lifting and climbing operations
- The operator shall be familiar with the equipment and its proper care
- All controls shall be tested by the operator at the start of a new shift

Safe Operation 2

Cranes shall not be operated when wind speeds exceed the maximum velocity recommended by the manufacturer. For night operations, lighting shall be adequate to illuminate the working areas while not interfering with the operator’s vision. No crane shall be loaded beyond the rated loads given in the rating chart.

Safe Operation (Continued)



- Cranes shall not be operated when wind speeds exceed the maximum velocity recommended by the manufacturer
- For night operations, lighting shall be adequate to illuminate the working areas while not interfering with the operator’s vision
- No crane shall be loaded beyond the rated loads given in the rating chart

Knowledge Check

- 1. Select the best answer.** What equipment is not allowed for tensioning bolting assemblies during tower crane installation?
 - A. electric tensioners
 - B. impact wrenches
 - C. torque wrenches
- 2. Select the best answer.** When cranes are assembled or disassembled, what is the wind velocity limit that should not be exceeded if the manufacturer of the crane does not specify a limit?
 - A. 10 mph
 - B. 20 mph
 - C. 30 mph
 - D. 40 mph
- 3. Select the best answer.** Tower crane assembly, disassembly, and climbing operations shall be performed under the supervision of a—
 - A. contracting officer
 - B. contractor representative
 - C. crane operator
 - D. qualified person
- 4. Select the best answer. True or False:** During climbing operations, the tower crane may be operated to lift a load that is not part of the climbing operation if a contractor representative approves it.
 - A. True
 - B. False
- 5. Select the best answer.** During assembly, what shall be done if a structural component of the crane is found to be damaged?
 - A. finish assembly using the damaged structural component, then notify your supervisor
 - B. have the component repaired or replaced in accordance with the manufacturer's instructions
 - C. replace the component as directed by your supervisor
- 6. Select the best answer.** For cranes used in construction, when is an inspection of the crane required to be performed?
 - A. at the beginning of each shift, monthly, and annually
 - B. at the end of the shift and when the operator is replaced
 - C. prior to operation if the operator has time to complete the inspection
 - D. when the site supervisor assigns personnel to perform the inspection

- 7. Select the best answer. True or False:** After assembly, a crane is required to have a functional test and load test prior to being placed in service.
- A.** True
 - B.** False
- 8. Select the best answer.** The crane operator is responsible for all the following except—
- A.** approving all critical lifts
 - B.** being familiar with the crane and its proper care
 - C.** performing an inspection at the beginning of the shift
 - D.** remaining in the cab during lifting and climbing operations

CRANE OPERATIONS

Welcome

Welcome to Contractor Crane Awareness: Crane Operations.



The image shows a digital welcome screen for the NAVFAC Navy Crane Center. At the top left is the NAVFAC logo with the text "Naval Facilities Engineering Systems Command" and "NAVY CRANE CENTER" below it. On the left side, there is a smaller version of the NAVFAC logo and a diagram of a crane with the text "WEIGHT HANDLING PROGRAM MANAGEMENT" and "NAVFAC P-307" below it. On the right side, the word "Welcome" is displayed in blue, followed by the text "Welcome to Contractor Crane Awareness: Crane Operations." At the bottom right, there is a "Begin" button.

Pre-Use Inspections

Crane pre-use inspections shall be performed in accordance with OSHA 29 CFR 1926 Subpart CC, Cranes and Derricks in Construction, standard 1926.1412 Inspections, EM 385-1-1 for construction contracts, and in accordance with applicable ASME B30 standards.

All rigging gear shall be inspected prior to use in accordance with OSHA 29 CFR 1926.251 and applicable ASME B30 standards.

The load shall be inspected prior to the lift for stability and integrity.



The slide is titled "Pre-Use Inspections" in blue. On the left is a photograph of a worker in a white hard hat and a high-visibility vest inspecting a yellow piece of rigging gear. On the right is a bulleted list of inspection requirements:

- Crane pre-use inspections shall be performed in accordance with OSHA 29 CFR 1926 Subpart CC, 29 CFR 1926.1412, EM 385-1-1 for construction contracts, and applicable ASME B30 standards
- Rigging gear shall be inspected prior to use in accordance with 29 CFR 1926.251 and applicable ASME B30 standards
- The load shall be inspected prior to the lift for stability and integrity

Discrepancies

Here are some examples of discrepancies found while performing a crane inspection. A thorough engineering evaluation followed by necessary repairs would be necessary prior to putting this crane to work.



The slide is titled "Discrepancies Found During Pre-Use Inspections" in blue. It contains two photographs with captions:

- Bent lattice member**: A photograph showing a structural steel lattice member that is significantly bent and distorted.
- Deteriorated hydraulic hose**: A close-up photograph of a hydraulic hose that is severely worn, frayed, and leaking.

Discrepancies Continued

This sheave shaft does not appear to be secured properly. If something does not look right, have a qualified crane inspector evaluate the components in question.

Discrepancies: Wire Rope

Observe for properly reeved wire rope. Look for obvious signs of wire rope damage. This wire rope should be inspected for damage and the drum should be properly re-reeved prior to operation.

Contractor Crane Operation Checklist

NAVFAC P-307, Figure P-2 provides a checklist that shall be used during oversight of contractor crane and rigging operations. Copies of the checklist shall be kept on file for one year.

The following screens provide information for each of the items on the checklist.

Select each item to view information and guidance for oversight. Each item description or text box will appear for 10 to 15 seconds. For additional viewing time, you can reselect the item.

Discrepancies Found During Pre-Use Inspections (Continued)



If something does not look right, have a qualified crane inspector evaluate the components in question.

Discrepancies Found During Pre-Use Inspections (Continued)



- Is the wire rope properly reeved on the drum?
- Is the wire rope spooled evenly?
 - Are there gaps in the layers that may result in damage to the wire rope?
 - Look for kinked or damaged wire rope

Contractor Crane or Rigging Operation Checklist

NO.	DESCRIPTION	YES	NO	DATE
1	Is the Certificate of Compliance (COC) in the operator's possession and is the contractor's name on the COC?			
2	Is the crane operator licensed to operate the crane? Are the COC and the operator's license in the same name?			
3	Is the crane operator wearing the safety harness and lanyard? Are the lanyard and snap hook attached to the crane's structure?			
4	Are all safety devices (load limiters, anti-collision devices, etc.) functioning properly?			
5	Is the crane operator wearing the safety harness and lanyard? Are the lanyard and snap hook attached to the crane's structure?			
6	Is the crane operator wearing the safety harness and lanyard? Are the lanyard and snap hook attached to the crane's structure?			
7	Is the crane operator wearing the safety harness and lanyard? Are the lanyard and snap hook attached to the crane's structure?			
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49	Is the crane operator wearing the safety harness and lanyard? Are the lanyard and snap hook attached to the crane's structure?			
50	Is the crane operator wearing the safety harness and lanyard? Are the lanyard and snap hook attached to the crane's structure?			

Signature of Contractor Representative: _____

Signature of Government Representative: _____

Page 1 of 1

Contractor Crane or Rigging Operation Checklist (Continued)

		YES	NO
1	Is the Certificate of Compliance, P-1, in the operator's cab (or in the contractor's onsite office for rigging operations) with the current operator's name listed?		
2	Is the crane/machine transited to and from the job site correctly? Are the OEM instructions for travel being followed?		
3	Does the operator know the weight of the load to be lifted?		
4	Is the load to be lifted within the crane/machine manufacturer's rated capacity in its present configuration?		
5	Are outriggers/stabilizers required, and if so, are they properly extended and down?		
6	If outriggers/stabilizers are used and the wheels are not off the ground, is this the correct setup in accordance with the OEM?		
7	Is the crane/machine level and on firm ground, or if the ground is not firm, are adequate supporting materials provided?		

- ♦ Select each number to view information and guidance for oversight
- ♦ Information will display for 15 seconds.

Cc

1. Check to make sure the Certificate of Compliance, P-1, is present on the equipment, or in the contractor's on-site office for rigging operations. Ask the operator or user of the equipment to see the form.
2. Check the crane or equipment operation manual for travel or transit requirements. Check to make sure the hook/block is secured properly for travel. Look to see that outriggers and floats are not extended and properly stowed. Look on the crane and see if material is improperly stored on the crane or equipment.
3. Does the operator know the weight of the load to be lifted? Ask the operator the weight of the load. The load weight should include the weight of the load and rigging equipment combined. If the load weight is unknown, it cannot be lifted safely.
4. Is the load to be lifted within the crane/machine manufacturer's rated capacity in its present configuration? Ask the operator to show you the crane configuration (i.e., load radius and boom angle) and the load chart capacity at the given radius and boom angle.
5. Look to see if the outriggers/stabilizers are properly extended and down. Outriggers, when used, must be fully deployed with the weight of the tires free of the ground. Some crane manufacturers allow intermediate outrigger positions. These cranes shall have appropriate load charts for each allowable outrigger position.
6. Look to see if the outriggers/stabilizers are properly extended and down and that the wheels are off the ground. Check the manufacturer requirements. Ask the operator to explain why the wheels are not clear of the ground and show you the requirements.
7. Look at the outrigger/stabilizer placement and see if they are on firm ground. Any sinking or settling is not acceptable. If the ground is not firm, supporting materials (i.e., cribbing or blocking) should be used. When working on outriggers, adequate blocking or cribbing is essential. Proper support materials underneath the outrigger pads allow greater ground load distribution.

Contractor Crane or Rigging Operation Checklist (Continued)

		YES	NO
8	If supporting materials are provided, is the entire surface of the outrigger/stabilizer pad supported and is the supporting material of sufficient strength to safely support the loaded outrigger/stabilizer pad?		
9	If outriggers/stabilizers are not used, is the crane/machine rated for on rubber lifts by the OEM's load chart?		
10	Is the swing radius of the crane counterweight clear of people and obstructions and are accessible areas within the swing area barricaded to prevent injury or damage?		
11	Has the hook been centered over the load in such a manner to minimize swing?		
12	Is the load well secured and balanced in the sling or lifting device after it is lifted a few inches for verification?		
13	Is the lift and rotation path clear of obstructions?		
14	If rotation of the load being lifted is hazardous, is a tagline or other restraint being used?		

- ◆ Select each number to view information and guidance for oversight.
- ◆ Information will display for 15 seconds.

Co 8. Look at the outrigger/stabilizer placement and see if they are adequately supported. The supporting material must have enough surface area to spread out the weight of the crane and load and must be strong enough to support the load without failure. Check manufacturer and local instructions for specific ground loading and/or cribbing requirements.

8 9. If the crane is going to be making an on-rubber or pick-and-carry lift, check the operations manual and/or load charts to see if it is acceptable or allowed by the OEM and that the crane has been certified for such lifts. When operating "on rubber" it is a good idea to extend outriggers, where clearances permit, for a safety backup (unless prohibited by the OEM).

9 10. Check to make sure the swing radius of the counterweight is clear of personnel and obstructions. Accessible areas within the swing radius must be barricaded to prevent injury or damage.

10 11. Check the alignment of the hook over the load prior to, during tensioning of rigging gear, and just prior to the load being lifted, to make sure the hook is centered over the load. Ensure the hook has been centered over the load in such a manner as to minimize swing. The hook should not be pulled at an angle or side-loaded.

11 12. Prior to, and just after being lifted a few inches off the ground, the lift should be stopped and the load should be checked to ensure it is balanced and secured to prevent the load from falling out of the rigging during lifting operations. In addition, each lift or load should be stopped after lifting a few inches to ensure the crane hoist brake is working properly prior to raising the load to a more dangerous height.

12 13. Check to ensure the lift or rotation path of the crane is clear of obstructions. The operator and riggers should verify that the load and crane are clear of obstructions prior to and during the lift.

13 14. If rotation of the load is hazardous, check to make sure that a tagline or other restraint is attached to the load and that adequate lines and personnel are used to ensure rotation does not occur.

Contractor Crane or Rigging Operation Checklist (Continued)

		YES	NO
15	Are personnel prevented from standing or passing under a suspended load?		
16	Is the operator paying full attention to the signal person?		
17	Are proper signals being used? Is the operator responding properly to the signals? Are radios used for blind lifts?		
18	Are empty hooks lashed or otherwise secured during travel to prevent swinging?		
19	Does the operator remain at the controls while the load is suspended?		
20	Does the operator ensure that side loading is prohibited?		
21	Are personnel prevented from riding on a load?		
22	Are start and stop motions in a smooth fluid motion (no sudden acceleration or deceleration)?		

- ♦ Select each number to view information and guidance for oversight.
- ♦ Information will display for 15 seconds.

Contractor Crane or Rigging Operation Checklist (Continued)

	15. Check and make sure personnel are not standing, passing, or working under a suspended load.
15	16. The operator should not be performing any other functions or operations during crane movement or operations.
16	17. Watch the riggers and check for proper signals being given in accordance with ASME B30 standards. Make sure the operator is responding properly to the signals. If blind lifts are being performed, check for radios being used and for proper signals and operations.
17	18. Empty hooks on mobile cranes or equipment should be lashed or secured during travel to prevent swinging and or contact with the crane or other obstructions.
18	19. Look and make sure that the operator remains at or near the controls while a load is suspended from the crane. The operator should not leave the cab during the lift.
19	20. The operator should not lift a load until the hook is centered over the load. The load should not be dragged or lifted when the possibility of a side pull exists.
20	21. Check and ensure personnel are not allowed to stand or ride on a suspended load. Lifts of personnel shall meet the requirements of 29 CFR 1926.1431.
21	22. Start and stop motions should be in a smooth motion with no sudden acceleration or deceleration. Sudden starts and stops can cause loss of load control and damage the crane.
22	

- ♦ Select each number to view information and guidance for oversight.
- ♦ Information will display for 15 seconds.

Contractor Crane or Rigging Operation Checklist (Continued)

		YES	NO
23	Is the lift critical lift?		
24	If so, is a lift plan provided and understood and check off sheets initiated and signed off?		
25	If overhead power lines are in the vicinity, is a critical lift plan provided addressing the requirements of 29 CFR 1926.1407-1411?		
26	If pick and carry operations are allowed and performed, are OEM directions followed (e.g. rotation lock engaged, boom centered over front or rear, etc.)?		
27	When the crane/machine is left unattended, is it in a safe condition?		
28	Is rigging gear undamaged and acceptable for the application?		

- ♦ Select each number to view information and guidance for oversight.
- ♦ Information will display for 15 seconds.

Contractor Crane or Rigging Operation Checklist (Continued)

	23. Is the lift a critical lift? If so, check to make sure that the lift is identified as such and being performed in accordance with a critical lift plan as required in NAVFAC P-307 section 11.
23	24. If a critical lift is being performed, is the plan signed off or approved and do all personnel involved understand the lift requirements?
24	25. If overhead power lines are in the vicinity of the lift, check and ensure a critical lift plan has been provided and addresses the requirements of 29 CFR 1926.1407-1411.
25	26. Check the crane OEM requirements for pick and carry operations and ensure the directions are followed. Also, check the equipment and make sure a on-rubber or pick and carry load chart is on the equipment.
26	27. Check the crane or machine and ensure it is left in a safe condition. On cranes, make sure the rotate lock is engaged, the boom should be in the stored position and blocks/hooks should be properly secured or in a safe position. On other equipment, check OEM requirements for securing.
27	28. Look at the rigging gear and check for damaged gear or equipment. Look for broken wires, excessive rust, distorted rigging hardware, cracked or damaged end fittings, frayed or cut synthetic slings, or other damage that could cause failure. Check and ensure the equipment is the correct equipment for the job and that it has adequate capacity for the lift.
28	

- ♦ Select each number to view information and guidance for oversight.
- ♦ Information will display for 15 seconds.

Contractor Crane or Rigging Operation Checklist (Continued)

		YES	NO
29	Does rigging gear meet applicable ASME or host nation standards (e.g. ASME B30.9 for slings, B30.10 for hooks, B30.26 for rigging hardware such as shackles, safety hoist rings, and eyebolts, B30.20 for below the hook lifting devices)?		
30	Was the rigging gear inspected prior to use?		
31	Is sling protection used to protect slings (especially synthetic slings) and equipment from damage due to abrasion and sharp corners and edges?		
32	Is the rigging gear used in accordance with its working load limit? Is the working load limit marked on the rigging gear?		
33	Are positive latching devices (or "mousing") used on crane and rigging hooks?		

- ♦ Select each number to view information and guidance for oversight.
- ♦ Information will display for 15 seconds.

Contractor Crane or Rigging Operation Checklist (Continued)

29	29. Check to see if rigging gear meets applicable ASME standards (e.g., ASME B30.9 for slings, B30.10 for hooks, B30.26 for rigging hardware such as shackles, safety hoist rings, and eyebolts, B30.20 for below the hook lifting devices) or host nation standards in foreign countries.
	30. Watch rigging or contractor personnel to see if rigging gear is inspected prior to use.
30	31. Look to see if sling protection or chafing gear (padding, blocking, or other material used to protect rigging equipment from damage) is used to protect slings and equipment from damage due to abrasion and sharp corners or edges. Synthetic slings are easily damaged by sharp edges.
31	
32	32. Look to see if rigging gear or equipment is used in accordance with its working load limit. In other words, make sure that it is not being overloaded. Ensure it is not being used improperly and check to see if the working load limit or rated capacity is marked as required on the rigging gear or attached tag.
33	33. Check hooks on cranes and rigging equipment and ensure that positive latching devices or "mousing" is used as required by NAVFAC P-307, paragraph 11.1f.

- ♦ Select each number to view information and guidance for oversight.
- ♦ Information will display for 15 seconds.

Contractor Crane or Rigging Operation Checklist (Continued)

		YES	NO
34	If a mobile crane is used on a barge, are all rules of 29 CFR 1926.1437 (construction) being followed?		
35	If a mobile crane is used on a barge, are the outriggers/stabilizers blocked or are the crawlers traveling in a defined space as allowed by 29 CFR 1926.1437 (construction)?		
36	For floating cranes, are rules of 29 CFR 1915 (ship repair) or 29 CFR 1926.1437 (construction) being followed?		
37	If a multipurpose machine, forklift, or construction equipment is being used, is there proof from the OEM (or qualified PE) that the machine is approved for suspended load lifting and is there a load chart?		
38	If a personnel lift is being performed with a crane or base mounted hoist, are all requirements of NAVFAC P-307 paragraph 11.1.g(5) for a crane or 11.1.m for a base mounted hoist being followed?		

- ♦ Select each number to view information and guidance for oversight.
- ♦ Information will display for 15 seconds.

Contractor Crane or Rigging Operation Checklist (Continued)

34	34. If a mobile crane is used on a barge, check to see if the requirements of 29 CFR 1926.1437 are being followed.
35	35. If a mobile crane or equipment is used on a barge, check to see if the outriggers/stabilizers are blocked or that crawlers are traveling in a defined space as allowed by 29 CFR 1926.1437. In addition, check to see if cranes are secured as required.
36	36. For floating cranes, check to see if the requirements of 29 CFR 1915 (for ship repair) or 29 CFR 1926.1437 (construction) are being followed.
37	37. If a multi-purpose machine, forklift, or construction equipment is being used, check for proof from the OEM or qualified PE that the machine or equipment is approved for suspended load lifting and that it has a load chart. This is required per NAVFAC P-307, paragraph 11.1e.
38	38. If a personnel lift is being performed with a crane, check to ensure the plan meets the requirements of 29 CFR 1926.1431 or host nation requirements in foreign countries. For base mounted hoists, check to ensure the requirements in NAVFAC P-307, paragraph 11.1m are being followed.

- ♦ Select each number to view information and guidance for oversight.
- ♦ Information will display for 15 seconds.

Contractor Crane or Rigging Operation Checklist (Continued)

Contractor:		Subcontractor:	
Location:		Date:	
Notes:			
Signature of Government Representative:			

On page 2 of the form, the contractor and subcontractor (if applicable), location, date, notes (i.e., operations or equipment observed, areas of concern, additional information on problem areas or issues), and signature of the government representative or person who completed the form must be provided.

Understanding Crane Capacities

The crane's capacity must be adequate for the greatest weight, radius, and boom length that is to be used. A crane's maximum rated capacity rarely gives a practical indication of the load that the crane can actually lift. The OEM maximum rated capacity is based on a configuration involving minimum length booms at maximum boom angles which would normally be impractical for most typical industrial crane operations.

Understanding Crane Capacities



The crane must have adequate capacity for the job.

Rated capacity is:

- Based on configuration
- Found on a crane's load chart
- Usually much greater than actual capacity

Load Charts

Every mobile crane must have a load chart or a rated capacity chart. Typically, a capacity chart will show the potential boom lengths and allowable operating radii and the gross capacities that lie within these variables. The crane’s operating radius is defined as the distance from the crane’s point of rotation to the centerline of the suspended hook. A crane’s actual capacity is affected by changes in its boom length and operating radius. Other capacity influencing factors include wire rope strength, types, and weight of ancillary equipment, whether or not outriggers are used, and deductions from capacity.

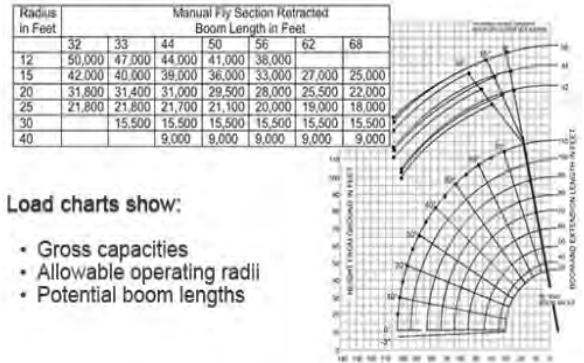
Load Chart Capacities

As a crane’s working radius increases, there is greater leverage on the boom resulting in a reduction of actual capacity. In the upper left, this load chart shows a maximum rated gross capacity of one hundred thousand pounds. If you follow the radius column down the left side and read across to the required boom length, you would find that with the longer boom length and greater radius, the gross capacity is reduced to 10,440 pounds. A 90% reduction in capacity. At this configuration, with the added weight of hooks, wire rope and ancillary equipment factored in, there may very little, if any, net capacity remaining.

Load Charts

All cranes must have a load chart.

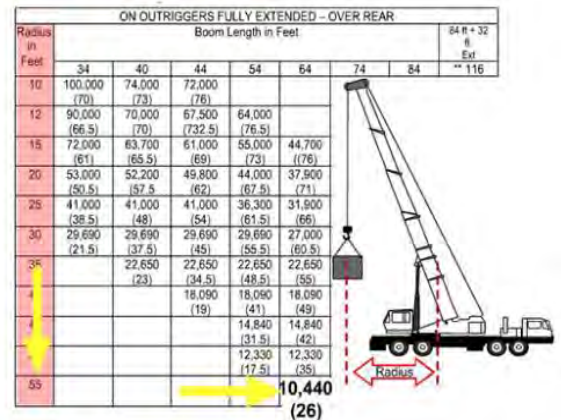
Examples of load charts:



Load charts show:

- Gross capacities
- Allowable operating radii
- Potential boom lengths

Load Chart Capacities



Operating Hazards

Always remain aware of operating hazards such as congestion, counterweight clearance, pinch points, and other cranes or equipment when observing crane operations.

Do not stand or walk under a suspended load.

Operating Hazards



Always remain aware of operating hazards such as:

- Congestion
- Counterweight clearance
- Pinch points
- Other cranes or equipment

Environmental Considerations

Environmental considerations such as wind and the operational limits for each crane, ice hazards including icing of the sheaves or structure and ice on barges supporting mobile cranes, visibility impairment and lightning strike potential should all be considered before any lift is put into motion.

Environmental Considerations



Consider environmental factors:

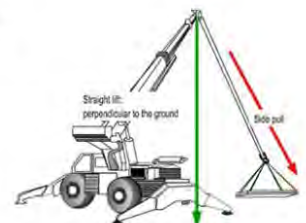
- Wind operational limits
- Ice hazards
 - Icing of the sheaves or structure
 - Ice on barges supporting mobile cranes
- Visibility impairment
- Lightning strike potential

Side Pulls

Loads shall be lifted vertically. The practice of side-loading the crane is dangerous and prohibited.

Side Pulls

- Crane components are designed for vertical, freely suspended lifts
- Booms and sheaves are not designed for side pulls



Limit Switches

The purpose of a hoist upper limit switch is to prevent overtravel of the hook block and the possibility of two-blocking. Two-blocking occurs when the hook block comes in contact with the upper sheave block during hoisting of the hook (or lowering the boom). Two-blocking is dangerous because it could result in damage to the crane, parting of the hoist lines, and dropping of the load.

Operators are required to check upper limit switches during the pre-use or pre-operational check of the crane.


Limit switches must be properly installed and are not to be used as operational devices. In other words, the crane operator should not be relying on the upper limit switch to stop movement of the hoist or load.

Lifting Personnel with Cranes

Cranes shall not be used to lift personnel unless there are no safer options to accomplish the job. When lifting of personnel by crane is necessary, ensure that a critical lift plan has been developed and that the plan demonstrates compliance with the requirements of OSHA 29 CFR 1926.1431.


For Navy activities in foreign countries the host nation requirements must be followed in lieu of the CFR.

Limit Switches



- The purpose of a hoist upper limit switch is to prevent two-blocking
- Limit switches must be properly installed
- They should not be used by the operator to stop hoisting or lifting

Limit Switches



- The purpose of a hoist upper limit switch is to prevent two-blocking
- Limit switches must be properly installed
- They should not be used by the operator to stop hoisting or lifting

Fall Protection

Body harnesses are required to be worn, with a shock absorbing lanyard attached to a structural member within the platform, whenever personnel are suspended in a personnel platform. The fall arrest system, which includes the harness, lanyard, and attachment point (anchorage), must meet the requirements in 29 CFR 1926.502. The use of restraint belts is prohibited by OSHA.

Limit Switches



- The purpose of a hoist upper limit switch is to prevent two-blocking
- Limit switches must be properly installed
- They should not be used by the operator to stop hoisting or lifting

Knowledge Check

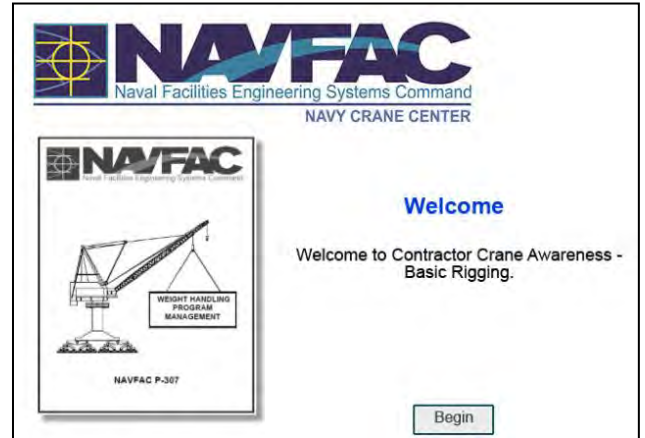
1. **Select the best answer. True or False:** The crane and rigging gear is required to be inspected prior to use.
 - A. True
 - B. False
2. **Select the best answer.** The contractor Crane or Rigging Operation Checklist (P-2) is used to—
 - A. document oversight of contractor crane and rigging operations
 - B. provide contractors a sheet or checklist to document crane and rigging gear certification
 - C. provide the contractor crane operator crane qualifications and rigger training
3. **Select the best answer.** How long are copies of the Contractor Crane or Rigging Operations Checklist (P-2) required to be kept on file?
 - A. 1 year
 - B. 2 years
 - C. 3 years
 - D. 4 years
4. **Select the best answer.** The capacities shown on a load chart are—
 - A. gross capacities
 - B. hook block capacities
 - C. net capacities
 - D. wire rope capacities

5. **Select the best answer. True or False:** Personnel are allowed to stand or walk under a suspended load.
- A. True
 - B. False
6. **Select the best answer.** What is the purpose of a hoist upper limit switch?
- A. to aid the operator in knowing the location of the hook block or hoist
 - B. to prevent over-travel of the hook block and the possibility of two-blocking
 - C. to stop movement of the hoist and prevent contact with obstructions
 - D. to stop upward movement of the boom
7. **Select the best answer.** What is required to be developed by the contractor prior to making a personnel lift?
- A. a complex lift plan
 - B. a Contractor Crane and Rigging Operations Checklist (P-2)
 - C. a critical lift plan
 - D. a personnel lift plan
8. **Select the best answer.** What fall protection equipment is required to be worn in a suspended personnel platform?
- A. a full body harness and a restraint lanyard
 - B. a full body harness and a shock absorbing lanyard
 - C. a restraint belt and a restraint lanyard
 - D. a restraint belt and shock absorbing lanyard
9. **Select the best answer.** In a suspended personnel platform, the fall protection lanyard should be attached to—
- A. a padeye on the lifting platform
 - B. a sling attached to the crane hook
 - C. a structural member within the platform
 - D. the crane hook
10. **Select the best answer. True or False:** The Contractor Crane or Rigging Operation Checklist (P-2) is required to be signed and approved by the contractor.
- A. True
 - B. False

BASIC RIGGING

Welcome

Welcome to Contractor Crane Awareness: Basic Rigging.




Personnel Qualifications

NAVFAC P-307 requires the contractor to certify (using Appendix P, Figure P-1) that the riggers are qualified to perform the work by either signing a statement of compliance, providing proof of successful completion of a rigging apprenticeship, or proof of successful completion of training courses from a recognized source that tests and qualifies riggers.

EM 385-1-1 requires that any worker engaged in the duties and performance of rigging shall be designated in writing and the specific rigging tasks for which they are qualified shall be provided.

Personnel Qualifications



- NAVFAC P-307 requires the contractor to certify that the riggers are qualified to perform the work
- EM 385-1-1 requires that any worker engaged in the duties and performance of rigging be designated in writing and the specific rigging tasks be provided

Knowledge and Experience

A rigger or qualified rigger is a person who has extensive knowledge, training, and experience sufficient to calculate loads, load weights, safe capacities, and apply other safe rigging principles and procedures; demonstrates the ability to utilize rigging materials and principles; and is capable of safely inspecting and performing rigging operations.

In addition, a qualified rigger must be able to communicate effectively with the crane operator, the lift supervisor, signal person, and affected personnel on site and have a basic knowledge and understanding of equipment-operating characteristics, capabilities, and limitations.

Knowledge and Experience

A rigger or qualified rigger is a person that is able to:

- Calculate loads, load weights, safe capacities, and apply other safe rigging principles and procedures
- Utilize rigging materials, equipment, and principles
- Safely inspect and perform rigging operations
- Communicate effectively with the crane operator, lift supervisor, signal person and affected personnel
- Demonstrate a basic knowledge and understanding of equipment operating characteristics, capabilities, and limitations

Rigging Gear Inspection and Use

Rigging gear shall be inspected prior to initial use and before use each shift to ensure that it is safe. An annual periodic inspection is also required. Defective rigging shall be removed from service. The use, inspection, and maintenance of rigging equipment shall be in accordance with the rigging equipment manufacturer and applicable ASME B30 standards.

Rigging equipment, when not in use, shall be removed from the immediate work area and properly stored and maintained in a safe condition.

Rigging Gear Inspection and Use

- All rigging gear or equipment shall be inspected prior to initial use and before use on each shift
- Defective rigging shall be removed from service
- Use and inspection shall be in accordance with the manufacturer
- When not in use, rigging equipment shall be stored in a safe condition



Hardware

Rigging hardware includes shackles, links, rings, swivels, turnbuckles, eyebolts, hoist rings, wire rope clips, wedge sockets, rigging blocks, and load-indicating devices.

All rigging hardware shall be inspected for defects prior to use on each shift and periodically as necessary during use. Periodic inspections shall not exceed 1 year.

Note: EM385-1-1 requires periodic inspections to be documented. All rigging hardware shall be constructed, installed, used, inspected, and maintained in accordance with ASME B30.26.

Hardware

- Rigging hardware includes: shackles, links, rings, swivels, turnbuckles, eyebolts, hoist rings, wire rope clips, wedge sockets, rigging blocks, and load indicating devices
- All rigging hardware shall be inspected for defects prior to use on each shift and periodically as necessary during use
- All rigging hardware shall be constructed, installed, used, inspected and maintained in accordance with ASME B30.26

Shackles

Each shackle body shall have durable markings by the manufacturer to show the name or trademark of the manufacturer, the working load limit or rated load, and the size. The pin shall show the name or trademark of the manufacturer and grade, material type, or load rating.

Some general requirements for use include the rated load shall not be exceeded; shackles should be stored in an area where they will not be subjected to damage, corrosive action, or extreme heat; the screw pin threads shall be fully engaged and tight, and the shoulder should be in contact with the shackle body; if a shackle is designed for a cotter pin, the cotter pin shall be used and maintained in good working condition; shock loading should be avoided; the load applied to the shackle should be centered in the bow of the shackle to prevent side loading of the shackle; multiple sling legs should not be applied to the shackle pin; and screw pin shackles shall not be rigged in a manner that would cause the pin to unscrew.

Shackles

- Shackles shall be marked with the name or trademark of the manufacturer, the WLL or rated load, and size
- The pin shall show the name or trademark of the manufacturer and grade, material type or load rating
- The rated load shall not be exceeded
- Screw pin threads shall be fully engaged
- The load should be centered in the bow of the shackle
- Multiple sling legs should not be applied to the pin



Sling Types

There are many types of slings used in rigging. Several types are shown here.

Sling types include: chain slings, wire rope slings, metal mesh slings, synthetic fiber rope slings, synthetic web slings, and synthetic round slings.

Synthetic slings are one of the most popular types of slings used in construction work. They are flexible and not as heavy as chain, wire rope, and metal mesh slings. But, they are also easily damaged and abused.



Sling Identification


All slings must have an affixed durable permanent identification tag that includes the following as a minimum: the name or trademark of the manufacturer (country identification only is not acceptable); the Working Load Limit (WLL) or rated load for a given type of hitch and configuration; and the number of legs if more than one.

Some sling types require additional markings or information. Chain slings require the grade and nominal chain size. Wire rope slings require the diameter or size. Metal mesh slings require individual sling identification (e.g. serial number). Synthetic slings require the manufacturer's code or stock number and the type of material used.

Sling Identification

All slings shall be marked to show:

- Name or trademark of manufacturer
- The working load limit or rated load
- The number of legs (if more than one)



Some sling types require additional markings or information:

- Chain slings require the grade and nominal chain size
- Wire rope slings require the diameter or size
- Metal mesh slings require individual sling identification
- Synthetic slings require the manufacturer's code or stock number and the type of material used

The tag shown here is from a synthetic sling and also provides the type of material (Nylon), and the manufacturer's code or stock number (EE4-94N)

Sling Use

Slings shall be manufactured, used, inspected, and maintained in accordance with ASME B30.9.

Natural fiber rope shall not be used to fabricate slings. Some common sling use rules include adequate and appropriate protection shall be used to protect slings from sharp edges, abrasion, and excessive bearing; slings shall not be knotted, shortened, or adjusted unless approved by the manufacturer or qualified person; the load shall not be landed on the sling and a sling shall not be pulled from under the load when the load is resting on the sling; slings shall not be dragged over abrasive surfaces; and shock loading is not allowed.

Additional rules include all slings shall be hitched or attached in a manner providing control of the load and so that the load is positively secured, and slings shall not be twisted or kinked.

Sling Use

Slings shall be manufactured, used, inspected, and maintained in accordance with ASME B30.9.

Natural fiber rope shall not be used to fabricate slings.

Some common sling use rules include:

- Adequate and appropriate protection shall be used to protect slings from sharp edges, abrasion, and excessive bearing
- Slings shall not be knotted, shortened, or adjusted unless approved by the manufacturer or qualified person
- The load shall not be landed on the sling and a sling shall not be pulled from under the load when the load is resting on the sling
- Slings shall not be dragged over abrasive surfaces
- Shock loading is not allowed

Sling Removal Criteria

Synthetic and wire rope slings are the two most common sling types used on construction sites.

Slings shall be removed from service if any of the removal criteria conditions listed in ASME B30.9 for the applicable sling type are discovered.

Wire rope removal criteria conditions include broken wires; severe localized abrasion or scraping; kinking, crushing, bird caging, or any other damage to the rope structure; evidence of heat damage; crushed, deformed, or worn end attachments; severe corrosion of the rope and attachments or fittings; missing or illegible sling identification; and other conditions that cause doubt as to safe use of the sling.

Synthetic sling removal criteria conditions include acid or caustic burns; melting or charring; snags, holes, tears, or cuts; broken or worn stitches; excessive abrasive wear; knots in any part of the sling; excessive pitting or corrosion, or cracked, distorted, or broken fittings; or other visible damage that causes doubt as the strength of the sling.

Sling Removal Criteria



- Synthetic and wire rope slings are the two most common sling types used on construction sites
- Slings shall be removed from service if any of the removal criteria conditions listed in ASME B30.9 for the applicable sling type are discovered

Rigging Gear Hazards

The first major hazard we must talk about is abuse. Here the biggest hazard is the user.

Slings should not be dragged on the ground. Cement or paved surfaces will quickly abrade slings and gear. Contact with the ground can embed grit and abrasives into the sling, which will cause damage. The load should not be placed or landed on slings, and slings should not be pulled from under a load while the load is resting on them. Loads should be placed on blocking to keep from crushing or damaging slings.

Hazards (Corrosives and Heat)

Gear should be kept away from corrosives, acids, paint thinners, and any other harmful chemicals.

Chemicals that may have a corrosive effect on one type of gear may not affect another. For example, acids would quickly destroy a nylon sling but might not harm another synthetic material. Gear should be protected from all heat sources such as welding, burning, grinding, or heat-treating.

Rigging gear should be stored in an area where it will not be subjected to mechanical, chemical, or environmental damage. Gear should not remain outside after use.

Rigging Gear Hazards

Slings should not be dragged on the ground. This causes abrasion and dirt or grit to become embedded into the sling.

Loads should not be placed on rigging gear.



Hazards (Corrosives and Heat)

Corrosives

- Acids
- Chemicals
- Solvents

Heat

- Welding
- Burning
- Heat treatment
- Grinding


Hazards (Sharp Edges)

Another common hazard is sharp edges. No matter what type of gear is used, sharp edges will leave their mark if the gear is not protected. Slings can be easily cut at corners or edges or otherwise damaged by abrasion or excessive bearing stress (especially synthetic slings). Adequate and appropriate sling protection shall be used where there is a possibility of the sling being cut or otherwise damaged by abrasion or bearing.

Sling protection material must be of sufficient thickness and strength to prevent sling damage.

Hazards - Sharp Edges

- Sharp edges can damage equipment!




Improper Rigging

This picture shows a web sling improperly attached to a load. Web slings must be installed flat around the load without kinks or twists. Kinks and twists prevent even loading of the fabric in the sling. Additionally, when shackles are used with web slings, the shackle size must allow the sling to lay relatively flat without much curling. Excessive curling at the edges causes uneven loading of the sling.

Improper Rigging

- Web slings must be installed flat around the load without kinks or twists



Poor Rigging Practices

This is an example of potentially dangerous rigging practices. Here, bolts are used for attaching and shortening a chain sling. In addition, non-shouldered eyebolts are being used for angular lifting and are not engaged properly (nuts are being used). Failure of the bolts, the chain, or the eyebolts are all possible as a result of these poor rigging practices. Failure of any of these components could be catastrophic.



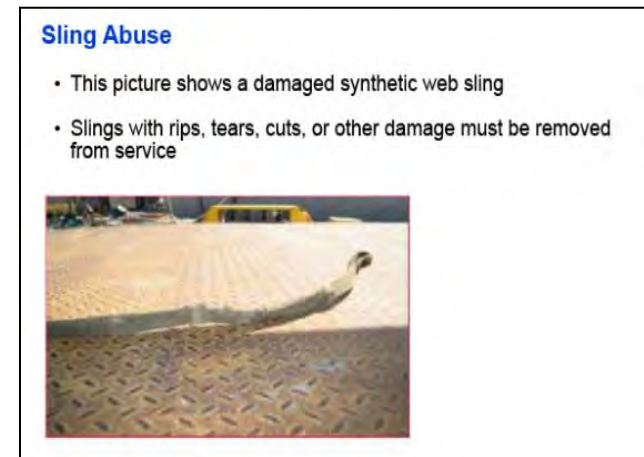
Overloaded Rigging

This picture shows a shackle that was overloaded. Overloading rigging gear can lead to failure. Personnel performing rigging and crane operations must ensure that rigging gear has the capacity to carry the weight of the load and that the items to be lifted are not attached or secured to another item or bolted down.



Sling Abuse

This picture shows a synthetic web sling that was abused and damaged. The sling contains numerous rips, tears, and cuts and must be removed from service. Personnel should not be using slings that are damaged.



Knowledge Check

- 1. Select the best answer.** Rigging gear is required to be inspected—
 - A. after subjected to extreme weather conditions
 - B. periodically
 - C. prior to use
 - D. when the contracting official requires inspection
- 2. Select the best answer. True or False:** A manila tag attached with a string should be used to provide sling identification.
 - A. True
 - B. False
- 3. Select the best answer.** What identification markings are required on wire rope slings?
 - A. the name or trademark of the manufacturer, the manufacture date, and the working load limit (WLL)
 - B. the name or trademark of the manufacturer, the working load limit (WLL), and the sling diameter
 - C. the working load limit (WLL), the manufacture date, and the sling length
 - D. the working load limit (WLL), the manufacture date, and the sling diameter
- 4. Select the best answer. True or False:** Natural fiber rope shall not be used to fabricate slings.
 - A. True
 - B. False
- 5. Select all that apply.** What markings are required on the body of a shackle?
 - A. the date of manufacture
 - B. the name or trademark of the manufacturer
 - C. the periodic inspection due date
 - D. the size
 - E. the working load limit (WLL) or rated load
- 6. Select the best answer.** What markings are required on the pin of a shackle?
 - A. the manufacture date and size
 - B. the name or trademark of the manufacturer and grade, the material type, or load rating
 - C. the name or trademark of the manufacturer, the working load limit (WLL), and the size
 - D. the working load limit (WLL) and serial number

- 7. Select the best answer.** What is the proper method used for installing a screw pin in a shackle?
- A.** The screw pin threads shall be fully engaged, and the shoulder shall be in contact with the shackle body.
 - B.** The user should screw the pin in fully with the shoulder flush against the shackle body then back the pin out a half a turn to prevent binding during lifting.
 - C.** The user should screw the pin in fully with the shoulder flush against the shackle body then back the pin out a quarter of a turn to prevent binding during lifting.
- 8. Select the best answer. True or False:** It is okay to land a load on slings as long as the slings will not be pulled out from under the load.
- A.** True
 - B.** False

CRANE AND RIGGING ACCIDENTS

Welcome

Welcome to Crane and Rigging Accidents.

Learning Objectives

Upon successful completion of this module, you will be able to identify the elements in the crane and rigging operating envelopes, define a crane accident, define a rigging accident, near miss, and unplanned occurrence, identify the primary causes of accidents, and explain the procedures to follow when an accident occurs.

Accident Categories

There are two general categories of accidents: crane accidents and rigging accidents. Crane accidents are those that occur during operation of a category 1, 2, 3, or 4 crane.

Rigging accidents are those that occur when gear and equipment identified in Section 14 is used by itself in a weight handling operation, for example without category 1 through 4 cranes, or when covered gear is used with multi-purpose machines, Material Handling Equipment (for example forklifts), and equipment covered by NAVFAC P-300 in a weight handling operation.

In addition, accidents that occur during the operation of entertainment hoists shall be classified as rigging accidents.



Learning Objectives

Upon successful completion of this module, you will be able to:

- Identify the elements in the crane and rigging operating envelopes
- Define a crane accident
- Define a rigging accident, near miss, and unplanned occurrence
- Identify the primary causes of accidents
- Explain the procedures to follow when an accident occurs

Accident Categories

There are two general categories of weight handling accidents: Crane Accidents and Rigging Accidents.

- A crane accident occurs during the operation of a Category 1, 2, 3, or 4 crane.
 - Rigging accidents are those that occur when gear and equipment identified in Section 14 is used by itself in a weight handling operation, or when covered gear is used with multi-purpose machines, MHE and equipment covered by NAVFAC P-300 in a weight handling operation.
 - Accidents that occur during the operation of entertainment hoists shall be classified as rigging accidents.
-
-
-

Significant Accidents

A significant accident is an accident that typically has a greater potential to result in serious injury or substantial property damage. The following accident types are considered significant accidents: injuries regardless of severity, overloads, dropped loads, two-blocks, crane derailments, or contact with overhead electrical power lines. Other types of accidents that result in OPNAV Class A, B, C, or D reporting thresholds for material property damage are also considered significant accidents.

Significant Accidents

Significant accidents include:

- Injuries
- Overloads
- Dropped Loads
- Two-blocks
- Crane derailments
- Contact with overhead electrical power lines


Crane Operating Envelope

In order to define a crane accident, you must first understand the crane operating envelope. The operating envelope consists of any of the following elements: the crane (except a crane being operated in transit as defined in NAVFAC P-307 Appendix A), the operator, the riggers, signal persons, and crane walker, other personnel involved in the operation, the rigging gear between the hook and the load, the load, the crane's supporting structure (ground, rail, etc.), and the lift procedure.

Crane Operating Envelope

The crane operating envelope consists of any of the following elements:

- the crane
- the operator
- the riggers, signal persons, and crane walker
- other personnel involved in the operation
- the rigging gear between the hook and the load
- the load
- the crane's supporting structure
- the lift procedure



Rigging Operating Envelope

The operating envelope around any rigging or other Section 14 equipment operation includes the rigging gear or miscellaneous equipment identified in Section 14, the user of the gear or equipment (including operators of multi-purpose machines, material handling equipment, and construction equipment), other personnel involved in the operation, the load, the gear or equipment's supporting structure (padeyes, ship's structure, building structure, etc.), the load's rigging path, and the rigging or lift procedure.

Rigging Operating Envelope

Includes:

- Rigging gear or miscellaneous equipment in Section 14
- The user of the gear or equipment
- Other personnel involved in the operation
- The load
- The gear or equipment's supporting structure
- The load's rigging path
- The rigging or lift procedure



Knowledge Check

- 1. Select all that apply.** The crane operating envelope includes the crane, the operator, the riggers, the crane walkers, and—
 - A. any supporting structures
 - B. rigging gear between the hook and the load
 - C. the area where the load will be landed
 - D. the load
- 2. Select all that apply.** The rigging operating envelope contains the rigging gear and miscellaneous equipment covered by P-307 Section 14, the load itself, and—
 - A. other personnel involved in the operation
 - B. the crane removal procedure
 - C. the gear or equipment's supporting structure
 - D. the load rigging path
 - E. the rigging procedure
 - F. the user of the gear or equipment

Near Miss

A near miss is an unplanned event during a weight handling operation that did not result in a definable accident but easily had the potential to do so. Only a break in the chain of events prevented an accident. Simply put, a near miss is an accident that almost took place. The difference between a near miss and an accident (serious or otherwise) is often a fraction of an inch or a split second of time. A near miss report is used to learn from situations where an accident "almost" happened so that the real event can be averted.

Near Miss

- A near miss is an unplanned event during a weight handling operation that did not result in a definable accident but easily had the potential to do so.
- A near miss report is used to learn from situations where an accident "almost" happened so that the real event can be averted.

Unplanned Occurrence

An "unplanned occurrence" describes an event that does not meet the definition of a crane or rigging accident but results in injury or damage to a crane, crane component, or related equipment due to an event not directly related to a weight handling operation. Examples include, but are not limited to, injury or damage caused by weather, damage to a parked or stationary crane caused by another moving object (e.g. vehicle, forklift), and flooding or fire damage.

Unplanned Occurrence

An "unplanned occurrence" describes an event that does not meet the definition of a crane or rigging accident but results in injury or damage to a crane, crane component, or related equipment due to an event not directly related to a weight handling operation.

Examples include:

- Injury or damage caused by weather
- Damage to a parked or stationary crane caused by another moving object
- Flooding or fire damage

Near Miss Reporting

Near Misses and unplanned occurrences that do not fall under the crane and rigging accident definitions shall be reported using Figure 12-2 (available on the Navy Crane Center website). These reports shall be submitted in accordance with NAVFAC P-307 Section 12 within 30 days of the event.

Reporting

- Near misses and unplanned occurrences shall be reported using the Near Miss and Unplanned Occurrence Report (Figure 12-2).
- These reports shall be submitted within 30 days of the event.


Crane Accident

A crane accident occurs when any of the elements in the crane operating envelope fails to perform correctly during a crane operation including operation during maintenance or testing resulting in any of the following: personnel injury or death, material or equipment damage, dropped load (including any part of the load or rigging gear and any item lifted with the load or rigging gear), derailment, two-blocking, overload (including load tests when the nominal test load is exceeded), or collision (avoidable contact between the load, crane, and/or other objects).

Crane Accidents Occur—

When any of the elements in the crane operating envelope fails to perform correctly during a crane operation including operation during maintenance or testing resulting in any of the following:

- Personnel injury or death
- Material or equipment damage
- Dropped load
- Derailment
- Two-blocking
- Overload
- Collision



Rigging Accidents

A rigging accident occurs when any of the elements in the operating envelope fails to perform correctly during a rigging operation resulting in any of the following: personnel injury or death, material or equipment damage that requires the damaged item to be repaired because it can no longer perform its intended function, dropped load (including any part of the load or rigging gear and any item lifted with the load or rigging gear), two-blocking of cranes and powered hoists identified in Section 14, or overload (including load tests when the test load tolerance is exceeded).

Note: A dropped load, two-blocking, and overload are considered accidents even though no material damage or injury occurs.

Rigging Accidents

Occur when any of the elements in the operating envelope fails to perform correctly during a rigging operation resulting in any of the following:

- Personnel injury or death
- Material or equipment damage
- Dropped load
- Two-blocking
- Overload

Note: A dropped load, two-blocking, and overload are considered accidents even though no material damage or injury occurs.



Damaged Rigging Gear

When damage to rigging gear is discovered during an inspection or when damaged rigging gear is returned to the gear room and an accident is suspected, the gear shall be immediately removed from service and a comprehensive investigation initiated.

For a suspected accident, the activity shall follow the investigation and reporting requirements of NAVFAC P-307 Section 12, promptly perform a comprehensive investigation and prepare a Crane and Rigging Accident Report and forward a copy to the Navy Crane Center (Code 06) within 30 days of the accident.

Local Weight Handling Equipment accident reporting procedures shall also be followed.

Accident Examples

Some common examples of accidents are dropped loads, injuries from a shifting load, failure of rigging gear resulting in a dropped load, overloads, and improperly secured loads falling from pallets.

Accident Exception

A component failure (e.g., motor burnout, gear tooth failure, bearing failure) shall be considered an accident only if damage to the load or another component occurs as a result of the failure.

Damaged Rigging Gear

When damage to rigging gear is discovered during an inspection or when damaged rigging gear is returned to the gear room AND an accident is suspected—

- Immediately remove the gear from service
- A prompt comprehensive investigation shall be performed
- The incident shall be documented on a Crane and Rigging Accident Report and forwarded to the Navy Crane Center within 30 days

Note: Local WHE accident reporting procedures shall also be followed.



Accident Examples



- Dropped loads
- Injuries from shifting loads
- Rigging gear failure
- Overloads
- Load falls off of pallet

Accident Exception

Component failure is considered an accident only if damage to the load or another component occurs as a result of the failure.



Accident Causes

In most cases, crane accidents result from personnel error and can be avoided. Most crane accidents are caused by inattention to the task, poor judgment, bad communication, team members having too much confidence in their abilities, or operating the crane too fast.

Accident Causes

In most cases, crane accidents result from personnel error and can be avoided.

In most cases, crane accidents are due to:

- Inattention to the task
- Poor judgment
- Overconfidence
- Excessive speed

Operator Responsibilities

The operator can play a significant role in eliminating human error and accidents. Drugs and alcohol can affect a person's capability to think, reason, or react in normal situations and can certainly lead to serious accidents. Operators must always consult their physicians regarding effects of prescription drugs before operating equipment and recognize that medications often affect people differently. An operator is responsible for evaluating his or her physical and emotional fitness.

Operator Responsibilities

Drugs and alcohol can affect a person's ability to think or react normally and can lead to accidents.

Operators shall:

- Consult their physician regarding effects of medications
- Evaluate his or her own physical and emotional fitness
- Inform their supervisor of conditions as appropriate

WHE Accident Response

Upon having an accident or having seen evidence of damage, the crane team, riggers, equipment users, etc., shall stop all operations and notify immediate supervisor(s). If there is impending danger to the equipment or personnel, place the crane and/or load in a safe position prior to notifying supervision. Ensure the accident scene is secured and undisturbed so as to facilitate the investigation. The supervisor shall review the situation and take any further emergency action. The supervisor shall notify management personnel as well as the activity safety office.

WHE Accident Response

- Upon having an accident or having seen evidence of damage, stop all operations and notify immediate supervision.
- If there is impending danger to the equipment or personnel, place the crane and/or load in a safe position prior to notifying supervision.
- Secure the accident scene.
- The supervisor shall review the situation, take any further emergency action, and notify management personnel as well as the activity safety office.

Notification and Reporting

For accidents involving a fatality, inpatient hospitalization, overturned crane, collapsed boom, or any other major damage to the crane, load, or adjacent property, notify the Navy Crane Center by e-mail as soon as practical but not later than eight hours following the accident. Notification for all other accidents shall be made as soon as practical but no later than three working days after the accident. For each suspected accident, activities shall promptly perform an investigation, prepare a crane and rigging accident report using Figure 12-1 (available on the Navy Crane Center website), and forward a copy to the Navy Crane Center (Code 06) within 30 days of the accident.

Notification and Reporting

For accidents involving a fatality, inpatient hospitalization, overturned crane, collapsed boom, or any other major damage to the crane, load, or adjacent property, notify the Navy Crane Center by e-mail (navfac_ncc_accident@us.navy.mil) as soon as practical but not later than eight hours following the accident.

For all other accidents, the Navy Crane Center must be notified as soon as practical but no later than three working days after the accident.

For each suspected accident, activities shall promptly perform an investigation, prepare a Crane and Rigging Accident Report, and forward a copy to the Navy Crane Center (Code 06) within 30 days of the accident.

Contractor Accident Reporting Procedures

The contractor shall notify the contracting officer as soon as practical, but not later than four hours, after any Weight Handling Equipment accident, secure the accident site and protect evidence until released by the contracting officer, and conduct an investigation to establish the root cause(s) of any Weight Handling Equipment accident, near miss, or unplanned occurrence.

Crane operations shall not proceed until the cause is determined and corrective actions have been implemented to the satisfaction of the contracting officer.

The contractor shall provide the contracting officer a report for an accident or near miss within 30 days using the appropriate form provided in NAVFAC P-307 Section 12 consisting of a summary of circumstances, an explanation of causes, photographs (if available), and corrective actions taken.

Reporting Procedures - Contractor

The contractor shall:

- Notify the contracting officer as soon as practical but no later than four hours after any WHE accident
- Secure the accident site and protect evidence until released by the contracting officer
- Conduct an accident investigation to establish the root cause(s) of any WHE accident, near miss, or unplanned occurrence

Crane operations shall not proceed until cause is determined and corrective actions have been implemented to the satisfaction of the contracting officer.

The contractor shall provide the contracting officer a report for an accident or near miss within 30 days using the appropriate form provided in NAVFAC P-307 Section 12.

Contracting Officer Reporting Procedures

The contracting officer shall notify the host activity of any Weight Handling Equipment accident upon notification by the contractor. Additionally, the contracting officer shall notify the Navy Crane Center, by e-mail (navfac_ncc_accident@us.navy.mil), of an accident involving a fatality, inpatient hospitalization, overturned crane, collapsed boom, or any other major damage to the crane or adjacent property as soon as possible, preferably within 8 hours of notification by the contractor. For all other accidents, notify the Navy Crane Center as soon as practical but no later than three working days after the accident.

The contracting officer shall provide the Navy Crane Center and host activity a copy of every accident and near miss report, regardless of severity, upon receipt from the contractor.

The contracting officer or designated weight handling representative shall sign all crane and rigging accident and near miss reports to indicate that they are satisfied that the contractor's investigation and corrective action are sufficient.

Reporting Procedures - Contracting Officer

The contracting officer shall:

- Notify the host activity of any WHE accident upon notification by the contractor
- Provide the Navy Crane Center and the host activity a copy of every accident report, regardless of severity, upon receipt from the contractor
- Notify the Navy Crane Center of any accident involving a fatality, inpatient hospitalization, overturned crane, collapsed boom, or any other major damage to the crane, load, or adjacent property as soon as possible, preferably within 8 hours of notification by the contractor

The contracting officer or designated weight handling representative shall sign all crane and rigging accident and near miss reports to indicate that they are satisfied that the contractor's investigation and corrective action are sufficient.

Knowledge Check

3. **Select the best answer.** During maintenance, the rigging gear between the crane hook and the load fails and results in equipment damage. This is reported as a(n)—
 - A. crane accident
 - B. operator error
 - C. rigger error
 - D. rigging gear deficiency

4. **Select the best answer.** During crane operations, the load shifts. The operator reacts quickly and saves the load but causes the crane to derail. This is reported as a(n)—
 - A. crane accident
 - B. crane walker's error
 - C. load configuration error
 - D. operator error

5. **Select the best answer.** When rigging gear covered by NAVFAC P-307 Section 14 fails while suspended from a structure and drops the load, it is a—
 - A. crane accident
 - B. load configuration error
 - C. rigging accident
 - D. rigging error

6. **Select the best answer.** If component failure occurs, such as motor burnout, and does not result in damage, the component failure is considered—
 - A. a crane accident
 - B. a non-accident
 - C. crane maintenance's responsibility
 - D. rigging accident

7. **Select the best answer.** To whom or to what are the majority of crane accidents attributed?
 - A. crane operators
 - B. equipment failure
 - C. personnel error
 - D. riggers or signalmen
 - E. weather conditions

8. **Select all that apply.** Overconfidence and poor judgement among team members can contribute to crane and rigging accidents. Select additional factors that can contribute to accidents.
 - A. engineering lift specifications
 - B. inattention to the task
 - C. operating the crane too fast
 - D. the crane operating envelope

9. **Select all the best answer.** If you have an accident with a crane or you find damage and suspect an accident has happened, your first step is to—
- A. Call emergency services if anyone is injured.
 - B. Notify your supervisor immediately.
 - C. Secure the crane and power as required.
 - D. Stop operations as soon as safely possible.

Completion

Completion

Congratulations.

You have completed the Crane and Rigging Accidents module.

Click on the Exit button to return to the main module menu.



CONTRACTOR CRANE AWARENESS EVALUATION

Student Name: _____

Command/Activity/Organization: _____

Instructor: _____ **Date:** _____

Directions: To assist in evaluating the effectiveness of this course, we would like your reaction to this class.

Do not rate questions you consider not applicable.

Please rate the following items:	Excellent	Very Good	Good	Fair	Poor
Content of the course met your needs and expectations.					
Content was well organized.					
Materials/handouts were useful.					
Exercises/skill practices were helpful.					
Training aids (slides, videos, etc.) were used effectively.					
Instructor presented the material in a manner which was easy to understand.					
Instructor was knowledgeable and comfortable with the material.					
Instructor handled questions effectively.					
Instructor covered all topics completely.					
Probability that you will use ideas from the course in your work.					
Your opinion of the course.					
Your overall opinion of the training facilities.					

What were the key strengths of the training? How could the training be improved? Other comments?

List other training topics in which you are interested: _____

Note: If you would like a staff member to follow up and discuss this training, please provide your phone number
