



Navy Crane Center



NAVFAC P-307 Training

ELECTRICAL CRANE INSPECTOR

WEB BASED TRAINING STUDENT GUIDE

NCC-ECI-02

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INTRODUCTION

Welcome

Welcome to the Electrical Crane Inspector course.

Welcome

Welcome to the NAVFAC P-307
Electrical Crane Inspector course.

Course Description

Electrical Crane Inspector is designed to acquaint electrical crane inspectors with Navy requirements for the safe inspection of electrical components on Navy cranes and provide a knowledge on which to build upon with on-the-job experience. Topics include specific documentation requirements for inspection and record keeping.

Course Description

Electrical Crane Inspector is designed to:

- acquaint electrical crane inspectors with Navy requirements for the safe inspection of electrical components on Navy cranes
- provide a knowledge base on which to build upon with on-the-job experience
- provide specific documentation requirements for inspection and record keeping

Topics Covered

This training course covers the inspection elements, requirements, and work practices for personnel who perform electrical maintenance and certification inspections on Navy cranes. It discusses features of both the Maintenance Inspection Specification Record and the Crane Condition Inspection Record. Knowledge of these requirements and how they apply to electrical components, such as motors and generators improves an inspector's ability to identify deficiencies and conditions that affect the safe operation and certification of the crane. Whether or not the inspections are performed by designated, qualified inspectors or by journeymen level mechanics and electricians, records of inspections, repairs, and verifications must be properly maintained.

Topics Covered

This training course covers the following:

- the inspection elements, requirements, and work practices for personnel who perform electrical maintenance and certification inspections on Navy cranes
- the features of both the Maintenance Inspection Specification Record and the Crane Condition Inspection Record
- how knowledge of inspection requirements improves an inspector's ability to identify deficiencies and conditions that affect the safe operation and certification of a crane
- how records of inspections, repairs, and verifications must be maintained

Course Modules

Following a brief explanation on navigating this type of web-based training course, you will be required to complete an overview of the NAVFAC P-307 Weight Handling Program Management Manual.

To support the objectives of this course and cover all the required information, this presentation is divided into six modules and has a Final Exam, which must be satisfactorily completed to pass the course. These modules include Inspections 1 and 2, Basic Inspection Techniques, Rotating Equipment Inspections, Controller Inspections, and Associated Equipment Inspections.

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.

Course Modules

- NAVFAC P-307 Overview
- Electrical Inspections 1
- Electrical Inspections 2
- Basic Inspection Techniques
- Rotating Equipment Inspections
- Controller Inspections
- Associated Equipment Inspections
- Final Exam



References

Click on your choice from the reference links below.

[NAVFAC P-307](#)

[View or Print Student Guides](#)

Getting the Most Out of this Course

To get the most out of this online course, you should

- Pay attention to narrations and screens (narration and screen information may differ)
- Replay as needed
- Complete knowledge checks and learning activities

The learning activities will help reinforce your learning and prepare you for the module and final assessments.



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

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.

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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Completion

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.

NAVFAC P-307 OVERVIEW SECTIONS 1-14

Welcome

Welcome to the NAVFAC P-307 Weight Handling Program Management manual overview.



Welcome

Welcome to the NAVFAC P-307 Weight Handling Program Management Manual Overview.

Introduction

This training contains abbreviated explanations of the content found in this manual. You are encouraged to have a copy of the NAVFAC P-307 manual available for reference as you go through this material. In the execution of your weight handling tasks and duties, always refer directly to the NAVFAC P-307 manual for exact wording. You may contact Navy Crane Center at any time for assistance. Contact information is provided at the bottom of the screen and on the last screen in this presentation.

Introduction

- This training contains abbreviated explanations of the content found in the NAVFAC P-307 manual.
- Have a copy of the NAVFAC P-307 manual available for reference.
- Always refer directly to the manual for exact wording.
- You may contact Navy Crane Center at any time for assistance.

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Learning Objectives

Upon successful completion of this training, you will possess a general understanding of the NAVFAC P-307 Weight Handling Program Management manual. This understanding will enable you to explain the purpose of NAVFAC P-307; identify types of covered equipment; list load bearing, load controlling, and operational safety device components and equipment; find maintenance, inspection, testing, and certification requirements; describe training, competency, and licensing requirements for Navy weight handling program personnel; find information to facilitate working with contractors; identify various forms used in the Navy's weight handling program; and know how to obtain support from Navy Crane Center.

Learning Objectives

Upon successful completion of this NAVFAC P-307 Overview training, you will possess a general understanding of the NAVFAC P-307 Weight Handling Program Management manual. This understanding will enable you to:

- explain the purpose of NAVFAC P-307
- identify types of covered equipment
- list load bearing, load controlling, and operational safety device components and equipment
- find maintenance, inspection, testing, and certification requirements
- describe training, competency, and licensing requirements
- find information to facilitate working with contractors
- identify various forms
- obtain support from Navy Crane Center

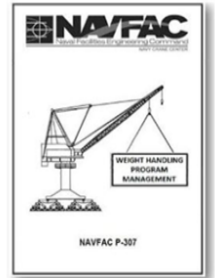
Section 1 Introduction

NAVFAC P-307 Section 1 provides a general overview of the Navy's weight handling program including the purpose, applicability, some basic requirements, and descriptions of the types of covered equipment.

Section 1 Introduction

Section 1: General Overview

- Section 2: Program Management
- Section 3: Maintenance and Inspection
- Section 4: Certification
- Section 5: Equipment History File
- Section 6: Alterations and Engineering
- Section 7: Training and Qualification
- Section 8: Operator Licensing
- Section 9: Operator Checks
- Section 10: Operations
- Section 11: Contractor and Other Non-Navy Owned Cranes
- Section 12: Accidents, Near Misses, and Unplanned Events
- Section 13: Entertainment Hoists
- Section 14: Rigging Gear and Miscellaneous Equipment



NAVFAC P-307 Purpose

The overall purpose of NAVFAC P-307 is to maintain the level of safety and reliability that was originally built into the equipment, ensure optimum service life, provide training and competency standards for all personnel involved with the maintenance, inspection, testing, certification, engineering, rigging and operation of weight handling equipment or WHE, ensure the safe lifting and controlling capability of WHE, promote safe operating practices, and provide guidance for overall weight handling program management.

Purpose

The overall purpose of NAVFAC P-307 is to:

- Maintain the level of safety and reliability that was originally built into the equipment
- Ensure optimum service life
- Provide training and competency standards for all personnel involved with WHE
- Ensure safe lifting and controlling capability of WHE and promote safe operating practices
- Provide guidance for overall weight handling program management

Note: Weight Handling Equipment includes both cranes and the rigging gear used for lifting operations.

NAVFAC P-307 Applicability

NAVFAC P-307 applies to Navy shore activities including Navy activities on joint bases and bases of other military services and agencies; Naval Construction Forces, including the naval construction training centers, and naval special operating units; and fleet activities and detachments that operate shore-based weight handling equipment. NAVFAC P-307 meets or exceeds all applicable OSHA requirements for maintenance, inspection, testing, certification, repair, alteration, and operation of equipment.

Applicability

NAVFAC P-307 applies to:

- Department of Navy Shore Activities
 - including Navy and Marine Corps activities on joint bases and bases of other military services and agencies
- Naval Construction Forces
 - Naval Construction Training Centers
- Naval Special Operating Units
- Fleet activities and detachments that operate shore based weight handling equipment

NAVFAC P-307 meets or exceeds all applicable OSHA requirements for maintenance, inspection, testing, certification, repair, alteration, and operation of WHE.

Covered Equipment

NAVFAC P-307 covers shore-based category 1, 2, 3, and 4 cranes including shore-based barge-mounted cranes. Detailed descriptions of the crane types are contained in Section 1. Illustrations of individual crane types can be found in Appendix B. Rigging Gear is covered in Section 14.

Program Requirements

NAVFAC P-307 provides program requirements for covered equipment to include program management, maintenance, inspection, testing, certification, alteration and engineering, crane and rigging operations, training, licensing, and documentation.

Figure 1-1

Figure 1-1, the Request for Clarification, Deviation, or Revision form, referred to as RCDR, is discussed in Paragraph 1.9 and allows users to request additional information or explanations of NAVFAC P-307 requirements or assistance with unique program circumstances. This form also allows users with sound reasoning to request to deviate from specified NAVFAC P-307 program requirements.

Covered Equipment

- NAVFAC P-307 covers shore-based equipment including:
 - Category 1, 2, 3, and 4 cranes
 - Barge mounted cranes
 - Rigging gear (Section 14)
- Detailed lists of the crane types are contained in Section 1.
- Illustrations can be found in Appendix B.

Weight Handling Program Requirements

NAVFAC P-307 provides program requirements for covered equipment to include:

- Program Management
- Maintenance
- Inspection
- Testing
- Certification
- Alteration and Engineering
- Crane and Rigging Operations
- Training and Licensing
- Documentation

REQUEST FOR CLARIFICATION, DEVIATION, OR REVISION			
CHECK APPROPRIATE BOX	CLARIFICATION	DEVIATION	REVISION
ACTIVITY	ACTIVITY REQUEST NUMBER		
WIRE NUMBER	MANUFACTURER	S/S CRANE YES _____ NO _____	
SUBJECT			
PREPARED BY	PHONE	FAX	DATE
	E-MAIL		
APPROVED BY	PHONE	FAX	DATE
	E-MAIL		
CONTRACTING OFFICER'S REPRESENTATIVE (IF PREPARED AND APPROVED BY CONTRACTOR)	PHONE	FAX	DATE
	E-MAIL		
REFERENCES			
ENCLOSURE(S)			
PURPOSE			
BACKGROUND			
DISCUSSION			
REQUEST			
NAVY CRANE CENTER RESPONSE			
NAVY CRANE CENTER CONTROL NUMBER			
PREPARED BY	PHONE	FAX	DATE
	E-MAIL		
APPROVED BY	PHONE	FAX	DATE
	E-MAIL		

Figure 1-1: Request for Clarification, Deviation, or Revision (RCDR)

Category 1 Cranes

This is a list of some of the more common types of category 1 cranes. Category 1 cranes come in a wide variety of sizes and configurations and include: portal cranes, hammerhead cranes, locomotive cranes, derricks, YD floating cranes*, tower cranes, container cranes, mobile cranes, aircraft crash cranes, mobile boat hoists including self-propelled and towed types, and rubber-tired gantry cranes. They are considered category 1 cranes regardless of capacity. All category 1 cranes require a license to operate. *Note: Other cranes on barges or floating mountings are the category of the crane itself, for example, monorail, jib crane, gantry crane

Category 1 Cranes

Category 1 Cranes include:

- Portal Cranes
- Hammerhead Cranes
- Locomotive Cranes
- Derricks
- YD Floating Cranes*
- Tower Cranes
- Container Cranes
- Mobile Cranes
- Aircraft Crash Cranes
- Mobile Boat Hoists
- Rubber Tire Gantry Cranes

* Other cranes on barges or floating mountings are the category of the crane itself, e.g., monorail, jib crane, gantry crane.

Category 1 Crane Examples

Here, and on the next few slides, are some un-narrated pictures and descriptions of different types of category 1 cranes. Use the forward and backward arrows to scroll through and review the various examples and their descriptions.

Category 1 Crane Examples

Floating Cranes

These types of cranes include barge, pontoon, or hull mounted with an integral base.

The luffing booms are capable of continuous 360 degrees rotation.

They are powered by diesel-electric generators, diesel-driven hydraulic pumps, and may be self-propelled and/or tug assisted.



Category 1 Crane Examples

Derricks

This crane has a boom that is hinged near the base of a fixed mast.

Typically, the boom rotates left and right between the mast support legs or "stiff legs." These stiff legs are capable of handling tensile and compressive forces.

The pictured crane is referred to as a stiff-leg derrick and can rotate 180 degrees.



Category 1 Crane Examples

Hammerhead Cranes

Hammerheads have a rotating counterbalanced cantilevered boom equipped with one or more trolleys that move along the length of the boom.

Most are supported by a pintle or turntable mounted to a traveling or fixed tower assembly.



Category 1 Crane Examples

Portal Cranes

Portal cranes consist of a rotating superstructure mounted on a gantry structure. The gantry style structure allows for the free movement of traffic and materials when the crane is located on the pier.

There is an operator's cab, machinery house, and a luffing boom.

The primary source of power is a diesel engine that drives generators or hydraulic pumps.

They are supported by wide gauge rails allowing the portal crane to move about the facility.



Category 1 Crane Examples

Container Cranes

Container cranes have hinged booms and main beams with traveling trolleys mounted on rails, which in turn, is mounted on a traveling gantry structure.

These cranes are used at several military port activities to quickly transfer containers on and off ships.



Category 1 Crane Examples

Mobile Cranes

The most common type of mobile crane is the truck mounted hydraulic crane.

These cranes consist of a rotating superstructure mounted on a specialized truck chassis equipped with a power plant, driver's cab, and operator's cab.

The primary source of power for these types of cranes are diesel engines that drive hydraulic pumps and provide electric power.



Mobile Boat Hoist

A mobile boat hoist consists of a steel structure of rectangular box sections, supported by four sets of wheels capable of straddling and carrying boats.

Landing Craft Retrieval Unit

A Landing Craft Retrieval Unit, or LCRU, is a type of mobile boat hoist with self-propelled or towed carriers consisting of a wheeled steel structure capable of straddling and carrying boats.

Rubber Tire Gantry

A rubber tired gantry crane may be single beamed or double beamed. Often, it resembles a mobile bridge crane with its hoist mounted on a bridge which spans two beams. As shown in the illustration, it may be configured with two hoists mounted on opposing beams which utilize a spreader bar or similar mechanism to lift loads. The gantry style legs allow the crane to hover over loads improving stability. The wheels and rubber tires may be motorized or non-motorized.

Mobile Boat Hoist

Straddle type carrier:

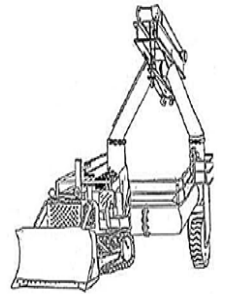
- steel structure of rectangular box sections
- supported by four sets of wheels
- are capable of straddling and carrying boats



Mobile Boat Hoist: LCRU

Landing Craft Retrieval Unit:

- Self propelled or towed
- Steel structure on wheels
- Capable of straddling and carrying boats



Rubber Tired Gantry Crane



- Portable elevated bridge crane or hoist(s) mounted on legs
- Legs mounted on rubber tires
- May be self-propelled or towed

Category 4 Crane Examples

Screen 1, Description: Typically, category 4 cranes are independently manufactured boom mechanisms that are subsequently attached to or mounted on commercially available trucks. These cranes are operated independent of the vehicle controls from standard ground control stations and may be powered by the truck engine or a power sending unit. The booms may rotate or articulate. Outriggers or stabilizers shall be used as required.

Screen 2, Booms and Mounts: Booms and Mounts: Category 4 cranes have different types of boom configurations such as telescoping, non-telescoping, and articulating. They may be mounted on flatbed trucks, trailers, stake beds, rail cars, barges and pontoons, or may be stationary mounted on piers, wharves, and docks.

Screen 3, Capacities: Capacities and Categories: Pedestal mounted commercial fixed length and telescoping boom assembly cranes with less than 2,000 pounds capacity are considered category 3 cranes. Capacities greater than 2,000 pounds are category 4 cranes.

Category 4 Crane Descriptions and Examples

General

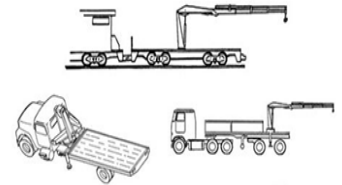
- are manufactured booms
- mounted on commercial trucks
- operated independently
- may be powered by the truck
- may be powered by power sending unit
- outriggers shall be used



Category 4 Crane Descriptions and Examples (Continued)

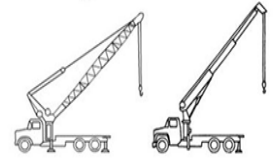
Booms

- Telescoping
- Non-telescoping
- Articulating



Mounts

- Flatbed Trucks
- Trailers
- Stake Beds
- Railcars
- Barges, Pontoons
- Piers, Wharves, Docks



Capacities & Categories

Pedestal Mounted Fixed Length and Telescoping Booms:

- If less than 2,000 pounds capacity, it's a category 3 crane.
- If greater than 2,000 pounds capacity, it's a category 4 crane



Category 4 cranes require a licensed operator.

Screen 4, Licensing: Standards and Licensing: Commercial truck mounted cranes as described in ASME B30.5 and articulating boom cranes as described in ASME B30.22 of all capacities are category 4 cranes and require a licensed operator - even if the crane is down rated for administrative purposes.

Category 2 and 3 Cranes

Category 2 and Category 3 cranes include: overhead traveling cranes; gantry cranes; wall cranes; jib cranes; davits; pillar cranes; pillar jib cranes; monorails and associated hoists; fixed overhead hoists, including fixed manual and powered hoists; portable hoists used continuously in a single location, that is, 6 months or more; portable A-frames and portable gantries with permanently installed hoists; and pedestal mounted commercial boom assemblies attached to stake trucks, trailers, flatbeds, or railcars, or stationary mounted to piers, etc., with certified capacities less than 2,000 pounds.

Category 2 and 3 Cranes: Capacity

The category of a category 2 or 3 crane is determined by its certified capacity. Category 2 cranes have a certified capacity of 20,000 pounds and greater. Category 3 cranes are those with a certified capacity of less than 20,000 pounds.

Category 4 Cranes: Standards & Licensing

Review Standards:

- ASME B30.5
- ASME B30.22

All capacities require a licensed operator.



Category 2 and 3 Cranes include:

- Overhead Traveling Cranes
- Rail Mounted Gantry Cranes
- Wall Cranes
- Jib Cranes
- Davits
- Pillar Cranes
- Pillar Jib Cranes
- Monorails and Associated Hoists
- Fixed Overhead Hoists
 - Manual
 - Powered
- Portable hoists used continuously in a single location (6 months or more, 12 months for shipboard availabilities)
- Portable A-frames and portable gantries with permanently installed hoists
- Pedestal mounted commercial boom assemblies with certified capacities less than 2,000 pounds

Certified Capacity Separates Category 2 and 3 Cranes

- Category 2 cranes have a capacity of 20,000 lbs. or greater.
- Category 3 cranes have a capacity of less than 20,000 lbs.

Category 2 and 3 Crane Examples

Here, and on the next few slides, are some un-narrated pictures and descriptions of different types of category 2 and 3 cranes. Use the forward and backward arrows to scroll through and review the various examples and their descriptions.

Category 2 and 3 Crane Examples

Bridge or Overhead Electric Traveling Cranes

- May be cab, pendant, or radio controlled
- Principal parts include the bridge, girders, end trucks, trolley, hoist, and controls.
- Mobility is limited to the height of the bay, length of the runway, and the span of the bridge.



Category 2 and 3 Crane Examples (Continued)

Jib Cranes

Jib cranes are normally category 3 cranes but can be category 2 cranes.

They consist of a horizontal boom that is either cantilevered or supported by tie rods and is capable of rotating left and right. They're equipped with either powered or manual hoists and may have trolleys.

They are usually mounted on a wall or column.



Category 2 and 3 Crane Examples (Continued)



Pillar Jib Cranes

This is a fixed crane consisting of a rotating vertical member with a horizontal arm supporting a trolley and hoist.

Pillar-jib cranes normally rotate 360 degrees.

Category 2 and 3 Crane Examples (Continued)



Trolley Mounted Overhead Hoists

These cranes consist of an under-hung trolley with one or more drums and sheaves for wire rope or chain.

They are powered manually, electrically, hydraulically, or pneumatically.

Mobility is limited to the height and length of the supporting beam.

Section 2 Introduction

NAVFAC P-307, Section 2 provides weight handling equipment program management concepts and guidance.

Section 2 Topics

Derived from the lessons learned and best practices of several successful weight handling organizations, Section 2 offers information to aid your organization in successfully managing its weight handling program. Topics found in Section 2 include program management, program manager expectations, improvement opportunities by way of self-assessments and evaluations, the benefits of collecting and interpreting metrics, the value of a high-quality monitoring program, long range planning strategies, lockout and tagging requirements, and safety and environmental considerations

Sections 3, 4, and 5 Introduction

NAVFAC P-307 Sections 3, 4, and 5 provide instructions on the maintenance, inspection, and certification processes and their documentation requirements.

Section 2 Introduction

- Section 1: General Overview
- Section 2: Program Management**
- Section 3: Maintenance and Inspection
- Section 4: Certification
- Section 5: Equipment History File
- Section 6: Alterations and Engineering
- Section 7: Training and Qualification
- Section 8: Operator Licensing
- Section 9: Operator Checks
- Section 10: Operations
- Section 11: Contractor and Other Non-Navy Owned Cranes
- Section 12: Accidents, Near Misses, and Unplanned Events
- Section 13: Entertainment Hoists
- Section 14: Rigging Gear and Miscellaneous Equipment



Section 2: Program Management

Topics include:

- Program management
- Program manager expectations
- Self-assessments and evaluations
- Metrics
- Monitoring programs
- Long range planning
- Lockout and tagging requirements
- Safety and Environmental considerations

Sections 3, 4, & 5 Introduction

- Section 1: General Overview
- Section 2: Program Management
- Section 3: Maintenance and Inspection**
- Section 4: Certification**
- Section 5: Equipment History File**
- Section 6: Alterations and Engineering
- Section 7: Training and Qualification
- Section 8: Operator Licensing
- Section 9: Operator Checks
- Section 10: Operations
- Section 11: Contractor and Other Non-Navy Owned Cranes
- Section 12: Accidents, Near Misses, and Unplanned Events
- Section 13: Entertainment Hoists
- Section 14: Rigging Gear and Miscellaneous Equipment



Section 3, 4, and 5 Topics

Sections 3 and 4 provide requirements for crane maintenance, inspection, and certification functions of a weight handling program. Section 3 lists requirements for maintenance and inspection personnel, the different types of inspections and their frequencies, how deficiencies and work deferrals are processed, and the performance of routine service work.

Section 4 picks up after maintenance and provides the requirements for certifying a crane for use. This includes personnel requirements, certification periodicities, load test requirements, test weights and capacities, the voiding and extending of certifications, considerations for specific types of equipment, and an explanation of the crane condition inspection. Section 4 also addresses third party certification of cranes and equipment used in cargo transfer and floating cranes used in ship repair.

Section 5 is all about documentation and requires an equipment history file to be kept for each crane. It also provides a list of the various documents that must be kept in the history file, as well as the lengths of time they must be retained.

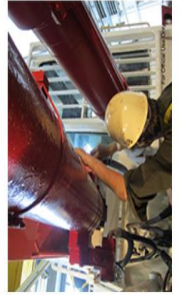
Certification Posting

The crane identification number, certified capacity, and certification expiration date must be posted on or near the crane. Posting a copy of the actual certification, crane test cards, stickers, or signs, are all acceptable methods provided they include the required information.

Maintenance, Inspection, Certification, and Record Keeping

NAVFAC P-307 Sections 3, 4, and 5

- Section 3: Maintenance & Inspection provides maintenance and inspection requirements including:
 - Personnel requirements
 - Inspection types, frequencies, and specifications
 - Deficiencies and deferrals
 - Routine services
- Section 4: Certification is a lengthy section that provides crane certification requirements including:
 - Personnel requirements
 - Periodicities
 - Load testing and capacities
 - Voiding and extending certifications
 - Specific equipment considerations
 - Condition inspections
 - Third party certifications
- Section 5: Equipment History File provides record keeping requirements



Posting of Certification Information

CRANE NO.	TYPE	LOCATION	HOOK LENGTH	HOOK'S RATED CAPACITY	CERTIFIED CAPACITY	TEST DATE
GR-4792-0509	MOBILE	MOBILE	34' 8" 100'	100,000 lbs	100,000 lbs	10-9-12

ANNUAL CERTIFICATION (5 PART LINE)

HOST	TEST LOAD %	MINIMUM RADIUS	MAXIMUM RADIUS	TEST DATE
105,863	87.2%	57,216'	57,216'	10-9-12
104,246	87.2%	57,216'	57,216'	10-9-12
106,179	87.2%	57,216'	57,216'	10-9-12
107,979	87.2%	57,216'	57,216'	10-9-12
106,242	87.2%	57,216'	57,216'	10-9-12

HOOK TRAIL MEASUREMENTS

HOST	BASE	REQUIRED	REPORE TEST	AFTER TEST
MAN	2' 0"	2' 0"	2' 3/4"	2' 3/4"
SWP	2' 0"	2' 0"	2' 3/4"	2' 3/4"

CERTIFICATION

THIS IS TO CERTIFY THAT INSPECTIONS AND TESTS ARE CONDUCTED IN ACCORDANCE WITH THE CRANE TEST PROCEDURES SET FORTH IN THE CURRENT NAVAL FACILITIES ENGINEERING COMMAND P-307 AND AS DIRECTED IN PARAGRAPH 107 OF THE CRANE TEST PROCEDURES TO LIST ITS RATED CAPACITY AT ITS RATED RADIUS.

TEST DIRECTOR: DATE: TEST DIRECTOR: DATE: CODE 712 DATE: DATE: CERTIFICATION SPECIAL: DATE: CERTIFICATION EXPIRES: 6/3/2014

WHEDR

In those instances where a deficiency is detected that has applicability at other Navy activities, the Navy Crane Center shall be notified as soon as practical, but in no case later than five days of the discovery. A summary report of the deficiency, including corrective actions taken or recommended, shall be forwarded to Navy Crane Center within 21 days. Figure 3-1, the Weight Handling Equipment Deficiency Report or WHEDR (pronounced: weeder) shall be used to report the deficiency to Navy Crane Center.

Figure 3-1: Weight Handling Equipment Deficiency Report (WHEDR)

Figure 4-1

The certifying official shall ensure the activity's cranes are inspected, tested, and certified. Certifications shall be based on the noted condition inspection and tests. The purpose of the condition inspection is to ensure that the overall structural, mechanical, and electrical components of the equipment have been maintained in a safe and serviceable condition and are functioning properly. The purpose of the load test is to ensure by controlled operation with prescribed test loads that the equipment is capable of safely lifting and moving the rated load through all design motions. Figure 4-1, Certification of Load Test and Condition Inspection is the form used to certify that these requirements have been met. Activities shall use this form or develop a similar form.

Figure 4-1: Certification of Load Test and Condition Inspection

Figure 4-2

For the additional testing and certification requirements on mobile cranes, locomotive cranes, aircraft crash cranes, and category 4 cranes, an attachment similar to Figure 4-2: Certification of Load Test and Condition Inspection Supplement for Mobile Cranes form shall be developed and used by activities with these types of cranes.

**CERTIFICATION OF LOAD TEST AND CONDITION INSPECTION
(SUPPLEMENT FOR MOBILE CRANE TESTS)**

Complete the appropriate portion of this certificate to indicate "Yes" for configurations that do not apply.

Crane No. _____

Lattice Boom Crane			Telescoping Boom Crane		
Boom Length (Feet)					
On Outriggers	Test Load	Radius	On Outriggers	Test Load	Radius
Maximum Certified Capacity			Maximum Certified Capacity		
Load Moment			Load Moment		
Free Fall Mode					
On Rubber (Stabilizer)	Test Load	Radius	On Rubber (Stabilizer)	Test Load	Radius
Maximum Certified Capacity			Maximum Certified Capacity		
On Tires or Crane Tracks (Flat and Carry)			On Tires (Flat and Carry) (Describe configuration and tire tread width below)		
Other Configurations, including mobility equipment (describe and test load(s))					

Figure 4-2

Figure 4-2: Certification of Load Test and Condition Inspection Supplement

Figure 4-3

Figure 4-3, the Crane Condition Inspection Record, or CCIR, is the form used to guide and document the performance of the condition inspection.

CRANE CONDITION INSPECTION RECORD

Note: Inspectors must complete this form in accordance with the following instructions.

Crane No.	Type	Location	Operator's Name	Operator's License No.	Date Completed				
Purpose of Inspection					Legend: Y = Below A or After 24-Houring		Date Started		Date Completed
Item No.	Item Description	Y	N	A	U	U	U	U	
1	Inspect structure components for damage or deterioration, and for evidence of loose and missing bolts and nuts.								
2	Inspect structure for wear, distortion, corrosion, or damage to critical components, including bolts, nuts, washers, and other fasteners.								
3	Inspect hoists for cracks, wear, fraying, pulleys, rollers, and condition of cables.								
4	Inspect main cables and condition of all cables, and condition of hoisting cables for cracks, wear, proper adjustment and proper condition of all components, including cables, sheaves, rollers, and other fasteners.								
5	Inspect cables and condition of all cables for condition of cables. For cables that show evidence of damage or deterioration, all cables should be replaced or repaired during the maintenance inspection or the condition inspection, as appropriate. Inspectors should verify that cables have been replaced or repaired during the maintenance inspection.								
6	Inspect cables for condition and proper operation.								
7	Inspect cables for condition and proper operation. Inspectors should verify that cables are in good condition and that all cables are properly adjusted and that all cables are properly secured.								
8	Inspect cables for condition and proper operation. Inspectors should verify that cables are in good condition and that all cables are properly adjusted and that all cables are properly secured.								
9	Inspect mechanical equipment (shafts, bearings, gears, etc.) for condition and proper operation.								
10	Inspect cables for condition and proper operation.								
11	Inspect cables, wires, and other cables for wear, damage, and condition of cables for condition and proper operation.								
12	Inspect cables for condition and proper operation.								
13	Verify capacity of hook load rating labels in view of operator's instructions.								

Figure 4-3 (F 2)

Figure 4-3: Crane Condition Inspection Record (CCIR)

Section 6 Introduction

NAVFAC P-307, Section 6 provides requirements regarding the use and processing of the different types of crane alterations as well as engineering reasoning, considerations, and guidance on various other equipment related topics.

Section 6 Introduction

- Section 1: General Overview
- Section 2: Program Management
- Section 3: Maintenance and Inspection
- Section 4: Certification
- Section 5: Equipment History File
- Section 6: Alterations and Engineering**
- Section 7: Training and Qualification
- Section 8: Operator Licensing
- Section 9: Operator Checks
- Section 10: Operations
- Section 11: Contractor and Other Non-Navy Owned Cranes
- Section 12: Accidents, Near Misses, and Unplanned Events
- Section 13: Entertainment Hoists
- Section 14: Rigging Gear and Miscellaneous Equipment

Section 7 and 8 Introduction

NAVFAC P-307 Sections 7 and 8 provide information on the training, testing, licensing, and competency requirements for personnel who work in a weight handling program managed in accordance with NAVFAC P-307.

Sections 7 & 8 Introduction

- Section 1: General Overview
- Section 2: Program Management
- Section 3: Maintenance and Inspection
- Section 4: Certification
- Section 5: Equipment History File
- Section 6: Alterations and Engineering
- Section 7: Training and Qualification**
- Section 8: Operator Licensing**
- Section 9: Operator Checks
- Section 10: Operations
- Section 11: Contractor and Other Non-Navy Owned Cranes
- Section 12: Accidents, Near Misses, and Unplanned Events
- Section 13: Entertainment Hoists
- Section 14: Rigging Gear and Miscellaneous Equipment



Section 7

Section 7 provides information on training and qualifications for personnel who work in a NAVFAC P-307 weight handling program. It provides the course titles for mandatory training, where to find the training courses, basic training requirements and exceptions, training for specific types of equipment, and record keeping, and features. Table 7-1 which lists the most common WHE job functions and their required courses. These web-based training courses can be found on Navy e-Learning, more commonly known as NeL. Click on the Table 7-1 link below the picture to view Table 7-1.

Section 7: Training and Qualification



[Click to view Table 7-1](#)

- Course titles
- Course locations (NeL)
- Qualification and Requalification requirements
 - Maintenance and Operations
- Training exceptions
- Record Keeping
- Table 7-1: Training Courses for WHE Job Functions

Table 7-1 Training Courses for WHE Job Functions

Course Title / Job Function	Table 7-1 Training Courses for WHE Job Functions														
	General Crane Safety	General Crane Safety Refresher	Category 1 Refresher	Category 2 Refresher	Category 3 Refresher	Category 4 Refresher	Rigging Practice	Rigging Test	Crane Operator	Crane Mechanic	Electrical Crane Inspector	Load Test Director	Crane Inspector	General Crane Inspector	
Category 1 Crane Operator	X	X													
Category 2 Crane Operator			X	X											
Category 3 Crane Operator					X	X									
Category 4 Crane Operator							X	X							
Crane Mechanic									X	X					
Electrical Crane Inspector											X	X			
Load Test Director													X		
Crane Inspector														X	
General Crane Inspector															X

Notes:

- 01 Category 1 and category 4 crane operators shall also satisfy the requirements in this section, sections 8, and appendix A and L, as applicable. Mobile crane hoists and electrical gear are an Category 1 course although Category 2 and Cat-Operated Category 3 Crane Safety is the designated training course for these cranes.
- 02 Category 2 and cat-operated category 3 crane operators shall also satisfy the requirements of this section, sections 8, and appendix A.
- 03 Satisfactory completion of General Crane Safety or Category 4 Crane Safety satisfies the requirements of this course.
- 04 Personnel shall also satisfy applicable applicable upgrade requirements.
- 05 Personnel who meet Category 1 technical operator qualification requirements may perform rigging on category 3 cranes. All other rigging requires satisfactory completion of Rigging Practices.
- 06 Satisfactory completion of General Crane Safety or Category 2 and Cat-Operated Category 3 Crane Safety or Category 4 Crane Safety satisfies the initial training requirements of this course.
- 07 Satisfactory completion of General Crane Safety Refresher or Category 2 Crane Safety Refresher satisfies the remaining requirement for this course.
- 08 Satisfactory completion of Rigging Practices satisfies the requirements of this course.
- 09 Satisfactory completion of Crane Mechanic is prerequisite to taking this course.
- 10 Satisfactory completion of Mobile Crane Mechanic is prerequisite to taking Mechanical Crane Inspector for personnel who will be inspecting mobile cranes.
- 11 Personnel who perform maintenance and/or condition inspections are required to satisfactorily complete Electrical Crane Inspector or Electrical Crane Inspector as applicable.
- 12 Satisfactory completion of Crane Electrician is prerequisite to taking this course.
- 13 Crane inspectors who inspect both mechanical and electrical components (i.e., General Inspectors) must satisfy these requirements.
- 14 Satisfactory completion of the applicable crane safety course (for the type of crane to be trained by the candidate) is prerequisite to taking Load Test Director.

Section 8

Section 8 provides uniform standards for crane operator training, testing, examining, and licensing. Category 1, category 2, cab-operated category 3, and category 4 crane operators must be licensed. Licenses are not required to operate non-cab operated category 3 cranes. However, training and a demonstration of ability to operate safely are required.

Section 8: Operator Training

Prior to taking a performance test, the license candidate shall be thoroughly trained on the operation of the type of crane for which a license is to be issued. The candidate shall operate that type of crane only under the direct observation of a licensed operator. The licensed operator shall retain full responsibility for the safe operation of the crane. The supervisor shall approve lifting of loads based upon the candidate's demonstration of knowledge of the equipment and operation without loads. The candidate shall not perform complex lifts.

Figure 8-1

Pictured here is the Application for Crane Operator License, Figure 8-1. This form, or one similar, shall be used by Navy activities when nominating a candidate for a crane operator license.

Section 8: Operator Licensing

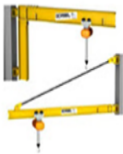
Category 1, 2, Cab-Operated Category 3, and Category 4 Operators must:

- Pass physical
- Pass training
- Pass examinations
- Be licensed



Non-Cab Operated Category 3 Operators must:

- Pass training
- Prove ability to operate safely
- No license is required



Operator Training



- License candidates shall be thoroughly trained on the operation of the types of cranes to be licensed.
- Trainees shall operate the crane only under the direct observation of a licensed operator.
- Trainees shall not perform complex lifts.

Figure 8-1: Crane Operator License Application

Figure 8-2

Pictured on the screen is Figure 8-2, the Crane Operator License. This form, or one similar, shall be used by the License Issuing Official when issuing a license to an operator who has satisfactorily completed all requirements. This form may be modified for local use. Personally identifiable information has been removed from the license form however a separate photo ID is required to accompany this license, both of which must be in the possession of the operator when operating a crane.

CRANE OPERATOR LICENSE		QUALIFIED TO OPERATE				
NAME OF OPERATOR	DATE ISSUED	CRANE TYPE	CAPACITY	ATTACHMENT	TYPE CONTROLS	EXAMINER
LICENSE NO.	DATE EXPIRES					
THE HOLDER OF THIS CARD IS QUALIFIED TO OPERATE U.S. NAVY CRANES AS SPECIFIED ON REVERSE OF THIS CARD.						
SIGNATURE OF ISSUING OFFICIAL						
SIGNATURE OF OPERATOR						
CARE MUST BE TAKEN AT ALL TIMES WHEN OPERATING NAVY CRANES. Not transferable to other personnel. NOTE: INFORMATION ON THIS LICENSE IS SUBJECT TO SAFEGUARD AND DISCLOSURE CONDITIONS OF THE PRIVACY ACT OF 1974.		RESTRICTIONS (Vision, Hearing, Other)				
FRONT		BACK				

Figure 8-2: Crane Operator License

Figure 8-3

Shown here is Figure 8-3, the Crane Operator License Record. This is a chronological record of the crane operator’s license/qualification activity. This form tracks the crane type, capacity, attachment, and control type. It shows where the license was issued and by whom, the date it was issued, the date it expires, the renewal date, the physical exam date, and if necessary, the date the license was revoked. Additional records may be attached as needed to document the operator’s licensing history and progress. License records should follow the crane operator from command-to-command.

CRANE OPERATOR LICENSE RECORD						SPECIAL REQUIREMENTS FOR		
LICENSE NO.	NAME	DATE OF BIRTH				VISION	HEARING	OTHER
EQUIPMENT LICENSED TO OPERATE								
EQUIPMENT TYPE DATA				LICENSING DATA				
CRANE TYPE	CAPACITY	ATTACHMENT	TYPE OF CONTROL	ISSUING ACTIVITY	EXAMINER	DATE ISSUED	DATE REVOKED	EXPIRATION DATE
								RENEWAL DATE
								DATE OF PHYSICAL EXAM

NOTE: INFORMATION ON THIS FORM IS SUBJECT TO SAFEGUARD AND DISCLOSURE CONDITIONS OF THE PRIVACY ACT OF 1974.

Figure 8-3: Crane Operator License Record

Section 9: Introduction

NAVFAC P-307, Section 9 provides requirements on the types of safety and equipment checks performed by the crane operator prior to operating a crane.

Section 9: Operator Checks


A complete equipment and safety check of the crane shall be performed by the operator prior to the first use of the crane each day, regardless of whether the crane is used in production, maintenance, testing, or just being relocated. Section 9 provides instructions for performing these checks, for reporting any deficiencies, and a means for documenting these findings.

Figure 9-1


Figure 9-1, the Crane Operator's Daily Checklist or ODCL, shall be used to document the pre-use equipment and safety checks. This shall be performed by the operator prior to the first use of the crane each day. The first operator in each subsequent shift shall perform the operational checks of paragraph 9.1.2.1.4. All other operators shall review and sign the ODCL and review any tags posted on the crane. For cranes used in construction operations, a complete check shall be performed each shift.

Section 9 Introduction

Section 1: General Overview
 Section 2: Program Management
 Section 3: Maintenance and Inspection
 Section 4: Certification
 Section 5: Equipment History File
 Section 6: Alterations and Engineering
 Section 7: Training and Qualification
 Section 8: Operator Licensing
Section 9: Operator Checks
 Section 10: Operations
 Section 11: Contractor and Other Non-Navy Owned Cranes
 Section 12: Accidents, Near Misses, and Unplanned Events
 Section 13: Entertainment Hoists
 Section 14: Rigging Gear and Miscellaneous Equipment



Section 9: Operator Checks



- Equipment pre-use checks
- Equipment safety checks
- Deficiency reporting
- Documentation requirements

CRANE OPERATOR'S DAILY CHECKLIST												
CRANE NO.	TYPE/CAPACITY	LOCATION	CERTIFICATION	ESTIMATOR	DATE	SHIFT		HOUR		OPERATED	DATE	
						1	2	START	STOP			
OPERATIONS												
WALK AROUND CHECK			MACHINERY HOUSE CHECK			OPERATOR CAB CHECK			OPERATIONAL CHECK			
Safety Guards and Plates	✓	✗	Hoisting	✓	✗	Drum	✓	✗	Alpha Safety	✓	✗	
Control Room and Hoist Base	✓	✗	Motor, Engine and Generator	✓	✗	Hoist and Draining Light	✓	✗	Drum Brakes	✓	✗	
Operational Hoists	✓	✗	Controls	✓	✗	Brake	✓	✗	Control Hoist	✓	✗	
Alpha Rope	✓	✗	Quadrant	✓	✗	Load Rating Check	✓	✗	Control and Control Arm	✓	✗	
Hoisting	✓	✗	Hoist	✓	✗	Last Transition (Feeding Crane)	✓	✗	Alpha Rope or Chain	✓	✗	
Brake	✓	✗	Flights	✓	✗	Bottom Angle (Feeding Crane)	✓	✗	Brakes and Clutches	✓	✗	
Alpha	✓	✗	Hoist	✓	✗	Flow Control	✓	✗	Bottoming (Feeding Crane)	✓	✗	
Omega or Barrels	✓	✗	Clutches and Brakes	✓	✗	Emergency Stop (Feeding Crane)	✓	✗	Load Brakes	✓	✗	
Omega Hoist	✓	✗	Electric Hoist	✓	✗	Emergency Stop (Feeding Crane)	✓	✗	Emergency Stop	✓	✗	
Hoist, Pendants, and Boom Stop	✓	✗	Hoist Engine and Components	✓	✗	Inhibitors	✓	✗	Other Operational Safety Devices	✓	✗	
Bottoming, Clutch and Brakes	✓	✗	Emergency Stop (Feeding Crane)	✓	✗	Hoisting	✓	✗	Personal Safety Devices	✓	✗	
Omega Locks, Stop, and Brakes	✓	✗	Free Emergency	✓	✗	Hoisting	✓	✗	Feeding Brakes	✓	✗	
Alpha, Omega, and Hoist	✓	✗	Hoist (Drum Pads and Pads)	✓	✗							
Omega	✓	✗										
Omega Hoist	✓	✗										
Omega Hoist	✓	✗										
Omega Hoist	✓	✗										
Omega Hoist	✓	✗										
Omega Hoist	✓	✗										
OPERATOR'S SIGNATURE: _____ DATE: _____ SUPERVISOR'S SIGNATURE: _____ DATE: _____												
OPERATOR'S SIGNATURE: _____ DATE: _____ OPERATOR'S SIGNATURE: _____ DATE: _____												
REMARKS: _____												

Figure 9-1: Operator's Daily Checklist (ODCL)

Section 10: Introduction

NAVFAC P-307, Section 10 provides general crane operations safety and precautionary considerations and requirements.

Section 10: Operations


Topics covered in Section 10 include: safety precautions, operating procedures, operational risk management (or ORM), crane teams, safety devices, assembly and disassembly requirements for cranes used in construction, complex lifts, lift preparations, communications, personnel lifts, adverse operating conditions, ground conditions, clearances, working around overhead power lines, and multi-purpose machines.

Section 11: Introduction

NAVFAC P-307, Section 11 provides requirements for cranes and rigging gear not belonging to the Navy but used on Navy property.


Section 10 Introduction

- Section 1: General Overview
- Section 2: Program Management
- Section 3: Maintenance and Inspection
- Section 4: Certification
- Section 5: Equipment History File
- Section 6: Alterations and Engineering
- Section 7: Training and Qualification
- Section 8: Operator Licensing
- Section 9: Operator Checks
- Section 10: Operations**
- Section 11: Contractor and Other Non-Navy Owned Cranes
- Section 12: Accidents, Near Misses, and Unplanned Events
- Section 13: Entertainment Hoists
- Section 14: Rigging Gear and Miscellaneous Equipment




Section 10: Operations

- Safety precautions
- Operating procedures
- ORM
- Crane teams
- Safety devices
- Construction crane assembly/disassembly
- Complex lifts
- Lift Preparations
- Communications
- Personnel Lifts
- Adverse operating conditions
- Ground conditions
- Clearances
- Overhead power lines
- Multi-purpose machines



Section 11 Introduction

- Section 1: General Overview
- Section 2: Program Management
- Section 3: Maintenance and Inspection
- Section 4: Certification
- Section 5: Equipment History File
- Section 6: Alterations and Engineering
- Section 7: Training and Qualification
- Section 8: Operator Licensing
- Section 9: Operator Checks
- Section 10: Operations
- Section 11: Contractor and Other Non-Navy Owned Weight Handling Equipment**
- Section 12: Accidents, Near Misses, and Unplanned Events
- Section 13: Entertainment Hoists
- Section 14: Rigging Gear and Miscellaneous Equipment



Section 11: Contractor and Non-Navy Owned WHE

Section 11 provides detailed guidelines and requirements for contracts and contractors using non-Navy owned equipment to lift suspended loads at Navy shore activities. This includes cranes, multi-purpose machines, construction equipment, and rigging gear, as well as material handling equipment. Contained in Section 11 are contract requirements, contracting officer responsibilities, host activity responsibilities, and requirements for using rented or leased WHE.

Section 11: Contractor and Other Non-Navy Owned WHE

- Contractor Operated Cranes & Multi-Purpose Machines
- Contracted Work Requirements
- Contracting Officers
- Host Activities
- Rented or Leased WHE Requirements



Section 12: Introduction

NAVFAC P-307, Section 12 provides requirements for reporting accidents, near misses, and other unplanned events.

Section 12 Introduction

- Section 1: General Overview
- Section 2: Program Management
- Section 3: Maintenance and Inspection
- Section 4: Certification
- Section 5: Equipment History File
- Section 6: Alterations and Engineering
- Section 7: Training and Qualification
- Section 8: Operator Licensing
- Section 9: Operator Checks
- Section 10: Operations
- Section 11: Contractor and Other Non-Navy Owned Weight Handling Equipment
- Section 12: Accidents, Near Misses, and Unplanned Events**
- Section 13: Entertainment Hoists
- Section 14: Rigging Gear and Miscellaneous Equipment



Section 12: Topics

Section 12 combines decades of experience with input from across the Navy to provide detailed weight handling accident information and definitions which include the two categories of accidents: crane and rigging. Other information includes an explanation of significant accidents, detailed accident definitions, and expected actions personnel should take when responding to accidents, near misses, or unplanned events along with the applicable notification and reporting procedures. The following screens will provide the definitions of a crane accident and a rigging accident.

Section 12: Accidents, Near Misses, and Unplanned Occurrences

- Accident categories
- Significant accidents
- Crane accident definition
- Rigging accident definition
- Accident response expectations
- Near misses
- Unplanned occurrences
- Notifications & reporting



Section 12: Significant Accident

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. Note: Other types of accidents that meet or exceed the OPNAV Class A, B, C, or D reporting thresholds for material property damage are also considered significant accidents.

Significant Accident Definition

A significant accident is an accident that typically has a greater potential to result in:

- Serious injury
- Substantial property damage

The following accident types are considered significant accidents:

- Injuries (regardless of severity)
- Overloads
- Dropped loads
- Two-blocks
- Crane derailments
- Contact with overhead electrical power lines

Note: OPNAV Reportable - Other types of accidents that meet or exceed the OPNAV Class A, B, C, or D reporting thresholds for material property damage are also considered significant accidents.

Section 12: Crane Accident

For the purpose of this definition, it is assumed there is an "operating envelope" around any crane. The operating envelope consists of any of the following elements: the crane, the operator, the riggers, signal persons, and crane walkers, other personnel involved in the operation, the rigging gear between the hook and the load, the load, the crane's supporting structure, and the lift procedure.

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, derailment, two-blocking, overload, and collision.

Note: The last five bullets are considered accidents even though no material damage or injury occurs.

Exceptions: a component failure shall be considered an accident only if damage to the load or another crane component occurs as a result of the failure. An accident involving a mobile crane that is configured for transit is considered an unplanned occurrence and shall be reported as such.

Crane Accident Definition

The operating envelope consists of any of the following elements:

- the crane
- the operator
- the riggers, signal persons, and crane walkers
- 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

A crane accident occurs when any of the elements in the crane operating envelope fails to perform correctly during a crane operation (see appendix A) 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

Note: The last five bullets are considered accidents even though no material damage or injury occurs.

Section 12: Rigging Accident

For the purpose of this definition, it is assumed there is an “operating envelope” around any rigging or other Section 14 equipment operation, and inside the envelope are the following: rigging gear or miscellaneous equipment identified 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.

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 (This does not include superficial damage such as scratched paint, minor lagging damage, or normal wear on rigging gear), dropped load, two-blocking of cranes and powered hoists identified in Section 14, overload (includes load tests when the test load tolerance is exceeded).

Note: The last three bullets are considered accidents even though no material damage or injury occurs. Exception: A component failure shall be considered an accident only if damage to the load or another component occurs as a result of the failure.

Section 12: Rigging Accident Definition

For the purpose of this definition, it is assumed there is an “operating envelope” around any rigging or other Section 14 equipment operation and inside the envelope are the following:

- rigging gear or miscellaneous equipment identified 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

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. This does not include superficial damage such as scratched paint, minor lagging damage, or normal wear on rigging gear.
- Dropped load
- Two-blocking of cranes and powered hoists identified in Section 14
- Overload (includes load tests when the test load tolerance is exceeded)

Note: The last three bullets are considered accidents even though no material damage or injury occurs.

Figure 12-1

For each suspected accident, activities shall promptly perform an investigation. Activities shall prepare a Crane and Rigging Accident Report, Figure 12-1 (available on the Navy Crane Center web site) and forward a copy to the Navy Crane Center within 30 days of the accident. 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 email 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 OFFICIAL USE ONLY (when filled)
CRANE AND RIGGING ACCIDENT REPORT
 Reporting Agency: Crane Accident Rigging Accident
 Activity Responsible for the Accident: _____
 Reporting Agency: _____
 Date: _____
 Title: _____
 Name: _____
 Address: _____
 City: _____
 State: _____
 Zip: _____
 Telephone: _____
 Fax: _____
 E-mail: _____
 Date: _____
 Name: _____
 Title: _____
 Date: _____

Figure 12-1: Crane and Rigging Accident Report

Figure 12-2

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 Section 12 within 30 days of the event.

FOR OFFICIAL USE ONLY (when filled)
NEAR MISS AND UNPLANNED OCCURRENCE REPORT
 Reporting Agency: Crane Near Miss Rigging Near Miss
 Activity Responsible for the Accident: _____
 Reporting Agency: _____
 Date: _____
 Title: _____
 Name: _____
 Address: _____
 City: _____
 State: _____
 Zip: _____
 Telephone: _____
 Fax: _____
 E-mail: _____
 Date: _____
 Name: _____
 Title: _____
 Date: _____

Figure 12-2: Near Miss and Unplanned Occurrence Report

Section 13: Introduction

NAVFAC P-307, Section 13 provides requirements for entertainment hoists. Entertainment hoists may be treated differently than category 2 or 3 cranes due to the inherent nature of their design, installation, application, and use. Unless otherwise specified, entertainment hoists are not required to meet other requirements of this publication.

Section 13 Introduction

- Section 1: General Overview
- Section 2: Program Management
- Section 3: Maintenance and Inspection
- Section 4: Certification
- Section 5: Equipment History File
- Section 6: Alterations and Engineering
- Section 7: Training and Qualification
- Section 8: Operator Licensing
- Section 9: Operator Checks
- Section 10: Operations
- Section 11: Contractor and Other Non-Navy Owned Weight-Handling Equipment
- Section 12: Accidents, Near Misses, and Unplanned Events
- Section 13: Entertainment Hoists**
- Section 14: Rigging Gear and Miscellaneous Equipment

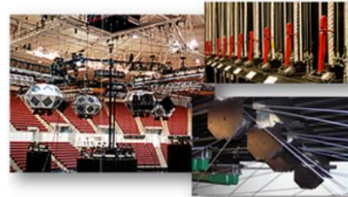


Section 13: Entertainment Hoists

Entertainment hoists, as defined in Appendix A, shall meet all of the requirements shown regarding design, installation, testing, maintenance, operations and record keeping. If the hoist cannot meet all of these requirements, then the hoist shall be treated as a category 2 or 3 crane. Section 13 also provides requirements for alterations to entertainment hoists, compliance reviews for existing entertainment hoists, procurement of new hoists, and accident, near miss, and unplanned occurrence reporting.

Section 13: Entertainment Hoists

- Designed and installed by a specialized company
- Designed, tested, maintained, operated IAW ANSI E1.6
- Equipment History File
- Alterations
- Existing EH reviews
- Procurement
- Accident, near misses and unplanned occurrences



Section 14: Introduction

Section 14 is the last section in the main body of NAVFAC P-307. It provides selection, maintenance, inspection, test, and use requirements for rigging gear and miscellaneous lifting equipment. These requirements apply to covered equipment used with or without cranes in weight handling operations, and to covered equipment used with multi-purpose machines, material handling equipment (or MHE, for example forklifts), and equipment covered by NAVFAC

P-300. These requirements also apply to contractor-owned rigging equipment used with Navy and BOS contractor-owned WHE, multi-purpose machines, MHE, and equipment covered by NAVFAC P-300 used in weight handling operations.

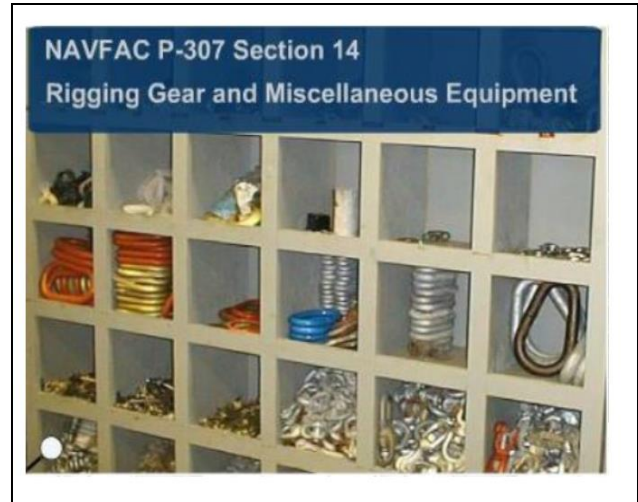
Section 14 Introduction

- Section 1: General Overview
- Section 2: Program Management
- Section 3: Maintenance and Inspection
- Section 4: Certification
- Section 5: Equipment History File
- Section 6: Alterations and Engineering
- Section 7: Training and Qualification
- Section 8: Operator Licensing
- Section 9: Operator Checks
- Section 10: Operations
- Section 11: Contractor and Other Non-Navy Owned Weight Handling Equipment
- Section 12: Accidents, Near Misses, and Unplanned Events
- Section 13: Entertainment Hoists
- Section 14: Rigging Gear and Miscellaneous Equipment**



Section 14: Gear and Equipment

This section and the applicable portions of Section 10 provide the minimum requirements for developing and maintaining a program for rigging gear and miscellaneous equipment, in other words, maintenance, inspection, and use of applicable gear, operational responsibilities and requirements, operational risk management, and critical non-crane rigging operations, etc. These requirements also apply to rigging gear and miscellaneous equipment used by other military services on Navy maintained and certified cranes at joint bases.



NAVFAC P-307 OVERVIEW APPENDICES A-R

Welcome



Welcome to the NAVFAC P-307 Overview Appendices A-R.

Appendix A: Introduction

NAVFAC P-307, Appendix A provides a glossary of terms and definitions that help further explain various aspects of the Navy's weight handling program.

Glossary

The glossary provides uniform definitions to aid personnel in understanding key concepts and terminology found in NAVFAC P-307 and for improved communications within the Navy's weight handling management program.


Welcome
Welcome to NAVFAC P-307 Overview Appendices A through R.

Begin

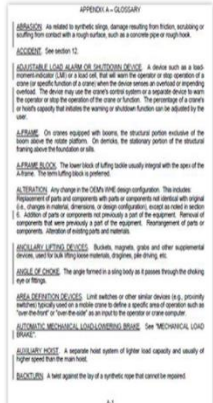
Appendix A: Introduction

Appendix A: Glossary

- Appendix B: Types of Weight Handling Equipment
- Appendix C: MISR for Category 1 and 4 Cranes
- Appendix D: AMISR for Category 2 and 3 Cranes
- Appendix E: Crane Test Procedures
- Appendix F: Examples of LB, LC, and OSD
- Appendix G, H, and I: Reserved for Future Use
- Appendix J: Basic Performance Test for Weight Handling Equipment Operator License: Category 1 and 4 Cranes
- Appendix K: Basic Performance Test for Weight Handling Equipment Operator License: Category 2 and Cab-Operated Category 3 Cranes
- Appendix L: Basic Performance Test for Weight Handling Equipment Operator License: Mobile Boat Hoist and Rubber-Tired Gantry Cranes
- Appendix M: Procedures for Third Party Certification by the Navy Crane Center
- Appendix N: Personnel Competencies
- Appendix O: Navy Crane Center Engineering Policies and Guidance for Crane Alteration Requests (CAR)
- Appendix P: Contractor Crane (or Alternate Machine Used to Lift Suspended Loads) and Rigging Gear Requirements
- Appendix Q: References
- Appendix R: Related Documents



Appendix A: Glossary



Why use the glossary?


- provides uniform definitions to aid personnel in understanding key concepts and terminology found in NAVFAC P-307
- improves communications within the Navy's weight handling community.

Appendix B: Introduction

NAVFAC P-307 Appendix B provides labeled illustrations of many types of weight handling equipment.

Appendix B: Introduction

Appendix A: Glossary
Appendix B: Types of Weight Handling Equipment
 Appendix C: MISR for Category 1 and 4 Cranes
 Appendix D: AMISR for Category 2 and 3 Cranes
 Appendix E: Crane Test Procedures
 Appendix F: Examples of LB, LC, and OSD
 Appendix G, H, and I: Reserved for Future Use
 Appendix J: Basic Performance Test for Weight Handling Equipment Operator License: Category 1 and 4 Cranes
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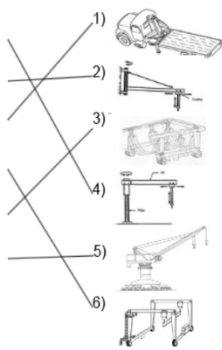
Types of WHE

They say a picture is worth a thousand words. If so, Appendix B reads like a novel. It contains close to 50 drawings that illustrate the basic configurations of many crane types found in the Navy's inventory. Like Appendix A, it is intended to improve communication and understanding within the Navy's weight handling community.

Test your understanding by correctly matching terms 1 through 6 to the pictured cranes by selecting the appropriate number for each crane pictured.

Directions: Match terms 1 through 6 with the correct Appendix B illustration by selecting the appropriate number for each crane pictured.

- 4 Pillar Jib Crane
- 2 Jib Crane
- 1 Commercial Truck-Mounted Articulating Boom Crane
- 6 Rubber-Tired Gantry Crane
- 3 Mobile Boat Hoist
- 5 Portal Crane



They say a picture is worth a thousand words. If so, Appendix B reads like a novel. It contains close to 50 drawings that illustrate the basic configurations of many crane types found in the Navy's inventory. Like Appendix A, it is intended to improve communication and understanding within the Navy's weight handling community.

Appendices C & D: Introduction


NAVFAC P-307, Appendices C and D provide the maintenance inspection specifications and record requirements for all cranes. These appendices contain the minimum inspection requirements. Additional inspection requirements or more frequent inspections may need to be developed locally depending on the particular piece of equipment being used and the original equipment manufacturer or OEM requirements.

MISR

Appendix C contains the Maintenance Inspection Specification and Record for category 1 and 4 cranes. This document is commonly referred to by the acronym MISR and is pronounced “mizer.” You can see in the illustration a sample of the many items that must be inspected, the manner or specification in which to perform the inspection, and the acceptance criteria to be used. Local variations of this document may be developed. See Section 3 for additional inspection details.

Appendices C & D: Introduction

- Appendix A: Glossary
- Appendix B: Types of Weight Handling Equipment
- Appendix C: MISR for Category 1 and 4 Cranes**
- Appendix D: AMISR for Category 2 and 3 Cranes**
- Appendix E: Crane Test Procedures
- Appendix F: Examples of LB, LC, and OSD
- Appendix G, H, and I: Reserved for Future Use
- Appendix J: Basic Performance Test for Weight Handling Equipment Operator License: Category 1 and 4 Cranes
- Appendix K: Basic Performance Test for Weight Handling Equipment Operator License: Category 2 and Cab-Operated Category 3 Cranes
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- Appendix N: Personnel Competencies
- Appendix O: Navy Crane Center Engineering Policies and Guidance for Crane Alteration Requests (CAR)
- Appendix P: Contractor Crane (or Alternate Machine Used to Lift Suspended Loads) and Rigging Gear Requirements
- Appendix Q: References
- Appendix R: Related Documents



Appendix C: Maintenance Inspection Specification and Record (MISR)

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
Item	Unit	Code	Frequency	Inspection Method	Inspection Location	Inspection Criteria	Inspection Results	Remarks	Inspector
1.1	1	1	1	Visual	General	Crane structure, including tower, jibs, and base, shall be free of cracks, corrosion, and other damage.			
1.2	1	1	1	Visual	General	Crane structure, including tower, jibs, and base, shall be free of loose or missing bolts, nuts, and washers.			
1.3	1	1	1	Visual	General	Crane structure, including tower, jibs, and base, shall be free of excessive rust or paint peeling.			
1.4	1	1	1	Visual	General	Crane structure, including tower, jibs, and base, shall be free of excessive vibration or noise during operation.			
1.5	1	1	1	Visual	General	Crane structure, including tower, jibs, and base, shall be free of excessive wear or deformation.			

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
Item	Unit	Code	Frequency	Inspection Method	Inspection Location	Inspection Criteria	Inspection Results	Remarks	Inspector
1.6	1	1	1	Visual	General	Crane structure, including tower, jibs, and base, shall be free of excessive sagging or deflection.			
1.7	1	1	1	Visual	General	Crane structure, including tower, jibs, and base, shall be free of excessive twisting or bending.			
1.8	1	1	1	Visual	General	Crane structure, including tower, jibs, and base, shall be free of excessive warping or distortion.			
1.9	1	1	1	Visual	General	Crane structure, including tower, jibs, and base, shall be free of excessive buckling or instability.			
1.10	1	1	1	Visual	General	Crane structure, including tower, jibs, and base, shall be free of excessive vibration or noise during operation.			

AMISR

Appendix D contains the Annual Maintenance Inspection Specification and Record for category 2 and 3 cranes. This document is commonly referred to by the acronym AMISR and is pronounced “A-mizer.” You can see in the illustration a sample of the many items that must be inspected, the manner or specification in which to perform the inspection, and the acceptance criteria to be used. Local variations of this document may be developed. See Section 3 for additional inspection details.

Appendix D: Annual Maintenance Inspection Specification and Record (AMISR)

The image shows two pages of the AMISR form. The left page is titled 'ANNUAL MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 2 AND 3 CRANES SHEET 1 OF 2'. It contains a table with columns for 'Item', 'Inspection Method', 'Inspection Frequency', 'Inspection Location', 'Inspection Criteria', and 'Inspection Record'. The right page is titled 'ANNUAL MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 2 AND 3 CRANES SHEET 2 OF 2' and contains a similar table with more inspection items.

Appendix E: Introduction

NAVFAC P-307, Appendix E provides crane test procedures. Because of the various makes and models of cranes in the Navy’s inventory, it is not possible to include specific tests for each individual crane or component, and some tests may not be applicable. All applicable tests shall be performed, and activities shall ensure that all additional components and features that affect load bearing, load control, or operational safety are properly tested and documented even though not specifically noted in these tests.

Appendix E: Introduction


- Appendix A: Glossary
- Appendix B: Types of Weight Handling Equipment
- Appendix C: MISR for Category 1 and 4 Cranes
- Appendix D: AMISR for Category 2 and 3 Cranes
- Appendix E: Crane Test Procedures**
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- Appendix Q: References
- Appendix R: Related Documents

Appendix E: Introduction

NAVFAC P-307, Appendix E provides crane test procedures. Because of the various makes and models of cranes in the Navy’s inventory, it is not possible to include specific tests for each individual crane or component, and some tests may not be applicable. All applicable tests shall be performed, and activities shall ensure that all additional components and features that affect load bearing, load control, or operational safety are properly tested and documented even though not specifically noted in these tests.

Appendix E: Introduction

- Appendix A: Glossary
- Appendix B: Types of Weight Handling Equipment
- Appendix C: MISR for Category 1 and 4 Cranes
- Appendix D: AMISR for Category 2 and 3 Cranes
- Appendix E: Crane Test Procedures**
- Appendix F: Examples of LB, LC, and OSD
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- Appendix Q: References
- Appendix R: Related Documents




Appendix E: Test Procedures

In addition to load test prerequisites and precautions, Appendix E provides inspection and test requirements for: hook assemblies, insulated links, duplex hooks with shackle pin holes, portal cranes, floating cranes, tower cranes, hammerhead cranes, mobile cranes, aircraft crash cranes, rubber-tired gantry cranes, category 4 cranes, bridge and overhead traveling cranes, wall cranes, gantry, semi-gantry and cantilever gantry cranes, portable gantry/A-frames with permanently mounted hoists, jib, pillar, and pillar-jib cranes, monorail cranes, davits, fixed overhead hoists, and mobile boat hoists.

Appendix E: Crane Test Procedures

- Hooks
- Insulated Links
- Duplex Hooks
- Portal, Floating, Tower, and Hammerhead Cranes
- Mobile, Aircraft Crash, RTG, and Category 4 Cranes
- Bridge, Overhead Traveling, and Wall Cranes
- Gantry, Semi-gantry, and Catilever Gantry Cranes
- Portable gantry/A-Frames with Permanently Mounted Hoists
- Jib, Pillar, and Pillar-jib Cranes
- Monorail Cranes
- Davits
- Fixed Overhead Hoists
- Mobile Boat Hoists



Appendix F: Introduction

NAVFAC P-307, Appendix F provides examples of load bearing parts and components, load controlling parts and components, and operational safety devices.

LB, LC, OSDs


NAVFAC P-307, Appendix F provides examples of load bearing parts and components, load controlling parts and components, and operational safety devices.

Appendices G, H, and I: Introduction

The content of NAVFAC P-307, Appendices G, H, and I were removed in the 2016 revision of the manual. They once contained test questions about crane operations and safety. These questions have been incorporated into pertinent NAVFAC P-307 crane safety courses. These appendices are now reserved for future use.

Appendix F: Introduction

Appendix A: Glossary
 Appendix B: Types of Weight Handling Equipment
 Appendix C: MISR for Category 1 and 4 Cranes
 Appendix D: AMISR for Category 2 and 3 Cranes
 Appendix E: Crane Test Procedures
Appendix F: Examples of LB, LC, and OSD
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 Appendix R: Related Documents




Below is a sample listing of components, parts, and devices from Appendix F.

Correctly identify each item as either a load bearing part, load controlling part, or an operational safety device by clicking in the appropriate box.

<input type="checkbox"/> Radius Indicator	1) Load Bearing Part
<input type="checkbox"/> Rotate Electric Brakes	
<input type="checkbox"/> Upper Hoist Limit Switch	2) Load Controlling Part
<input type="checkbox"/> Travel Gear Shafts	
<input type="checkbox"/> Wire Rope Drum	3) Operational Safety Device
<input type="checkbox"/> Overload Indicator with Shutdown Capability	
<input type="checkbox"/> Hook	
<input type="checkbox"/> Hoist Drive Train Components	

Appendices G, H, & I: Introduction

Appendix A: Glossary
 Appendix B: Types of Weight Handling Equipment
 Appendix C: MISR for Category 1 and 4 Cranes
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 Appendix P: Contractor Crane (or Alternate Machine Used to Lift Suspended Loads) and Rigging Gear Requirements
 Appendix Q: References
 Appendix R: Related Documents



Appendices J, K, and L: Introduction

NAVFAC P-307, Appendices J, K, and L provide the basic attributes for testing a crane operator candidate's operational performance. These basic performance tests shall be supplemented and modified as needed by each activity for specific crane types, characteristics, and operations.

Appendices J, K, & L: Introduction


Appendix A: Glossary
Appendix B: Types of Weight Handling Equipment
Appendix C: MISR for Category 1 and 4 Cranes
Appendix D: AMISR for Category 2 and 3 Cranes
Appendix E: Crane Test Procedures
Appendix F: Examples of LB, LC, and OSD
Appendix G, H, and I: Reserved for Future Use

**Appendix J: Basic Performance Test for Weight Handling Equipment Operator
License: Category 1 and 4 Cranes**

**Appendix K: Basic Performance Test for Weight Handling Equipment Operator
License: Category 2 and Cab-Operated Category 3 Cranes**

**Appendix L: Basic Performance Test for Weight Handling Equipment Operator
License: Mobile Boat Hoist and Rubber-Tired Gantry Cranes**

Appendix M: Procedures for Third Party Certification by the Navy Crane Center
Appendix N: Personnel Competencies
Appendix O: Navy Crane Center Engineering Policies and Guidance for Crane Alteration Requests (CAR)
Appendix P: Contractor Crane (or Alternate Machine Used to Lift Suspended Loads) and Rigging Gear Requirements
Appendix Q: References



Appendices J, K, and L: Performance Tests

This screen provides descriptions of the content for each appendix. Appendix J contains the basic performance test requirements and instructions for applicants of category 1 and 4 crane licenses.

Appendix K provides the basic performance test requirements and instructions for applicants of category 2 and cab-operated category 3 crane licenses.

Appendix L provides the basic performance test requirements and instructions for applicants of mobile boat hoists and rubber-tired gantry crane licenses.

Appendices J, K, and L: Crane Operator Basic Performance Tests

- **Appendix J** - Contains the basic performance test requirements and instructions for applicants of category 1 and 4 crane licenses
- **Appendix K** - Provides the basic performance test requirements and instructions for applicants of category 2 and cab-operated category 3 crane licenses
- **Appendix L** - Provides the basic performance test requirements and instructions for applicants of mobile boat hoists and rubber tired gantry crane licenses

Appendix J

Shown here is a preview of the first two pages of the category 1 and 4 crane operator performance test displaying various instructions and attributes.

Appendix J: Category 1 and 4 Crane Operator Basic Performance Test

APPENDIX J BASIC PERFORMANCE TEST FOR WEIGHT-MEASURING EQUIPMENT OPERATOR LICENSE CATEGORY 1 AND 4 CRANES EXCEPT MOBILE BOAT HOISTS AND RUBBER-TIRED GANTRY CRANES

Notes: (1) Prerequisite for this examination is complete familiarity with Standard Hand Signals for Controlling Crane Operations shown in Figure 10-1.

(2) Performance test requirements shall be supplemented and modified by each activity for the particular operating characteristics and features of their cranes as well as the unique mission of the activity.

(3) Performance tests for category 4 cranes shall be modified, as necessary, for the type of crane being used.

(4) Notation on Test Forms: A short line is provided before each test item. The examiner shall make a check mark to indicate that the applicant has correctly performed or answered the question. The examiner shall indicate by plus or circle where the applicant fails to perform or answer correctly. The examiner shall provide a short written explanation of all failures. Items that are not applicable shall be marked "NA".

GENERAL INFORMATION:

TESTING ACTIVITY: _____ TEST DATE: _____

APPLICANT'S NAME: _____

TO BE COMPLETED BY EXAMINER:

MAKE AND MODEL OF TEST CRANE: _____

TYPE AND CAPACITY (See section 5, paragraph 5.7.2): _____

RESULTS: SATISFACTORY _____ UNSATISFACTORY _____

REMARKS: _____

SIGNATURE: _____

1. PRE-USE CHECK

1.1. Ensure the crane is currently certified before proceeding.

1.2. Check the crane for tags or other operational restrictions or warnings.

1.3. Ensure no repairs are in progress.

1.4. Ensure no vehicles or objects are in a position where they might be struck by the crane and that no other ground or overhead obstacles and hazards are in the operating areas, travel, and work areas.

1.5. Perform a pre-use walk around check, a machinery check, and an operator cab check, and document on a Crane Operator's Daily Checklist (DOC), (Figure 9-1).

1.6. Remove when checks, urinals or cat dummies, and remove air truck spring weights as required.

2. FAMILIARITY WITH LUBRICATION REQUIREMENTS

2.1. Check lubricant levels where accessible and identify points that may require lubrication during periods of operation.

GROUP B - STARTING THE ENGINE

1. Check the position and disengage the master clutch, engine clutch, or hydraulic pump drive as applicable.

2. Check the control handles and ensure that they are in neutral.

3. The operator shall explain to the examiner the function of the control handles and all other push, twist, and switch on the crane.

3. Start the engine in the manner prescribed by the OEM.

4. Observe gauges for correct readings and describe the purpose of gauges.

5. Allow the engine to warm up as appropriate.

6. Cranes equipped with air or hydraulic controls shall not be operated until gauges show required operating pressures.

Appendix K

Shown here is a preview of the first two pages of the category 2 and cab-operated category 3 crane operator performance test, displaying various instructions and attributes.

Appendix K: Category 2 and Cab-Operated Category 3 Crane Operator Basic Performance Test

APPENDIX K BASIC PERFORMANCE TEST FOR WEIGHT-MEASURING EQUIPMENT OPERATOR LICENSE CATEGORY 2 AND CAB-OPERATED CATEGORY 3 CRANES

Notes: (1) Prerequisite for this examination is complete familiarity with Standard Hand Signals for Controlling Crane Operations shown in Figure 10-1.

(2) Performance test requirements shall be supplemented and modified by the activity for the particular operating characteristics and features of their cranes as well as the unique mission of the activity.

(3) The performance tests include evaluation of the operator's ability to follow hand signals. Unacceptable actions include moving without a signal and incorrect responses to signals. The operator will be required to answer without seeing the test. The test shall be modified accordingly. Additional criteria for testing the ability to follow hand signals and limit operation are included in specific (basic performance test) provisions.

(4) Notation on Test Forms: A short line is provided before each test item. The examiner shall make a check mark to indicate that the applicant has correctly performed or answered the question. The examiner shall indicate by plus or circle where the applicant fails to perform or answer correctly. The examiner shall provide a short written explanation of all failures. Items that are not applicable shall be marked "NA".

GENERAL INFORMATION:

TESTING ACTIVITY: _____ TEST DATE: _____

APPLICANT'S NAME: _____

TO BE COMPLETED BY EXAMINER:

MAKE AND MODEL OF TEST CRANE: _____

TYPE OF CONTROLS: _____

CAPACITY: _____

RESULTS: SATISFACTORY _____ UNSATISFACTORY _____

REMARKS: _____

SIGNATURE: _____

1. PRE-USE CHECK

1.1. Ensure the crane is currently certified before proceeding.

1.2. Check the crane for tags or other operational restrictions or warnings.

1.3. Ensure no repairs are in progress.

1.4. Perform the walk-around, machinery, and operator cab checks based on the Operator Daily Checklist (DOC) and document on the DOC, (Figure 9-1).

1.5. Remove when checks, track tracks for obstructions, misalignment, damage, loose connections, and conditions that may prevent proper operation.

2. FAMILIARITY WITH LUBRICATION REQUIREMENTS

2.1. Check the work area for hazards and obstacles. Report correction before proceeding as necessary.

GROUP A - TESTING OPERATING CONTROLS

1. Check to assure that all controls are in the "OFF" position.

2. Engage the crane.

3. Freely adjust, check the action of hydraulic switches.

4. Test the action of hand controls by raising, lowering, and stopping the hook.

5. Test the action of hand controls and brakes by moving the crane back and forth in the test. Check for proper brake action.

6. Test the hoist controls and brakes by hoisting the hoist load and both a test load. Check for proper brake action.

7. Test the limit switches and other safety devices.

8. Check the emergency stop, operational safety devices, warning devices and gauges. Verify the operation of interlocks.

9. Document the operating test portion on the DOC. The applicant and the performance examiner shall sign the DOC.

Appendix L

Shown here is a preview of the first two pages of the mobile boat hoist and rubber-tired gantry crane operator performance test displaying various instructions and attributes.

Appendix L: Mobile Boat Hoist and Rubber Tired Gantry Crane Operator Basic Performance Test

APPENDIX L BASIC PERFORMANCE TEST FOR WEIGHT-MEASURING EQUIPMENT OPERATOR LICENSE MOBILE BOAT HOISTS AND RUBBER-TIRED GANTRY CRANES

Notes: (1) Prerequisite for this examination is complete familiarity with Standard Hand Signals for Controlling Crane Operations shown in Figure 10-1.

(2) Performance test requirements shall be supplemented and modified by each activity for the particular operating characteristics and features of their mobile boat hoist or rubber-tired gantry cranes, as well as the unique mission of the activity.

(3) Performance tests may be modified to assess an operator's ability to safely operate a mobile boat hoist used for purposes other than lifting loads in or out of the water. For example, some mobile boat hoists are only used to pump water or maintain water levels. Similarly, this test may be modified as needed for rubber-tired gantry cranes.

(4) Notation on Test Forms: A short line is provided before each test item. The examiner shall make a check mark to indicate that the applicant has correctly performed or answered the question. The examiner shall indicate by plus or circle where the applicant fails to perform or answer correctly. The examiner shall provide a short written explanation of all failures. Items that are not applicable shall be marked "NA".

GENERAL INFORMATION:

TESTING ACTIVITY: _____ TEST DATE: _____

APPLICANT'S NAME: _____

TO BE COMPLETED BY EXAMINER:

MAKE AND MODEL OF TEST CRANE: _____

CAPACITY: _____

RESULTS: SATISFACTORY _____ UNSATISFACTORY _____

REMARKS: _____

SIGNATURE: _____

1. PRE-USE CHECK

1.1. Ensure the crane is currently certified before proceeding.

1.2. Check the crane for tags or other operational restrictions or warnings.

1.3. Ensure no repairs are in progress.

1.4. Ensure no vehicles or objects are in a position where they might be struck by the crane and that no other ground or overhead obstacles and hazards are in the parking, travel, and work areas.

1.5. Perform a walk around check, a machinery check, and an operator cab check, and document on a Crane Operator's Daily Checklist (DOC), (Figure 9-1).

1.6. Remove when checks or weights as required.

2. FAMILIARITY WITH LUBRICATION REQUIREMENTS

2.1. Check lubricant levels where accessible.

2.2. Identify points that may require lubrication during periods of operation.

GROUP B - STARTING THE ENGINE

1. Check the position and disengage the master clutch or hydraulic pump drive as applicable.

2. Check the control handles and ensure that they are in neutral.

3. The operator shall explain to the examiner the function of the control handles and all other push, twist, and switch on the crane.

3. Start the engine in the manner prescribed by the OEM.

4. Observe gauges for correct readings and describe the purpose of gauges.

5. Observe the test indicators for correct readings, without load, if applicable.


6. Allow the engine to warm up as appropriate.

Appendix M: Introduction

NAVFAC P-307, Appendix M provides procedures for third party certifications performed by Navy Crane Center on Navy owned cranes, derricks, container spreaders and below-the-hook lifting devices. This includes a documentation review, condition inspection, load test, and the satisfactory completion of local certification requirements. NAVFAC P-307, Section 4 provides additional certification information.

Appendix M: Introduction

- Appendix A: Glossary
- Appendix B: Types of Weight Handling Equipment
- Appendix C: MISR for Category 1 and 4 Cranes
- Appendix D: AMISR for Category 2 and 3 Cranes
- Appendix E: Crane Test Procedures
- Appendix F: Examples of LB, LC, and OSD
- Appendix G, H, and I: Reserved for Future Use
- Appendix J: Basic Performance Test for Weight Handling Equipment Operator License: Category 1 and 4 Cranes
- Appendix K: Basic Performance Test for Weight Handling Equipment Operator License: Category 2 and Cab-Operated Category 3 Cranes
- Appendix L: Basic Performance Test for Weight Handling Equipment Operator License: Mobile Boat Hoist and Rubber-Tired Gantry Cranes
- Appendix M: Procedures for Third Party Certification by the Navy Crane Center**
- Appendix N: Personnel Competencies
- Appendix O: Navy Crane Center Engineering Policies and Guidance for Crane Alteration Requests (CAR)
- Appendix P: Contractor Crane (or Alternate Machine Used to Lift Suspended Loads) and Rigging Gear Requirements
- Appendix Q: References
- Appendix R: Related Documents



Appendix M: Forms

Appendix M contains two forms used by Navy Crane Center third party certifiers: Figures M-1 and M-2. Click on either title to display the forms. Figure M-1 is the Certificate of Unit Test and/or Examination of Crane, Derrick or Other Material Handling Device and is used to indicate a satisfactory third-party certification of applicable equipment. Figure M-2 is the Notice to Owner of Deficiencies Found on the Certification Survey and is used to document uncorrected deficiencies found during the third-party test and examination.


Appendix M Forms: Figure M-1 and Figure M-2

Click on either title to view the form.

[Third Party Certificate](#)

[Notice of Deficiencies](#)

Figure M-1:



NAVY CRANE CENTER
Certificate of Unit Test and/or Examination of Crane, Derrick, or Other Material Handling Device
 This certificate may be issued only by persons specifically approved by the Navy Crane Center to comply with the Navy's Alternate Standard for Certification of Weight Handling Equipment. NAVFAC P-307 has been approved by the U.S. Department of Labor, Occupational Safety and Health Administration, as an alternate means of compliance with the provisions of 29 CFR Part 1919.

Certificate No. _____

1. Owner: _____

2. Description (check): Crane _____ Derrick _____ Other (describe) _____
 Location: (a) Remains at worksite _____ (b) Changes worksite _____ (c) Aboard vessel _____
 If (a) or (c), describe _____
 If crane, type (truck, rail, etc.): _____
 Manufacturer: _____ Model: _____ Serial No.: _____
 If derrick, describe: _____
 Owner's identification, if any: _____

3. Service status at time of survey (check): Lifting _____ Clamshell _____ Magnet _____
 Other Describe: _____

4. Boom at time of survey (except bridge cranes): Length _____ Type _____

5. Test loads applied (cross out if only examination conducted):

Radius	Proof Loads (TEST LOAD)	Rated Loads

Means of application of proof load: _____
 Basis for assigned load ratings: _____


6. Remarks and/or limitations imposed: _____

7. Load indicating or limiting device (check): Fitted _____ Not fitted _____ Accuracy per _____
 I certify that on the _____ day of _____, 20____, the above described device was (tested and examined) (examined) by the undersigned or his/her authorized representative; that said (test and examination) (examination) met in all respects with the requirements of NAVFAC P-307, an OSHA approved alternate standard for compliance with the provisions of 29 CFR Part 1919; any deficiencies considered to constitute an unsatisfactory condition have been corrected and that the device has been found to be in compliance in all applicable respects with the governing requirements.
 Name and address of accredited or otherwise authorized organization making the test and/or examination: Navy Crane Center, Bldg 491 NNSY, Portsmouth, VA 23709.
 Name and address of authorized person carrying out the test and/or examination: _____
 Position of signatory in the organization making the test and/or examination: _____

Distribution:
 Original - Owner (post in operator cab) Signature: _____
 Copies to - Owner (equipment history file) _____
 Certifier Date: _____
 Navy Crane Center

Figure M-1

Figure M-2:



NAVY CRANE CENTER
Notice to Owner of Deficiencies Found on Certification Survey
 This notice may be issued only by persons specifically approved by the Navy Crane Center to comply with the Navy's Alternate Standard for Certification of Weight Handling Equipment. NAVFAC P-307 has been approved by the U.S. Department of Labor, Occupational Safety and Health Administration, as an alternate means of compliance with the provisions of 29 CFR Part 1919.

1. Owner: _____

2. Identification, location, and specific description of equipment: _____

3. The undersigned, being authorized to do so, hereby tenders notification of the following listed uncorrected deficiencies, found upon (test and examination) (examination) of the described equipment in accordance with the requirements of NAVFAC P-307, to constitute in the opinion of the undersigned a currently unsatisfactory condition.

4. Under the applicable requirements of NAVFAC P-307, an OSHA approved alternate standard for compliance with the provisions of 29 CFR Part 1919; the issuance of any certificate of (test and examination) (examination) is prohibited until such time as correction of deficiencies has been verified by the undersigned.

5. Name and address of accredited or otherwise authorized organization making the test and/or examination: Navy Crane Center, Bldg 491 NNSY, Portsmouth, VA 23709.

6. Name and address of authorized person carrying out the test and/or examination: _____

7. Position of signatory in the organization making the test and/or examination: _____

Distribution:
 Original - Owner (post in operator cab) Signature: _____
 Copies to - Certifier _____
 Navy Crane Center Date: _____

Appendix N: Introduction

NAVFAC P-307, Appendix N provides a listing of competency attributes that personnel must satisfy prior to performing assigned weight handling duties in the noted positions. Appendix N augments the requirements of Sections 1, 3, 4, 7, 8, and 10, all of which discuss personnel qualifications.

Appendix N: Introduction

- Appendix A: Glossary
- Appendix B: Types of Weight Handling Equipment
- Appendix C: MISR for Category 1 and 4 Cranes
- Appendix D: AMISR for Category 2 and 3 Cranes
- Appendix E: Crane Test Procedures
- Appendix F: Examples of LB, LC, and OSD
- Appendix G, H, and I: Reserved for Future Use
- Appendix J: Basic Performance Test for Weight Handling Equipment Operator License: Category 1 and 4 Cranes
- Appendix K: Basic Performance Test for Weight Handling Equipment Operator License: Category 2 and Cab-Operated Category 3 Cranes
- Appendix L: Basic Performance Test for Weight Handling Equipment Operator License: Mobile Boat Hoist and Rubber-Tired Gantry Cranes
- Appendix M: Procedures for Third Party Certification by the Navy Crane Center
- Appendix N: Personnel Competencies**
- Appendix O: Navy Crane Center Engineering Policies and Guidance for Crane Alteration Requests (CAR)
- Appendix P: Contractor Crane (or Alternate Machine Used to Lift Suspended Loads) and Rigging Gear Requirements
- Appendix Q: References
- Appendix R: Related Documents



Appendix N: Personnel Competencies

NAVFAC P-307, Appendix N provides a listing of competency attributes that personnel must satisfy prior to performing assigned weight handling duties in the noted positions. Appendix N augments the requirements of Sections 1, 3, 4, 7, 8, and 10, all of which discuss personnel qualifications.

Appendix N: Personnel Competencies

- Maintenance Personnel: Mechanic and Electrician
- Inspector
- Load Test Director
- Operator of Non-Cab Operated Category 3 WHE
- Rigger
- Crane Walker
- Crane Signal Person
- Operator Supervisor
- Rigger Supervisor
- Maintenance Mechanic/Electrician, Inspector, and Load Test Director Supervisor
- Engineer
- Certifying Official
- Weight Handling Program Manager

Appendix O: Introduction

NAVFAC P-307, Appendix O provides supplemental engineering policies and guidance for crane alteration requests. This appendix works in conjunction with Section 6, which provides the basic information for the crane alteration process as well as examples of the crane alteration request and mandatory alteration forms found in Figures 6-1 and 6-2.

Appendix O: Introduction

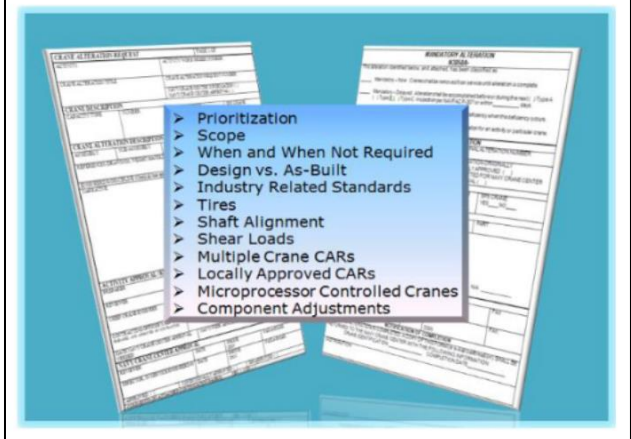
- Appendix A: Glossary
- Appendix B: Types of Weight Handling Equipment
- Appendix C: MISR for Category 1 and 4 Cranes
- Appendix D: AMISR for Category 2 and 3 Cranes
- Appendix E: Crane Test Procedures
- Appendix F: Examples of LB, LC, and OSD
- Appendix G, H, and I: Reserved for Future Use
- Appendix J: Basic Performance Test for Weight Handling Equipment Operator License: Category 1 and 4 Cranes
- Appendix K: Basic Performance Test for Weight Handling Equipment Operator License: Category 2 and Cab-Operated Category 3 Cranes
- Appendix L: Basic Performance Test for Weight Handling Equipment Operator License: Mobile Boat Hoist and Rubber-Tired Gantry Cranes
- Appendix M: Procedures for Third Party Certification by the Navy Crane Center
- Appendix N: Personnel Competencies
- Appendix O: Navy Crane Center Engineering Policies and Guidance for Crane Alteration Requests (CAR)**
- Appendix P: Contractor Crane (or Alternate Machine Used to Lift Suspended Loads) and Rigging Gear Requirements
- Appendix Q: References
- Appendix R: Related Documents



Appendix O: Topics

What is in Appendix O? Appendix O discusses the prioritization and scoping of alteration requests, when alteration requests should and should not be used, design and as built considerations, and industry standards related to the certification of weight handling equipment. See the list on the screen for additional topics contained in Appendix O.

What is in Appendix O?



Appendix P: Introduction


NAVFAC P-307, Appendix P: Contractor Crane and Rigging Gear Requirements provides copies of the Certificate of Compliance and the Contractor Crane or Rigging Operation Checklist. These forms are more commonly known as the “P-1” and “P-2” .” These forms augment Section 11 requirements and assist with oversight of contractor crane and rigging operations on Navy property.

Appendix P: Figure P-1

NAVFAC P-307, Appendix P: Contractor Crane and Rigging Gear Requirements provides copies of the Certificate of Compliance and the Contractor Crane or Rigging Operation Checklist. These forms are more commonly known as the “P-1” and “P-2” .” These forms augment Section 11 requirements and assist with oversight of contractor crane and rigging operations on Navy property.

Appendix P: Introduction

- Appendix A: Glossary
- Appendix B: Types of Weight Handling Equipment
- Appendix C: MISR for Category 1 and 4 Cranes
- Appendix D: AMISR for Category 2 and 3 Cranes
- Appendix E: Crane Test Procedures
- Appendix F: Examples of LB, LC, and OSD
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- Appendix M: Procedures for Third Party Certification by the Navy Crane Center
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- Appendix O: Navy Crane Center Engineering Policies and Guidance for Crane Alteration Requests (CAR)
- Appendix P: Contractor Crane (or Alternate Machine Used to Lift Suspended Loads) and Rigging Gear Requirements**
- Appendix Q: References
- Appendix R: Related Documents



APPENDIX P – CONTRACTOR CRANE (OR ALTERNATE MACHINE USED TO LIFT SUSPENDED LOADS) AND RIGGING GEAR REQUIREMENTS

CERTIFICATE OF COMPLIANCE

This certificate shall be signed by an official of the company that provides cranes (or multi-purpose machines, MHE, or construction equipment used to lift loads suspended by rigging gear) or rigging gear for any application under this contract. Post a completed certificate on each crane or alternate machine (or in the contractor's on-site office for rigging operations) brought onto Navy property.

CONTRACTING OFFICER'S POINT OF CONTACT (Government Representative)	PHONE
PRIME CONTRACTOR/PHONE	CONTRACT NUMBER
CRANE OR ALTERNATE MACHINE SUPPLIER/PHONE (if different from prime contractor)	CRANE OR ALTERNATE MACHINE NUMBER (i.e., ID number)

CRANE OR ALTERNATE MACHINE MANUFACTURER/TYPE/CAPACITY

CRANE OR ALTERNATE MACHINE OPERATOR'S NAME(S)

I certify that

1. The above noted crane or alternate machine and all rigging gear conform to applicable OSHA regulations (most nation regulations for naval activities in foreign countries) and applicable ASME B30 or other standards. The following OSHA regulations and ASME or other standards apply.
2. The operators noted above have been trained and are qualified for the operation of the above noted crane(s) or alternate machine(s).
3. All safety devices and operator aids are enabled and functioning properly and the operators noted above have been trained not to bypass safety devices and operator aids during lifting operations.
4. The operators, riggers and company officials are aware of the actions required in the event of an accident as specified in the contract.
5. Signal persons used in construction work are qualified in accordance with 29 CFR 1926.1428.
6. Riggers are qualified in accordance with NAVFAC P-307, paragraph 11.1.k.
7. 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 NAME/TITLE

POST ON CRANE (OR ALTERNATE MACHINE)
(IN CAB OR VEHICLE)
(or in the contractor's on-site office for rigging operations)

Figure P-1

Figure P-1: Certificate of Compliance

Appendix P: Figure P-2

Appendix P, Figure P-2 provides a checklist that shall be used during oversight of contractor crane and rigging operations. Copies of Figure P-2 shall be kept on file for one year. Personnel performing oversight shall complete the Contractor Crane Awareness training course or the NAVFAC 40-hr Contract Hazard Awareness Training Course.

Figure P-2: Contractor Crane or Rigging Operation Checklist

CONTRACTOR CRANE OR RIGGING OPERATION CHECKLIST		YES	NO	NOA
1	Is the Certificate of Compliance (COC) in the operator's cab or in the contractor's possession for the operation, with correct operator's name listed?			
2	Is the crane machine "marked" and from the job site controls? Are the OSHA conditions followed being followed?			
3	Is the crane to be used within the manufacturer's rated capacity as marked on the crane?			
4	Are safety devices required and, if so, are they properly extended and engaged?			
5	If counterweights are used, are they marked and set off the ground in the correct order? Are they secured in the correct order? Are the counterweights adequately supported and secured?			
6	If supporting members are provided, are the surface of the supporting member properly supported and the supporting member of sufficient strength to support the rated load? Are they secured to the crane?			
7	If rigging devices are used, are the crane manufacturer's rated capacity and safe working areas within the swing area barricaded to prevent injury or damage?			
8	Has the hook been examined and inspected for damage or wear? Is the hook marked and secured in the correct order? Are the hook and shackle properly secured to the crane?			
9	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
10	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
11	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
12	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
13	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
14	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
15	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
16	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
17	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
18	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
19	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
20	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
21	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
22	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
23	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
24	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
25	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
26	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
27	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
28	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
29	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
30	Is the hook and shackle properly secured to the crane? Are the hook and shackle properly secured to the crane?			
Contractor: _____ Subcontractor: _____				
Location: _____ Date: _____				
Notes: _____				
Signature of Government Representative: _____				

Figure P-2 (1)


Appendices Q and R: Introduction

NAVFAC P307, Appendix Q "References" and Appendix R "Related Documents" provide lists of documents, manuals, instructions, publications, and standards, either directly referenced in the manual (Appendix Q) or related to the subject matter of the manual (Appendix R).

Appendices Q & R: Introduction

Appendix A: Glossary
 Appendix B: Types of Weight Handling Equipment
 Appendix C: MISR for Category 1 and 4 Cranes
 Appendix D: AMISR for Category 2 and 3 Cranes
 Appendix E: Crane Test Procedures
 Appendix F: Examples of LB, LC, and OSD
 Appendix G, H, and I: Reserved for Future Use
 Appendix J: Basic Performance Test for Weight Handling Equipment Operator License: Category 1 and 4 Cranes
 Appendix K: Basic Performance Test for Weight Handling Equipment Operator License: Category 2 and Cab-Operated Category 3 Cranes
 Appendix L: Basic Performance Test for Weight Handling Equipment Operator License: Mobile Boat Hoist and Rubber-Tired Gantry Cranes
 Appendix M: Procedures for Third Party Certification by the Navy Crane Center
 Appendix N: Personnel Competencies
 Appendix O: Navy Crane Center Engineering Policies and Guidance for Crane Alteration Requests (CAR)
 Appendix P: Contractor Crane (or Alternate Machine Used to Lift Suspended Loads) and Rigging Gear Requirements

Appendix Q: References
Appendix R: Related Documents




Appendices Q and R: References and Documents

Appendix Q identifies the 83 military, federal, industry, and consensus standards referenced in the manual.

Appendix R provides a list of standards and guides that provide additional weight handling related information.

Appendices Q & R: References and Related Documents



Appendix Q Examples:

- United Facilities Criteria 3-320-07N, Weight Handling Equipment
- NAVFAC Instruction 11230.0, Inspection, Certification, and Audit of Crane Railroad Trackage
- NAVAIR 00-80T-119, Weight Handling Equipment Support Manual
- EM 385-1-1, Safety and Health Requirements Manual
- Motor Carrier Safety Regulation 49 CFR Part 391, Sections 41.43, Physical Qualifications and Examinations

Appendix R Examples:

- Bob's Rigging and Crane Handbook
- Handbook for Riggers, Mobile Craning Today
- OPNAV Instruction 5450.348, Mission, Functions and Tasks of the Naval Facilities Engineering Command
- Wire Rope Users Manual
- Naval Ships' Technical Manual S9086-T4-STM-010, Chapter 589, Cranes

NAVFAC P-307 OVERVIEW QUIZ AND SUMMARY

Welcome

The next several screens contain questions relating to the covered material. Check your comprehension of the course content by answering these questions. Online answers may appear in a different order than those shown below. Correct answers are indicated by red font color.

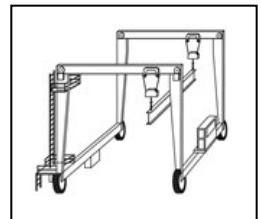
1. **Select all that apply.** The overall purpose of NAVFAC P-307 is to—
 - A. ensure the safe lifting and controlling capability of WHE
 - B. maintain the level of safety and reliability that was originally built into the equipment
 - C. promote safe operating practices
 - D. provide detailed maintenance, test, and certification schedules for specific or unique pieces of WHE
 - E. provide training and qualification standards for all personnel involved in maintenance, inspection, test, certification, engineering, rigging and operation of WHE

2. **Select the best answer.** Which document would you use to request a revision, deviation, or clarification to NAVFAC P-307?
 - A. CAR
 - B. CCIR
 - C. ODCL
 - D. RCDR

3. **Select the best answer.** Which NAVFAC P-307 section or appendix would you read to learn more about self-assessments, monitoring programs, metrics, and general program management?
 - A. Appendix C
 - B. Appendix E
 - C. Section 1
 - D. Section 2
 - E. Section 4
 - F. Section 7
 - G. Section 10

4. **Select the best answer.** Sections 3, 4 and 5 provide information on which topics?
 - A. alterations, engineering policies, technical advisories
 - B. inspection, maintenance, certification
 - C. operations, operator inspections, operator licensing
 - D. performance testing for category 1, 2 and 3 crane operators

5. **Select the best answer. True or False:** The crane identification number, certified capacity and certification expiration date must be posted on or near the crane.
- A. True
 - B. False
6. **Select all that apply.** The purpose of the condition inspection is to ensure that—
- A. the overall electrical components of the equipment have been maintained in a safe and serviceable condition and are functioning properly
 - B. the overall mechanical components of the equipment have been maintained in a safe and serviceable condition and are functioning properly
 - C. the overall structural components of the equipment have been maintained in a safe and serviceable condition and are functioning properly
 - D. work required by all WHEDRs, CARs and ODCLs has been satisfactorily completed and properly recorded
 - E. all the above
7. **Select the best answer to fill in the blank.** The purpose of the _____ is to ensure by controlled operation with prescribed test loads that the equipment is capable of safely lifting and moving the rated load through all design motions.
- A. condition inspection
 - B. load test
 - C. maintenance inspection
 - D. ODCL
8. **Select the best answer.** What section and/or appendix contains information on crane alterations?
- A. Appendix O
 - B. Appendix P
 - C. Section 6
 - D. Section 6 and Appendix O
 - E. Section 8
 - F. Section 8 and Appendix P
 - G. Sections 5 and 11
9. **Select the best answer.** What is the category of this crane?
- A. Category 1
 - B. Category 2
 - C. Category 3
 - D. Category 4



- 10. Select the best answer.** What is the category of a jib crane with a capacity of less than 20,000 pounds?
- A. Category 1
 - B. Category 2
 - C. Category 3
 - D. Category 4
- 11. Match the following.** Correctly identify each item as either a load bearing component, a load controlling component, or an operational safety device by checking the appropriate box adjacent to that item.

Matching

Correctly identify each item as either a load bearing component, a load controlling component, or an operational safety device by selecting the corresponding number.

<input type="checkbox"/>	Load Block	
<input type="checkbox"/>	Locking Devices	
<input type="checkbox"/>	Rotate Drive Keys	1. Load Bearing Part
<input type="checkbox"/>	Truck Axles/Wheels	2. Load Controlling Part
<input type="checkbox"/>	Travel Electric Brakes	3. Operational Safety Device
<input type="checkbox"/>	Proximity Switch	
<input type="checkbox"/>	Drum Hoist	
<input type="checkbox"/>	Luffing Hoist Limit Switch	

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____

- 12. Select the best answer.** Who is responsible for completing, signing, posting, and retaining this (P-1) form?
- A. Certifying Official
 - B. Contracting Officer
 - C. Crane Owner
 - D. Oversight Inspector

APPENDIX P - CONTRACTOR CRANE (OR ALTERNATE MACHINE) USED TO LIFT SUSPENDED LOADS AND RELATED USAR REQUIREMENTS

CERTIFICATE OF COMPLIANCE

This certificate shall be signed by an official of the company that provides cranes for such purpose machines, MHE, or construction equipment used to lift loads suspended by rigging gear or rigging gear for any application under this contract. Final completed certificate on each crane or alternate machine for in the contractor's on-site office for rigging operations to be kept on file permanently.

CONTRACTING OFFICER'S POINT OF CONTACT		PHONE
PRIME CONTRACTOR PHONE	CONTRACT NUMBER	
CRANE OR ALTERNATE MACHINE SUPPLIER PHONE	CRANE OR ALTERNATE MACHINE NUMBER (i.e., ID number)	
CRANE OR ALTERNATE MACHINE MANUFACTURER TYPE/CAPACITY		
CRANE OR ALTERNATE MACHINE OPERATOR'S NAME(S)		

VERIFY THAT

1. The above noted crane or alternate machine and all rigging gear conform to applicable OSHA regulations (that nation regulations for naval activities in foreign countries) and applicable ASME B30 or other standards. The following OSHA regulations and ASME or other standards.
2. The operators noted above have been trained and are qualified for the operation of the above noted crane or alternate machine(s).
3. All safety devices and operator aids are enabled and functioning properly and the operators noted above have been trained not to bypass safety devices and operator aids (spring lifting) operations.
4. The operators, riggers and company officials are aware of the actions required in the event of an accident, as specified in the contract.
5. Signal persons used in construction work are qualified in accordance with 29 CFR 1926.1426.
6. Riggers are qualified in accordance with NAVFAC P-307, paragraph 11.5.8.
7. 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 ESR 105.1.1.

COMPANY OFFICIAL SIGNATURE	DATE
COMPANY OFFICIAL NAME/TITLE	

POST ON CRANE (OR ALTERNATE MACHINE)
BY (CRANE OR VEHICLE)

(to be submitted to on-site office for rigging operations)







Figure P-1

- 13. Select the best answer. True or False:** NAVFAC P-307 provides guidance to shore based naval activities for weight handling equipment program management.
- A. True
 - B. False

14. **Select the best answer. True or False:** Non-cab operated category 3 cranes require a license to operate.
- A. True
 - B. False
15. **Select all that apply.** A license is required to operate—
- A. Category 1 cranes
 - B. Category 2 cranes
 - C. Cab-operated category 3 cranes
 - D. Category 4 cranes
16. **Matching.** Assign the correct NAVFAC P-307 crane category to the pictured items by selecting the corresponding number in the drop-down box.

Matching

Assign the correct NAVFAC P-307 crane category to the pictured items by selecting the corresponding number in the drop down box.

<input type="text"/>		<ul style="list-style-type: none">1. Category 42. Category 33. Category 24. Category 15. None of the listed categories	
<input type="text"/>			
<input type="text"/>			
<input type="text"/>			
<input type="text"/>			
<input type="text"/>			






- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____
- 6. _____

17. **Select the best answer.** Which form would be used to perform a maintenance inspection on a cab-operated category 3 crane?
- A. AMISR
 - B. MISR
18. **Select all that apply.** A crane accident occurs when any of the elements in the crane operating envelope fails to perform correctly resulting in any of the following except when—
- A. a component fails with no other damage occurring
 - B. a load is dropped
 - C. a mobile crane is configured for transit
 - D. an overload occurs
 - E. material or equipment is damaged
 - F. personnel injury or death occurs
 - G. the crane two-blocks

19. **Select the best answer to fill in the blank.** Section _____ provides a list of the various documents that must be kept in the history file as well as the lengths of time they must be retained.
- A. 2
 - B. 3
 - C. 5
 - D. 7
20. **Select the best answer to fill in the blank.** NAVFAC P-307 appendix N provides a listing of _____ that personnel must satisfy prior to performing assigned weight handling duties in the noted positions.
- A. examinations
 - B. performance exams
 - C. personnel competencies
 - D. training qualifications
21. **Select the best answer. True or False:** The Appendix B glossary provides uniform definitions to aid personnel in understanding key concepts and terminology found in NAVFAC P-307.
- A. True
 - B. False
22. **Matching.** Assign the correct crane type to the pictured crane by selecting the correct number next to the picture.

Matching

Assign the correct crane type to the pictured crane by selecting the corresponding number in the drop down box.

<input type="text"/>			
<input type="text"/>			
<input type="text"/>			
<input type="text"/>			
<input type="text"/>			

- 1. Mobile Boat Hoist
- 2. Bridge Crane
- 3. Rubber-Tire Gantry Crane
- 4. Portal Crane
- 5. Commercial Truck Mounted Crane

- 1. _____
- 2. _____
- 3. _____
- 4. _____
- 5. _____

23. **Select the best answer.** To review basic crane test procedures for most cranes you would refer to which part of the NAVFAC P-307 manual?
- A. Appendix E: Crane Test Procedures
 - B. Appendix T: Testing
 - C. Section 15 and Appendix T: Test Specifications and Testing
 - D. Section 15: Test Specifications

- 24. Select the best answer.** A Navy Crane Center third party certifier would use which of the listed forms to inform the crane owner of uncorrected deficiencies found on the crane?
- A. Figure M-1: Certificate of Unit Test and Examination
 - B. Figure M-2: Notice to Owner of Deficiencies Found on the Certification Survey
 - C. Figure M-3: Deficient Items List
- 25. Select the best answer.** A significant accident is an accident that typical has a greater potential to result in—
- A. crane component failure
 - B. rigging equipment damage
 - C. serious injury or substantial property damage
 - D. voiding of crane certification

Summary

During this overview, you were exposed to all the sections, appendices, and forms found in the NAVFAC P307 manual along with a brief explanation of each one. Your understanding of this manual includes its purpose and scope, the types of equipment covered, load bearing, load controlling, and operational safety devices, training, competency and licensing requirements, information on working with contractors, various tables, and figures, and how to obtain support and assistance from Navy Crane Center.

Now that you have completed this brief introduction, you are encouraged to learn more about the Navy's weight handling program by mentoring, shadowing or simply listening to more experienced program personnel. You can also go to the Navy Crane Center's web page where you can download a copy of NAVFAC P307, review and print crane safety advisories, equipment deficiency memorandums, RCDRs, safety and training briefs, and other forms and figures. Above all, be ever vigilant, situationally aware, and stay safe at all times, not only for yourself but for all your teammates as well. The following screen provides contact information and is the final screen in this overview. Thank you for taking the time to learn more about NAVFC P307 and the Navy's Weight Handling Program.

NAVFAC P-307 Weight Handling Program Management Overview Summary

Exposure of NAVFAC P-307 manual to include:

- all sections,
- appendices,
- forms

Your understanding of this manual includes:

- the purpose of NAVFAC P-307
- types of equipment covered
- load bearing, load controlling, and operational safety device component and equipment
- maintenance, inspection, testing, and certification requirements
- training, competency, and licensing requirements
- information supporting work with contractors
- various tables, forms and figures
- support from Navy Crane Center

Be Smart! Be Aware! Be Safe!

Contact

The Navy Crane Center is available to assist in matters relating to Navy weight handling equipment and programs. Navy Crane Center can be contacted by mail, phone, fax, internet, email, or in-person visit. Review the data on the screen for brief descriptions and general information about NCC including services, office locations, and contact information.

Navy Crane Center General and Contact Information

Director (Attn: xxx)
Navy Crane Center
Norfolk Naval Shipyard, Bldg. 491
Portsmouth, VA 23709
General Phone: 757-967-3803, DSN: 387, Fax: 757-967-3808

Headquarters: Portsmouth, VA

- Acquisition: Project Management (757-967-3810), contracts (757-967-3819), and Design Engineering (757-967-3822), Technical pre-delivery
- In-Service Engineering: RCDRs, WHEDRs, Alterations, P-307 Interpretations, Technical post-delivery, 757-396-0220
- Compliance: Reviews, Evaluations, 757-967-3855
- Safety and Training: Safety, Accidents, Near Misses, Unplanned Events, Training, Licensing, 757-967-4042
- NCCR: Onsite Representation, 08 Liaison, 757-967-3838

Engineering, Compliance and On-Site Representative (NCCR) Field Offices

- Norfolk Naval Shipyard NCCR, 757-396-1771 (DSN 386)
- Puget Sound Naval Shipyard and Intermediate Maintenance Facility NCCR, 360-476-8011 (DSN 439)
- Portsmouth Naval Shipyard NCCR, 207-438-4740 (DSN 684)
- Pearl Harbor Naval Shipyard and Intermediate Maintenance Facility NCCR, 808-473-8000 ext. 6112 (DSN 449)
- Newport News Shipbuilding NCCR, 757-534-3519
- General Dynamics Electric Boat NCCR, 806-433-6699
- Pacific Northwest Region Compliance and Engineering: Silverdale, WA, 360-476-8050/2054 (DSN 439)
- Pacific Southwest Region Compliance: San Diego, CA, 619-532-2232 (DSN 526)

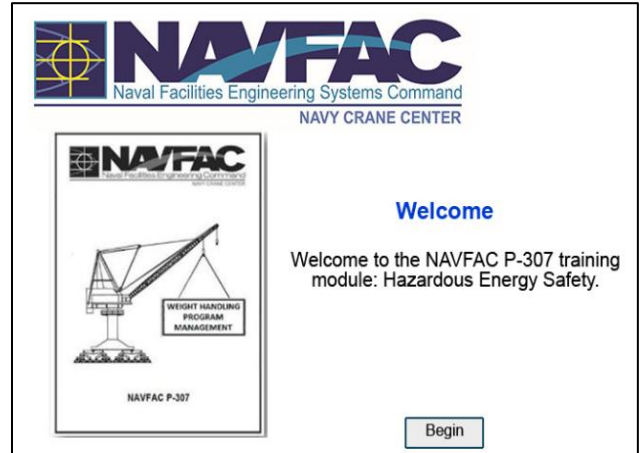
Internet: <https://ncc.navfac.navy.mil>

- NAVFAC P-307 (nfsh_ncc_p307@navy.mil)
- CSAs, EDMs, Safety Messages (nfsh_ncc_csa@navy.mil)
- Training (nfsh_ncc_training@navy.mil)
- Alterations (nfsh_ncc_craneall@navy.mil)
- Crane Corner Articles, Reports, Safety Videos, Accident Prevention, Safety Briefs, Other Links & Information

HAZARDOUS ENERGY SAFETY

Welcome

Welcome to the NAVFAC P-307 Mobile Crane Mechanic training module Hazardous Energy Safety.



Learning Objectives

Upon successful completion of this module, you will be able to define hazardous energy. You will know what questions to ask yourself to determine if you are fully trained and qualified to perform hazardous energy work. You will become familiar with several OSHA, NFPA, and Navy standard requirements. You will be able to explain the basic concepts of lockout-tagout. You will be able to define a qualified worker, authorized worker, and affected worker.

Learning Objectives

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

- Define Hazardous Energy
- Determine if fully trained and qualified to perform hazardous energy work
- Familiar with OSHA, NFPA, and Navy standard requirements
- Define a qualified worker, authorized worker, and affected worker

Hazardous Energy Safety

What is hazardous energy? Hazardous energy is any source of energy (electrical, mechanical, thermal, kinetic and pneumatic) that can be hazardous to workers when discharged from a stored energy source. Failure to control the unexpected release of energy can lead to machine-related injuries or fatalities. The risk from these sources of energy can be controlled in several ways including lockout-tagout policies and procedures.

Hazardous Energy Safety

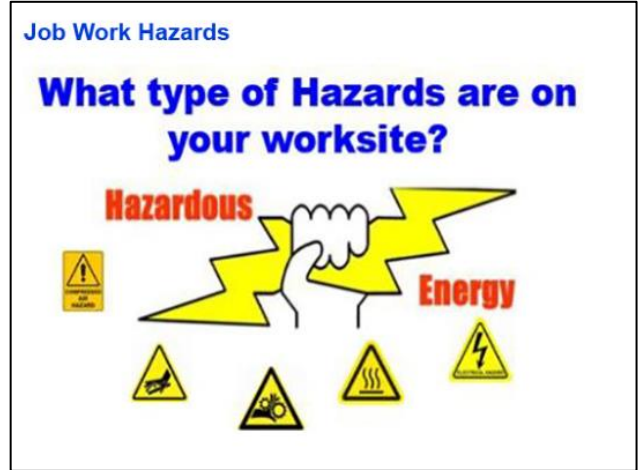
Hazardous energy source ?
Authorized worker ?
Lockout/tagout ?
Qualified worker ?
Affected worker ?
NFPA work practices ?

- Examples of Hazardous Energy Sources: Electrical, Mechanical, Thermal, Kinetic, and Pneumatic
- Failure to control the hazardous energy can lead to machine related failures or fatalities
- Energy Controls such as Lockout/Tagout are designed to control hazardous energy

Job Work Hazards

How to identify the hazardous energy in your worksite? Here are some examples, both general and specific, of the types of questions you may want to ask yourself before starting work.

Is there any electricity present? Is there pneumatic energy present? Is there kinetic (stored) energy present? Is there any other type of stored hazardous energy? If I disassemble this component, will there be any spring tension or pressure released? Before I release this brake, is there an additional measure (second brake, tie back, bar in the drum, spud or wind lock, etc.) I can employ to prevent uncontrolled movement (of hoist, boom, rotate, etc.)? What could happen if I disassemble a component without control measures in place? Is there any special PPE, tooling, guarding, training or procedures, supervision, etc. needed to mitigate the risks associated with accomplishing this type of work?



Qualified and Unqualified Persons

Crane mechanics work on many types of cranes. Most cranes have electrical systems that use either AC, DC, or both AC and DC. Mechanical personnel may work on mobile crane electrical systems. Most mobile cranes contain less than 50 volts. Regardless of the type of crane, work on any system 50 volts or greater requires a qualified person (i.e., electrician). Crane mechanics working on cranes with 50 volts or greater are normally not qualified to perform work on these types of electrical systems. Working on systems with less than 50 volts does not require the same energy controls. You can refer to the NFPA 70E, Article 130.2 (A) 3 for equipment operating at less than 50 volts. A qualified electrician is required when working on any electrical system that is 50 volts or greater. Your activity will determine who is qualified.

A qualified person is one who has received training in and has demonstrated skills and knowledge of the construction and operation of electrical equipment and installations and the hazards



involved, and how to mitigate the electrical hazards of working on or near exposed energized parts.

An unqualified person is one who has received little or no training in these types of electrical hazards and does not possess the knowledge, skills, and abilities to work on these types of electrical systems. Your activity determines who is qualified to perform work assignments.

Lockout/tagout (LOTO)

Lockout/tagout (LOTO) is a safety process used to secure potentially hazardous energy on machinery, equipment, or systems. It requires that hazardous energy sources be "isolated and rendered inoperative" to prevent the uncontrolled release of energy prior to beginning maintenance or repair work. The hazardous energy sources are isolated, locked, and tagged out in the proper position. The locks used identify with the worker that placed the lock on the isolation point. The worker holds the key to the lock and removes the lock when the work is complete. When lock(s) and tag(s) are removed, the system may be returned to normal operation. This prevents accidental release of hazardous energy or the potential start-up of a machine while maintenance is being performed.

Lockout/tagout is performed by authorized employees. Authorized employees are trained and knowledgeable on the equipment and system that they are working on. They understand the importance of lockout/tagout, and they are authorized per the activity to install locks and tags. The activity determines who is an authorized employee.

What are affected employees?

Affected employees are those personnel who may be affected by the action of a lockout/tagout. This includes employees who normally operate or use the equipment or system that is going to be locked out or tagged out while maintenance is being performed. For example, personnel who use cranes as a tool to



perform their everyday work and may be impacted (or affected) by a lockout/tagout.

Disconnecting or making the equipment safe involves the removal of all energy sources. This is commonly referred to as isolation. For example, mobile crane battery disconnects isolate the battery's energy from the crane's electrical system and may be considered an isolation point. The steps necessary to isolate equipment are often documented in an isolation procedure or a lockout tagout procedure. The isolation procedure generally includes the following tasks: Announce shut off (warn affected employees), identify the energy source(s), isolate the energy source(s), lock and tag the energy source(s), prove that the equipment isolation is effective or it has reached a zero energy state.

Each activity shall establish, document, and implement a lockout/tagout program. The lockout/tagout program shall specify lockout/tagout procedures to safeguard workers from exposure to hazardous energy and the accidental release of these energy sources.

Standards and Procedures

There are several high-level directives that must be followed which we will briefly discuss. Bottom line is that you will follow the local instructions, standard operating procedures (SOP), and original equipment manufacturer (OEM) manuals provided by your activity, etc.

The OSHA standard for the Control of Hazardous Energy (lockout/tagout) is found in 29 CFR 1910.147. This standard addresses practices and procedures necessary to disable machinery and prevent the release of potentially hazardous energy while maintenance or servicing activities are performed.

Other OSHA standards that contain energy control provisions are 29 CFR 1910.331, .332, and .333. In addition, some standards relating to specific types of machinery that contain de-energization requirements include 29 CFR 1910.179 (l) (2) (i) (c) which requires the switches to be "open and locked



in the open position" before performing preventive maintenance on overhead and gantry cranes. The provisions of Part 1910.147 apply in conjunction with these machine-specific standards to assure that employees are adequately protected against hazardous energy.

NFPA 70E addresses electrical safety work practices and is widely considered as the standard for Electrical Safety in the Workplace. This standard focuses on practical safeguards that also allow workers to be productive within their job functions. NFPA 70E Article 130.2(3) provides the work practices on systems or equipment with less than 50 volts.

The Department of the Navy issued OPNAVINST 5100.23, which includes Prevention and Control of Workplace Hazards, Energy Control Program (LOTO), and Weight Handling Equipment.

Summary

Use caution when working on or near systems or components that may contain hazardous energy. Your activity provides the training necessary for employees to perform the work they are assigned. Always check with your supervisor to ensure you have the proper training, qualifications, and tools to perform that work as well as any required safety checks and procedures.


Local safety policies, OEM manuals, SOPs, work documents, etc., developed by or for your activity will most likely have all the higher-level OSHA, Navy, and industry requirements built-in. Your local instructions and work documents should provide all the necessary rules, regulations, definitions, and restrictions that you need to know for the work you perform. Your safety office, supervisor, engineering, or inspection and QA offices should have these documents and references available.

Knowledge Check

- 1. Select the best answer. True or False:** Failure to control the hazardous energy can lead to machine related failures or fatalities.
A. True
B. False

Summary

- Use caution when working near systems or components with Hazardous Energy.
- Activity provides training.
- Check with supervisor on training and qualifications.
- Check with supervisor on required safety procedures.
- OSHA, Navy, and industry requirements should be built into all local policies, manuals, SOPs, and work documents.
- Local instructions and work documents should provide all the necessary rules, regulations, definitions, and restrictions.
- Safety office, supervisor, engineering, or inspection and QA offices should have documents and references available.



2. **Select all that apply.** Job work hazards include which of the following?
 - A. Electricity
 - B. Kinetic
 - C. Pneumatic
 - D. Spring Tension

3. **Select all that apply.** What are the attributes of a qualified person?
 - A. activity will identify who is qualified
 - B. demonstrated skills and knowledge of equipment
 - C. familiar with hazards involved
 - D. received training

4. **Select the best answer. True or False:** An unqualified person is one who has been trained and possesses knowledge, skills, and abilities of the work that is being performed.
 - A. True
 - B. False

5. **Select all that apply.** Lockout/tagout is a safety process used to secure potentially hazardous energy sources—
 - A. and is performed by authorized personnel.
 - B. and when locks and tags are removed, the system may be returned to normal operation.
 - C. by isolating, locking, and tagging in the proper position
 - D. by preventing the uncontrolled release of energy prior to beginning work.

6. **Select the best answer. True or False:** No activity shall establish, document, and implement a lockout/tagout (LOTO) program.
 - A. True
 - B. False

7. **Select the best answer. True or False:** Lockout/tagout (LOTO) programs shall specify LOTO procedures to safeguard workers from exposure to hazardous energy and the accidental release of these energy sources.
 - A. True
 - B. False

NAVFAC P-307 INSPECTIONS 1

Welcome

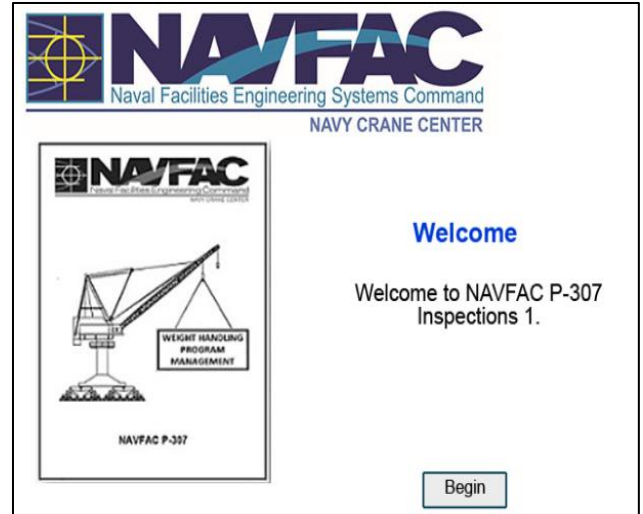
Welcome to NAVFAC P-307 Inspections 1.

Instructional Objectives

Upon successful completion of this module, you will be able to state the requirements for performing crane maintenance inspections, state the requirements for documenting crane deficiencies, and list the documents required for the Crane History File.

Inspections

NAVFAC P-307 covers inspection requirements in Sections 3 and 4, record retention requirements in Section 5, and provides inspection attributes, criteria, and sample forms in Appendices C and D. Inspections are performed at frequencies required by NAVFAC P-307. Examination shall be by sight, sound, touch, and as necessary instrumentation nondestructive testing and disassembly.



Instructional Objectives

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

- state the requirements for performing crane maintenance inspections
- state the requirements for documentation of crane deficiencies
- list the documents required for the Crane History File

Inspection Requirements

- Perform at frequencies required by NAVFAC P-307
- Done by sight, sound, touch
- Sometimes instrumentation
- Non-destructive testing and disassembly

Inspection Safety

Primary emphasis during inspections shall be given to ensure maximum safety by maintaining all load bearing and load controlling parts and operational safety devices in a safe and sound working condition.

Inspectors shall not engage in calculated risks or depend on their judgment alone where there is a doubt in their mind regarding a questionable condition.

Questionable conditions of load bearing and load controlling parts and operational safety devices shall be referred immediately to the activity engineering organization and, if necessary, to the certifying official for resolution.

Contact the Navy Crane Center for engineering assistance if necessary.

Specification Record Forms

Maintenance Inspection Specification and Record (MISR) forms are identified in NAVFAC P-307 Appendices C and D. These prescribe the type of inspection (A, B, C, or Annual), the components and parts to be inspected, and the inspection action.

The extent of disassembly shall be as noted. Each activity shall develop Maintenance Inspection Specification and Record (MISR) forms in accordance with the sample formats shown in Appendices C and D.

For unique items not covered, additional inspection attributes shall be included.

Inspection Specification forms for Category 4 cranes shall be developed by the activity based on applicable portions of Appendix C and as recommended by the OEM.

Inspection Safety

- Primary emphasis should be on safety
- Inspectors should not take calculated risks
- Refer questionable conditions to higher authority

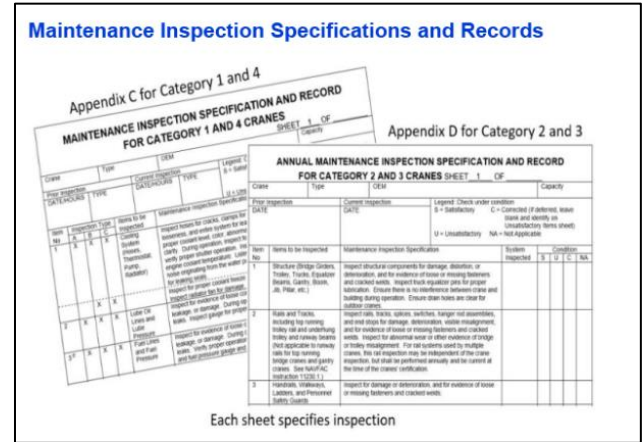


Specification Record Forms

- Sample forms included in Appendices C and D
- Each activity develops their own forms
- Additional attributes must be included for unique items

Maintenance Inspection and Specification Record (MISR)

Here is an example of a Maintenance Inspection and Specification Record or MISR. The MISR pictured here is found in Appendix C and contains the inspection criteria and documentation requirements for category 1 and 4 cranes. Appendix D contains the A-MISR used for category 2 and category 3 cranes. As you can see, each item identifies the component, system, inspection type, inspection requirements, and inspection results.



Specification Data Sheets

Each activity shall augment the specifications noted above with specification data sheets.

These shall contain all guidance and technical information needed by inspectors in checking for wear, adjustments, settings, and tolerances during inspections.

This information shall be extracted from OEM's technical manuals and other authoritative technical sources. Measurement locations for verifying settings shall be clearly identified.

Specification Data Sheets

- Should contain data needed for making inspections and checking for:
 - wear
 - adjustments
 - settings
 - tolerances
- Measurement locations should be clearly identified.

Brake Data Sheet

Here is an example from NAVFAC P-307 of a brake specification data sheet.

It contains all the pertinent data necessary for a thorough inspection of the brake. It includes information such as torque spring length, armature air gap, and lining thickness.

Notice that there are enough spaces on the form for nine different brakes. If your crane has more than this, you would use two forms.

Inspections & Corrective Actions

Inspection conditions and corrective actions must be documented.

MISR forms shall be used to record conditions at each inspection. These shall be filed in the equipment history file.

All inspection conditions shall be recorded as satisfactory, unsatisfactory, or not applicable.

Where measurements are specified or required for acceptance, the actual readings shall be recorded.

Brake Data Sheets

Data Sheets contain:

- Spring length
- Air gap
- Lining thickness

The form is titled 'MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 2 AND 3 CRANES BRAKE DATA'. It includes a section for 'CRANE' and a 'NOTE TO INSPECTOR' at the top. The main table is organized into columns for 'BRAKE' and 'TYPE', with sub-columns for 'TORQUE SETTINGS' and 'FLANGE STROKE'. Each of these sub-columns has further columns for 'MIN', 'MAX', 'ACTUAL', and 'N/A'. The table has 9 rows for recording data for different brakes.

Inspections and Corrective Actions

- Use Maintenance Inspection Specification and Record Forms
- Filed in Equipment History Jackets
- All conditions marked "Sat., Unsat., or N/A"
- Record measurements taken

Deficiency Reports

Deficiencies and corrective actions to load bearing and load controlling parts and operational safety devices shall be documented. Deficiency reports must be filed in the equipment history file.

Shown is a sample of the form used to report deficiencies to the Navy Crane Center.

Deficiencies include failure or malfunction of equipment, improper engineering, inspection, or maintenance procedures, and major or unsafe discrepancies between design drawings and equipment configuration. This does not include normal wear on the equipment.

In those instances where deficiencies are detected that have applicability at other Navy activities, the Navy Crane Center shall be notified within five days of the discovery. A summary report of the deficiency, including corrective actions taken or recommended, shall be forwarded to the Navy Crane Center within 21 days.


Unsatisfactory Conditions

Where an unsatisfactory condition is found, the item shall be identified on the "Unsatisfactory Items" sheet together with a statement of the condition observed.

Corrective action in terms of adjustments, repairs, or replacements of items shall be detailed on a shop repair order or other appropriate document and be identified on the "Unsatisfactory Items" sheet together with a statement of the condition observed.

Deficiency Reports


- Must be filed in Equipment History File
- Must be filed with the Navy Crane Center if it affects other cranes



The image shows a 'WEIGHT HANDLING EQUIPMENT DEFICIENCY REPORT' form. The form includes fields for 'ACTIVITY' and 'DEFICIENCY REPORT NUMBER', and checkboxes for 'PROPERTY OF' and 'SPECIFIED BY'. It also contains sections for 'MODELS/SERIAL NUMBER', 'CAPACITY/TONNAGE', 'TYPE OF ACCIDENT', and 'TYPE OF REPORT GENERATED DUE TO'. There are several checkboxes for categories like 'MULTIFUNCTIONALITY OF LOAD BEARING/EASE CONTROLS PARTS/OPERATIONAL', 'SAFETY CONTROLS/EASE PARTS', and 'UNDESIRABLE DESIGN FACTORS'. A 'DESCRIPTION OF DEFICIENCY' section is provided, along with fields for 'PROBABLE CAUSE' and 'CORRECTIVE ACTION TAKEN/RECOMMENDATION'. At the bottom, there are checkboxes for 'FOR NAVY CRANE CENTER USE' and a 'NUMBER 3 EXPLANATION OF BOX CHECKED ABOVE' field.

Unsatisfactory Conditions

- List unsatisfactory items along with SRO number for corrective actions
- Give a statement of the condition observed



The image shows a 'MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES UNSATISFACTORY ITEMS' form. The form has a header with the title and a date field. Below the header is a large table with columns for 'Inspection Item', 'Inspection Date', 'Inspection Status', 'SRO Number', and 'Remarks'. At the bottom of the form, there are several checkboxes for 'Inspected by', 'Inspected by Date', and 'Inspected by Title'.

Replacement Parts

Replacement parts are a concern when doing crane repairs. Replacement load bearing and load controlling parts and safety devices shall be identical to those of the original design.

Where circumstances require substitution of either material or design configuration, such matters shall be approved by the activity engineering organization, or Navy Crane Center.

Replacement Parts

- Shall be identical to those of the original design
- Substitutions shall be approved by the activity engineering

Reinspection

Reinspection is sometimes required for work done. Where adjustment, repair, or replacement has been performed satisfactorily and the original unsatisfactory condition eliminated, the inspector shall sign the repair document to verify actions taken have corrected the reported deficiency.

Reinspection shall include an operational test where necessary.

Reinspection

- Inspector must verify and sign for completed repairs
- Operational test may be necessary



Deferral of Work

Deferral of Maintenance Inspections, Lubrication, or Servicing/Maintenance may exist under the following conditions: When an emergent or other contingent condition precluding the timely completion of a MISR/maintenance item, the certifying official may authorize the deferral. Technical justification shall be provided. Each deferral and justification shall be in writing and shall be filed in the equipment history file. If the crane certification is extended per Paragraph 4.5.1, a written deferral of the maintenance inspection/lubrication and servicing schedules is not required. The deferral shall be completed as soon as the emergent or contingent condition is resolved.

Deferral of Work

- Major deficiencies must be corrected before certification.
- Deferrals must be:
 - approved by Certifying Official
 - justified by engineering
- Deferred work must be completed by next annual certification.

Equipment History File

Each activity shall establish and maintain an individual equipment history file on each crane. The equipment history file, or history jacket as it's commonly called, shall contain the documentation discussed in NAVFAC P-307, Section 5.

The files shall be made available to government oversight agencies (e.g., OSHA, Navy Crane Center) upon request. The equipment history file shall contain the documentation which we will discuss next.

Maintenance Inspections

The minimum record retention requirements for Type A Inspection documentation is to keep the latest inspection document plus the previous two inspection documents (if on a calendar basis) or the latest plus the previous two years (if on an engine hour operating basis).

For Type B and C Inspections, the latest inspection document plus one previous inspection document will be retained.

For Annual Inspections, the latest inspection plus previous Load Test year.

Operator's Daily Checklist

The Operator's Daily Checklist or ODCL shall be kept on file as follows: current month plus previous month, current month plus two previous months for cranes used in construction, and current month plus five previous months for 3rd party certified cranes.

Equipment History File

- Each crane must have its own file
- Accurate and auditable
- NAVFAC P-307, Section 5 requirements

Maintenance Inspections

Types	Minimum Retention Requirement
"A" Inspection	Latest plus previous 2
"B" Inspection	Latest plus previous 2
"C" Inspection	Latest plus previous 2
Annual Inspection	Latest plus previous load test year

Operator's Daily Checklist (ODCL)

- Current month plus previous month

CRANE OPERATOR'S DAILY CHECKLIST											
OPERATIONS	INSPECTION	FUNCTION	DEFECTS/REPAIRS	DATE			OPERATOR'S SIGNATURE	INSPECTOR'S SIGNATURE	DATE	INSPECTOR'S SIGNATURE	DATE
				YEAR	MONTH	DAY					
<p>PRELIMINARY CHECKS</p> <p>1. GENERAL CRANE CONDITION</p> <p>2. CRANE SERIAL NUMBER</p> <p>3. CRANE MAKE AND MODEL</p> <p>4. CRANE WEIGHT AND CAPACITY</p> <p>5. CRANE SERIAL NUMBER</p> <p>6. CRANE MAKE AND MODEL</p> <p>7. CRANE WEIGHT AND CAPACITY</p> <p>8. CRANE SERIAL NUMBER</p> <p>9. CRANE MAKE AND MODEL</p> <p>10. CRANE WEIGHT AND CAPACITY</p> <p>11. CRANE SERIAL NUMBER</p> <p>12. CRANE MAKE AND MODEL</p> <p>13. CRANE WEIGHT AND CAPACITY</p> <p>14. CRANE SERIAL NUMBER</p> <p>15. CRANE MAKE AND MODEL</p> <p>16. CRANE WEIGHT AND CAPACITY</p> <p>17. CRANE SERIAL NUMBER</p> <p>18. CRANE MAKE AND MODEL</p> <p>19. CRANE WEIGHT AND CAPACITY</p> <p>20. CRANE SERIAL NUMBER</p> <p>21. CRANE MAKE AND MODEL</p> <p>22. CRANE WEIGHT AND CAPACITY</p> <p>23. CRANE SERIAL NUMBER</p> <p>24. CRANE MAKE AND MODEL</p> <p>25. CRANE WEIGHT AND CAPACITY</p> <p>26. CRANE SERIAL NUMBER</p> <p>27. CRANE MAKE AND MODEL</p> <p>28. CRANE WEIGHT AND CAPACITY</p> <p>29. CRANE SERIAL NUMBER</p> <p>30. CRANE MAKE AND MODEL</p> <p>31. CRANE WEIGHT AND CAPACITY</p> <p>32. CRANE SERIAL NUMBER</p> <p>33. CRANE MAKE AND MODEL</p> <p>34. CRANE WEIGHT AND CAPACITY</p> <p>35. CRANE SERIAL NUMBER</p> <p>36. CRANE MAKE AND MODEL</p> <p>37. CRANE WEIGHT AND CAPACITY</p> <p>38. CRANE SERIAL NUMBER</p> <p>39. CRANE MAKE AND MODEL</p> <p>40. CRANE WEIGHT AND CAPACITY</p> <p>41. CRANE SERIAL NUMBER</p> <p>42. CRANE MAKE AND MODEL</p> <p>43. CRANE WEIGHT AND CAPACITY</p> <p>44. CRANE SERIAL NUMBER</p> <p>45. CRANE MAKE AND MODEL</p> <p>46. CRANE WEIGHT AND CAPACITY</p> <p>47. CRANE SERIAL NUMBER</p> <p>48. CRANE MAKE AND MODEL</p> <p>49. CRANE WEIGHT AND CAPACITY</p> <p>50. CRANE SERIAL NUMBER</p> <p>51. CRANE MAKE AND MODEL</p> <p>52. CRANE WEIGHT AND CAPACITY</p> <p>53. CRANE SERIAL NUMBER</p> <p>54. CRANE MAKE AND MODEL</p> <p>55. CRANE WEIGHT AND CAPACITY</p> <p>56. CRANE SERIAL NUMBER</p> <p>57. CRANE MAKE AND MODEL</p> <p>58. CRANE WEIGHT AND CAPACITY</p> <p>59. CRANE SERIAL NUMBER</p> <p>60. CRANE MAKE AND MODEL</p> <p>61. CRANE WEIGHT AND CAPACITY</p> <p>62. CRANE SERIAL NUMBER</p> <p>63. CRANE MAKE AND MODEL</p> <p>64. CRANE WEIGHT AND CAPACITY</p> <p>65. CRANE SERIAL NUMBER</p> <p>66. CRANE MAKE AND MODEL</p> <p>67. CRANE WEIGHT AND CAPACITY</p> <p>68. CRANE SERIAL NUMBER</p> <p>69. CRANE MAKE AND MODEL</p> <p>70. CRANE WEIGHT AND CAPACITY</p> <p>71. CRANE SERIAL NUMBER</p> <p>72. CRANE MAKE AND MODEL</p> <p>73. CRANE WEIGHT AND CAPACITY</p> <p>74. CRANE SERIAL NUMBER</p> <p>75. CRANE MAKE AND MODEL</p> <p>76. CRANE WEIGHT AND CAPACITY</p> <p>77. CRANE SERIAL NUMBER</p> <p>78. CRANE MAKE AND MODEL</p> <p>79. CRANE WEIGHT AND CAPACITY</p> <p>80. CRANE SERIAL NUMBER</p> <p>81. CRANE MAKE AND MODEL</p> <p>82. CRANE WEIGHT AND CAPACITY</p> <p>83. CRANE SERIAL NUMBER</p> <p>84. CRANE MAKE AND MODEL</p> <p>85. CRANE WEIGHT AND CAPACITY</p> <p>86. CRANE SERIAL NUMBER</p> <p>87. CRANE MAKE AND MODEL</p> <p>88. CRANE WEIGHT AND CAPACITY</p> <p>89. CRANE SERIAL NUMBER</p> <p>90. CRANE MAKE AND MODEL</p> <p>91. CRANE WEIGHT AND CAPACITY</p> <p>92. CRANE SERIAL NUMBER</p> <p>93. CRANE MAKE AND MODEL</p> <p>94. CRANE WEIGHT AND CAPACITY</p> <p>95. CRANE SERIAL NUMBER</p> <p>96. CRANE MAKE AND MODEL</p> <p>97. CRANE WEIGHT AND CAPACITY</p> <p>98. CRANE SERIAL NUMBER</p> <p>99. CRANE MAKE AND MODEL</p> <p>100. CRANE WEIGHT AND CAPACITY</p>											

Shop Repair Orders

Shop Repair Orders (SRO) or other repair documents must be included. SRO's for repairs to load bearing/load controlling parts and operational safety devices must be included and kept in the record for seven years.

Repairs to all other components must be left in the record for one year.

Shop Repair Orders (SROs)

Seven Years

- Load Bearing, Load Controlling Parts and Operational Safety Devices

One Year

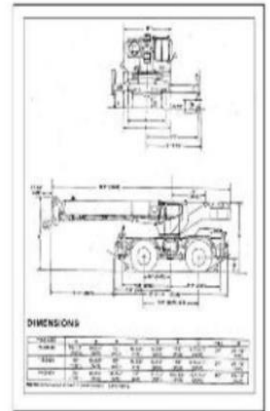
- All others

Work Documents Invoking Crane Alterations

All crane alteration documentation, including approval, installation, and certification paperwork, whether approved by the local activity or by Navy Crane Center, shall be kept in the equipment history file for the life of the crane.

Crane Alteration Documentation

- Kept for the life of the crane
- Includes local and/or Navy Crane Center approvals



Nondestructive Test

The latest Non-Destructive Test Reports for any component must be included.

Nondestructive Test

- Latest (for any component)

Crane Condition Inspection Record

Crane Condition Inspection Record requirements are the current (including interim's) plus the previous load test year.

Crane Condition Inspection Record

- Current (including interim's) plus previous load test year

CRANE CONDITION INSPECTION RECORD											
Crane No.	Type	Location	Operator's Name	Inspector's License No.							
Purpose of Inspection		Inspected By	Date Inspected	Date Completed	Test Description						
Item No.	Description	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail	Pass	Fail
1	Inspect structural components for damage or deteriorated members, including condition of flanges and rivets, bolting and electrical cables. Inspect wire rope for wear, broken wires, corrosion, kinks, damage, fraying, condition of sheaves, condition of cables, steel and connections, and for proper lubrication.										
2	Inspect hook and attachment of all cables and cables support. Inspect cables for condition, wear, or size adjustment and proper operation from each sheave. Inspect cables and sheaves for condition, wear, proper adjustment and proper operation.										
3	Inspect control and control connections for condition and proper operation. For cranes that utilize secondary or tertiary controls, all controls shall be operable and ready for use. For cranes that utilize primary controls, the condition of the controls shall be inspected. Inspect in Remarks block other controls that are not specifically mentioned in the code requirements.										
4	Inspect limit switches for condition and proper operation. Inspect crane limit switch interlocks when a limit is reached for function and accuracy using the rated capacity load. Inspect the condition of the limit switch mechanism. Inspect the condition of the limit switch mechanism. Inspect the condition of the limit switch mechanism. Inspect the condition of the limit switch mechanism.										
5	Inspect electrical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect electrical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect electrical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect electrical equipment (cables, switches, fuses, etc.) for condition and proper operation.										
6	Inspect mechanical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect mechanical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect mechanical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect mechanical equipment (cables, switches, fuses, etc.) for condition and proper operation.										
7	Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation.										
8	Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation.										
9	Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation.										
10	Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation.										

Certification of Load Test

The Certification of Load Test for each crane must appear in the history file. Include the current with any interim's and extensions, plus one previous load test certification.

Certification of Load Test

- Current (including interim's and extensions)
- Plus previous load test certification

CERTIFICATION OF LOAD TEST AND CONDITION INSPECTION											
Crane No.	Type	Location	Operator's Name	Inspector's License No.							
Purpose of Inspection		Inspected By	Date Inspected	Date Completed	Test Description						
1	Inspect structural components for damage or deteriorated members, including condition of flanges and rivets, bolting and electrical cables. Inspect wire rope for wear, broken wires, corrosion, kinks, damage, fraying, condition of sheaves, condition of cables, steel and connections, and for proper lubrication.										
2	Inspect hook and attachment of all cables and cables support. Inspect cables for condition, wear, or size adjustment and proper operation from each sheave. Inspect cables and sheaves for condition, wear, proper adjustment and proper operation.										
3	Inspect control and control connections for condition and proper operation. For cranes that utilize secondary or tertiary controls, all controls shall be operable and ready for use. For cranes that utilize primary controls, the condition of the controls shall be inspected. Inspect in Remarks block other controls that are not specifically mentioned in the code requirements.										
4	Inspect limit switches for condition and proper operation. Inspect crane limit switch interlocks when a limit is reached for function and accuracy using the rated capacity load. Inspect the condition of the limit switch mechanism. Inspect the condition of the limit switch mechanism. Inspect the condition of the limit switch mechanism. Inspect the condition of the limit switch mechanism.										
5	Inspect electrical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect electrical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect electrical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect electrical equipment (cables, switches, fuses, etc.) for condition and proper operation.										
6	Inspect mechanical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect mechanical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect mechanical equipment (cables, switches, fuses, etc.) for condition and proper operation. Inspect mechanical equipment (cables, switches, fuses, etc.) for condition and proper operation.										
7	Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation.										
8	Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation.										
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10	Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation. Inspect crane and control connections for condition and proper operation.										

Third Party Certifications

For cranes which require Third Party Certifications, the current plus one previous certification must be included.

Third Party Certifications

- Keep current certification plus one previous Certification

NAVFAC Naval Facilities Engineering Command											
Certificate of Load Test and/or Examination of Crane, Derris, or Other Material Handling Device											
This certificate is to be used to certify the condition of a crane, derrick, or other material handling device. It is not to be used to certify the condition of a crane, derrick, or other material handling device. It is not to be used to certify the condition of a crane, derrick, or other material handling device. It is not to be used to certify the condition of a crane, derrick, or other material handling device.											
1	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on
2	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on
3	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on
4	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on
5	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on
6	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on
7	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on
8	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on
9	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on
10	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on	Inspected at	Inspected by	Inspected on

Wire Rope Records

For new cranes and for replacement wire rope on existing cranes, the history jacket must include the latest Wire Rope Breaking Strength Certification Record. This is the rope manufacturer's certification that the rope meets the published breaking strength, or the actual breaking strength of a sample taken from the reel and tested. For cranes used in cargo transfer operations, certification of actual breaking strength is required.

Crane Alterations

All crane alterations, whether approved by the local activity or by Navy Crane Center, shall be kept in the equipment history file for the life of the crane.

Deficiency Reports

Deficiency reports for load bearing or load controlling parts or operational safety devices must be maintained for seven years.

Wire Rope Records

- History jacket must include latest Wire Rope Breaking Strength Certification Record
- Cranes used in cargo transfer:
 - Certification of breaking strength required

Crane Alterations

- Keep for the life of the crane
- Includes local and/or Navy Crane Center approvals


Deficiency Reports

- Kept for 7 years

Purchase Contracts

Any purchase contracts for the crane shall be retained in the history file for the life of the crane.

Purchase Contracts




- Kept for the life of the crane

Accident Reports

Crane Accident Reports are kept in the history file for the life of the crane.

Accident Reports




- Kept for the life of the crane

Hook Base Measurement

Hook Base Measurement must be included in the history file and is kept for the life of the hook. Hooks must be marked and measured before installation to provide the base measurement. When measured as part of the annual certification, the new measurement is compared to the base measurement on record.

Hook Base Measurement

- Kept for the life of the hook



Lifts Exceeding Capacity

Records of any operational lifts made which exceed the rated crane capacity must be kept in the Equipment History File for the life of the crane.

The crane must not be overloaded without Navy Crane Center approval. Requests must verify that there are no other safer means available (including leased equipment) to make the lift.

Specification Data Sheets

Specification Data Sheets must be kept for the life of the crane. This will allow brake readings and other measurements to be compared with the original specifications.

Crane Acceptance Test

The records of the original Crane Acceptance Test shall be maintained for the life of the crane.

Lifts Exceeding Capacity

- Operational lifts which exceed the rated crane capacity:
 - records kept for the life of the crane



Specification Data Sheets

- Kept for the life of the crane

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES BRAKE DATA												
CRANE:												
SPECIFICATION												
TYPE	HYDRAULIC SYSTEM				ELECTRIC SYSTEM				MECHANICAL			
	MIN.	MAX.	TEST	READ	MIN.	MAX.	TEST	READ	MIN.	MAX.	TEST	

Crane Acceptance Test

- Kept for the life of the crane



Ancillary Equipment Procedures

The manufacturer’s instructions for the operation of ancillary equipment, (for example how to correctly set up a fly away jib) should be kept with the Equipment History File for the life of the crane. Completed procedures when used must be kept for seven years.

Ancillary Equipment Procedures

- Kept for the life of the crane
- Completed procedures when used must be kept for seven years



Crane Roller Clearance Data Standard of Acceptance

The “crane roller clearance data standard of acceptance” for balance deck design cranes shall be kept in the equipment history jacket for the life of the crane.

Crane Roller Clearance Data Standard of Acceptance

- Kept for the life of the crane
- For balance deck design cranes

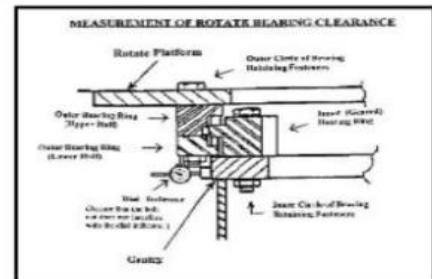


Slewing Bearing Clearances

The bearing clearance readings for the slewing bearings shall be maintained for the life of the bearing.

Slewing Bearing Clearances

- Kept for the life of the bearing



Oil or Vibration Analysis Data

Results of oil or vibration analysis shall be kept for the life of the component.

When tests like these are done, the first set of test data becomes the baseline to which subsequent test data are compared to determine if detrimental wear is taking place. **Note:** The same equipment or process should be used each time to be sure that results will be valid. An alternative to these tests is an inspection report of the internal gears of the component, which will involve disassembly.

Floating Crane History File

The equipment history file for floating cranes must include: the latest Material Inspection per OPNAVINST 4780.6, plus the previous year, and shall include any waivers of depot availability.

The crane portion of a floating crane is handled like any other crane, but the barge is a naval vessel and there are special requirements for dry-docking, hull fitness inspections, void inspections, and so forth.

Coupling Alignment Data

The equipment history file must also include coupling alignment data. The latest alignment data must be on file.

Oil or Vibration Analysis Data

- Kept for the life of the component



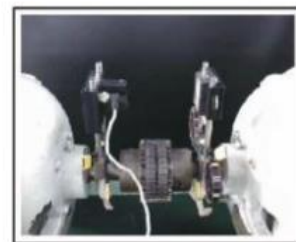
Material Inspection Report for Floating Cranes

- Reference OPNAVINST 4780.6
- Latest plus previous year
- Waivers of depot availability



Coupling Alignment Data

- Latest alignment data kept on file



Summary and Review

This module covered requirements for performing crane maintenance inspections, requirements for documenting crane deficiencies, and the records required for the Crane History File.

Summary and Review

This module covered:

- Requirements for crane maintenance inspections
- Requirements for documenting deficiencies
- Records required for the Equipment History File

Knowledge Check

- 1. Select the best answer.** Where in NAVFAC P-307 would you find the electrical inspection requirements for a bridge crane installed at a Navy Shore Activity?
 - A. Appendix B
 - B. Appendix C
 - C. Appendix D
 - D. Appendix E
- 2. Select the best answer.** NAVFAC P-307 specifies which of the following for crane inspections?
 - A. frequency of inspections
 - B. required documentation
 - C. types of inspections
 - D. all the above
- 3. Select the best answer.** What determines the minimum items to be inspected during the crane inspection?
 - A. past inspections and problem areas
 - B. the Maintenance Inspection Specification Record (MISR)
 - C. written guidance from the certifying official
 - D. your own good judgement and experience
- 4. Select the best answer.** Which document augments maintenance inspection forms with additional technical data and specifications?
 - A. data entry forms
 - B. Naval Technical Review pages
 - C. specification data sheets
 - D. technical foot notes

5. **Select the best answer.** Which of the following will **not** be found in the equipment history file?
- A. Crane Operator's Daily Checklist
 - B. Crane Operator's Log Sheet
 - C. Maintenance Inspection Specification and Record
 - D. Shop Repair Orders
6. **Select the best answer.** Which of the following will **not** be found in the equipment history file?
- A. Certification of Load Test
 - B. Crane Condition Inspection Record
 - C. Crane Location Record
 - D. Non-Destructive Test Reports
7. **Select the best answer.** Which of the following will **not** be found in the equipment history file?
- A. crane alterations
 - B. deficiency reports
 - C. list of applicable drawings
 - D. purchase contracts

NAVFAC P-307 INSPECTIONS 2

Welcome

Welcome to NAVFAC P-307 Inspections 2.

Instructional Objectives



Upon successful completion of this module, you will be able to state NAVFAC P-307 requirements for the certification of cranes, identify the conditions which void the certification of a crane, and list the procedures for Crane Condition Inspection Reports or CCIR.

Crane Certification Program

Navy shore activities that possess Weight Handling Equipment shall have a Weight Handling Certification Program.

The commanding officer is responsible for ensuring safety within the activity. The commanding officer shall designate the Weight Handling certifying official(s) who shall ensure the activity's Weight Handling Equipment is inspected, tested, and certified in accordance with NAVFAC P-307. Certifications shall be based on the condition inspection and load test as prescribed.

These inspections and tests shall be performed by technically competent inspection and test personnel under the direction of a designated test director.

Welcome

Welcome to NAVFAC P-307 Inspections 2.

Begin

Instructional Objectives

- Upon successful completion of this module, you will be able to:
- State NAVFAC P-307 requirements for the certification of cranes
 - Identify the conditions which void the certification of a crane
 - List the procedures for Crane Condition Inspection Reports (CCIR)

Crane Certification Program

- Commanding Officer has overall responsibility and appoints the Certifying Official
- Certifications of cranes are based on inspections and load tests
- Certifications are signed by the inspectors, test director, and Certifying Official

Upon successful completion of the condition inspection and load test, a Certification of Load Test and Condition Inspection shall be signed by the test director, inspection personnel, and the certifying official.

Inspections and Test

The purpose of the condition inspection is to ensure that the overall structural, mechanical, and electrical components of the equipment have been maintained in a safe and serviceable condition and are functioning properly.

The purpose of the load test is to ensure by controlled operation with prescribed test loads that the equipment is capable of safely lifting and moving the rated load through all design motions.

Inspections and Test

- Inspection ensures that equipment is maintained in a safe, serviceable condition and functioning properly.
- Test ensures that the crane is capable of safely lifting and moving the rated load.

Annual Certification

The certification (for all crane categories) is valid for one year from the date of signature of the certifying official. A crane shall not be used in service without a valid certification.

Except as noted, the certification process shall include a load test. Category two and three cranes shall be inspected, operationally tested (without load), and certified annually, however, a load test shall be performed at every fourth annual certification, as a minimum. The certification shall indicate when a crane is in the quadrennial load test program. If an activity performs load testing at a periodicity other than annually or quadrennial, the test periodicity shall be noted on the certification form.

For floating cranes (including mobile cranes mounted on barges), as a condition for certification, the barge shall be determined fit for further service as evidenced by a current material inspection report and documentation of a current regular overhaul (ROH), or an approved deviation of ROH, as required by OPNAVINST 4780.6.

Annual Certification

- The certification is valid for one year from the date of signature by the Certifying Official.
 - Floating cranes must have a barge inspection
-
-
-
-
-
-
-
-

Interim Recertification

Interim certification is done based on the following: Recertification is required when the adjustment, repair, disassembly, alteration, or replacement of a load bearing part, load controlling part, or operational safety device on a crane must be a load tested to verify work performed.

To determine if a load test is required, the component's impact on holding strength shall be assessed. If holding strength could be affected by the work performed (i.e., failure to make the proper adjustment, repair, etc., could result in dropping, uncontrolled shifting, or uncontrolled movement of the load), then a selective inspection, load test, and recertification shall be performed. This includes rotate and travel components when the rotate or travel function may operate on an inclined plane such as the rotate function on floating and barge mounted cranes and a trolley on a luffing boom.

The extent of inspection and testing may be limited, where practical, to those parts and components of systems affected, but shall fully ensure that the adjustment, repair, disassembly, replacement, or alteration has been performed correctly and that the crane operates properly.

Recertification Not Required

Recertification is not required when the adjustment, repair, etc., of a load bearing part, load controlling part, or operational safety device does not require a load test for verification of satisfactory work but does require an operational test.

This includes work performed on rotate and travel brakes, friction clutches, and travel components, where the load travels in a horizontal plane. Work documents for all such work shall be approved by a designated inspector or the activity's engineering organization prior to starting the work. Work documents shall include a requirement for an operational test. All completed work shall be inspected and the operational test witnessed by a designated inspector.

These requirements do not apply to routine maintenance, servicing, or adjustments on diesel

Interim Recertification

- Required when crane must be load tested to verify work
- Inspection and test may be limited to parts affected

Recertification Not Required

- Not required when the crane requires only an operational test
- Not required when only routine maintenance is performed
- Chief Engineer of Certifying Official must sign paperwork

Note: Interim Recertification Requirements can be found in section 4.4.2 - 4.4.3 of the NAVFAC P-307. The inspection and operational test requirements of section 3 apply to these actions.

engines or generators recommended by the OEM. However, the reinspection requirements of NAVFAC P-307, Section 3 apply.

After all work is completed, prior to returning the crane to service, the work document shall be signed by the chief engineer or the certifying official.

Note: Interim Recertification Requirements can be found in section 4.4.2 - 4.4.3 of the NAVFAC P-307. The inspection and operational test requirements of Section 3 apply to these actions.

Voiding of Certifications

Here are the conditions which will void the certification of the crane. All certifications are automatically void after one year; after exceeding the certified capacity during operation; or after an adjustment, repair, disassembly, replacement, or alteration of a load bearing or load controlling part, or operational safety device which requires a load test for verification of satisfactory work.

Voiding of Certifications

- Void automatically after 1 year
- After exceeding the certified capacity during operation
- Upon discovery of a major deficiency
- After an adjustment, repair, disassembly, replacement, or alteration of a load bearing part, load controlling part, or operational safety device which requires a load test for verification

Exceptions

There are several exceptions to the rule about voiding crane certifications.

The following exceptions apply under very specific conditions. Consult NAVFAC P-307 Section 4 for the full text.

Some exceptions to this policy include: A deficiency, adjustment, alteration, etc., to one function will not necessarily void the entire crane certification, for example, when a function is tagged out and prevented from operating. Exceeding the certified capacity in a load test of a sample crane during a Navy Crane Center Weight Handling Equipment (WHE) program evaluation or during a third-party certification. Extension of

Exceptions

- A deficiency, adjustment, alteration, etc., to one function
- Exceeding the certified capacity in a load test of a sample crane during an evaluation or third party certification
- Extension of certification for emergent conditions
- Controlled disassembly and reassembly of components for inspection
- Re-reeving and installation of ancillary equipment
- Exception for continuance for productive service
- Re-calibration of indicating devices

certification for emergent conditions. Controlled disassembly and reassembly of components for inspection (specific conditions apply). Re-reeving of mobile cranes and installation of ancillary equipment (specific conditions apply). Exception for continuance for productive service (i.e., recertifying the crane prior to the expiration of the current certification and while the crane is in productive service) (specific conditions apply).
Recalibration of indicating devices

Extension of Certification

When an emergent or other contingent condition exists, precluding the timely certification of a crane, the commanding officer of the activity using the crane, with concurrence by the certifying official, may approve in writing a temporary extension (not to exceed 60 calendar days) of the current annual certification.

Authority to extend a certification shall not be delegated. Before extending the certification, the crane shall pass a complete condition inspection including functional testing through all motions at normal operating speeds. Each authorization to extend a certification shall be filed in the crane's equipment history file.

Extension of Certification

- Emergent conditions
- Commanding Officer and the Certifying Official approval
- Not to exceed 60 days
- Authority shall not be delegated
- CCIR required
- Authorization must be filed in WHE history file

Crane Condition Inspections

The Crane Condition Inspection Report (CCIR) is another type of inspection the crane inspector must be familiar with. A condition inspection shall be performed before, during, and after the load test.

For cranes idle for a period greater than six months, a condition inspection shall be performed prior to placing the crane in service. A CCIR shall be used to record results of the inspection. The inspection shall, in general, be by sight, sound, and touch with the depth and detail limited to that necessary to verify the overall condition. It is not intended to be in the same detail as a maintenance inspection.

Each item on the CCIR shall be marked as either satisfactory or unsatisfactory. A description of unsatisfactory conditions shall be noted in the "Remarks" portion of the form.

The completed CCIR shall be included with the crane certification form submitted to the certifying official. See the next presentation for the exceptions to Category 2 and 3 cranes.

Exceptions for Category 2 and 3 Cranes

There are some exceptions to the CCIR requirements for certain types of category 3 cranes.

The requirement that a condition inspection shall be performed prior to placing the crane in service for cranes idle for a period greater than six months does not apply to category 3 jib cranes, pillar cranes, monorails, or fixed overhead hoists.

For category 2 and 3 cranes, if no major deficiencies are found in the maintenance inspection and if no work is done between the maintenance inspection and the load test, the maintenance inspection may serve as the "before" portion of the condition inspection.

Both inspection forms shall be fully completed.

Crane Condition Inspection Report (CCIR)

Exceptions for Category 3

- Exceptions for jib cranes, pillar cranes, monorails, and fixed overhead hoist
- Maintenance inspection and before load test CCIR can be the same inspection
- Complete both forms

Load Tests

The procedures for load testing are covered in a separate module, which will be presented for those who are or will be designated as test directors.

In general, load tests are conducted by a Load Test Director.

As an inspector, you will be required to sign the Certification of Load Test and Condition Inspection, verifying that you have conducted inspections of the crane.

Summary and Review

This module covered the NAVFAC P-307 requirements for the certification of cranes, the conditions which void the certification of a crane, and the procedures for crane condition inspection reports.

Load Test

- Conducted by a Test Director
- Inspector must sign for inspections conducted



Summary and Review

This module covered:

- the NAVFAC P-307 requirements for certification of cranes
- the conditions which void the certification of a crane
- the procedures for Crane Condition Inspection Reports

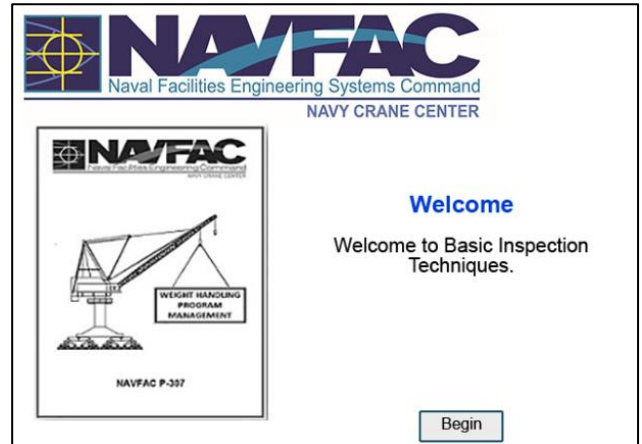
Knowledge Check

- 1. Select the best answer.** Which of the items listed below is **not** required to certify a crane?
 - A. CCIR
 - B. OEM acceptance criteria
 - C. signature of the certifying official
 - D. signature of the test director and inspection personnel
- 2. Select the best answer.** Which of the following events will void the certification of a crane?
 - A. exceeding the rated capacity
 - B. performing work on a LB/LC component which requires a load test
 - C. the passage of one year
 - D. all the above
- 3. Select the best answer.** Which of the statements below about crane condition inspection reports is false?
 - A. CCIR's are filled out anytime a crane has been idle for more than 6 months.
 - B. CCIR's are filled out before, during, and after a load test.
 - C. CCIR's are filled out daily by the operator.
 - D. CCIR's are not intended to be of the same depth as a maintenance inspection.
- 4. Select the best answer.** Recertification is required after—
 - A. routine maintenance and servicing of diesel engines
 - B. work performed on travel brakes
 - C. work that can be fully evaluated by an operational test
 - D. none of the above
- 5. Select the best answer.** What action will void a crane's certification.
 - A. controlled disassembly and reassembly of components
 - B. observing a minor deficiency
 - C. recalibration of electronic load/moment indicating devices
 - D. none of the above

BASIC INSPECTION TECHNIQUES

Welcome

Welcome to Basic Inspection Techniques.



Learning Objectives

At the end of this lesson, you will be able to identify areas of concern associated with electrical inspection and NAVFAC P-307 electrical inspection requirements.

Learning Objectives

- Upon successful completion of this module, you will be able to:
- identify areas of concern associated with electrical inspection
 - identify general NAVFAC P-307 electrical inspection requirements
 - identify electrical inspection items that can be addressed by a mechanical inspector

Routine Inspections

Routine inspections play an essential part in establishing and maintaining the quality of Weight Handling Equipment maintenance and are divided into three areas.

Pre-inspections are performed to detect and document conditions that can affect the safe and reliable operation of the equipment.

In-process inspections are performed on those items that require extensive disassembly or items that are impractical to post-inspect.

Post-inspections are performed to ensure that repairs to and maintenance on the equipment are in compliance with applicable specifications and requirements.

Routine Inspections

- Routine inspections which aid in establishing a high quality of maintenance are:
- Pre-Inspection
 - In Process Inspection
 - Post-Inspection



Category 1 Crane Inspections

Category 1 cranes have three types of inspections, Types A, B, and C and two distinct bases for defining the frequency of inspections: calendar or engine.

Note: If engine hours are used as the basis for inspection frequency, a Type B inspection must still be performed annually in conjunction with the annual certification.

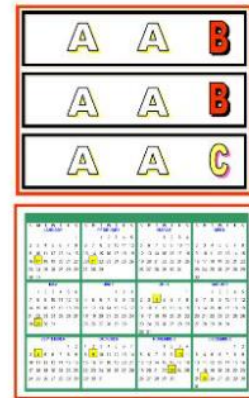
Category 1 Crane Inspections

- **Inspection Types:**
 - A
 - B
 - C
- **Inspection Frequencies:**
 - calendar
 - engine hours

Category 1 Inspection Types

Type A, B, and C inspections for category 1 cranes are found in Appendix C of NAVFAC P-307. The appropriate inspection shall be performed and documented in accordance with the directives of Section 2 of NAVFAC P-307. In addition to the routine maintenance inspections prescribed in Section 3 of NAVFAC P-307, repairs to load bearing, load-controlling, or operational safety items made during the certification period must be inspected.

Category 1 Crane Inspection Types



Category 1 Inspection Frequencies

Each command has the ability to choose between category 1 crane maintenance inspections based on calendar or by engine hours. Calendar based inspections are conducted every 4 months plus 10 days. "B" inspections are conducted every third "A" inspection but annually as a minimum. "C" inspections are conducted every third "B" inspection.

Category 1 Crane Inspection Frequencies

Frequency based by month:

- "A" Inspection
 - 4 calendar months plus 10 days
- "B" Inspection
 - Every third "A" inspection
 - Shall be performed annually as a minimum
- "C" Inspection
 - Every third "B" inspection

Category 1 Inspection Frequencies: Engine Hours

If the category 1 crane inspection frequency is measured by engine hours, a Type A inspection is required every 500 engine operating hours plus 50 hours. A Type B inspection is required every 2,000 engine operating hours plus 200 hours or annually as a minimum. A Type C inspection is required every 8,000 engine operating hours plus 800 operating hours.


Category 2, 3, and 4 Crane Inspection Frequencies

Inspect category 2, 3, and 4 cranes annually in conjunction with the annual certification. For category 1 and 4 cranes, the annual tests shall include a load test. Category 2 and 3 cranes shall be inspected, operationally tested (without load) and certified annually; however, a load test shall be performed at every fourth annual certification as a minimum. The certification shall indicate when a crane is in the quadrennial load test program.

Category 1 Crane Inspection Frequencies

Frequency based on engine hours:


- "A" Inspection
 - 500 engine operating hours
 - plus 50 hours
- "B" Inspection
 - each 2,000 engine operating hours
 - plus 200 hours
 - annually as a minimum
- "C" Inspection
 - each 8,000 engine operating hours
 - plus 800 hours



Inspection Frequencies for Category 2, 3, and 4 Cranes

Category 2, 3, and 4 Cranes:

- annually in conjunction with the annual certification



Inspection Aids

An inspector must be able to recognize abnormal conditions by understanding normal conditions and characteristics of the equipment. This involves knowing what the equipment looks, sounds, feels, and smells like. This involves knowing how the equipment properly operates and knowing when unusual conditions exist. Learn to recognize the noise caused by metal-to-metal contact, which may indicate a bad bearing, or abnormal odors, which can indicate scorching insulation. Feel the bearing housing for evidence of vibration and excessive heat. Also inspect the bearing housings for the possibility of creeping grease on the inside of the motor which might harm the insulation.

Common Attributes

Some common attributes that apply to both pre-inspection and post-inspection and are applicable to all types of electrical equipment are damaged wiring, proper lubrication, cleanliness, loose or missing hardware, and loose connections. The Maintenance Inspection Specification and Record found in Appendices C and D of NAVFAC P307 should be used as a guideline and the above elements can be applied to each item inspected.

Inspection Aids

- Recognize the abnormal conditions by understanding normal conditions and characteristics
- Knowledge of the equipment through:
 - sight
 - sound
 - feel
 - smell
 - constant attention

Common Attributes

Common attributes of pre-inspection and post-inspection:

- damaged wiring
- proper lubrication
- cleanliness
- loose or missing hardware
- loose connections



Apply each attribute to the items defined in NAVFAC P-307 Appendix C, Maintenance Inspection Specification and Record (MISR), and Appendix D, Annual Maintenance Inspection Specification and Record (AMISR).

Wiring

Many electrical items on NAVFAC P-307 Maintenance Inspection Specification and Record also known as the MISR for category 1 cranes or AMISR for annual inspections performed on Cat 2, 3 and 4 cranes require that wiring be inspected for damage or deterioration. This applies to cables that enter the machinery, wiring between the cable entry point, and components including flexible shunts and connections including jumpers and risers. Damage or deterioration can be found on the conductor's insulation or the conductor itself.

Proper Lubrication

Most motors, generators, and alternators are properly lubricated at the time of manufacture, and it is not necessary to lubricate them at the time of installation. However, if they have been in storage for a period of 6 months or longer, they should be relubricated before starting.

The type of grease is important. You should always follow the OEM recommendation or equivalent. Consult your local engineering group for a suitable replacement.

Wiring

MISR and/or AMISR

- inspect wiring for damage or deterioration



Proper Lubrication

- ensure properly lubrication
- motors that have been in storage for 6 months should be relubricated
- type of grease is important



Proper Lubrication Quantity

The quantity of grease is important. Remember, too much grease is as detrimental as insufficient grease. Too much grease can spread into the windings of rotating machines and will decrease the life and reliability of these machines. For this reason, a lubrication procedure that ensures that grease is available to the bearing and does not force grease into the unit under pressure must be used.

Cleaning

It's important for electrical equipment to be kept clean. The dirtier the environment, the more often cleaning will have to be performed by maintenance personnel. Inspect and verify that electrical components, cabinets, and air filters are clean and free of dirt, grit, water, oil, grease, paint, and other foreign material.

Proper Lubrication Quantity

- too much grease is as detrimental as too little grease.



Cleaning

Maintenance/Cleaning:


- Frequency depends on the environment.
- A dirty environment increases the frequency.
- Clean inside and outside.
- Clean filters as needed.

Connections

Most of the electrical connections for rotating machinery are made in the cable entry box. To completely inspect for the loose connections specified in many of the electrical items found in NAVFAC P-307 Maintenance Inspection Specification and Record, the applied insulation must be removed. If these leads are to be disturbed for repair, the connections should be inspected after the lugs are crimped on the cables, after the fasteners have been installed and torqued per specifications as addressed in the Fasteners Lesson, and before the insulating tape is applied.

Connections

- Electrical connections for rotating machinery are made in the cable entry box.
- If leads are disturbed for repair, inspect the connections:
 - after the lugs are crimped on the cables
 - the fasteners have been installed and torqued per specifications as addressed in the fasteners lesson, and
 - before the insulating tape is applied




Hardware

Electrical machinery is usually made up of components that are fastened together. In this equipment, the components are electrical hardware, mechanical hardware, stationary, and moving components. In this illustration of an alternator exciter and a contactor, there are examples of each. It is imperative that all hardware is installed properly.

Hardware

- It is imperative that all hardware and fasteners used to connect electrical components be correctly installed and tight.



Alternator Exciter Contactor

Inspector Disciplines

If one person is to perform both the electrical and the mechanical inspections, their training and background shall reflect both disciplines. If both electrical and mechanical inspectors perform an inspection, then they should address the appropriate elements of NAVFAC P-307 MISR.

Inspector Disciplines

- Electrical and mechanical inspections can be performed by the same inspector provided he or she is trained in both disciplines.
- Mechanical and Electrical Inspections address the appropriate elements of NAVFAC P-307 Maintenance Inspection Specification and Record.



Shared Items

There is a group of items in NAVFAC P-307 Maintenance Inspection Specification and Record that are electrical in nature but are associated with engines, are low voltage, and are usually maintained by mechanics. They can be inspected by either discipline. These items are the starter, the battery charging system including the battery and cables, engine wiring, gauges, and engine alarm safety devices.

Engine Starters

Inspect the engine starter for damaged or deteriorated wiring, evidence of loose connections, and proper lubrication. Operate the starter and listen for abnormal noise and verify proper operation.

Engine Alternator/Generator

Inspect the alternator or generator for cleanliness and proper lubrication.

Shared Items

NAVFAC P-307 Maintenance Inspection Specification and Record:

No.	Item
4	Starter
7	Engine Alternator/Generator (Battery System)
8	Battery and Cables
9	Voltage Regulator (Battery Charging System)
10	Engine Wiring
11	Gauges
	- Oil
	- Fuel
	- Temperature
	- Ammeter
	- Tachometer, etc.
20	Engine Alarm Safety Devices

- The items above may be inspected by either discipline: mechanic or electrician

Engine Starters

- Inspect engine starters for:
 - damaged or deteriorated wiring
 - evidence of loose connections
 - proper lubrication
- Operate the starter:
 - listen for abnormal noise
 - verify proper operation

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES													SHEET 1 OF	
Crane		Type	DEU		Category		Legend: Check under description							
Inspector	Date	Time	Inspector	Date	Time	Inspector	Date	Time	Inspector	Date	Time	Inspector	Date	Time

Engine Alternator / Generator

- Inspect the alternator or generator for:
 - cleanliness
 - proper lubrication

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES													SHEET 1 OF	
Crane		Type	DEU		Category		Legend: Check under description							
Inspector	Date	Time	Inspector	Date	Time	Inspector	Date	Time	Inspector	Date	Time	Inspector	Date	Time

External Wiring

Inspect external wiring for damage, deterioration, oil or grease contamination, and evidence of loose connections.

External Wiring

Inspect external wiring for:

- damage
- deterioration
- oil or grease contamination
- evidence of loose connections

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES															
SHEET 1 OF										Capacity					
Crane		Type		DEM		Legend: Check under condition									
Inspection DATE-HOUR		TYPE		Current inspection DATE-HOUR		TYPE		Legend: Check under condition							
								S = Satisfactory C = Corrected if referred, see date and identify on Un satisfactory item sheet U = Unsatisfactory NA = Not Applicable							
Item No.	Inspection No.	Items to be inspected			Maintenance Inspection Specification	System Inspected	Condition								
		A	B	C			S	C	U	NA	OK	NOK			
17					Engine Alternator Generator Battery Charging System	Inspect for cleanliness and proper lubrication. Inspect external wiring for damage, deterioration, or oil or grease contamination, and for evidence of loose connections. During operation, inspect for rubbing, vibration, and sparking. Listen for abnormal noise. Verify that alternator/generator is properly charging batteries.									

Inspection During Operation

During operation, inspect for rubbing, vibration, sparking, and abnormal noise.

Inspection During Operation

During operation, inspect the engine alternator/generator for:

- rubbing
- vibration
- sparking
- abnormal noise

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES															
SHEET 1 OF										Capacity					
Crane		Type		DEM		Legend: Check under condition									
Inspection DATE-HOUR		TYPE		Current inspection DATE-HOUR		TYPE		Legend: Check under condition							
								S = Satisfactory C = Corrected if referred, see date and identify on Un satisfactory item sheet U = Unsatisfactory NA = Not Applicable							
Item No.	Inspection No.	Items to be inspected			Maintenance Inspection Specification	System Inspected	Condition								
		A	B	C			S	C	U	NA	OK	NOK			
17					Engine Alternator Generator Battery Charging System	Inspect for cleanliness and proper lubrication. Inspect external wiring for damage, deterioration, or oil or grease contamination, and for evidence of loose connections. During operation, inspect for rubbing, vibration, and sparking. Listen for abnormal noise. Verify that alternator/generator is properly charging batteries.									

Battery Charge

Verify that the alternator or generator is properly charging the batteries.

Battery Charge

- Verify that the alternator/generator is properly charging batteries.

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES															
SHEET 1 OF										Capacity					
Crane		Type		DEM		Legend: Check under condition									
Inspection DATE-HOUR		TYPE		Current inspection DATE-HOUR		TYPE		Legend: Check under condition							
								S = Satisfactory C = Corrected if referred, see date and identify on Un satisfactory item sheet U = Unsatisfactory NA = Not Applicable							
Item No.	Inspection No.	Items to be inspected			Maintenance Inspection Specification	System Inspected	Condition								
		A	B	C			S	C	U	NA	OK	NOK			
17					Engine Alternator Generator Battery Charging System	Inspect for cleanliness and proper lubrication. Inspect external wiring for damage, deterioration, or oil or grease contamination, and for evidence of loose connections. During operation, inspect for rubbing, vibration, and sparking. Listen for abnormal noise. Verify that alternator/generator is properly charging batteries.									

Battery and Cables

Inspect the battery for proper electrolyte level, cleanliness, structural distortion, damaged racks or holders, and evidence of loose terminals. Inspect the battery cables for damage, deterioration, and evidence of loose connections.

Battery and Cables

- Inspect the battery for proper:
 - electrolyte level
 - cleanliness
 - structural distortion
 - damaged racks or holders
 - evidence of loose terminals
- Inspect battery cables for:
 - damage
 - deterioration
 - evidence of loose connections

Voltage Regulator

Inspect for evidence of loose or damaged wires and connections. During operation, verify the regulator cycles properly and does not overcharge batteries.

Voltage Regulator

- Inspect the voltage regulator for evidence of loose or damaged wires and connections.
- During operation, verify the regulator:
 - cycles properly
 - does not overcharge batteries

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES											
										SHEET 1 OF	
Date	Type	DEF		Capacity							
INSPECTION DATE/TIME	TYPE	CRANE NUMBER	TYPE	APPROX. CRANE USED (LBS)	APPROX. CRANE USED (KVA)						
				0 = Satisfactory	0 = Corrected (if correct, date seen and identity of Un satisfactory item noted)						
				U = Unsatisfactory	NA = Not Applicable						
NO.	DESCRIPTION	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
1	2	3	4	5	6	7	8	9	10	11	12
1	Inspect for evidence of loose or damaged wires and connections. During operation, verify the regulator cycles properly and does not overcharge batteries.										

Engine Wiring

Inspect the wiring to lights, warning devices, and meter connections for damage, deterioration, and evidence of loose connections.

Engine Wiring

Inspect wiring to lights, warning devices, and meter connections for:

- damage
- deterioration
- evidence of loose connections

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES											
										SHEET 1 OF	
Date	Type	DEF		Capacity							
INSPECTION DATE/TIME	TYPE	CRANE NUMBER	TYPE	APPROX. CRANE USED (LBS)	APPROX. CRANE USED (KVA)						
				0 = Satisfactory	0 = Corrected (if correct, date seen and identity of Un satisfactory item noted)						
				U = Unsatisfactory	NA = Not Applicable						
NO.	DESCRIPTION	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.	NO.
1	2	3	4	5	6	7	8	9	10	11	12
1	Inspect the wiring to lights, warning devices, and meter connections for damage, deterioration, and evidence of loose connections.										

Gauges

Inspect gauges for identification, legibility, condition and evidence of loose electrical or mechanical connections. Verify operation. Calibration is not required.

Engine Alarm Safety Devices

Inspect wiring for damage, deterioration, and evidence of loose connections. Verify proper operation of engine over-speed shutdown, oil, and water system shutdown and alarm systems. Verify sensors function properly by testing with sensors connected to system. If sensor removal is necessary for shop testing or calibration, reinstallation and inspection shall be per controlled procedures approved by the activity engineering organization.

Summary and Review

Basic Inspection Techniques identified areas of concern associated with electrical inspection and general NAVFAC P-307 electrical requirements and discussed electrical inspection items that can be addressed by a mechanical inspector.

Gauges

Inspect gauges for:

- identification
- legibility
- condition
- evidence of loose connections
- proper operation - calibration not required

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES											
Crane No.		Type	Serial	SHEET 1 OF							
OVERSPEED TYPE		OVERSPEED TYPE		Legend: Check and identify in parentheses, note date and identify in parentheses, note date							
OVERSPEED TYPE		OVERSPEED TYPE		1 = satisfactory, 2 = unsatisfactory, NA = Not Applicable							
Item No.	Component	Inspection Points	Inspection Results	Inspection Date	Inspector	Checked	By	Checked	By	Checked	By
1	Engine	Inspect for damage and deterioration									
2	Adaptor	Inspect for damage and deterioration									
3	Generator	Inspect for damage and deterioration									
4	Battery	Inspect for damage and deterioration									
5	Charging System	Inspect for damage and deterioration									

Engine Alarm Safety Devices

- Inspect wiring for:
 - damage
 - deterioration
 - evidence of loose connections
- Verify proper operation of engine shutdown and alarm systems:
 - over-speed
 - oil system
 - water system
- Verify portal and floating cranes sensor function by testing with sensors connected to system.

Summary and Review

Basic Inspection Techniques identified:

- areas of concern associated with electrical inspection
- general NAVFAC P-307 electrical requirements
- electrical inspection items that can be addressed by either an electrical or mechanical inspector

Knowledge Check

8. **Select the best answer.** Common inspection attributes include all the following except—
- C. cleanliness
 - D. damaged wiring
 - E. high megger readings
 - F. proper lubrication
9. **Select all that apply.** Who authorizes the proper lubricant for motors and generators?
- E. crane engineering
 - F. Mobil Oil
 - G. Navy Crane Center
 - H. original equipment manufacturer
10. **Select all that apply.** Which of the following items are important considerations when lubricating motors?
- E. filling to the proper level
 - F. using engineering specified lubricant
 - G. using excess lubrication
 - H. using OEM recommended lubricant
11. **Select the best answer.** What is an important factor in the safe and reliable operation of motors and generators?
- C. cleanliness
 - D. lubrication
 - E. proper and timely inspection
 - F. all the above
12. **Select the best answer.** To perform a pre-inspection on a motor wiring circuit, and inspector should open the motor connection box and—
- E. check for loose connections
 - F. check for signs of overheating
 - G. listen for abnormal noise
 - H. all the above
13. **Select the best answer.** To completely inspect for loose connections—
- C. fasteners must be installed and torqued properly
 - D. insulation must be removed
 - E. lugs must be crimped on the cables
 - F. all the above

- 14. Select the best answer.** If sensor removal is necessary for shop testing or calibration, reinstallation and inspection shall be per—
- A. controlled procedures approved by the activity engineering organization
 - B. National Electric Code specifications
 - C. NAVFAC P-307 Appendix C
 - D. none of the above
- 15. Select the best answer.** Where one person performs an inspection on both mechanical and electrical components, what determines suitability to the task?
- A. grades and certifications
 - B. pay grade and step
 - C. resume and employment contract
 - D. training and background
- 16. Select all that apply.** Some common attributes that apply to both pre-inspection and post-inspection and are applicable to all types of electrical equipment are—
- A. damaged wiring
 - B. loose or missing hardware
 - C. proper gap
 - D. proper lubrication
- 17. Select the best answer.** Identify the items that can be addressed by a mechanical inspector.
- A. battery charging system
 - B. engine alarm safety devices
 - C. engine wiring
 - D. gauges

ROTATING EQUIPMENT INSPECTIONS

Welcome



Welcome to Rotating Equipment Inspections.

Learning Objectives

Upon successful completion of this module, you will be able to identify inspection items that are applicable to motors and generators and associate the appropriate inspection techniques with the applicable NAVFAC P-307 specifications.

Recommended Items

Generators and motors must be inspected by a designated inspector with training and background in electrical disciplines. They must use the appropriate requirements from the NAVFAC P-307, Appendices C and D and record the findings on the applicable MISR or AMISR.



Welcome
Welcome to Rotating Equipment Inspections.

Begin

Learning Objectives

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

- identify inspection items applicable to motors and generators
- associate inspection techniques with NAVFAC P-307 specifications

Recommended Items

MISR items

No.	Item
68	Main and Auxiliary Generators
69	Electric Motors (Hoist, Rotate, Travel)

- Generators and motors must be inspected by a designated inspector with training and background in electrical disciplines addressing the appropriate requirements from NAVFAC P-307 Appendices C and D.



General Conditions

When inspecting the general conditions of electrical machinery, pay attention to the wiring, lubrication, cleanliness, hardware, and connections.

Motors and Generators

Inspect motors and generators and associated wiring for cleanliness, damage, deterioration evidence of loose connections and proper lubrication.

Bearing Maintenance

Proper lubrication of motor bearings is essential for reliable motor operation. Minimum lubrication may be sufficient. Over lubrication that forces grease into the motor windings is more detrimental than under lubrication. A formal lubrication process will ensure proper lubrication and guard against over lubrication. If necessary, use in-process inspection to verify proper lubrication. A sound minimum process is shown.

General Conditions

The five main areas of concern for inspecting general conditions on rotating electrical machinery are:

- wiring
- lubrication
- cleanliness
- hardware
- connections



Motors and Generators

Inspect motors, generators, and wiring for:

- cleanliness
- damage
- deterioration
- evidence of loose connections
- proper lubrication

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
SHEET 16 OF 16									
TITLE									
NO.	DESCRIPTION	UNITS	INSPECTED	CONFORMS	REMARKS	DATE	BY	CHECKED	DATE

Bearing Maintenance

- Stop the motor.
- Clean all grease fittings.
- Remove the filler and drain plugs.
- Free the drain hole of any hard grease.
- Add 3 to 5 pumps using a low pressure grease gun.
- Start the motor and let it run approximately 60 minutes.
- Stop the motor, wipe off any drained grease, and replace the filler and drain plugs.
- The motor is ready for operation.



Slip Ring Evaluation

The slip rings are the collectors that electrically connect the wound rotor to external circuits. To ensure good electrical conductivity, a proper film must be maintained on the face of the slip rings. If the slip ring is true and free of blemishes, a clear varnish like film should build up. The face of the slip rings must be round and true to the axis of rotation. If the ring is more than a few thousandths out of round, brush wear will be greatly increased. In such cases, the ring may need to be removed and machined. Minor grooves, pits, and gouges can be stoned in place. If the surface is grooved, the brush tension is too high, the brush is too hard, or the brush has contamination in its face. If the surface is chalky, the brush tension is too light or there are contaminants in the atmosphere.

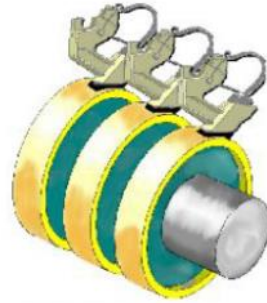
Slip Ring and Commutator Inspection

Inspect slip rings and commutators for damage and evidence of destructive commutation.

Slip Ring Evaluation

To ensure good electrical conductivity:

- a proper film must be maintained
- face condition must be round and true to axis
- film condition must be checked



Slip Ring and Commutator Inspection

Inspect slip rings and commutators for:

- damage
- evidence of destructive commutation



Perfect Commutator

A perfect commutator film is clear, tan, and shiny. To achieve this film, the proper brush with the proper tension must be run at a constant load in one direction with clean air at constant humidity. Most motors on cranes are not constant load, must turn in both directions, and ran in a contaminated atmosphere having large variances in humidity. An experienced inspector realizes that a perfect film is not possible and judges crane commutators accordingly

Perfect Commutator

A perfect commutator film is:

- clear
- tan
- shiny




Normal Commutator: Blemished

A normal commutator is lightly mottled with dark patches in a random pattern caused by airborne contamination. No action is required.

Normal Commutator - Blemished

- Lightly mottled
- Dark patches
 - Caused by airborne contamination
- No action required




Normal Commutator: Heavy Film

A heavy dark film over the entire surface can be cleaned with folded canvas applied to the running commutator.

Normal Commutator - Heavy Film

- heavy film
- entire surface
- clean commutator with folded canvas



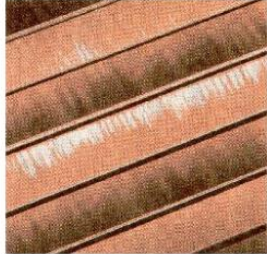
Normal Commutator: Slot Bar Marking

Slot Bar Marking is noted by a slightly darker film on one bar in a pattern caused by a slight imbalance in multi coil armature windings. No action is required.

Normal Commutator - Slot Bar Marking

Slot Bar Marking:

- slightly darker film on one bar in a pattern
- caused by a slight imbalance in multi-coil armature windings
- no action required



Commutator Repair: Streaking

Streaking is characterized by fine lines in the film finish. It is the beginning of copper transfer to the brush face. An electrician should lightly stone the commutator and reseal the brushes.

Commutator Needing Repair - Streaking

Streaking

- lines in the film finish
- copper transfer



Commutator Repair: Threading

Threading is characterized by lines in the film finish resulting from copper being transferred to brush face. An electrician should stone and chamfer the commutator and replace the brushes.

Commutator Needing Repair - Threading

Threading:

- fine lines
- copper transferred to brush face
- serious condition



Commutator Repair: Grooving

Grooving is noted by a distinct loss of material in the brush path. This condition can be caused by improper brush-hardness or brush tension to current balance. This can be corrected by machining the commutator to restore an even surface and replacing the brushes with the correct brushes adjusted to match the current ratio.

Commutator Repair: Copper Drag

Copper Drag is the build-up of copper on the trailing edge of the commutator bars resulting from poor film maintenance. Correct by slotting, chamfering, and stoning the commutator and replacing brushes.

Commutator Repair: Pitch Bar Marking

Pitch bar marking is indicated by burned spots. It is caused by instantaneous armature over-current on one brush. Clean the commutator with canvas and check all brush rigging connections.

Commutator Needing Repair - Grooving

Grooving:

- loss of material in brush path
- improper brush hardness or brush tension to current balance



Commutator Needing Repair - Copper Drag

Copper Drag:

- buildup of copper on the trailing edge of the bar
- poor film maintenance

Repair:

- slot
- chamfer
- stone
- replace brushes



Commutator Needing Repair - Pitch Bar Marking

Pitch Bar Marking:

- burned spots
- instantaneous over-current on one brush

Repair:

- canvas commutator
- check connections



Commutator Repair: Heavy Slot Bar Marking

Heavy slot bar marking is the etching of the trailing edge of the commutator bar caused by armature winding unbalance. This is a serious condition requiring rewinding the rotor, and re-machining the commutator.

Commutator Needing Repair - Heavy Slot Bar Marking

Heavy Slot Bar Marking:

- etching of the trailing edge of the commutator bar
- armature winding unbalance
- serious condition

Repair:

- rewind the rotor
- re-machine the commutator



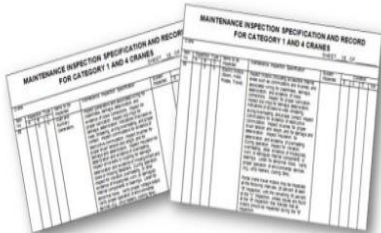
Brush Inspection

Inspect brushes for proper tension, length, damage, and deterioration.

Brush Inspection

Inspect brushes for:

- tension
- length
- damage
- deterioration

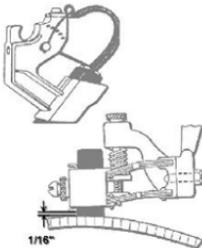


Brush Evaluation

Brushes are the consumable component of motors and generators. They must be the proper grade as recommended by the manufacturer. They must be adequate length to provide enough brush material to accommodate the predicted wear for one maintenance period. The shunts must be in good electrical condition. The brush tensioning device must provide the correct pressure for the brush used. The brush holder must be positioned correctly to provide adequate support for the brush. The standard recommendation is 1/16th of an inch from the surface of the commutator or slip ring unless the OEM specifies a different clearance. The brush must be properly seated. The surface of the brush next to the slip ring or commutator must be smooth, without chipped edges and without imbedded impurities.

Brush Evaluation

- Proper Grade
- Adequate Length
- Functional Shunts
- Proper Brush Tension
- Proper Brush Holder Position
- Proper Seating



Insulation Inspection

Inspect insulation for deterioration and evidence of overheating.

Insulation Inspection

Inspect insulation for:

- deterioration
- evidence of overheating




Insulation Evaluation

Insulation comes in different forms. These dipped pole pieces are varnish insulated. Insulation is used on internal jumpers. The slip ring spacers are made of a solid insulating material.

Insulation Evaluation

Types

- Dipped Pole Pieces
- Jumper
- Slip Ring Spacer




Verify Voltage Output

Verify proper voltage output. Generators and alternators should produce the name plate rated voltage and should not drop appreciably when brought to full load. Check the operation of environmental devices such as strip heaters and cooling fans.

Verify Voltage Output

Verify proper:

- voltage output
- operation of environmental devices (e.g., strip heaters, cooling fans)



Drive Belts or Couplings

Inspect drive belts or couplings for damage, deterioration, evidence of misalignment, and loose or missing fasteners.

Drive Belts or Couplings

Inspect drive belts or couplings for:

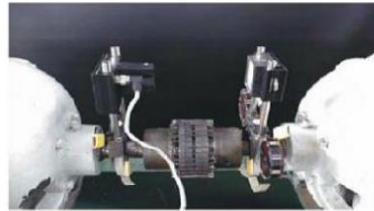
- damage
- deterioration
- evidence of misalignment
- loose or missing fasteners

Coupling Alignment

Poorly aligned couplings will get hot, throw grease, and make noise. However, to be aligned to specifications, precision instruments are required. For this reason, verification of alignment is best done as an in-process inspection. The Equipment History File must include coupling alignment data with verification signatures for load bearing or load controlling couplings.

Coupling Alignment In-Process Inspection

- Verified by in-process inspection
- Coupling alignment data must be retained in the equipment history file with verification signatures for load bearing or load controlling couplings



Coupling Alignment Operational Check

During operation, inspect for vibration, overheating, and other evidence of misalignment. Also check for worn or damaged internal components or bearings and abnormal noise.

Coupling Alignment Operational Check

During operation, inspect for:

- vibration
- overheating
- evidence of misalignment
- worn or damaged internal components or bearings
- abnormal noise

Summary and Review

This module identified inspection items applicable to motors and generators and associated the appropriate inspection techniques with the applicable NAVFAC P-307 specifications.

Summary and Review

This module:

- identified inspection items applicable to motors and generators
- associated the appropriate inspection techniques with the applicable NAVFAC P-307 specifications

Knowledge Check

- 1. Select the best answer.** Slip rings shall be inspected to evaluate—
 - A. out of round conditions
 - B. the condition of the faces
 - C. the condition of the film
 - D. all the above
- 2. Select the best answer.** Which characteristic of DC motors used on crane functions prevents an ideal commutating film from forming?
 - A. reversing
 - B. varying load
 - C. varying speed
 - D. all the above
- 3. Select the best answer.** Which of the following commutator conditions poses the least concern?
 - A. copper drag
 - B. slot bar marking
 - C. streaking
 - D. threading
- 4. Select the best answer.** Which of the following commutator conditions poses the most concern?
 - A. blemishes
 - B. grooving
 - C. heavy film
 - D. slot bar marking
- 5. Select the best answer.** Motor winding insulation is generally—
 - A. dipped Plastisol
 - B. dipped varnish
 - C. PVC thermoset
 - D. solid mica
- 6. Select the best answer.** The brush condition that produces poor commutation is—
 - A. improper brush hardness
 - B. improper brush seating
 - C. improper brush tension
 - D. all the above

7. **Select the best answer.** What condition would an electrical inspector normally relate to a questionable shaft alignment?
- A. Coupling gets hot.
 - B. Coupling makes noise.
 - C. Coupling throws grease.
 - D. All the above
8. **Select the best answer.** In addition to the maintenance inspection specifications listed for motors, the inspector shall also verify a generator's –
- A. bearing temperatures
 - B. full load current
 - C. megger readings
 - D. voltage output
9. **Select all that apply.** What are the main areas of concern for inspecting general conditions on rotating electrical machinery?
- A. connections
 - B. duty cycle
 - C. lubrication
 - D. wiring

CONTROLLER INSPECTIONS

Welcome

Welcome to Controller Inspections.



Welcome
Welcome to Controller Inspections.

Begin

Learning Objectives

Upon successful completion of this module, you will be able to identify inspection requirements and attributes for crane controllers.

Learning Objectives

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

- Identify inspection attributes for controllers
- Identify inspection requirements for controllers

Definitions: Controller

A controller is the device that connects motor leads to power or regulates the power to those motor leads. A drum controller is a multiple connection, manually operated switch that provides control switching. A magnet controller employs relays and contactors to provide control switching.

Definitions - Controller

A controller is the device that regulates power to a motor.

- **Drum Controller**
 - multiple connection
 - manually operated switch
- **Magnet Controller**
 - employs relays and contactors for control switching

Definitions: Controller Continued

An electronic drive employs solid state devices to provide control switching. A master-switch is a multiple connection, manually operated switch that provides a low voltage, low current signal to operate a controller.

Controllers: Inspection 1

Inspect for broken or loose springs, cracked or loose operating levers, pitted or burned contact points and segments, broken segment dividers and insulators, and excessive arcing. Look for evidence of worn or loose cams, pins, rollers, or chains.

Controllers: Inspection 2

Inspect controllers for loose connections, proper contact pressure, function labels, indicators, proper spring return, and neutral latching.

Definitions - Continued

Electronic Drive

- employs solid state devices for control switching
- NAVFAC P-307 inspection item 62

Master Switch

- multiple connection, manually operated switch that provides a low voltage, low current signal to operate a controller
- NAVFAC P-307 inspection item 61

Controllers - Inspection

Inspect controllers for:

- broken or loose springs
- cracked or loose operating levers
- pitted or burned contact points and segments
- broken segment dividers and insulators
- excessive arcing
- evidence of worn or loose cams, pins, rollers, or chains

Controllers - Inspection

Inspect controllers for:

- loose connections
- proper contact pressure
- identifying label plates
- indicators
- proper spring return
- neutral latching

Controllers: Inspection 3

Inspect wiring for damage, deterioration, and evidence of loose connections. Inspect bearings, star wheels, and pawls for proper lubrication. During operation, verify proper sequencing of speed points, operation of controller indicating lights and dead-man devices.

Controllers - Inspection

Inspect wiring for:

- damage
- deterioration
- evidence of loose connections

Inspect for proper lubrication of:

- bearings
- star wheels
- pawls

During operation, verify proper:

- sequencing of speed points
- operation of controller indicating lights
- deadman devices

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
DATE		JOB		SHEET		OF		CRANES	
INSPECTOR	TYPE	CURRY NUMBER	TYPE	1-Secondary	2-Check of internal, non-drm and safety of (unintended) stop time	3-Check of (unintended) stop time	4-Check of (unintended) stop time	5-Check of (unintended) stop time	6-Check of (unintended) stop time
NO.	1	2	3	4	5	6	7	8	9
NOTE: Inspect for damage to any wiring, evidence of loose connections, and proper lubrication. Operation shall be verified against manufacturer's specifications.									

Controller Springs

In drum controllers, contact points are held against the segments by springs. In master switches, springs hold the switch actuators against the cams. In both controllers, the detent spring holds the pawl against the star wheel.

Controller Springs

In drum controllers:

- springs hold contact points against the segments

In master switches:

- springs hold the switch actuators against the cams

In drum controllers and master switches:

- a detent spring holds the pawl against the star wheel



Operating Levers

Operating levers should be tight enough to assure positive speed control but loose enough to be easily operated. Both drum controllers and master switches can have spring return to the off position. Levers should return to neutral from any speed point when released. The operating lever shall have a positive latch in the neutral position that resists accidental movement. If the unit is stepped, then each speed point should have positive detent to clearly indicate the location of each point.

Operating Levers

Operating lever considerations:

- proper spring return
- neutral latching



Contact Points and Segments

The contact points and the segments that form the drum must line up to provide a good electrical connection. They must have adequate spring pressure as to prevent arcing on the segments and be loose enough as to prevent damaging the leading edges of the contact points.

Contact Points and Segments

Contact points and segments must:

- line up
- have adequate spring pressure



Segment Dividers and Insulators

The segment dividers and insulators within the controller shall be correctly installed, tightly mounted, and free of contaminants and cracks.

Segment Dividers and Insulators

Segment dividers and insulators within the controllers shall be:

- correctly installed
- tightly mounted
- free of contaminants
- free of cracks

Cams, Pins, Rollers, or Chains

Cams, pins, rollers, or chains shall be correctly installed, tightly mounted, and properly lubricated.

Cams, Pins, Rollers, or Chains

Cams, pins, rollers, or chains shall be:

- correctly installed
- tightly mounted
- properly lubricated

Loose Wiring and Connections

Inspect all wiring and connections including jumpers, contacts, conductors, and shunts for tight connections, deterioration, and damage.

Loose Wiring and Connections

Inspect wiring and connections for:

- tight connections
- deterioration
- damage

Identifying Label Plates

Each controller and master switch shall be clearly marked to indicate function and direction.

Identifying Label Plates

- Each controller and master switch shall be clearly marked indicating:
 - function
 - direction
- Function and direction must be clearly visible to the operator.



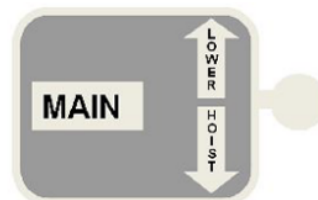
Operational Check

Operate each controller and master switch, and verify proper sequencing, speed points, indicating lights, and operation.

Operational Check

Operate controllers and master switches to verify:

- sequencing
- speed points
- indicator lights
- operation



Speed Points

Each type of controller has unique characteristics. Knowledge of these characteristics is necessary to correctly evaluate the performance of the function. Constant voltage DC resistive controls have positive control when lowering. The hoist runs up about twice as fast as when lowering, and an empty hook travels twice as fast as a fully loaded hook. Wound rotor motors (with mechanical load brakes) exhibit variable speeds, whether hoisting or lowering, depending on the load applied. This speed “curve” needs to be understood when inspecting these types of controls.

Speed Points

Unique Characteristics of Controllers

- Constant Voltage DC Resistive Control
 - positive control when lowering
 - hoist runs up about twice as fast as when lowering
 - empty hook travels twice as fast as a fully loaded hook
- Wound Rotor Motor (with a Mechanical Load Brake)
 - have defined speed points with a fully loaded hoist
 - hoist and lowering speeds vary

Speed Points Continued

Wound rotor motors with electric load brakes have good speed regulation with a fully loaded hoist, fair speed point definition with an empty hook and good speed regulation when lowering. Electronic drive control modules usually have good speed regulation in both directions.

Speed Points Continued

- Wound Rotor Motor (with Electrical Holding Brake)
 - have good speed regulation with a fully loaded hoist
 - fair speed point definition with an empty hook
 - good speed regulation when lowering
- Electronic Drive Control Modules
 - usually have good speed regulation in both directions

Controller Indicating Lights

If the controller is equipped with indicator lights, compare the operation to the schematic to determine that the indicators operate properly.

Controller Indicating Lights

- If equipped with indicator lights, compare the schematic to determine proper operation.

Deadman Devices

A deadman device is intended to prevent accidental or inadvertent operation of a crane function due to an incapacitated operator. Each deadman device prevents operation unless activated. Most prevent operation of all functions. Once a deadman control stops a function, that function should not restart without returning the control to neutral. Some require that all functions be returned to neutral.

Deadman Devices

Understand each design

- Deadman devices:
 - prevent operation by an incapacitated operator
 - prevent operation of that function
 - some prevent or allow operation of all functions
 - do not allow restart without returning to neutral
 - prevent accidental operation



Control Panels, Relays, Coils

Inspect transfer switch, and disconnect switch contacts for proper alignment, pitting, evidence of excess heating, and arcing. Inspect overload devices for evidence of loose connections and overheating. Inspect coil, contact leads, and shunts for insulation breakdown and evidence of overheating. Inspect wiring for damage, deterioration, and evidence of loose connections. Inspect fuses and fuse holders for type, rating, and proper fit.

Control Panels, Relays, Coils

- Inspect transfer switches, disconnect switches, and conductor contacts for:
 - alignment
 - damage
- Inspect overload devices for:
 - loose connections
 - overheating
- Inspect coils, contact leads, and shunts for:
 - insulation
 - overheating
- Inspect wiring and fuses for:
 - damage
 - loose connections
 - type, rating, and fit

Control Panels, Relays, Coils Continued

Inspect circuit breakers and switches for cleanliness and proper operation. Inspect panel boards and arc shields for cracks, evidence of loose or missing fasteners, cleanliness, and moisture. Manually operate relays, switches, contactors, and interlocks, and verify that all moving parts operate freely, without binding, or excessive play.

Control Panels, Relays, Coils (Continued)

- Inspect Circuit Breakers and Switches:
 - cleanliness
 - proper operation
- Inspect Panel Boards and Arc Shields:
 - loose or missing fasteners
 - cleanliness
 - moisture
- Manually operate relays, switches, contactors, and interlocks:
 - verify all moving parts operate freely without binding or excessive play

Control Panels, Relays, Coils Continued

Inspect enclosures for cleanliness, damage, evidence of loose or missing fasteners, and gaskets. During operation, verify proper operation of panel indicating lights, contactor sequence, and environmental devices such as strip heaters and cooling fans.

Control Panels, Relays, Coils (Continued)

- **Inspect enclosures:**
 - cleanliness
 - damage
 - evidence of loose or missing fasteners
 - gaskets
- **Observe proper operation of:**
 - indicating lights
 - contactor sequence
 - environmental devices
 - strip heaters
 - cooling fans

Contacts

The contacts must be properly aligned to ensure proper electrical contact. They must not be pitted to the point of interfering with the proper operation of the unit or show indications of excessive heat or arcing.

Contacts

To ensure proper electrical contact, contacts must:

- be properly aligned
- not be pitted to the point of interfering with proper operation
- not show indications of excess heating or arcing



Leads and Shunts

Leads and shunts must be closely examined for signs of insulation breakdown or overheating.

Leads and Shunts

Closely examine leads and shunts for:

- insulation breakdown
- evidence of overheating

Wiring

All wiring must be free of damage and deterioration. There should be no evidence of overheating, which can be caused by loose connections.

Wiring

Inspect wiring for:

- damage
- deterioration
- overheating

Fuses

All fuses must be checked against the crane schematic, blueprint, tech manual, and/or name plate data to ensure proper rating and type. The fuse and fuse holder shall also be free of evidence of loose connections and overheating.

Fuses

All fuses must be inspected for:

- proper rating
- proper type
- evidence of loose connections
- evidence of overheating

Overload Devices

Overload devices must not have loose connections or evidence of overheating.

Overload Devices

Overload devices must not have:

- evidence of loose connections
- evidence of overheating



Circuit Breakers and Switches

Circuit breakers and switches must be checked for cleanliness and proper operation.

Circuit Breakers and Switches

Check breakers and switches for:

- cleanliness
- proper operation

Panel Boards and Arc Shields

Panel boards and arc shields must be free of cracks and have no loose or missing fasteners. Inspect for cleanliness and moisture.

Panel Boards and Arc Shields

Inspect for:

- cracks
- evidence of loose or missing fasteners
- cleanliness
- moisture

Manually Operate

Manually operate relays, switches, contactors, and interlocks to verify that all moving parts operate freely without binding or excessive play. Contacts on relays and contactors must mate properly. The contactor and relay armature should travel a little further after the contacts close. Contactor contacts should have a rocking action as their armature moves from first contact to fully actuated. Mechanical interlocks between relays and contactors should operate in a manner that prevents both contactors from being closed at the same time.

Manually Operate

Manually operate:

- relays
- switches
- contactors
- interlocks

... to verify all moving parts operate freely and without binding or excessive play.

Enclosures

Inspect enclosures for cleanliness, damage, and evidence of loose or missing fasteners and gaskets.

Proper Operation

During operation, verify proper operation of panel indicating lights. Check contactor sequence. Each controller should have a schematic and a sequencing chart stored in or on its door to be used for troubleshooting. Verify sequencing and proper operation of panel indicating lights. Check environmental devices such as strip heaters and cooling fans.

Electronic Drive Control System

Inspect wiring for damage or deterioration and evidence of loose connections. Visually inspect components for evidence of damage or overheating. Inspect the drive for dust, dirt, and debris.

Enclosures

Inspect enclosures for:

- cleanliness
- damage
- evidence of loose or missing fasteners and gaskets

Proper Operation

Verify proper operation of:

- panel indicating lights
- contactor sequence
- environmental devices

Electronic Drive Control Systems

- Inspect wiring for damage or deterioration, and evidence of loose connections.
- Visually inspect components without removing for evidence of damage or overheating.
- Inspect the drive for dust, dirt, and debris.

Resistors

The heat makes resistor components brittle and more susceptible to damage. The heat can cause the metal components to deform. Inspect wiring, resistors, insulators, and brackets for damage, distortion, deterioration, and evidence of loose or missing fasteners or overheating. The extreme changes in temperature can cause fasteners to loosen on the resistor. Heat will eventually break down the insulation on the wiring. When the insulation has deteriorated to the point where there is a possibility of shorting, it should be replaced.

Summary and Review

This module covered controller inspection including inspection attributes for controllers and inspection requirements for controllers.

Resistors

Inspect wiring, resistors, insulators, and brackets for:

- damage
- distortion
- deterioration
- loose or missing fasteners
- evidence of overheating

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES										
SHEET 14 OF										
CRANE										
ITEM NO.	FUNCTION			PARTS TO BE INSPECTED	INSPECTION POINTS TO CHECK FOR	DEFECTS FOUND	CORRECTIVE ACTION			DATE
	1	2	3				1	2	3	
101				RESISTORS	INSPECT RESISTORS, INSULATORS, AND BRACKETS FOR DAMAGE, DISTORTION, DETERIORATION, AND FOR EVIDENCE OF LOOSE OR MISSING FASTENERS OR OVERHEATING. EVIDENCE OF DAMAGE TO INSULATION, AND FOR EVIDENCE OF LOOSE CONNECTIONS.					

Summary and Review

Controller Inspection covered:

- inspection attributes for controllers
- inspection requirements for controllers

Knowledge Check

1. **Select the best answer.** A drum controller is a manual switch that connects—
 - A. the motor
 - B. the power
 - C. the speed control resistors
 - D. all the above

2. **Select the best answer.** Inspection of a controller includes checking wiring, hardware, and labeling, but also includes—
 - A. checking for residual magnetization
 - B. contact air gap measurement
 - C. contact alignment procedure
 - D. operation / function test

3. **Select the best answer.** Each drum controller and master switch shall be marked as to—
 - A. be easily visible to the operator
 - B. direction of motion
 - C. function
 - D. all the above

4. **Select the best answer.** Each drum controller and master switch shall be operated and verified for proper—
 - A. operation
 - B. sequencing
 - C. speed points
 - D. all the above

5. **Select the best answer.** A deadman device—
 - A. allows only qualified operators to control the crane
 - B. prevents accidental or inadvertent operation
 - C. provides control upon loss of power



6. **Select the best answer.** Inspection of fuses shall include all the following except—
 - A. evidence of overheating
 - B. proper color code
 - C. proper rating
 - D. proper type

7. **Select all that apply.** What do you look for when inspecting panel boards and arc shields?
- A. cleanliness
 - B. cracks
 - C. evidence of loose or missing fasteners
 - D. moisture
8. **Select the best answer.** Manually operate and verify proper operation of all moving parts on—
- A. contactors
 - B. interlocks
 - C. light bulbs
 - D. relays
9. **Select the best answer. True or False:** When inspecting enclosures, you should look for evidence of loose or missing fasteners, gaskets, damage, and overall cleanliness.
- A. True
 - B. False
10. **Select all that apply.** What items below do you look for when inspecting resistors?
- A. damage
 - B. evidence of overheating
 - C. loose or missing fasteners
 - D. proper operation

ASSOCIATED EQUIPMENT INSPECTIONS

Welcome

Welcome to Associated Equipment Inspections.



Welcome

Welcome to Associated Equipment Inspections.

Begin

Learning Objectives

At the end of this lesson, you will be able to identify electrical inspection criteria, NAVFAC P-307 requirements, and electrical inspection items that can be addressed by a mechanical inspector.

Learning Objectives

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

- electrical inspection criteria
- NAVFAC P-307 requirements
- electrical inspection items that can be addressed by a mechanical inspector

Associated Inspection Items

Low voltage electrical components, like the MISR items listed here, are often maintained and inspected by qualified mechanical personnel. Check with activity management, safety, and/or engineering organizations for policies and component ratings regarding allowable low voltage electrical work by mechanical personnel. High voltage electrical work shall only be performed by qualified electrical personnel. Component voltage can vary on different cranes. For example, collector ring assemblies on mobile cranes are usually low voltage while collector ring assemblies on portal cranes are high voltage. Always proceed with caution when working in or around electrical components.

Associated Inspection Items

No.	Items
48	Center Collector Assembly (for mobile cranes)
56	Load Indicators, Warning Devices, Shutdown Devices
57	Drum Rotation Indicators
58	Radius/Boom Angle Indicators
64	Limit and Bypass Switches
65	Warning Devices
66	Electrical Hardware and General Lighting
67	Electrical Cable Reels

Center Collector Assembly

Inspect the center collector assembly for loose or bent supports, worn brushes, and proper spring tension. Inspect wiring for damage or deterioration and evidence of loose connections. During operation, verify brush to collector ring alignment.

Load Indicators

Inspect wiring on load indicating devices for damage, deterioration, and evidence of loose connections. Verify proper operation and ensure that measurements are within tolerance.

Drum Rotation Indicators

Inspect wiring for damage, deterioration, and evidence of loose connections. Verify proper operation.

Center Collector Assembly

Inspect collectors for:

- loose or bent supports
- worn brushes
- proper spring tension

Inspect wiring for:

- damage or deterioration
- evidence of loose connections

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
SHEET 13 OF									
CRANE									
NO.	INSPECTOR	TYPE	DATE	ITEMS TO BE INSPECTED	MAINTENANCE INSPECTOR SPECIFICATION	STATUS	CONDITION	REMARKS	DATE
13				CENTER COLLECTOR ASSEMBLY (SEE DRAWING)	INSPECT COLLECTOR SUPPORTS, BRUSHES, SPRING TENSION, AND WIRING FOR DAMAGE OR DETERIORATION AND EVIDENCE OF LOOSE CONNECTIONS. DURING OPERATION, VERIFY BRUSH TO COLLECTOR RING ALIGNMENT.				

Load Indicators

Inspect wiring on load indicating devices for:

- damage
- deterioration
- loose connections

Verify:

- proper operation
- tolerance

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
SHEET 13 OF									
CRANE									
NO.	INSPECTOR	TYPE	DATE	ITEMS TO BE INSPECTED	MAINTENANCE INSPECTOR SPECIFICATION	STATUS	CONDITION	REMARKS	DATE
13				LOAD INDICATING DEVICES	INSPECT WIRING FOR DAMAGE, DETERIORATION, AND EVIDENCE OF LOOSE CONNECTIONS. VERIFY PROPER OPERATION AND ENSURE THAT MEASUREMENTS ARE WITHIN TOLERANCE.				

Drum Rotation Indicators

Inspect wiring for:

- damage
- deterioration
- loose connections

Verify:

- proper operation

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
SHEET 13 OF									
CRANE									
NO.	INSPECTOR	TYPE	DATE	ITEMS TO BE INSPECTED	MAINTENANCE INSPECTOR SPECIFICATION	STATUS	CONDITION	REMARKS	DATE
13				DRUM ROTATION INDICATORS	INSPECT WIRING FOR DAMAGE OR DETERIORATION AND FOR EVIDENCE OF LOOSE CONNECTIONS. VERIFY PROPER OPERATION.				

Radius/Boom Angle Indicator

Verify actual radius by comparing to measured radii at the minimum and maximum boom operating positions. Measurements are made from the center line of rotation to the centerline of the hook. Verify boom angle indications by comparing the indicated boom angle to the boom angle on the load chart corresponding to the boom length and measured radius at the minimum and maximum boom operating positions.

Limit and Bypass Switches

Inspect electrical and mechanical components and wiring for damage, deterioration, and evidence of loose connections. Inspect enclosures for evidence of moisture and arcing.

Limit and Bypass Switches Continued

Inspect drive and actuating components for damage, deterioration, and proper lubrication. Look for loose or missing fasteners. During operation, verify proper functioning of limit switches, indicator lights, and bypass switches.

Radius/Boom Angle Indicator

Verify radius indications by comparing to measured radii:

- minimum boom operating position
- maximum boom operating position

Verify boom angle indications by:

- comparing to the boom angle on the load chart
- measure at minimum and maximum boom

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
SHEET 18 OF 27									
DATE	TIME	INSPECTOR	CRANE NO.	CRANE TYPE	CRANE CAPACITY	CRANE SERIAL NO.	CRANE MODEL	CRANE YEAR	CRANE LOCATION

Limit and Bypass Switches

Inspect electrical and mechanical components and wiring for:

- damage
- deterioration
- loose connections

Inspect enclosures for evidence of:

- moisture
- arcing

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
SHEET 18 OF 27									
DATE	TIME	INSPECTOR	CRANE NO.	CRANE TYPE	CRANE CAPACITY	CRANE SERIAL NO.	CRANE MODEL	CRANE YEAR	CRANE LOCATION

Limit and Bypass Switches (Continued)

Inspect components for:

- damage
- deterioration
- proper lubrication
- loose or missing fasteners

During operation, verify proper functioning of:

- limit switches
- indicator lights
- bypass switches

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
SHEET 18 OF 27									
DATE	TIME	INSPECTOR	CRANE NO.	CRANE TYPE	CRANE CAPACITY	CRANE SERIAL NO.	CRANE MODEL	CRANE YEAR	CRANE LOCATION

Warning Devices

Inspect components and associated wiring for damage, deterioration, and evidence of loose connections. During operation, verify proper functioning of devices.

Warning Devices

Inspect components and wiring for:

- damage
- deterioration
- evidence of loose connections

During operation, verify proper functioning of devices.

Electrical Hardware and General Lighting

Inspect conduits, raceways, junction boxes, light fixtures, and associated wiring for damage, deterioration, and loose connections. Verify operation of lights.

Electrical Hardware and General Lighting

Inspect:

- conduits
- raceways
- junction boxes
- light fixtures
- associated wiring

Look for evidence of:

- damage
- deterioration
- evidence of loose connections

Verify operation of lights.

Electrical Cable Reels

Inspect wiring and reel assembly for damage, deterioration, evidence of loose connections, and missing fasteners. Verify proper operation.

Electrical Cable Reels

Inspect wiring and reel assembly for:

- damage
- deterioration
- evidence of loose connections
- missing fasteners

Verify proper operation

Summary and Review

This module covered identification of electrical inspection criteria, NAVFAC P-307 requirements, and electrical inspection items that can be addressed by a mechanical inspector.

Summary and Review

Topics covered in this module were:

- electrical inspection criteria
- NAVFAC P-307 requirements
- electrical inspection items that can be addressed by a mechanical inspector

Knowledge Check

- 1. Select the best answer.** An operational test is required to verify the proper operation of all the following except—
 - A. breakers
 - B. indicator lights
 - C. limit switches
 - D. master switches
- 2. Select the best answer. True or False:** Like components installed on different types of cranes (bridge, mobile, portal) will always have the same voltage and ampere ratings; therefore, if mechanical personnel work center collector assemblies on mobile cranes, they can also work center collector assemblies on portal cranes.
 - A. True
 - B. False
- 3. Select the best answer.** To verify indicated load radius, the inspector shall measure from the—
 - A. head block to heel pin
 - B. hook to center pin
 - C. hook to ground
 - D. hook to head block
- 4. Select the best answer.** A center collector assembly transfers power between—
 - A. the controller and the motor
 - B. the generator and the controller
 - C. the stationary and rotating portion of the crane
 - D. none of the above

5. **Select the best answer.** A device that allows monitoring of the weight being lifted is a—
- A. hoist interlock
 - B. limit switch
 - C. load indicator
 - D. potentiometer
6. **Select the best answer.** You can verify a hoist limit switch setting by comparing the specifications to—
- A. proper type
 - B. the actual weight being picked up
 - C. the measurement from the center of rotation to the center of the shaft of the boom tip sheave
 - D. the physical measurement
7. **Select all that apply.** Where would mechanical personnel find policies and component ratings regarding low voltage work on cranes?
- A. activity engineering organization
 - B. activity safety organization
 - C. American Society of Mechanical Engineers (ASME)
 - D. NFPA/NEC
8. **Select the best answer.** Radius indicators shall be checked at—
- A. 30-, 45-, and 60-degrees boom angle radius
 - B. maximum boom radius
 - C. minimum and maximum boom radius
 - D. minimum boom radius

SIGMA INSPECTION SIGN OFFS

Welcome

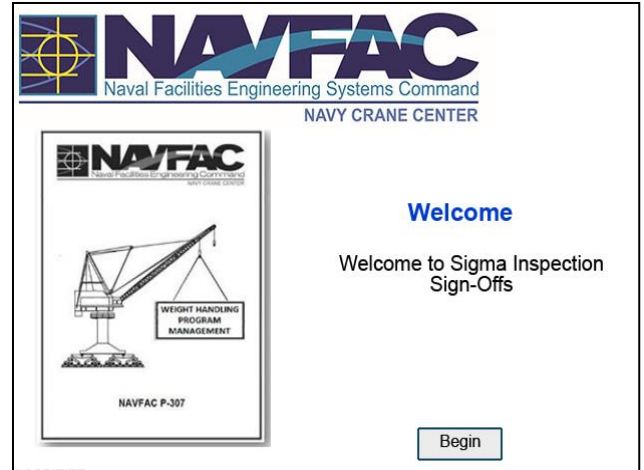
Welcome to Sigma Inspection Sign-Offs.

Introduction

This module presents the approved journeyman level inspection items found on the MISR and AMISR. These items may be inspected by a mechanic or electrician in lieu of an inspector. Using the MISR to illustrate an example you will learn how to identify these inspection items, the manner in which to document the inspection results, how to mark non-applicable items, and the procedure for documenting unsatisfactory items.

MISR and AMISR

Show here are copies of the Maintenance Inspection Specification and Record for Category1 and 4 cranes and the Annual maintenance Inspection Specification and Record for Category 2 and 3 cranes which are commonly referred to as MISR and AMISR. For illustration purposes, we show the MISR. The AMISR is completed the same way as the MISR. They both can be found in the NAVFAC P-307, Appendices C and D.



Introduction

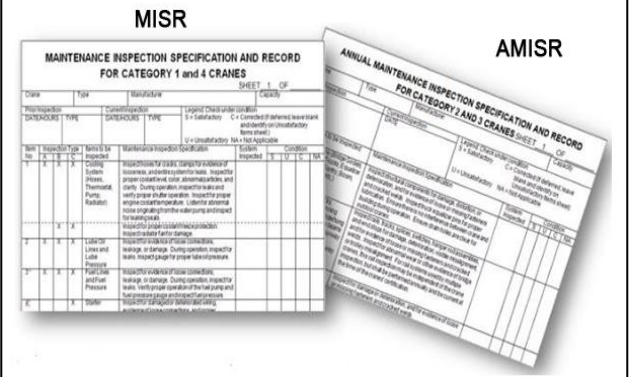
SIGMA INSPECTIONS σ

MAINTENANCE INSPECTION SPECIFICATION AND RECORD FOR CATEGORY 1 AND 4 CRANES									
Crane		Type	OEM		SHEET 1 OF		Capacity		
Prior Inspection DATE/HOURS		TYPE	Current Inspection DATE/HOURS		TYPE		Legend: Check under condition		
							S = Satisfactory C = Corrected (if deferred, leave blank and identify on Unsatisfactory Items sheet)		
							U = Unsatisfactory NA = Not Applicable		
Item No	Inspection Type			Items to be Inspected	Maintenance Inspection Specification	System Inspected	Condition		
	A	B	C				S	U	C
3	X	X	X	Fuel Lines and Fuel Pressure	Inspect for evidence of loose connections, leakage, or damage. During operation, inspect for leaks. Verify proper operation of the fuel pump and fuel pressure gauge and inspect fuel pressure.				

- Approved journeyman level inspection items
- Inspected by a mechanic or electrician
- Identify inspection items
- Document inspection results
- Document unsatisfactory items
- Mark non-applicable items

MISR and AMISR

These MISR's can be found in NAVFAC P-307 Appendix C and D.



Items Marked with Sigma

Note 11 of each appendix states, “Items marked with a lower-case sigma after the item number may be inspected by a mechanic or electrician in lieu of an inspector.”

MISR Completion

The following screens illustrate how the mechanic or electrician would fill out the MISR or AMISR when performing inspection signoffs on any of the items marked with a lower-case sigma.

Satisfactory Condition

If the item is inspected and found to be satisfactory, mark the Satisfactory or “S” condition box for that item as shown or as required by local instruction.

Items Marked with a Sigma

- NAVFAC P-307 Appendix C and D, see Note 11
- Electrician/Mechanic inspection attributes identified with lower case sigma
- Electrician/Mechanic can make MISR sign-offs

Class	Type	Code	Priority	Quantity
DATE/TIME	TYPE	CONDITION	TYPE	STATUS
1	X	S	X	X
2	X	S	X	X
3	X	S	X	X
4	X	S	X	X
5	X	S	X	X
6	X	S	X	X
7	X	S	X	X
8	X	S	X	X
9	X	S	X	X
10	X	S	X	X
11	X	S	X	X
12	X	S	X	X
13	X	S	X	X
14	X	S	X	X
15	X	S	X	X
16	X	S	X	X
17	X	S	X	X
18	X	S	X	X
19	X	S	X	X
20	X	S	X	X
21	X	S	X	X
22	X	S	X	X
23	X	S	X	X
24	X	S	X	X
25	X	S	X	X
26	X	S	X	X
27	X	S	X	X
28	X	S	X	X
29	X	S	X	X
30	X	S	X	X
31	X	S	X	X
32	X	S	X	X
33	X	S	X	X
34	X	S	X	X
35	X	S	X	X
36	X	S	X	X
37	X	S	X	X
38	X	S	X	X
39	X	S	X	X
40	X	S	X	X
41	X	S	X	X
42	X	S	X	X
43	X	S	X	X
44	X	S	X	X
45	X	S	X	X
46	X	S	X	X
47	X	S	X	X
48	X	S	X	X
49	X	S	X	X
50	X	S	X	X
51	X	S	X	X
52	X	S	X	X
53	X	S	X	X
54	X	S	X	X
55	X	S	X	X
56	X	S	X	X
57	X	S	X	X
58	X	S	X	X
59	X	S	X	X
60	X	S	X	X
61	X	S	X	X
62	X	S	X	X
63	X	S	X	X
64	X	S	X	X
65	X	S	X	X
66	X	S	X	X
67	X	S	X	X
68	X	S	X	X
69	X	S	X	X
70	X	S	X	X
71	X	S	X	X
72	X	S	X	X
73	X	S	X	X
74	X	S	X	X
75	X	S	X	X
76	X	S	X	X
77	X	S	X	X
78	X	S	X	X
79	X	S	X	X
80	X	S	X	X
81	X	S	X	X
82	X	S	X	X
83	X	S	X	X
84	X	S	X	X
85	X	S	X	X
86	X	S	X	X
87	X	S	X	X
88	X	S	X	X
89	X	S	X	X
90	X	S	X	X
91	X	S	X	X
92	X	S	X	X
93	X	S	X	X
94	X	S	X	X
95	X	S	X	X
96	X	S	X	X
97	X	S	X	X
98	X	S	X	X
99	X	S	X	X
100	X	S	X	X

MISR Completion

- The following screens illustrate how a mechanic or electrician would fill out the MISR when performing inspection sign-offs.
- When filling out the MISR, electricians and mechanics should follow all local instructions and procedures.

Class	Type	Code	Priority	Quantity
DATE/TIME	TYPE	CONDITION	TYPE	STATUS
1	X	S	X	X
2	X	S	X	X
3	X	S	X	X
4	X	S	X	X
5	X	S	X	X
6	X	S	X	X
7	X	S	X	X
8	X	S	X	X
9	X	S	X	X
10	X	S	X	X
11	X	S	X	X
12	X	S	X	X
13	X	S	X	X
14	X	S	X	X
15	X	S	X	X
16	X	S	X	X
17	X	S	X	X
18	X	S	X	X
19	X	S	X	X
20	X	S	X	X
21	X	S	X	X
22	X	S	X	X
23	X	S	X	X
24	X	S	X	X
25	X	S	X	X
26	X	S	X	X
27	X	S	X	X
28	X	S	X	X
29	X	S	X	X
30	X	S	X	X
31	X	S	X	X
32	X	S	X	X
33	X	S	X	X
34	X	S	X	X
35	X	S	X	X
36	X	S	X	X
37	X	S	X	X
38	X	S	X	X
39	X	S	X	X
40	X	S	X	X
41	X	S	X	X
42	X	S	X	X
43	X	S	X	X
44	X	S	X	X
45	X	S	X	X
46	X	S	X	X
47	X	S	X	X
48	X	S	X	X
49	X	S	X	X
50	X	S	X	X
51	X	S	X	X
52	X	S	X	X
53	X	S	X	X
54	X	S	X	X
55	X	S	X	X
56	X	S	X	X
57	X	S	X	X
58	X	S	X	X
59	X	S	X	X
60	X	S	X	X
61	X	S	X	X
62	X	S	X	X
63	X	S	X	X
64	X	S	X	X
65	X	S	X	X
66	X	S	X	X
67	X	S	X	X
68	X	S	X	X
69	X	S	X	X
70	X	S	X	X
71	X	S	X	X
72	X	S	X	X
73	X	S	X	X
74	X	S	X	X
75	X	S	X	X
76	X	S	X	X
77	X	S	X	X
78	X	S	X	X
79	X	S	X	X
80	X	S	X	X
81	X	S	X	X
82	X	S	X	X
83	X	S	X	X
84	X	S	X	X
85	X	S	X	X
86	X	S	X	X
87	X	S	X	X
88	X	S	X	X
89	X	S	X	X
90	X	S	X	X
91	X	S	X	X
92	X	S	X	X
93	X	S	X	X
94	X	S	X	X
95	X	S	X	X
96	X	S	X	X
97	X	S	X	X
98	X	S	X	X
99	X	S	X	X
100	X	S	X	X

Satisfactory Condition

When an item meets the inspection criteria:

- Record the “Satisfactory” condition on the MISR

Mark the appropriate condition box on the MISR

Class	Type	Code	Priority	Quantity
DATE/TIME	TYPE	CONDITION	TYPE	STATUS
1	X	S	X	X
2	X	S	X	X
3	X	S	X	X
4	X	S	X	X
5	X	S	X	X
6	X	S	X	X
7	X	S	X	X
8	X	S	X	X
9	X	S	X	X
10	X	S	X	X
11	X	S	X	X
12	X	S	X	X
13	X	S	X	X
14	X	S	X	X
15	X	S	X	X
16	X	S	X	X
17	X	S	X	X
18	X	S	X	X
19	X	S	X	X
20	X	S	X	X
21	X	S	X	X
22	X	S	X	X
23	X	S	X	X
24	X	S	X	X
25	X	S	X	X
26	X	S	X	X
27	X	S	X	X
28	X	S	X	X
29	X	S	X	X
30	X	S	X	X
31	X	S	X	X
32	X	S	X	X
33	X	S	X	X
34	X	S	X	X
35	X	S	X	X
36	X	S	X	X
37	X	S	X	X
38	X	S	X	X
39	X	S	X	X
40	X	S	X	X
41	X	S	X	X
42	X	S	X	X
43	X	S	X	X
44	X	S	X	X
45	X	S	X	X
46	X	S	X	X
47	X	S	X	X
48	X	S	X	X
49	X	S	X	X
50	X	S	X	X
51	X	S	X	X
52	X	S	X	X
53	X	S	X	X
54	X	S	X	X
55	X	S	X	X
56	X	S	X	X
57	X	S	X	X
58	X	S	X	X
59	X	S	X	X
60	X	S	X	X
61	X	S	X	X
62	X	S	X	X
63	X	S	X	X
64	X	S	X	X
65	X	S	X	X
66	X	S	X	X
67	X	S	X	X
68	X	S	X	X
69	X	S	X	X
70	X	S	X	X
71	X	S	X	X
72	X	S	X	X
73	X	S	X	X
74	X	S	X	X
75	X	S	X	X
76	X	S	X	X
77	X	S	X	X
78	X	S	X	X
79	X	S	X	X
80	X	S	X	X
81	X	S	X	X
82	X	S	X	X
83	X	S	X	X
84	X	S	X	X
85	X	S	X	X
86	X	S	X	X
87	X	S		

Inspection Signoffs

After completing the MISR inspections and marking the corresponding item(s) on the MISR, the mechanic or electrician will sign and date the MISR in the appropriate signature block.

Inspection Sign-Offs

- Make inspection sign-offs
- Make sure to use correct signature block (see Mechanic or Electrician)
- Sign and date

When complete, sign and date in the applicable signature block (e.g., Mechanic or Electrician).

Unsatisfactory Condition

If the item is inspected and found to be unsatisfactory, mark the Unsatisfactory or “U” condition box for the item as shown, or as required by local instruction.

Unsatisfactory Condition

When an item doesn't meet the inspection criteria:

- Record the “Unsatisfactory” condition on the MISR

Mark the appropriate condition box on the MISR

Unsatisfactory Items Sheet

All Unsatisfactory items shall be recorded on the Unsatisfactory Items Sheet. The first block is for the MISR Item Number of the unsatisfactory item. To clarify, this item number corresponds with the unsatisfactory inspection attribute or item number on the MISR. The next block is for the Deficiency. A brief yet concise statement of condition observed is entered here. The next block is for the SRO number. Corrective action in terms of adjustments, repairs, or replacements of items shall be detailed on a TWD, SRO, or other appropriate document, and the document number entered here.

MISR Unsatisfactory Items Sheet

- Next, complete the MISR Unsatisfactory Items Sheet:

- Use the item number from the MISR that corresponds to the unsatisfactory inspection attribute
- Statement of condition observed
- Enter the repair work order number

ELECTRICAL CRANE INSPECTOR STUDENT GUIDE

Corrected Condition

Once the item has been corrected, mark the Corrected or “C” in the appropriate condition box for that item as shown or as required by local instruction.

Verification of Correction

After marking the condition block as being corrected, sign and date the applicable Verification of Condition block on the Unsatisfactory items sheet that correspond to the corrected item.

Items that do not Pertain

When “NA” is used to note that an inspection criterion does not apply due to a reason other than the component or feature is not on the crane, or inspection is not required due to the type of inspection, follow as required Note 4 of Appendix C or D of the NAVFAC P-307 and all local instructions. Mark as “Not Applicable” or “NA” in the condition box for that item as shown.

Corrected Condition

- Once the Unsatisfactory item has been corrected:
- Mark MISR in the Corrected “C” Condition block
- Next, complete the MISR Unsatisfactory Items Sheet

DATE	TYPE	DEFECT	STATUS	REMARKS	INITIALS	DATE
1	X	X	X	...		
2	X	X	X	...		
3	X	X	X	...		
4	X	X	X	...		
5	X	X	X	...		
6	X	X	X	...		
7	X	X	X	...		
8	X	X	X	...		
9	X	X	X	...		
10	X	X	X	...		
11	X	X	X	...		
12	X	X	X	...		
13	X	X	X	...		
14	X	X	X	...		
15	X	X	X	...		
16	X	X	X	...		
17	X	X	X	...		
18	X	X	X	...		
19	X	X	X	...		
20	X	X	X	...		

Mark the appropriate condition box on the MISR

Verification of Correction

- Finally, sign the Unsatisfactory Items Sheet:
- After marking the item “C” on the MISR
- Complete the MISR Unsatisfactory Item Sheet
- Make verification signature and date

NO.	DESCRIPTION OF DEFICIENCY	DATE CORRECTED	VERIFICATION OF CORRECTION (Signature and Date)
3	Damage to fuel hose on fuel pump.	17-0113	

Verification of Correction signature and date is entered here.

Items That Do Not Pertain to the Crane

- For instructions on N/A'd items see:
- NAVFAC P-307 Appendix C and D, Note 4

DATE	TYPE	DEFECT	STATUS	REMARKS	INITIALS	DATE
1	X	X	X	...		
2	X	X	X	...		
3	X	X	X	...		
4	X	X	X	...		
5	X	X	X	...		
6	X	X	X	...		
7	X	X	X	...		
8	X	X	X	...		
9	X	X	X	...		
10	X	X	X	...		
11	X	X	X	...		
12	X	X	X	...		
13	X	X	X	...		
14	X	X	X	...		
15	X	X	X	...		
16	X	X	X	...		
17	X	X	X	...		
18	X	X	X	...		
19	X	X	X	...		
20	X	X	X	...		

Mark the appropriate condition box on the MISR

Knowledge Check

1. **Select the best answer.** The MISR and the AMISR can be found in what section of the NAVFAC P-307?
 - A. Appendix A and B
 - B. Appendix B and C
 - C. Appendix C and D
 - D. Appendix D and E

2. **Select the best answer.** How are mechanic and electrician inspection attributes identified?
 - A. They are identified with a lower-case sigma after the item number.
 - B. They are only on the first page of the AMISR after the signature block.
 - C. They are only on the first page of the MISR after the signature block.
 - D. They are only on the first page of the MISR.

3. **Select the best answer. True or False:** If an item is found unsatisfactory, you must mark the item unsatisfactory and complete the MISR or AMISR unsatisfactory items sheet.
 - A. True
 - B. False

4. **Select the best answer.** When filling out the MISR or AMISR unsatisfactory items sheet, you must describe the problem in detail and sign and date the sheet.
 - A. True
 - B. False

5. **Select all that apply.** After correcting an unsatisfactory item on a MISR, you must—
 - A. complete the MISR unsatisfactory sheet
 - B. mark the item on the MISR as complete
 - C. review the test procedure
 - D. sign and date the verification of correction

Completion

Congratulations.
You have completed Sigma Inspection Sign-Offs.
Click on the Exit button to return to the main module menu.



ELECTRICAL CRANE INSPECTOR EVALUATION SHEET

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
