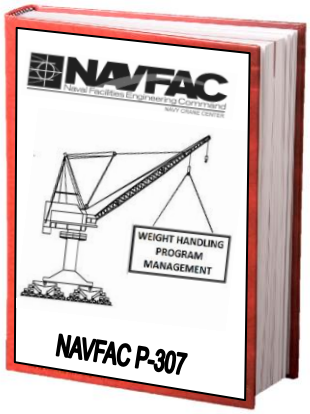
Navy Crane Center



NAVFAC P-307 Training

ELECTRICAL CRANE INSPECTOR

WEB BASED TRAINING STUDENT GUIDE

NCC-ECI-02

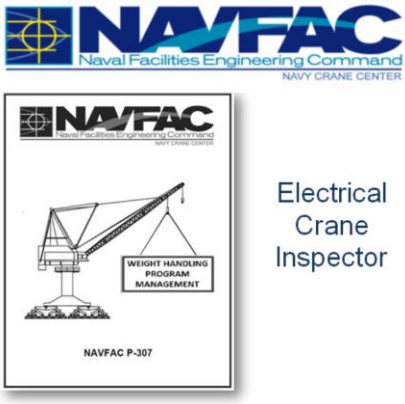
Naval Facilities Engineering Command
Navy Crane Center
Norfolk Naval Shipyard, Bldg. 491
Portsmouth, VA 23709-5000
Comm. Phone: 757.967.3803, DSN: 387
Fax: 757.967.3808
http://www.navfac.navy.mil/ncc

TABLE OF CONTENTS

ECI INTRODUCTION

WELCOME & OVERVIEW

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



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.

COURSE OBJECTIVES

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 base on which to build upon with on-the-job experience. Topics include specific documentation requirements for inspection and record keeping.

COURSE MODULES

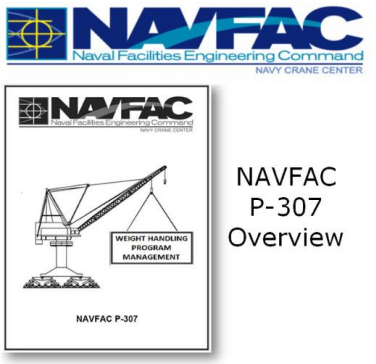
Following a brief explanation on navigating this type of web based training course, you will be required to complete an overview of the NAVFAC P-307 Weight Handling Program Management Manual.

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.

NAVFAC P-307 OVERVIEW SECTIONS 1-14

WELCOME

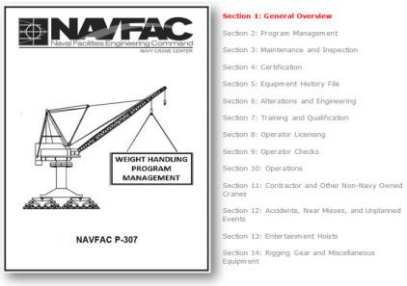
This training contains abbreviated explanations of the content found in this manual. You are encouraged to have a copy of the NAVFAC P-307 manual available for reference as you go through this material. In the execution of your weight handling tasks and duties, always refer directly to the NAVFAC P-307 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.



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.

SECTION 1: GENERAL

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.

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.

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.

Equipment

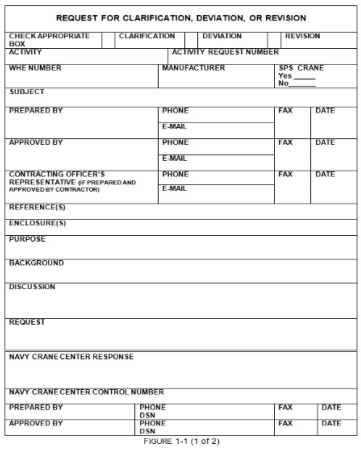
NAVFAC P-307 covers shore-based category 1, 2, 3, and 4 cranes including shore-based barge-mounted cranes. Detailed descriptions of the crane types are contained in Section 1. Illustrations of individual crane types can be found in Appendix B. Rigging Gear is covered in Section 14.

Program

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 R C D R, 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.



REQUEST FOR CLARIFICATION, DEVIATION, OR REVISION

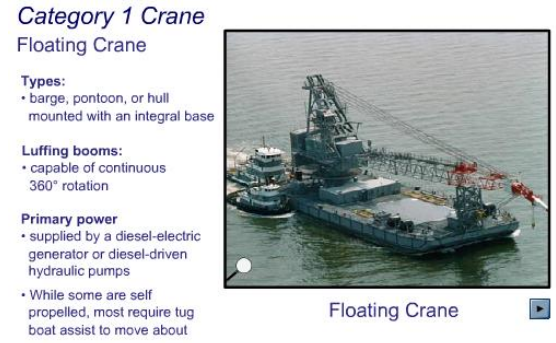
CHECK APPROPRIATE BOX	CLARIFICATION	DEVIATION	REVISION
ACTIVITY		ACTIVITY REQUEST NUMBER	
WHE NUMBER	MANUFACTURER	SPS CRANE Yes ____ No ____	
SUBJECT			
PREPARED BY	PHONE / E-MAIL	FAX	DATE
APPROVED BY	PHONE / E-MAIL	FAX	DATE
CONTRACTING OFFICER'S REPRESENTATIVE (IF PREPARED AND APPROVED BY CONTRACTOR)	PHONE / E-MAIL	FAX	DATE
REFERENCE(S)			
ENCLOSURE(S)			
PURPOSE			
BACKGROUND			
DISCUSSION			
REQUEST			
NAVY CRANE CENTER RESPONSE			
NAVY CRANE CENTER CONTROL NUMBER			
PREPARED BY	PHONE DSN	FAX	DATE
APPROVED BY	PHONE DSN	FAX	DATE

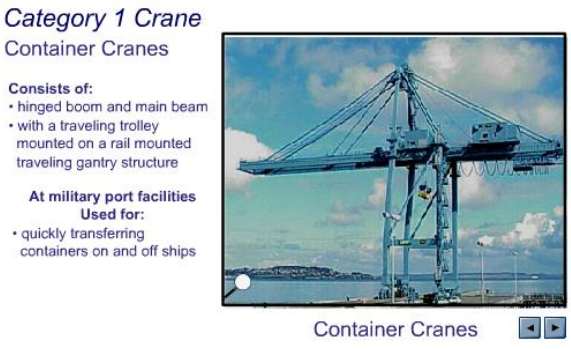
FIGURE 1-1 (1 of 2)

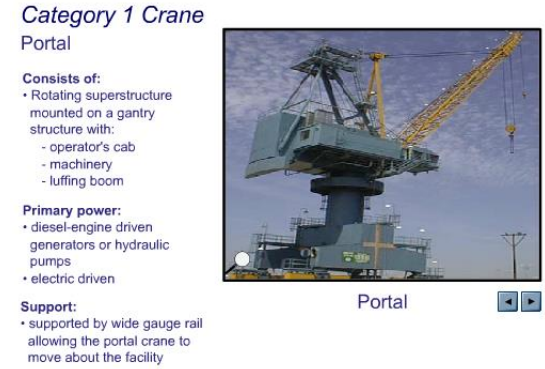
Category 1 Cranes & Examples

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, e.g., monorail, jib crane, gantry crane.







Category 1 Crane
Mobile Crane

Example:
Truck mounted hydraulic Cranes
• most common mobile cranes

Consists of:
• rotating superstructure
• upperworks mounted on an specialized truck chassis equipped with a power plant and cab for traveling over the road

Primary power:
• one engine for both the upper works and the carrier or
• a separate engine for each

Mobile

Category 1 Crane
Derrick

Example:
• crane with a boom hinged near the base of a fixed mast

Typically:
• boom may rotate 90° or more between the mast supports or "stiff legs" or members capable of resisting both tensile and compressive forces

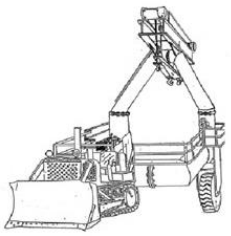
Derrick

MBH

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.

LCRU

A landing craft retrieval unit, or L C R U, 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.



RTG

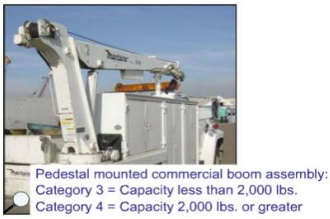
A rubber tire gantry crane may be single beamed or double beamed. Often it resembles a mobile bridge crane with its hoist mounted on a bridge which spans two beams. As shown in the illustration, it may be configured with two hoists mounted on opposing beams which utilize a spreader bar or similar mechanism 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.

Category 4 Crane Examples

Screen 1, General: 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. *Click on the right and left arrows at the bottom of the slide show window to view each of the 4 screens.*

Screen 2, Booms & 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 & 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.



Screen 4, Standards & Licensing: Commercial truck mounted cranes, as described in ASME B-30.5, and articulating boom cranes, as described in ASME B-30.22, 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.

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.

EXAMPLES

Category 2 and 3 Cranes

Bridge or OET Crane

Example:
- cab-operated
- can be pendant or radio controlled

Principal parts include:
- Bridge girders, end trucks, trolley with hoisting mechanism, and operator's cab or pendant control

Mobility:
- limited to the area between the runways

Bridge or OET Crane

Category 2 and 3 Cranes

Pillar-Jib Crane

- A fixed crane consisting of a rotating vertical member with a horizontal arm supporting a trolley and hoist
- Normally rotates 360°

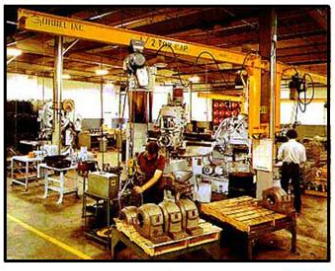
Pillar Jib

Category 2 and 3 Cranes

Jibs

Points:
- normally category 3 cranes
- category 2 if certified capacity of 20,000 pounds or greater

Consists of:
- a rotating horizontal boom (either cantilevered or supported by tie rods) carrying a trolley and hoist.
- usually mounted on a wall or building column



Jib

Category 2 and 3 Cranes

Trolley Mounted Overhead Hoist

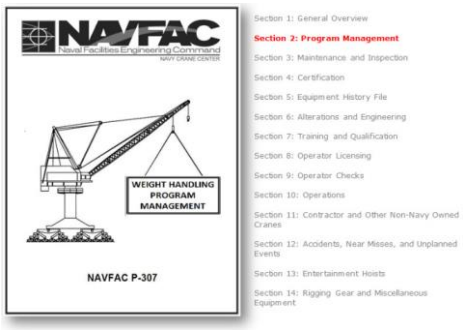
Consists of:
- an under-hung trolley
- one or more drums and sheaves for wire rope or chain

Powered by:
- manual
- electric
- hydraulic
- or pneumatic powered

Mobility:
- fixed
- or may travel on jib crane booms or monorail track

Trolley Mounted Overhead Hoist

SECTION 2: PROGRAM MANAGEMENT



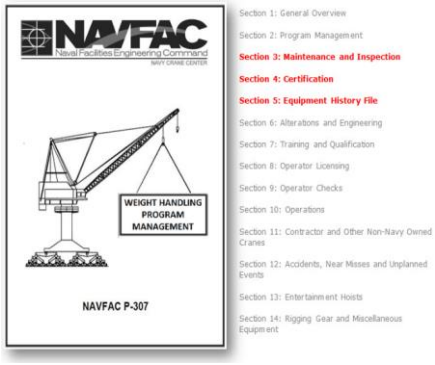
Introduction

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

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: MAINTENANCE, INSPECTION, CERTIFICATION, EQUIP HISTORY FILE



Introduction

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

Topics

Sections 3 and 4 provide requirements for crane maintenance, inspection and certification functions of a weight handling program.

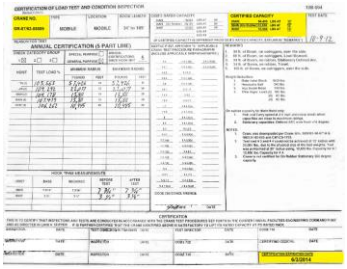
Section 3 lists requirements for maintenance and inspection personnel, the different types of inspections and their frequencies, how deficiencies and work deferrals are processed, and the performance of routine service work.

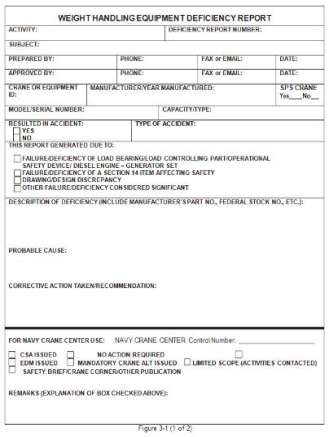
Section 4 picks up after maintenance and provides the requirements for certifying a crane for use. This includes personnel requirements, certification periodicities, load test requirements, test weights and capacities, the voiding and extending of certifications, considerations for specific types of 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.





WEIGHT HANDLING EQUIPMENT DEFICIENCY REPORT

ACTIVITY: DEFICIENCY REPORT NUMBER:

SUBJECT:

PREPARED BY: PHONE: FAX or EMAIL: DATE:

APPROVED BY: PHONE: FAX or EMAIL: DATE:

CRANE OR EQUIPMENT ID: MANUFACTURER/YEAR MANUFACTURED: SPS CRANE: Yes___No___

MODEL/SERIAL NUMBER: CAPACITY/TYPE:

RESULTED IN ACCIDENT: ☐ YES ☐ NO TYPE OF ACCIDENT:

THIS REPORT GENERATED DUE TO:

☐ FAILURE/DEFICIENCY OF LOAD BEARING/LOAD CONTROLLING PART/OPERATIONAL SAFETY DEVICE/ DIESEL ENGINE – GENERATOR SET
☐ FAILURE/DEFICIENCY OF A SECTION 14 ITEM AFFECTING SAFETY
☐ DRAWING/DESIGN DISCREPANCY
☐ OTHER FAILURE/DEFICIENCY CONSIDERED SIGNIFICANT

DESCRIPTION OF DEFICIENCY (INCLUDE MANUFACTURER'S PART NO., FEDERAL STOCK NO., ETC.):

PROBABLE CAUSE:

CORRECTIVE ACTION TAKEN/RECOMMENDATION:

FOR NAVY CRANE CENTER USE: NAVY CRANE CENTER Control Number: _____

☐ CSA ISSUED ☐ NO ACTION REQUIRED ☐
☐ CDM ISSUED ☐ MANDATORY CRANE ALT ISSUED ☐ LIMITED SCOPE (ACTIVITIES CONTACTED)
☐ SAFETY BRIEF/CRANE CORNER/OTHER PUBLICATION

REMARKS (EXPLANATION OF BOX CHECKED ABOVE):

Figure 3-1 (1 of 2)

Figure 3-1

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 W H E D R (pronounced: weeder), shall be used to report the deficiency to Navy Crane Center.

Figure 4-1

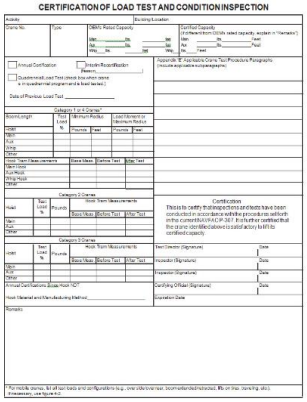

CERTIFICATION OF LOAD TEST AND CONDITION INSPECTION

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.

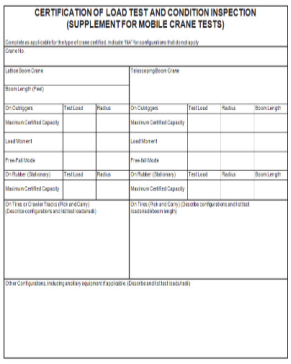

CERTIFICATION OF LOAD TEST AND CONDITION INSPECTION
(SUPPLEMENT FOR MOBILE CRANE TESTS)

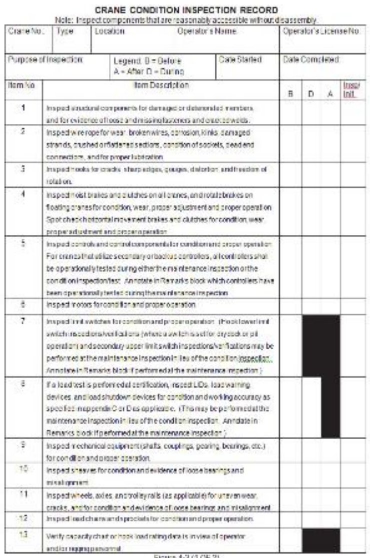
Figure 4-2

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.

Figure 4-3

Figure 4-3, the *Crane Condition Inspection Record*, or C C I R, is the form used to perform and document this inspection.



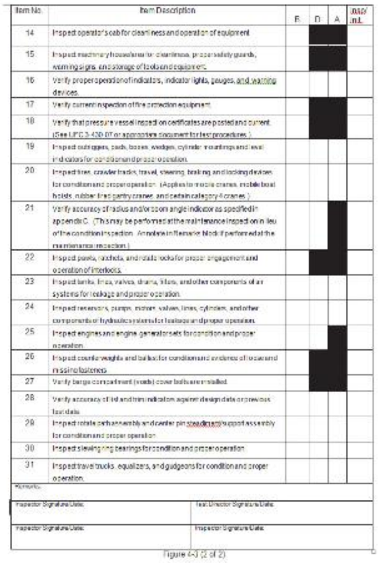
CRANE CONDITION INSPECTION RECORD

Note: Inspect components that are reasonably accessible without disassembly.

Crane No.	Type	Location	Operator's Name	Operator's License No.
Purpose of Inspection	Legend: B = Before A = After D = During		Date Started	Date Completed

Item No.	Item Description	B	D	A	Insp/ Init.
1	Inspect structural components for damaged or deteriorated members and for evidence of loose and missing fasteners and cracked welds.				
2	Inspect wire rope for wear, broken wires, corrosion, kinks, damaged strands, crushed or flattened sections, condition of sockets, dead end connections, and for proper lubrication.				
3	Inspect hooks for cracks, sharp edges, gouges, distortion, and freedom of rotation.				
4	Inspect hoist brakes and clutches on all cranes, and rotate brakes on floating cranes for condition, wear, proper adjustment and proper operation. Spot check horizontal movement brakes and clutches for condition, wear, proper adjustment and proper operation.				
5	Inspect controls and control components for condition and proper operation. For cranes that utilize secondary or backup controllers, all controllers shall be operationally tested during either the maintenance inspection or the condition inspection/test. Annotate in Remarks block which controllers have been operationally tested during the maintenance inspection.				
6	Inspect motors for condition and proper operation.				
7	Inspect limit switches for condition and proper operation. (Hook lower limit switch inspections/verifications (where a switch is set for drydock or pit operations) and secondary upper limit switch inspections/verifications may be performed at the maintenance inspection in lieu of the condition inspection. Annotate in Remarks block if performed at the maintenance inspection.)				
8	If a load test is performed at certification, inspect LIDs, load warning devices, and load shutdown devices for condition and working accuracy as specified in appendix C or D as applicable. (This may be performed at the maintenance inspection in lieu of the condition inspection. Annotate in Remarks block if performed at the maintenance inspection.)				
9	Inspect mechanical equipment (shafts, couplings, gearing, bearings, etc.) for condition and proper operation.				
10	Inspect sheaves for condition and evidence of loose bearings and misalignment.				
11	Inspect wheels, axles, and trolley rails (as applicable) for uneven wear, cracks, and for condition and evidence of loose bearings and misalignment.				
12	Inspect load chains and sprockets for condition and proper operation.				
13	Verify capacity chart or hook load rating data is in view of operator and/or rigging personnel.				

Figure 4-3 (1 OF 2)



Item No.	Item Description	B	D	A	Insp/ Init.
14	Inspect operator's cab for cleanliness and operation of equipment.				
15	Inspect machinery house/area for cleanliness, proper safety guards, warning signs, and storage of tools and equipment.				
16	Verify proper operation of indicators, indicator lights, gauges, and warning devices.				
17	Verify current inspection of fire protection equipment.				
18	Verify that pressure vessel inspection certificates are posted and current. (See UFC 3-430-07 or appropriate document for test procedures.)				
19	Inspect outriggers, pads, boxes, wedges, cylinder mountings and level indicators for condition and proper operation.				
20	Inspect tires, crawler tracks, travel, steering, braking and locking devices for condition and proper operation. (Applies to mobile cranes, mobile boat hoists, rubber tired gantry cranes, and certain category 4 cranes.)				
21	Verify accuracy of radius and/or boom angle indicator as specified in appendix C. (This may be performed at the maintenance inspection in lieu of the condition inspection. Annotate in Remarks block if performed at the maintenance inspection.)				
22	Inspect pawls, ratchets, and rotate locks for proper engagement and operation of interlocks.				
23	Inspect tanks, lines, valves, drains, filters, and other components of air systems for leakage and proper operation.				
24	Inspect reservoirs, pumps, motors, valves, lines, cylinders, and other components of hydraulic systems for leakage and proper operation.				
25	Inspect engines and engine generator sets for condition and proper operation.				
26	Inspect counterweights and ballast for condition and evidence of loose and missing fasteners.				
27	Verify barge compartment (voids) cover bolts are installed.				
28	Verify accuracy of list and trim indicators against design data or previous test data.				
29	Inspect rotate path assembly and center pin steadiment/support assembly for condition and proper operation.				
30	Inspect slewing ring bearings for condition and proper operation.				
31	Inspect travel trucks, equalizers, and gudgeons for condition and proper operation.				

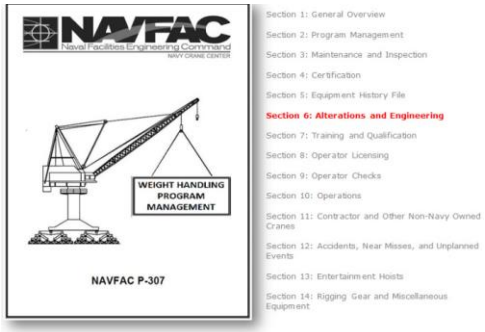
Remarks:	
Inspector Signature/Date:	Test Director Signature/Date:
Inspector Signature/Date:	Inspector Signature/Date:

Figure 4-3 (2 of 2)

SECTION 6: ALTERATIONS AND ENGINEERING

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.

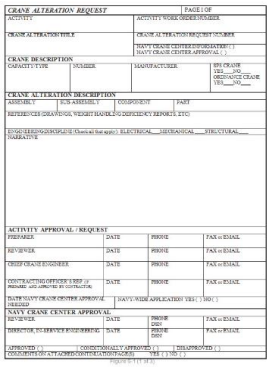


Topics

Section 6 not only provides the details on the types of crane alterations but also offers a wide variety of engineering information on end connections, indicators, crane clearances, equipment repairs and replacement, damaged booms, crane stability and overload protection. Additional engineering policy and guidance on crane alterations can be found in appendix O.

Figure 6-1

Alterations shall be documented on Figure 6-1, the *Crane Alteration Request*, which is commonly referred to by the acronym "CAR".



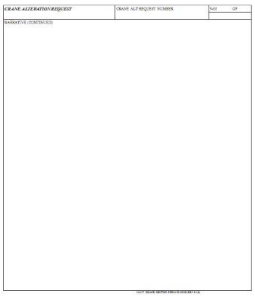


Figure 6-2

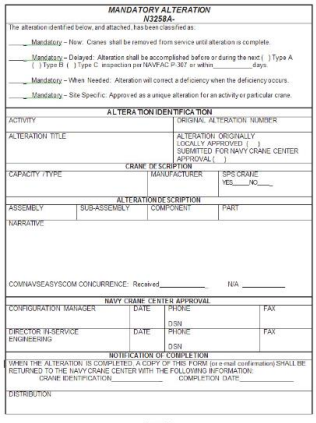
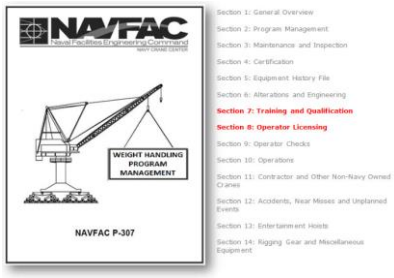


Figure 6-2, the *Mandatory Alteration*, is used by Navy Crane Center to issue mandatory alteration notices and directions. Activities shall provide notification of completion of the mandatory alteration to Navy Crane Center upon accomplishment by using figure 6-2. E-mail or fax is acceptable.

SECTIONS 7 AND 8: TRAINING, QUALIFICATION, AND OPERATOR LICENSING

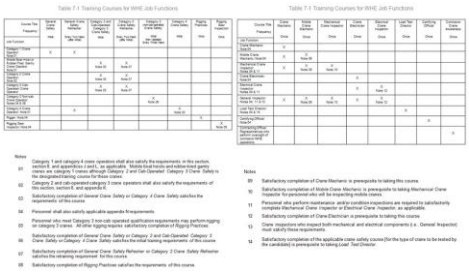
Introduction



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.

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 N E L. Table 7-1 shown here.



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.

Ops 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.

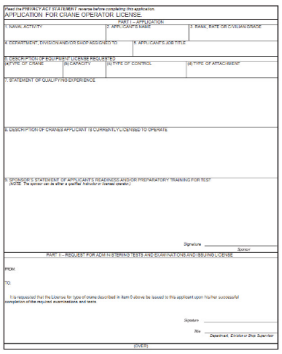


Figure 8-1 (1 of 2)

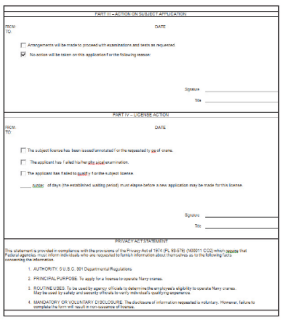


Figure 8-1 (2 of 2)

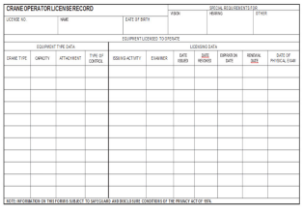
Figure 8-2

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

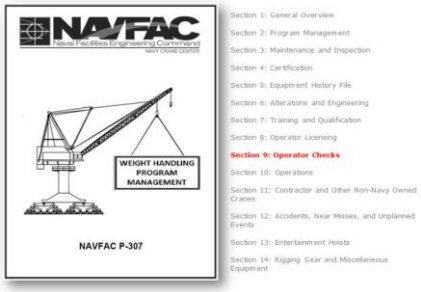
Figure 8-3



CRANE OPERATOR LICENSE RECORD

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.

SECTION 9: OPERATOR CHECKS



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.

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

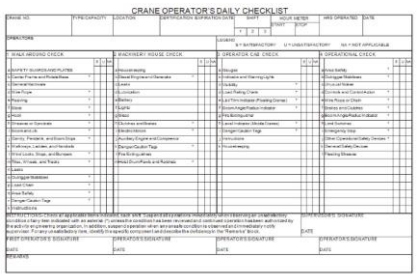
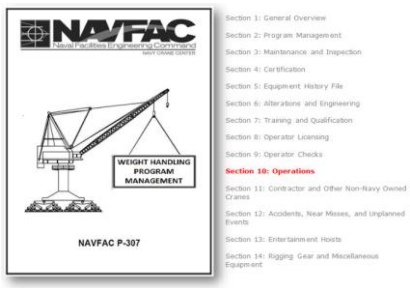

CRANE OPERATOR'S DAILY CHECKLIST

Figure 9-1, the *Crane Operator's Daily Checklist* or O D C L, 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 O D C L and review any tags posted on the crane. For cranes used in construction operations, a complete check shall be performed each shift.

SECTION 10: OPERATIONS



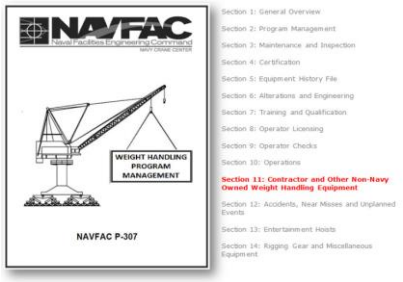
Introduction

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

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: CONTRACTOR AND OTHER NON-NAVY OWNED CRANES



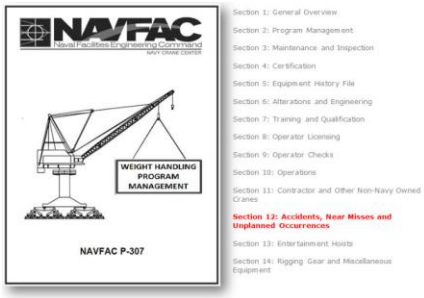
Introduction

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

Non-Navy 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 12: ACCIDENTS, NEAR MISSES, AND UNPLANNED OCCURRENCES



Introduction

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

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.

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.

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
- 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
- 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.

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

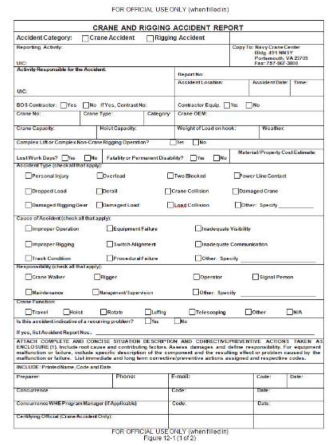
A rigging accident occurs when any of the elements in the operating envelope fails to perform correctly during a rigging operation resulting in any of the following:

- 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.

<u>Figure 12-1</u>


FOR OFFICIAL USE ONLY (when filled in)

CRANE AND RIGGING ACCIDENT REPORT

Accident Category: ☐ Crane Accident ☐ Rigging Accident

Reporting Activity:
UIC:

Copy To: Navy Crane Center
Bldg. 491 NNSY
Portsmouth, VA 23709
Fax: 757-967-3808

Activity Responsible for the Accident:
UIC:

Report No:
Accident Location: | Accident Date: | Time:

BOS Contractor: ☐ Yes ☐ No If Yes, Contract No: | Contractor Equip. ☐ Yes ☐ No

Crane No: | Crane Type: | Category: | Crane OEM:

Crane Capacity: | Hoist Capacity: | Weight of Load on hook: | Weather:

Complex Lift or Complex Non-Crane Rigging Operation? ☐ Yes ☐ No

Lost Work Days? ☐ Yes ☐ No | Fatality or Permanent Disability? ☐ Yes ☐ No | Material/Property Cost Estimate:

Accident Type (check all that apply):
☐ Personal Injury ☐ Overload ☐ Two Blocked ☐ Power Line Contact
☐ Dropped Load ☐ Derail ☐ Crane Collision ☐ Damaged Crane
☐ Damaged Rigging Gear ☐ Damaged Load ☐ Load Collision ☐ Other: Specify ________

Cause of Accident (check all that apply):
☐ Improper Operation ☐ Equipment Failure ☐ Inadequate Visibility
☐ Improper Rigging ☐ Switch Alignment ☐ Inadequate Communication
☐ Track Condition ☐ Procedural Failure ☐ Other: Specify ________

Responsibility (check all that apply):
☐ Crane Walker ☐ Rigger ☐ Operator ☐ Signal Person
☐ Maintenance ☐ Management/Supervision ☐ Other: Specify ________

Crane Function:
☐ Travel ☐ Hoist ☐ Rotate ☐ Luffing ☐ Telescoping ☐ Other ☐ N/A

Is this accident indicative of a recurring problem? ☐ Yes ☐ No
If yes, list Accident Report Nos.: ________

ATTACH COMPLETE AND CONCISE SITUATION DESCRIPTION AND CORRECTIVE/PREVENTIVE ACTIONS TAKEN AS ENCLOSURE (1). Include root cause and contributing factors. Assess damages and define responsibility. For equipment malfunction or failure, include specific description of the component and the resulting effect or problem caused by the malfunction or failure. List immediate and long term corrective/preventive actions assigned and respective codes.

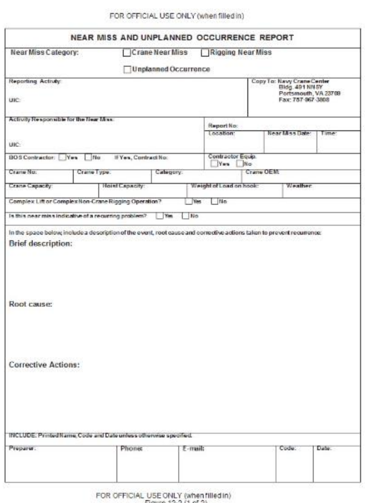
INCLUDE: Printed Name, Code and Date

Preparer: | Phone: | E-mail: | Code: | Date:
Concurrence | Code: | Date:
Concurrence WHE Program Manager (If Applicable) | Code: | Date:
Certifying Official (Crane Accident Only):

FOR OFFICIAL USE ONLY (when filled in)
Figure 12-1 (1 of 2)

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 in)

NEAR MISS AND UNPLANNED OCCURRENCE REPORT

Near Miss Category: ☐ Crane Near Miss ☐ Rigging Near Miss
☐ Unplanned Occurrence

Reporting Activity:
UIC:

Copy To: Navy Crane Center
Bldg. 491 NNSY
Portsmouth, VA 23709
Fax: 757-967-3808

Activity Responsible for the Near Miss:
UIC:

Report No:
Location: | Near Miss Date: | Time:

BOS Contractor: ☐ Yes ☐ No If Yes, Contract No: | Contractor Equip. ☐ Yes ☐ No

Crane No: | Crane Type: | Category: | Crane OEM:

Crane Capacity: | Hoist Capacity: | Weight of Load on hook: | Weather:

Complex Lift or Complex Non-Crane Rigging Operation? ☐ Yes ☐ No

Is this near miss indicative of a recurring problem? ☐ Yes ☐ No

In the space below, include a description of the event, root cause and corrective actions taken to prevent recurrence:

Brief description:

Root cause:

Corrective Actions:

INCLUDE: Printed Name, Code and Date unless otherwise specified.

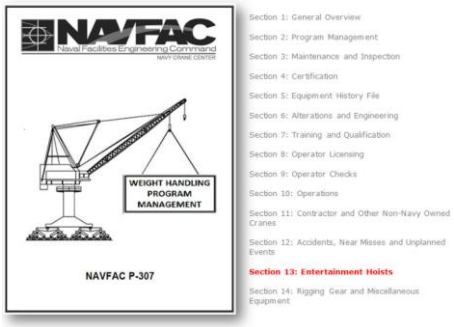
Preparer: | Phone: | E-mail: | Code: | Date:

FOR OFFICIAL USE ONLY (when filled in)
Figure 12-2 (1 of 2)

<u>Figure 12-2</u>

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.

SECTION 13: ENTERTAINMENT HOISTS



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.

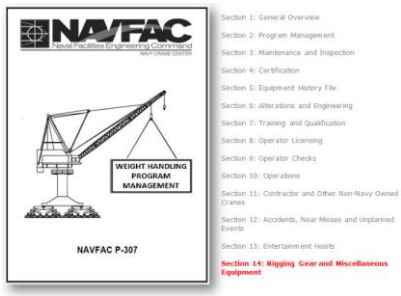
Entertainment Hoists

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 14: RIGGING GEAR AND MISCELLANEOUS EQUIPMENT

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.

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.

NOTES

NAVFAC P-307 OVERVIEW APPENDICES A-R

APPENDIX A: GLOSSARY

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.

Roll you mouse over each question below to view three sample definitions found in the glossary.

Binding Condition

The condition that exists when a load being lifted or lowered is not free to move due to an external force such as friction, suction, the object being frozen or rusted to another object, or paint. Additionally, potential for unremoved restraints (e.g., fasteners or welds) due to complexity, number, or location/accessibility.

Crane Attachment

A structural and/or mechanical component added to a piece of materials handling equipment (forklift) or equipment covered by NAVFAC P-300 (backhoe, front-end loader) that extends the load center of the machine beyond the machine's existing capability without the component.

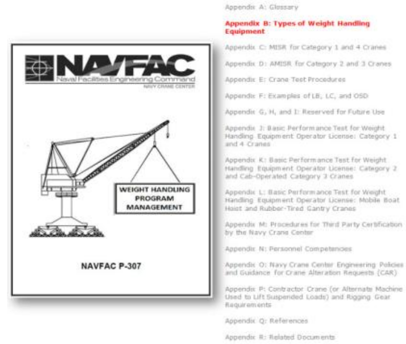
Multi-Purpose Machine

A machine that is designed to be configured in various ways, at least one of which allows it to hoist (by means of a winch or hook) and horizontally move a suspended load. This includes machines that are sometimes referred to as telescopic handlers or rough-terrain forklifts.

APPENDIX B: TYPES OF WHE

Introduction

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



Types of WHE

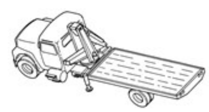
They say a picture is worth a thousand words. If so, Appendix B reads like a novel. It contains close to 50 drawings that illustrate the basic configurations of many crane types found in the Navy's inventory. Like Appendix A, it is intended to improve communication and understanding within the Navy's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

A sampling of Appendix B illustrations is provided below.

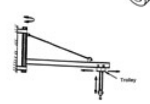
Test your understanding by correctly matching terms 1 through 7 to the pictured cranes by clicking in the appropriate box.

Q: Match terms 1 through 7 with the correct Appendix B illustration by clicking on the appropriate box next to each crane pictured.

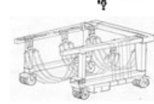
1. Semi-Gantry Crane
2. Rubber-Tired Gantry
3. Commercial Truck Mounted Articulating Boom Crane
4. Jib crane
5. Pillar Jib Crane
6. Mobile Boat Hoist
7. Portal Crane



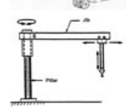
☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7



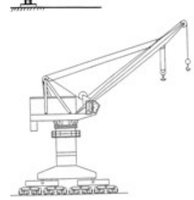
☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7



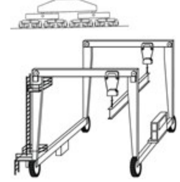
☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7



☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7



☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7



☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

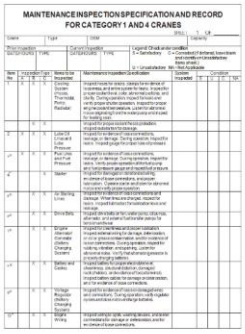
☐1 ☐2 ☐3 ☐4 ☐5 ☐6 ☐7

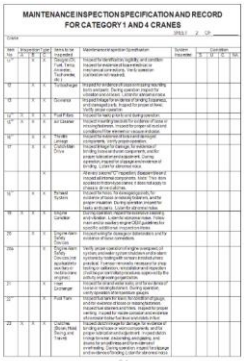
APPENDICES C AND D: MISR AND AMISR

Introduction

NAVFAC P-307 appendixes 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

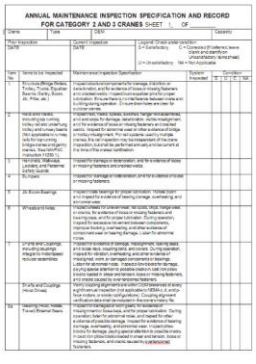


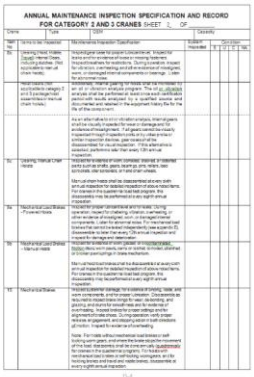


Appendix C contains the *Maintenance Inspection Specification and Record* for category 1 and 4 cranes. This document is commonly referred to by the acronym M-I-S-R and is pronounced “mizer”. You can see in the illustration a sample of the many items that must be inspected, the manner or specification 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.

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 A-M-I-S-R 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 E: CRANE TEST PROCEDURES

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.

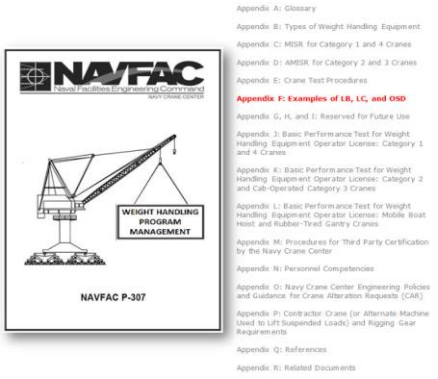

Jib crane load test.

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 F: EXAMPLES OF LB PARTS, LC PARTS, AND OSDS

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

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.

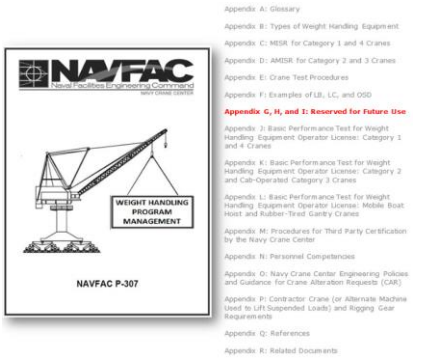
Below is a sample listing of components from NAVFAC P-307 appendix F. Correctly identify each item as either a load bearing part, a load controlling part or an operational safety device.

1. Load Bearing Part
2. Load Controlling Part
3. Operational Safety Device

Hook	☐1	☐2	☐3
Radius Indicator	☐1	☐2	☐3
Travel Gear Shafts	☐1	☐2	☐3
Hoist Drive Train Components	☐1	☐2	☐3
Rotate Electric Brakes	☐1	☐2	☐3
Overload Indicator with Shutdown Capability	☐1	☐2	☐3
Upper Hoist Limit Switch	☐1	☐2	☐3
Wire Rope Drum	☐1	☐2	☐3
Anti-Two-Block Warning Limit Switch	☐1	☐2	☐3
Crane Mounted Electrical Power Distribution	☐1	☐2	☐3

APPENDICES G, H, AND I: RESERVED

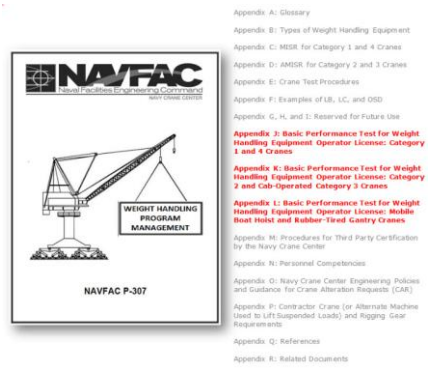
Introduction



The content of NAVFAC P-307 appendixes 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 appendixes are now reserved for future use.

APPENDICES J, K, AND L: CRANE OPERATOR BASIC PERFORMANCES TESTS

Introduction



NAVFAC P-307 appendixes 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.

Topics

This screen provides descriptions of the content for each appendix. *Click on each appendix title to view these descriptions.*

Appendix J

Appendix J contains the basic performance test requirements and instructions for applicants of category 1 and 4 crane licenses.

Appendix K

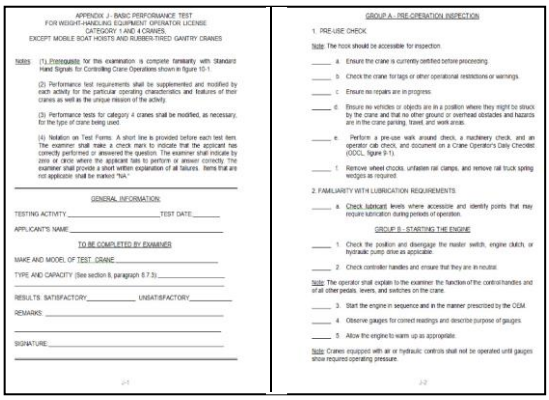
Appendix K provides the basic performance test requirements and instructions for applicants of category 2 and cab-operated category 3 crane licenses.

Appendix L

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

Cat 1&4 PT

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 - BASIC PERFORMANCE TEST
FOR WEIGHT-HANDLING 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 zero 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 8, paragraph 8.7.3):_____

RESULTS: SATISFACTORY_____ UNSATISFACTORY_____

REMARKS: _____

SIGNATURE:_____

J-1

GROUP A - PRE-OPERATION INSPECTION

1. PRE-USE CHECK

Note: The hook should be accessible for inspection.

_____ a. Ensure the crane is currently certified before proceeding.

_____ b. Check the crane for tags or other operational restrictions or warnings.

_____ c. Ensure no repairs are in progress.

_____ d. 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 crane parking, travel, and work areas.

_____ e. Perform a pre-use walk around check, a machinery check, and an operator cab check, and document on a Crane Operator's Daily Checklist (CDCL, figure 9-1).

_____ f. Remove wheel chocks, unfasten rail clamps, and remove rail truck spring wedges as required.

2. FAMILIARITY WITH LUBRICATION REQUIREMENTS

_____ a. 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 switch, engine clutch, or hydraulic pump drive as applicable.

_____ 2. Check controller handles and ensure that they are in neutral.

Note: The operator shall explain to the examiner the function of the control handles and of all other pedals, levers, and switches on the crane.

_____ 3. Start the engine in sequence and in the manner prescribed by the OEM.

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

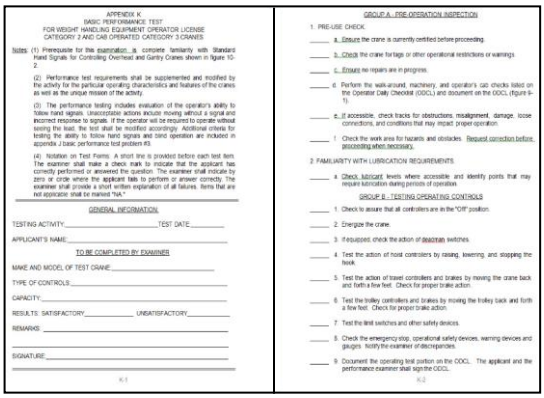
_____ 5. Allow the engine to warm up as appropriate.

Note: Cranes equipped with air or hydraulic controls shall not be operated until gauges show required operating pressure.

J-2

Cat 2 & 3 PT

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
BASIC PERFORMANCE TEST
FOR WEIGHT HANDLING 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 Overhead and Gantry Cranes shown in figure 10-2.

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

(3) The performance testing includes evaluation of the operator's ability to follow hand signals. Unacceptable actions include moving without a signal and incorrect response to signals. If the operator will be required to operate without seeing the load, the test shall be modified accordingly. Additional criteria for testing the ability to follow hand signals and blind operation are included in appendix J basic performance test problem #3.

(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 zero 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:_____

K-1

GROUP A - PRE-OPERATION INSPECTION

1. PRE-USE CHECK

_____ a. Ensure the crane is currently certified before proceeding.

_____ b. Check the crane for tags or other operational restrictions or warnings.

_____ c. Ensure no repairs are in progress.

_____ d. Perform the walk-around, machinery, and operator's cab checks listed on the Operator Daily Checklist (ODCL) and document on the ODCL (figure 9-1).

_____ e. If accessible, check tracks for obstructions, misalignment, damage, loose connections, and conditions that may impact proper operation.

_____ f. Check the work area for hazards and obstacles. Request correction before proceeding when necessary.

2. FAMILIARITY WITH LUBRICATION REQUIREMENTS

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

GROUP B - TESTING OPERATING CONTROLS

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

_____ 2. Energize the crane.

_____ 3. If equipped, check the action of deadman switches.

_____ 4. Test the action of hoist controllers by raising, lowering, and stopping the hook.

_____ 5. Test the action of travel controllers and brakes by moving the crane back and forth a few feet. Check for proper brake action.

_____ 6. Test the trolley controllers and brakes by moving the trolley back and forth a few feet. Check for proper brake action.

_____ 7. Test the limit switches and other safety devices.

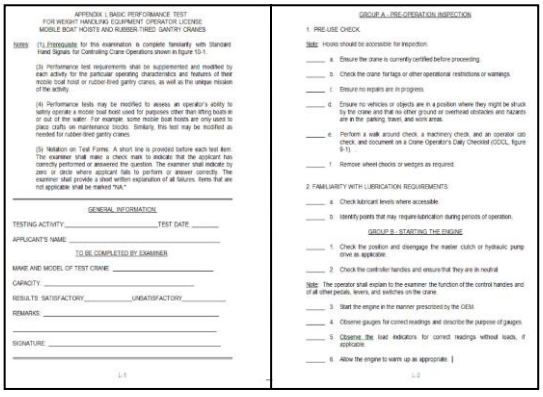
_____ 8. Check the emergency stop, operational safety devices, warning devices and gauges. Notify the examiner of discrepancies.

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

K-2

MBH and RTG PT

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 BASIC PERFORMANCE TEST
FOR WEIGHT HANDLING 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.

(3) 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.

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

(5) 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 zero or circle where 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: _____

L-1

GROUP A - PRE-OPERATION INSPECTION

1. PRE-USE CHECK

Note: Hooks should be accessible for inspection.

_____ a. Ensure the crane is currently certified before proceeding.

_____ b. Check the crane for tags or other operational restrictions or warnings.

_____ c. Ensure no repairs are in progress.

_____ d. 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.

_____ e. Perform a walk around check, a machinery check, and an operator cab check, and document on a Crane Operator's Daily Checklist (CDCL, figure 9-1).

_____ f. Remove wheel chocks or wedges as required.

2. FAMILIARITY WITH LUBRICATION REQUIREMENTS

_____ a. Check lubricant levels where accessible.

_____ b. 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 controller handles and ensure that they are in neutral.

Note: The operator shall explain to the examiner the function of the control handles and of all other pedals, levers, and switches 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.

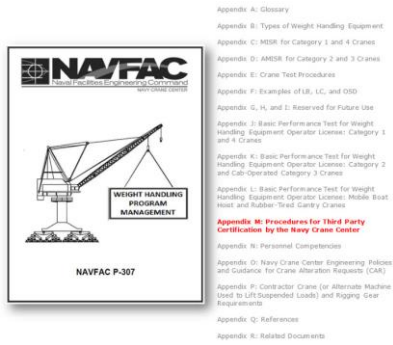
_____ 5. Observe the load indicators for correct readings without loads, if applicable.

_____ 6. Allow the engine to warm up as appropriate.

L-2

APPENDIX M: THIRD PARTY CERTIFICATION BY NAVY CRANE CENTER

Introduction

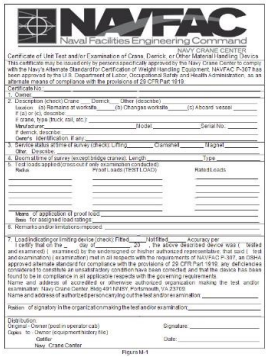


NAVFAC P-307 appendix M provides procedures for third party certifications performed by Navy Crane Center on Navy owned cranes, derricks, container spreaders and below-the-hook lifting devices. This includes a documentation review, condition inspection, load test, and the satisfactory completion of local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

Figures M-1 and M-2

Appendix M contains two forms used by Navy Crane Center third party certifiers: figures M-1 and M-2.

THIRD PARTY CERTIFICATE



NOTICE OF DEFICIENCIES

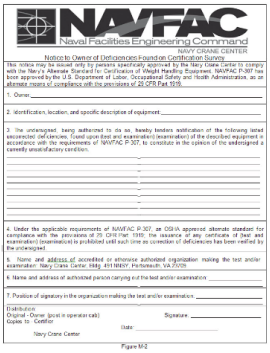


Figure M-1 is the *Certificate of Unit Test and/or Examination of Crane, Derrick, or Other Material Handling Device* and is used to indicate a satisfactory third party certification of applicable equipment.

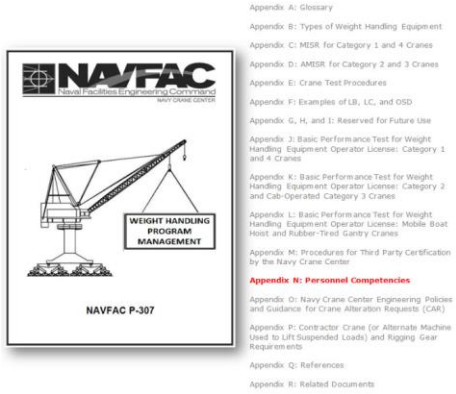
Figure M-2 is the *Notice to Owner of Deficiencies Found on the Certification Survey* and is used to document uncorrected deficiencies found during the third party test and examination.

APPENDIX N: PERSONNEL COMPETENCIES

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.



- 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

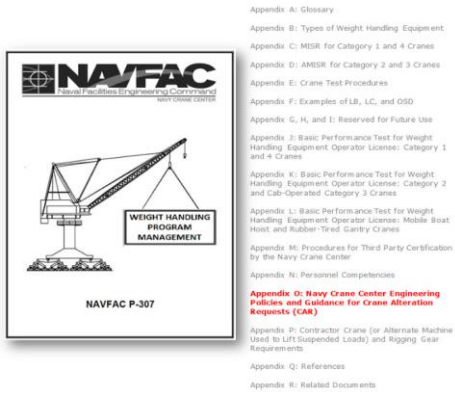
Competencies

Listed here are the positions found in Appendix N. These are the requirements of NAVFAC P-307. Additional requirements, competencies, skills, and knowledge may be required by individual activities or by other policies, instructions or directives.

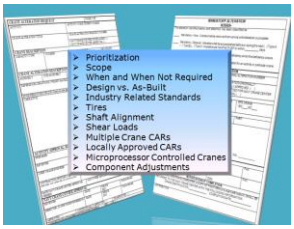
APPENDIX O: ENGINEERING POLICIES AND CRANE ALTERATION GUIDANCE

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.



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.

APPENDIX P: CONTRACTOR CRANE AND RIGGING GEAR REQUIREMENTS

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.

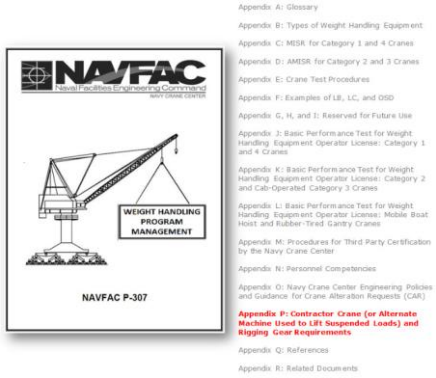
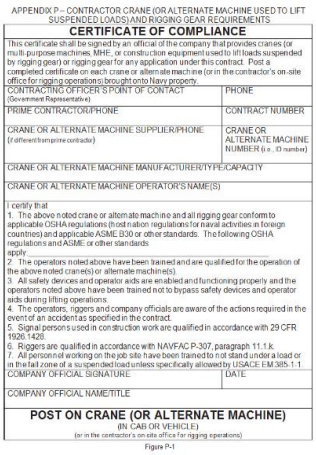


Figure P-1



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 (host 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	

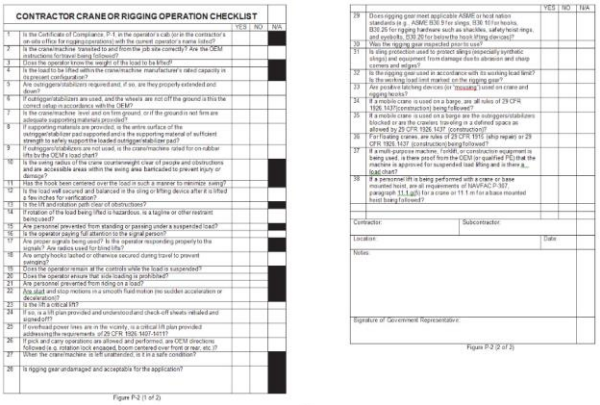
POST ON CRANE (OR ALTERNATE MACHINE)
(IN CAB OR VEHICLE)
(or in the contractor's on-site office for rigging operations)

Figure P-1

This certificate shall be signed by an official of the company that provides cranes or rigging gear for any application under a contract. A completed certificate shall be posted on each crane or alternate machine brought onto Navy property. Briefly, the company official signing this form certifies that:

- the equipment conforms to applicable industry standards
- the equipment operators are properly trained and are qualified
- all safety devices and operator aids are enabled and functioning properly
- personnel are aware of the actions required in the event of an accident
- signal persons used in construction work are properly qualified
- riggers are qualified
- personnel have been trained to not stand under a load or in the fall zone

See section 11 and appendix P for more detailed descriptions of these requirements.



CONTRACTOR CRANE OR RIGGING OPERATION CHECKLIST

		YES	NO	N/A
1	Is the Certificate of Compliance, P-1, in the operator's cab,or in the contractor's on-site office for rigging operations) with the current operator's name listed?			
2	Is the crane/machine transited to and from the job site correctly? Are the OEM instructions for travel being followed?			
3	Does the operator know the weight of the load to be lifted?			
4	Is the load to be lifted within the crane/machine manufacturer's rated capacity in its present configuration?			
5	Are outriggers/stabilizers required and, if so, are they properly extended and down?			
6	If outriggers/stabilizers are used, and the wheels are not off the ground is this the correct setup in accordance with the OEM?			
7	Is the crane/machine level and on firm ground, or if the ground is not firm are adequate supporting materials provided?			
8	If supporting materials are provided, is the entire surface of the outrigger/stabilizer pad supported and is the supporting material of sufficient strength to safely support the loaded outrigger/stabilizer pad?			
9	If outriggers/stabilizers are not used, is the crane/machines rated for on-rubber lifts by the OEM's load chart?			
10	Is the swing radius of the crane counterweight clear of people and obstructions and are accessible areas within the swing area barricaded to prevent injury or damage?			
11	Has the hook been centered over the load in such a manner to minimize swing?			
12	Is the load well secured and balanced in the sling or lifting device after it is lifted a few inches for verification?			
13	Is the lift and rotation path clear of obstructions?			
14	If rotation of the load being lifted is hazardous, is a tagline or other restraint being used?			
15	Are personnel prevented from standing or passing under a suspended load?			
16	Is the operator paying full attention to the signal person?			
17	Are proper signals being used? Is the operator responding properly to the signals? Are radios used for blind lifts?			
18	Are empty hooks tashed or otherwise secured during travel to prevent swinging?			
19	Does the operator remain at the controls while the load is suspended?			
20	Does the operator ensure that side loading is prohibited?			
21	Are personnel prevented from riding on a load?			
22	Are start and stop motions in a smooth fluid motion (no sudden acceleration or deceleration)?			
23	Is the lift a critical lift?			
24	If so, is a lift plan provided and understood and check-off sheets initialed and signed off?			
25	If overhead power lines are in the vicinity, is a critical lift plan provided addressing the requirements of 29 CFR 1926.1407-1417?			
26	If jack and carry operations are allowed and performed, are OEM directions followed (e.g. rotation lock engaged, boom centered over front or rear, etc.)?			
27	When the crane/machine is left unattended, is it in a safe condition?			
28	Is rigging gear undamaged and acceptable for the application?			

Figure P-2 (1 of 3)

		YES	NO	N/A
29	Does rigging gear meet applicable ASME or local nation standards (e.g., ASME B30.9 for slings, B30.10 for hooks, B30.26 for rigging hardware such as shackles, safety hook rings, and eyebolts, B30.20 for below the hook lifting devices)?			
30	Was the rigging gear inspected prior to use?			
31	Is sling protection used to protect slings (especially synthetic slings) and equipment from damage due to abrasion and sharp corners and edges?			
32	Is the rigging gear used in accordance with its working load limit? Is the working load limit marked on the rigging gear?			
33	Are positive latching devices (or "keepers") used on crane and rigging hooks?			
34	If a mobile crane is used on a barge, are all rules of 29 CFR 1926.1437(construction) being followed?			
35	If a mobile crane is used on a barge are the outriggers/stabilizers blocked or are the cranes traveling in a defined space as allowed by 29 CFR 1926.1437 (construction)?			
36	For floating cranes, are rules of 29 CFR 1915 (ship repair) or 29 CFR 1926.1437 (construction) being followed?			
37	If a multi-purpose machine, forklift, or construction equipment is being used, is there proof from the OEM (or qualified PE) that the machine is approved for suspended load lifting and is there a load chart?			
38	If a personnel lift is being performed with a crane or base mounted hoist, are all requirements of NAVFAC P-307, paragraph 11.1.g(6) for a crane or 11.1.m for a base mounted hoist being followed?			

Contractor: Subcontractor:

Location: Date:

Notes:

Signature of Government Representative:

Figure P-2 (2 of 3)

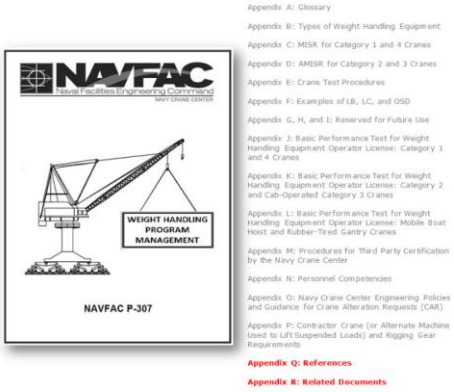
Figure P-2

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.

APPENDICES Q AND R: REFERENCES AND RELATED DOCUMENTS

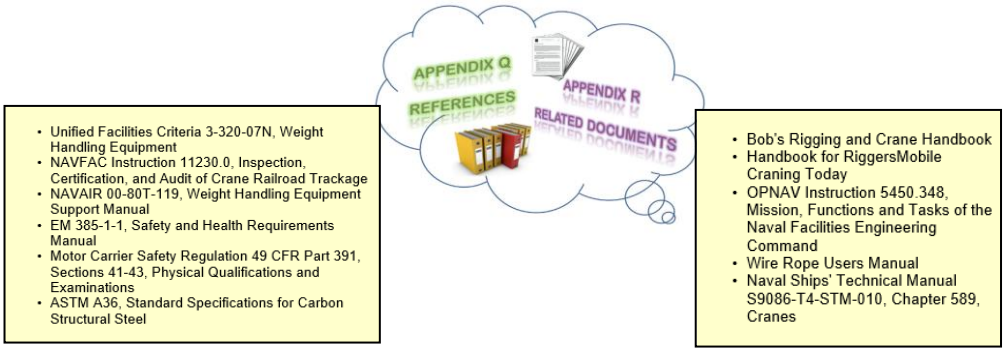
Introduction

NAVFAC P-307 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).



Examples

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.



NOTES

NAVFAC P-307 OVERVIEW QUIZ AND SUMMARY

KNOWLEDGE CHECK

1. Select all that apply.

The overall purpose of NAVFAC P-307 is to…

A. Promote safe operating practices
B. Provide detailed maintenance, test and certification schedules for specific or unique pieces of WHE
C. Ensure the safe lifting and controlling capability of WHE
D. Provide training and qualification standards for all personnel involved in maintenance, inspection, test, certification, engineering, rigging and operation of WHE
E. Maintain the level of safety and reliability that was originally built into the equipment

2. Select the best answer.

Which document would you use to request a revision, deviation or clarification to NAVFAC P-307?

A. CCIR
B. CAR
C. RCDR
D. ODCL

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. Section 1
B. Appendix E
C. Appendix C
D. Section 10
E. Section 2
F. Section 4
G. Section 7

4. Select the best answer.

Sections 3, 4 and 5 provide information on which topics?

A. Performance testing for category 1, 2 and 3 crane operators
B. Inspection, maintenance, certification
C. Operations, operator inspections, operator licensing
D. Alterations, engineering policies, technical advisories

5. 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 mechanical components of the equipment have been maintained in a safe and serviceable condition and are functioning properly
B. ...the overall electrical components of the equipment have been maintained in a safe and serviceable condition and are functioning properly
C. …work required by all WHEDRs, CARs and ODCLs has been satisfactorily completed and properly recorded
D. …the overall structural components of the equipment have been maintained in a safe and serviceable condition and are functioning properly
E. All listed answer are correct.

7. 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. _____ _____

8. Select the best answer.

What section and/or appendix contains information on crane alterations?

A. Appendix O
B. Section 8
C. Appendix P
D. Section 6 and appendix O
E. Section 6
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. Matching

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.

1. Load bearing part
2. Load controlling part
3. Operational safety device

A. Load block _____
B. Locking devices _____
C. Rotate drive keys _____
D. Truck axles/wheels _____
E. Travel electric brakes _____
F. Proximity switch _____
G. Luffing hoist limit switch _____
H. Drum shafts _____
I. Emergency stop switches _____
J. Crane mounted diesel engines and generators _____

12. Select the best answer.

Who is responsible for completing, signing, posting, and retaining this (P-1) form?

A. Certifying Official
B. Oversight Inspector
C. Crane Owner
D. Contracting Officer

13. True or False

NAVFAC P-307 provides guidance to shore based naval activities for weight handling equipment program management.

A. True
B. False

14. 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 clicking the appropriate box next to the picture.

1. Category 4
2. Category 3
3. Category 2
4. Category 1
5. None of the listed categories

A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

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. the crane two-blocks
B. a mobile crane is configured for transit
C. personnel injury or death occurs
D. material or equipment is damaged
E. a load is dropped
F. a component fails with no other damage occurring
G. an overload occurs

19. 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. _____

20. Fill in the blank.

NAVFAC P-307 appendix N provides a list of _____ that personnel must satisfy prior to performing assigned weight handling duties in the noted positions.

A. _____ _____

21. True or False

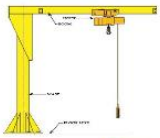
The appendix B glossary provides uniform definitions to aid personnel in understanding key concepts and terminology found in NAVFAC P-307.

A. True
B. False

22. Matching

Match terms 1 through 7 with the correct picture by clicking in the appropriate box next to each pictured crane.

1. Mobile Boat Hoist
2. Bridge Crane
3. Rubber-Tired Gantry Crane
4. Portal Crane
5. Commercial Truck Mounted Hydraulic Boom Crane
6. Floating Crane
7. Jib Crane



A. _____

B. _____

C. _____

D. _____

E. _____

F. _____

G. _____

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 T: Testing
B. Section 15 and Appendix T: Test Specifications and Testing
C. Appendix E: Crane Test Procedures
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-2: Notice to Owner of Deficiencies Found on the Certification Survey
B. Figure M-1: Certificate of Unit Test and Examination
C. Figure M-3: Deficient Items List

25. Fill in the blank.

A significant accident is an accident that typical has a greater potential to result in _____.

A. _____ _____ _____ _____ _____ _____

SUMMARY

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 P-307 and the Navy's Weight Handling Program.

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 (or below) 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: On-site Representation, 08 liaison, 757-967-3838

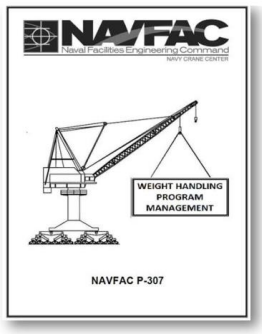
Engineering, Compliance and On-Site Representative (NCCR) Field Offices

- 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://www.navfac.navy.mil/ncc

- 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_cranealt@navy.mil)
- Crane Corner Articles, Reports
- Safety Videos
- Accident Prevention
- Safety Briefs
- Other Links and Information

NAVFAC P-307 ELECTRICAL INSPECTIONS 1



NAVFAC P-307 Inspections 1

WELCOME

Welcome to NAVFAC P-307 Inspections 1.

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.

INSPECTIONS

Inspections

NAVFAC P-307 covers inspection requirements in Sections 3, and 4, record retention requirements in section 5, and provides inspection attributes, criteria, and forms in appendices C and D.

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.

RECORDS

Maintenance Inspection Specification and Record

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, and 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.

MISR


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

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.

Brake Data Sheet

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


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 CRANES
BRAKE DATA

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.

CORRECTIVE ACTIONS

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.

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.


WEIGHT HANDLING EQUIPMENT DEFICIENCY REPORT

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


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES
UNSATISFACTORY ITEMS

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.

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 by the Navy Crane Center.

Re-Inspection

Re-inspection is sometimes required for work done.

Where the 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.

Re-inspection shall include an operational test, where necessary.

Deferral

Deferral of Maintenance Inspections, Lubrication, or Servicing/Maintenance may exist under the following conditions:

When an emergent or other contingent condition exists 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.

FILES AND CHECKLISTS

Equipment History File

SECTION 5
EQUIPMENT HISTORY FILE

5.1 Equipment History File. Each activity shall establish and maintain an individual equipment history file on each crane. The equipment history file shall contain the documentation shown in table 5-1 for the time period indicated. The files shall be made available to Government oversight agencies (e.g., OSHA, Navy Crane Center) upon request. For convenience, the files may be together in one central location, or portions of the file may be located separately so long as they are available upon request. Electronic versions of equipment history files are acceptable.

Table 5-1
Equipment History File

	Documentation	Minimum Retention Time
1	MISRs (Indicate the scheduling basis, either hour meter or calendar month)	
1.1	Type "A" inspection	Latest plus previous two (if on calendar basis) or latest plus previous two years (if on engine hour operating basis)
1.2	Type "B" inspection	Latest plus previous one
1.3	Type "C" inspection	Latest plus previous one
1.4	Type "Annual"	Latest plus previous load test year
2	Crane Operator's Daily Checklist/Monthly checklist for non-cab operated category 1 bridge, gantry, and wall cranes). Monthly inspection of floating cranes used in construction	Current month plus previous month (current month plus two previous months for cranes used in construction) Current month plus five previous months for 3rd party certified cranes
3	SWOs or other work documents	
3.1	Load bearing/critical controlling parts and operational safety devices	Seven years
3.2	Hoist ropes	Life of rope
3.3	Work documents involving crane alterations	Life of crane
4	Non-destructive test reports	Latest that component
5	CDR	Current (including interims) plus previous load test year
6	Certification of Load Test And Condition Inspection	Current (including interims and extensions) plus one previous load test certification
7	Third party certifications (for applicable cranes)	Current plus one previous certification

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


CRANE OPERATOR'S DAILY CHECKLIST

The Operator's Daily Checklist or ODCL shall be kept on file as follows:

Current month plus previous month,

Or Current month plus two previous months for cranes used in construction,

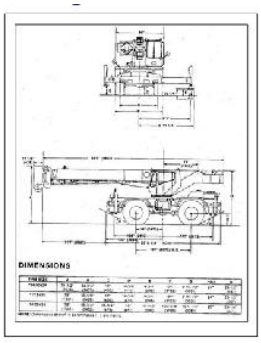
And current month plus five previous months for 3rd party certified cranes.

Shop Repair Order

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.

Invoking Alterations


DIMENSIONS

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.

TEST AND REPORTS 1

Non-destructive Test Reports

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

Crane Condition Inspection Record

Crane Condition Inspection Record Requirements are:
The current (including interims) plus the previous load test year.

Certification of Load Test

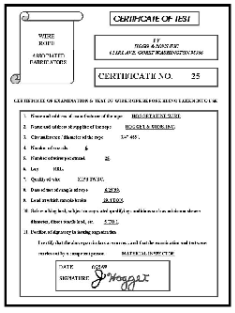
The Certification of Load Test for each crane must appear in the history file.
Include the current with any interim's and extensions plus one previous load test certification.

TEST AND REPORTS 2

Third Party Certifications

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

Wire Rope Records


CERTIFICATE OF TEST

CERTIFICATE NO. 25

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.

MISCELLANEOUS HISTORY RECORDS 1

Crane Alterations

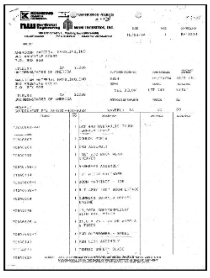
All crane alterations, whether approved by the local activity or by Navy Crane Center, shall be kept in the equipment history file for the life of the crane.

Deficiency Reports

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

Purchase Contracts

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



Accident Reports

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

MISCELLANEOUS HISTORY RECORDS 2

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 this base measurement. When measured as part of the annual certification, the new measurement is compared to the base measurement on record.

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.

MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 CRANES
BRAKE DATA

Crane Acceptance Test

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

ADDITIONAL PROCEDURES AND RECORDS 1

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.

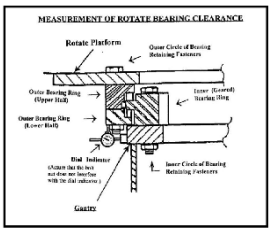
Note: Completed AEP's or signoff sheets when used shall be retained for seven years.

Roller Clearance Standard

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.

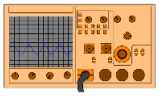
Slewing Bearing Clearances

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



ADDITIONAL PROCEDURES AND RECORDS 2

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.

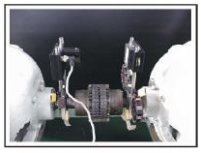
Note: The latest alternate inspection report of the internal gear(s) is required.

Floating Crane History File

The equipment history file for floating cranes must include: the latest Material Inspection, 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.

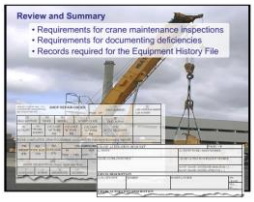
Coupling Alignment Data



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

REVIEW AND SUMMARY

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



NOTES

KNOWLEDGE CHECK

Online exam questions may appear in a different order than those shown below.

1. Select the best answer.

Which document augments maintenance inspection forms with additional technical data and specifications?

A. technical foot notes
B. data entry forms
C. naval technical review pages
D. specification data sheets

2. Select the best answer.

Which of the following will NOT be found in the Equipment History File?

A. maintenance inspection specification and record
B. crane operator's log sheets
C. crane operator's daily checklist
D. crane operator's monthly checklist

3. 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 A
B. Appendix B
C. Appendix C
D. Appendix D

4. Select the best answer.

What determines the minimum items to be inspected during the crane inspection?

A. your own good judgment and experience
B. the Maintenance Inspection Specification Record (MISR)
C. past inspections and problem areas
D. written guidance from the certifying official

5. Select the best answer.

NAVFAC P-307 specifies which of the following for crane inspections?

A. type of inspections
B. all listed inspections
C. frequency of inspections
D. required documentation

6. Select the best answer.

Which of the following will NOT be found in the equipment history file?

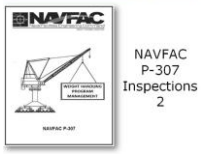
A. certification of load test
B. crane condition inspection record
C. non-destructive test reports
D. Crane location record

7. Select the best answer.

Which of the following will NOT be found in the Equipment History File?

A. purchase contracts
B. list of applicable drawings
C. crane alterations
D. crane accident reports

NAVFAC P-307 ELECTRICAL INSPECTIONS 2



WELCOME

Welcome to NAVFAC P-307 Inspections 2.

OBJECTIVES

Upon the 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

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.

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.

Inspection 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.

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 quadrennially, 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.

CERTIFICATION

Re-certification Interim

Interim certification is done based on the following:

Re-certification 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 re-certification 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.

Not Required

Re-certification 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 engines or generators recommended by the OEM. However, the re-inspection 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 Certification

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.

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.
- Exceeding the certified capacity in a load test of a sample crane during a Navy Crane Center WHE audit or during a third party certification.
- Extension of 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).
- Re-calibration 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 speed.

Each authorization to extend a certification shall be filed in the crane's equipment history file.

CRANE CONDITION INSPECTION

Crane Condition Inspection Report

The Crane Condition Inspection 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.

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.

REVIEW AND SUMMARY

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.

NOTES

KNOWLEDGE CHECK

Online exam questions may appear in a different order than those shown below.

1. Select the best answer.

What action will void a crane's certification?

A. re-calibration of electronic load/moment indicating devices
B. None of these listed will void a crane's certification
C. controlled disassembly and re-assembly of components
D. observing a minor deficiency

2. Select the best answer.

Which of the statements below about crane condition inspection reports is FALSE?

A. CCIRs are not intended to be of the same depth as a maintenance inspection
B. CCIRs are filled out daily by the operator
C. CCIRs are submitted with the crane certification form to the certifying official
D. CCIRS are made before, during and after a load test

3. Select the best answer.

Which of the items listed below is NOT required to certify a crane?

A. OEM acceptance criteria
B. signature of certifying official
C. CCIR
D. Signatures of test director and inspection personnel

4. Select the best answer.

Re-certification is required after _____.

A. routine maintenance and servicing of diesel engines
B. none of the listed conditions
C. work performed on travel brakes
D. work that can be fully evaluated by an operational test

5. Select the best answer.

Which of the following events will void the certification of a crane?

A. all listed activities
B. exceeding the rated capacity
C. discovering a major deficiency
D. performing work on a LB/LC component which requires a load test

BASIC INSPECTION TECHNIQUES

WELCOME

Welcome to Basic Inspection Techniques.

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.

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.

The following italicized information on crane inspection types and frequencies has been modified and updated in this student guide. It does not read the same as the current online content (some of which may be misleading).

CRANE INSPECTIONS

Cat 1 & 4 Crane Inspection Types

Category 1 & 4 cranes have three types of inspections: "A", "B" and "C". These may be performed on either a calendar or engine hour basis. Detailed explanations of each type of inspection can be found in section 3.

Appendix C, the MISR, lists the inspection items for each type of inspection. The appropriate inspection attributes for the type of inspection shall be performed and documented accordingly.

In addition to routine maintenance inspections prescribed in section 3, repairs to load bearing components, load controlling components, or operational safety items made during the certification period must also be inspected.

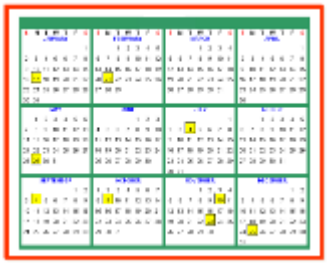
Category 1 & 4 Crane Inspection Frequencies

The activity has the option of basing inspections on engine operating hours or time intervals in calendar months. The scheduling basis shall be annotated in the equipment history file for the crane. A type "B" inspection shall be performed before the option to change is exercised.

If engine hours are used as the basis for inspection frequency, a type "B" inspection shall be performed annually as a minimum.

Calendar based frequencies:

- *"A" inspections are conducted every 4 months (+ 10 days)*
- *"B" inspections are conducted every third "A" inspection, but annually as a minimum*
- *"C" inspections are conducted every third "B" inspection*



Engine hour based frequencies:

- *"A" inspections are required every 500 engine operating hours (+50 hours)*
- *"B" inspections are required every 2,000 engine operating hours (+200 hours) or annually as a minimum*
- *"C" inspections are required every 8,000 engine operating hours (+800 hours) or every sixth annual certification as a minimum*

Category 2 & 3 Crane Inspections

Category 2 and 3 cranes shall have an annual inspection of the items specified in appendix D: the Annual MISR.

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

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.

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 into the machinery, wiring between the cable entry point and components including flexible shunts and connections including jumpers and risers.

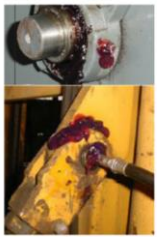
Damage or deterioration can be found on the conductor’s insulation, or the conductor itself.

Lubrication 1

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 re-lubricated 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.

Lubrication 2



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 insures 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.

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; 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 in the component 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.

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.

SHARED ITEMS 1

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.

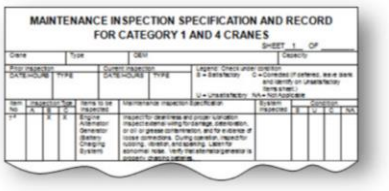
Engine Starters


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

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.

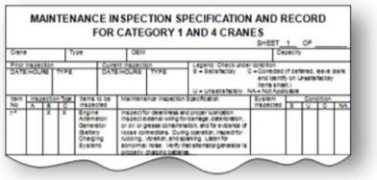
Alternator/Generator

Inspect the alternator or generator for cleanliness and proper lubrication.


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

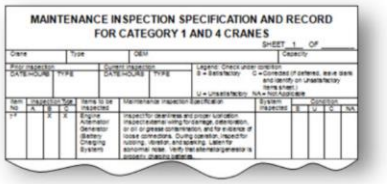
External Wiring

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


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

Inspection during Operation

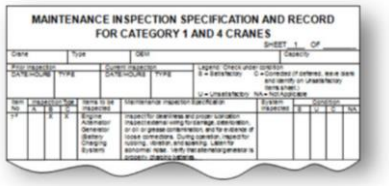
During operation, inspect for rubbing, vibration, sparking and abnormal noise.


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

SHARED ITEMS 2

Battery Charge

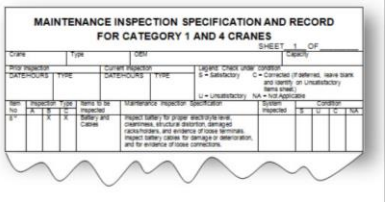
Verify that alternator or generator is properly charging the batteries.


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

Battery and Cables

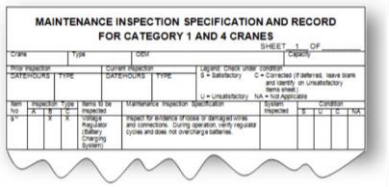
Inspect battery for proper electrolyte level, cleanliness, structural distortion, damaged racks/holders and evidence of loose terminals.

Inspect the battery cables for damage, deterioration and evidence of loose connections.

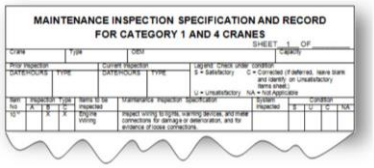

MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

Voltage

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

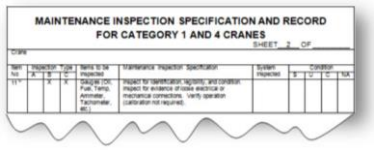

MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

Engine Wiring


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

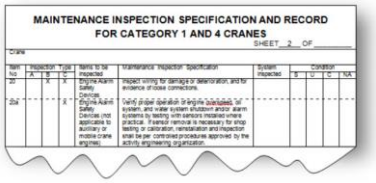
Inspect wiring to lights, warning devices, and meter connections for damage, deterioration and evidence of loose connections.

Gauges


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

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

Engine Alarm Safety Devices


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

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.

REVIEW AND SUMMARY

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.

NOTES

KNOWLEDGE CHECK

Online exam questions may appear in a different order than those shown below.

1. Select the best answer.

Common inspection attributes include all the following except _____.

A. damaged wiring
B. proper lubrication
C. cleanliness
D. high megger readings

2. Select the best answer.

Who authorizes the proper lubricant for motors and generators?

A. Original equipment manufacturer
B. Navy Crane Center
C. Crane engineering
D. Mobil oil

3. Select all that apply.

Which of the following items are important considerations when lubricating motors?

A. Use excess lubrication
B. Using engineering specified lubricant
C. Using OEM recommended lubricant
D. Filling to the proper level

4. Select all that apply.

The following is an important factor in the life and reliable operation of motors and generators.

A. all listed factors
B. Proper and timely inspection
C. Cleanliness
D. Lubrication

5. Select all that apply.

To perform a pre-inspection on a motor wiring circuit, an inspector should open up the motor connection box and _____.

A. Check for signs of overheating
B. Listen for abnormal noise
C. check for loose connections
D. These are all pre-inspection characteristics

6. Select all that apply.

To completely inspect for loose connections:

A. All listed items
B. Insulation must be removed
C. lugs must be crimped on the cables
D. fasteners must be installed and torqued properly

7. Select all that apply.

If sensor removal is necessary for shop testing or calibration, reinstallation and inspection shall be per _____.

A. none of the items listed
B. controlled procedures approved by the activity engineering organization
C. NAVFAC P-307, Appendix C
D. National Electric Code specifications

8. Select all that apply.

Where one person performs an inspection on both mechanical and electrical components, what determines suitability to the task?

A. Training and background
B. Grades and certifications
C. Pay grade and step
D. Resume and employment contract

9. 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. proper lubrication
C. proper gap
D. loose or missing hardware

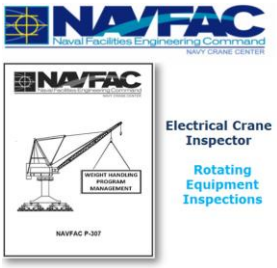
10. Select all that apply.

Identify items that can be addressed by a mechanical inspector?

A. Battery charging system
B. Engine alarm safety devices
C. Gauges
D. Engine wiring

ROTATING EQUIPMENT INSPECTIONS

WELCOME



Welcome to Rotating Equipment Inspections.

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

MISR 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.

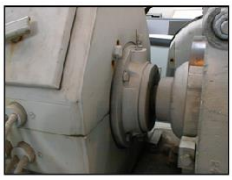
General Conditions

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.

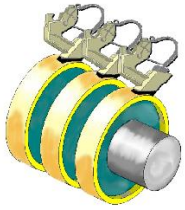
Bearing Maintenance



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 then under lubrication. A formal lubrication process will insure proper lubrication and guard against over lubrication. If necessary, use in-process inspection to verify proper lubrication. A sound minimum process is shown.

SLIP RINGS AND COMMUTATORS

Slip Ring Evaluation



The slip rings are the collectors that electrically connect the wound rotor to external circuits. To insure 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.

Inspect Slip Rings and Commutators

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

COMMUTATORS NORMAL

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

Normal – Blemished

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

Normal - Heavy Film

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

Normal – 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.

COMMUTATORS NEEDING REPAIR

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 reseat the brushes.

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

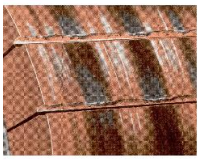
Grooving

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.

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.

Pitch Bar Marking



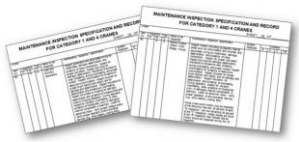
Pitch bar marking is indicated by burned spots. It is caused by instantaneous armature over-current on one brush. Clean the commutator with canvas and check all brush rigging connections.

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.

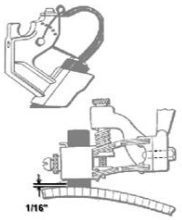
BRUSHES

Brush Inspection



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

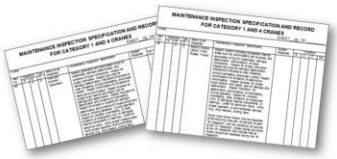
Brush Evaluation



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.

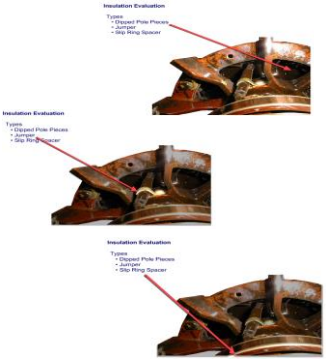
INSULATION

Insulation Inspection



Inspect insulation for deterioration and 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.

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.

DRIVE BELTS

Drive Belts or Coupling

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

COUPLING ALIGNMENT

Coupling Alignment In-Process Inspection

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 Operational Inspection

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

REVIEW AND SUMMARY

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

NOTES

KNOWLEDGE CHECK

Online exam questions may appear in a different order than those shown below.

1. Slip rings shall be inspected to evaluate _____.

A. the condition of the faces
B. for all conditions listed
C. the condition of the film
D. out or round conditions

2. Which characteristic of DC motors used on crane functions prevents an ideal commutating film from forming?

A. Varying load
B. All of the characteristics listed
C. Reversing
D. Varying speed

3. Which of the following commutator conditions poses the least concern?

A. Streaking
B. Copper Drag
C. Threading
D. Slot Bar Marking

4. Which of the following commutator conditions poses the most concern?

A. Grooving
B. Blemishes
C. Slot bar marking
D. Heavy film

5. Motor winding insulation is generally _____.

A. solid mica
B. dipped varnish
C. PVC Thermoset
D. dipped Plastisol

6. The brush condition that produces poor commutation is _____.

A. Improper brush tension
B. all listed conditions
C. Improper brush seating
D. Improper brush hardness

7. What condition would an electrical inspector normally relate to a questionable shaft alignment?

A. Coupling gets hot
B. Coupling throws grease
C. Coupling makes noise
D. All of the listed conditions

8. In addition to the maintenance inspection specifications listed for motors, the inspector shall also verify a generator's _____.

A. bearing temperatures
B. megger readings
C. voltage output
D. full load current

9. What are the main areas of concern for inspecting general conditions on a rotating electrical machinery?

A. Lubrication
B. Wiring
C. Duty Cycle
D. Connections

10. The annual certification process requires the certifying official to review which of the following documents?

A. Operator License Record
B. SRO
C. Certification of Load Test and Condition Inspection
D. CCIR

11. If an inspection block on a MISR or AMISR is marked with a “U”, and the work has been corrected, what other mark would you expect to see in that inspection block?

A. D
B. S
C. R
D. C

12. For category 3 jib cranes, pillar cranes, monorail cranes, and fixed overhead hoists, 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 can serve as the “before” portion of the condition inspection.

A. True
B. False

13. Your mobile crane has been reconfigured with fewer parts of hoist line resulting in a reduced certified capacity. How would you expect this to be documented in the certification paperwork?

A. An email sent from management
B. An explanation in the remarks section of the CCIR
C. An explanation in the remarks section of the MISR
D. An explanation in the remarks section of the Certification of Load Test and Condition Inspection form

14. On the MISR or the AMISR all inspection blocks must be marked S, U, C, D, and/or N/A. What do these letters indicate?

A. satisfied, unsatisfied, concealed, deferred, not applicable
B. satisfactory, unsatisfactory, corrected, deferred, not applicable
C. selected, unselected, completed, detailed, not available
D. satisfactory, unsatisfactory, completed, deferred, not available

15. Who is required to sign the Certification of Load Test and Condition Inspection form?

A. Electrical Inspector
B. Certifying Official
C. Mechanical Inspector
D. Load Test Director

CONTROLLER INSPECTIONS

WELCOME

Welcome to Controller Inspections

OBJECTIVES

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

CONTROLLERS DEFINED

Controller Definition 1

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.

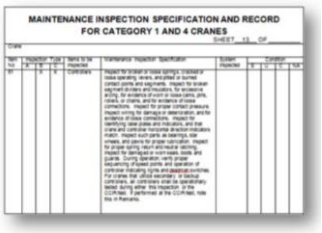
Controller Definitions – Continued

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

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.

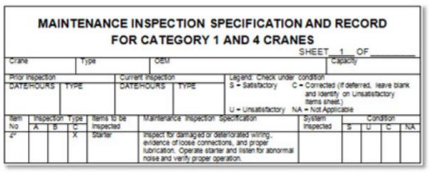

MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

Inspections 2


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

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

Inspections 3

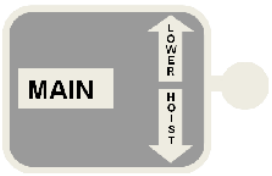

MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

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 SPRINGS

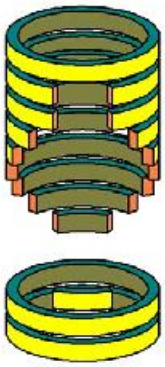
In drum controllers contact points are held against the segments by springs. In master switches springs hold the switch actuators against the cams. In both controllers the detent spring holds the pawl against the star wheel.

OPERATING LEAVERS



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 so as to clearly indicate the location of each point.

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 (cont.)

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

CAMS, PINS, ROLLERS, OR CHAINS

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

LOOSE CONNECTIONS

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

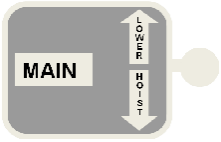
IDENTIFYING LABELS PLATES

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

OPERATIONAL CHECK

Speed Points

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



Speed Points (continued)

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

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.

CONTROLLING INDICATING LIGHTS

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

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.

CONTROL PANELS, RELAYS, COILS

Control Panels

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 (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 (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.

CONTACTS

The contacts must be properly aligned to insure 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.

LEADS AND SHUNTS

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

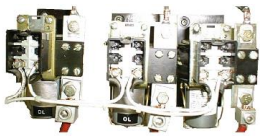
WIRING

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

FUSES

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

OVERLOAD DEVICES



Overload devices must not have loose connections or evidence of overheating

CIRCUIT BREAKERS AND SWITCHES

Circuit breakers and switches must be checked for cleanliness and 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.

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 actuate. Mechanical interlocks between relays and contactors should operate in a manner that prevents both contactors from being closed at the same time.

ENCLOSURES

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

VERIFY PROPER OPERATION

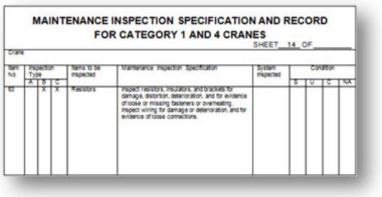
During operation, verify proper operation of panel indicating lights. Check contactor sequence. Each controller should have a schematic and a sequencing chart stored in or on its door, to be used for troubleshooting. Verify sequencing and proper operation of panel indicating lights. Check environmental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

ELECTRONIC DRIVE CONTROL SYSTEMS

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.

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.



MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

SHEET 14 OF

Crane

Item No	Inspection Type A	B	C	Items to be inspected	Maintenance Inspection Specification	System Inspected	Condition S	U	C	NA
63		X	X	Resistors	Inspect resistors, insulators, and brackets for damage, distortion, deterioration, and for evidence of loose or missing fasteners or overheating. Inspect wiring for damage or deterioration, and for evidence of loose connections.					

SUMMARY AND REVIEW

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

NOTES

KNOWLEDGE CHECK

Online exam questions may appear in a different order than those shown below.

1. A drum controller is a manual switch that connects _____.

A. the motor
B. the speed control resistors
C. all of the listed parts
D. the power

2. Inspection of a controller includes checking wiring, hardware, and labeling, but also includes _____.

A. contact air gap measurement
B. checking for residual magnetization
C. operational / function test
D. contact alignment procedure

3. Each drum controller and master switch shall be marked as to _____.

A. be easily visible to the operator
B. all listed items
C. function
D. direction of motion

4. Each drum controller and master switch shall be operated and verified for proper _____.

A. operation
B. sequencing
C. all the listed items
D. speed points

5. A deadman device _____.

A. honors all operators that died in the line of duty
B. prevents accidental or inadvertent operation
C. provides control upon loss of power
D. allows only qualified operators to control the crane

6. Inspection of fuses shall include the following except _____.

A. proper type
B. proper color code
C. proper rating
D. evidence of overheating

7. What do you look for when inspecting panel boards and arc shields?

A. cleanliness
B. Evidence of loose or missing fasteners
C. moisture
D. cracks

8. Manually operate to verify all moving parts on:

A. Light bulbs
B. Relays
C. Contractors
D. Interlocks

9. When inspecting enclosures you should look for evidence of loose or missing fasteners, gaskets, damage and overall cleanliness.

A. True
B. False

10. Things to look for while checking resistors:

A. Proper operation
B. Loose or missing fasteners
C. Evidence of overheating
D. Damage

ASSOCIATED EQUIPMENT INSPECTIONS

WELCOME

Welcome to Associated Equipment Inspections

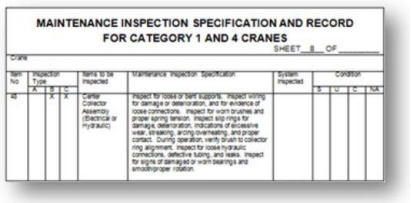
OBJECTIVES

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.

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.

CENTER COLLECTOR ASSEMBLY


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES
SHEET 8 OF
Crane
Item No | Inspection Type A B C | Parts to be Inspected | Maintenance Inspection Specification | System Inspected | Condition S U C N/A
46 | Center Collector Assembly (Electrical or Hydraulic) | Inspect for loose or bent supports. Inspect wiring for damage or deterioration, and for evidence of loose connections. Inspect for worn brushes and proper spring tension. Inspect slip rings for damage, deterioration, indications of excessive wear, streaking, arcing/overheating, and proper contact. During operation, verify brush to collector ring alignment. Inspect for loose hydraulic connections, defective tubing, and leaks. Inspect for signs of damaged or worn bearings and smooth/proper rotation.

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


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

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

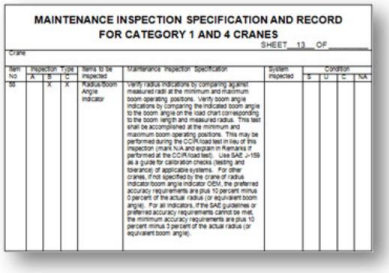
DRUM ROTATION INDICATORS


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

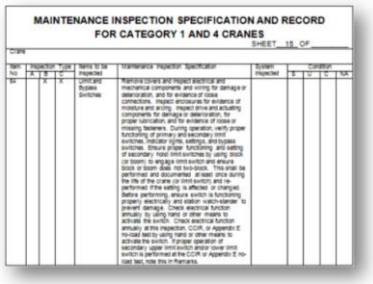
Inspect wiring for damage, deterioration and evidence of loose connections. Verify proper operation.

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.


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

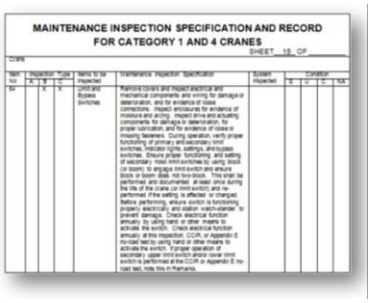
LIMIT AND BYPASS SWITCHES 1


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

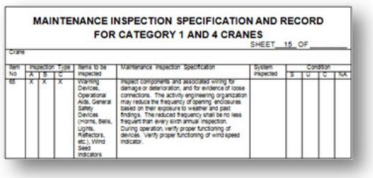
Inspect electrical and mechanical components and wiring for damage, deterioration and evidence of loose connections. Inspect enclosures for evidence of moisture and arcing.

LIMIT AND BYPASS SWITCHES 2

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.


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

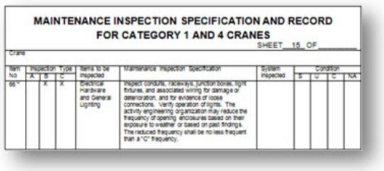
WARNING DEVICES


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

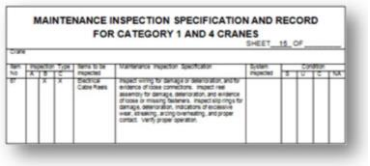
Inspect components and associated wiring for damage, deterioration and evidence of loose connections. During operation, verify proper functioning of devices.

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.


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

ELECTRICAL CABLE REELS


MAINTENANCE INSPECTION SPECIFICATION AND RECORD
FOR CATEGORY 1 AND 4 CRANES

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

REVIEW AND SUMMARY

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

NOTES

KNOWLEDGE CHECK

Online exam questions may appear in a different order than those shown below.

1. Select the best answer.

An operational test is required to verify the proper operation of all of the following except…

A. limit switches
B. master switches
C. breakers
D. indicator lights

2. 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 radii, the inspector shall measure from the…

A. hook to the ground
B. head block to heel pin
C. hook to center pin
D. hook to head block

4. Select the best answer.

A Center Collector Assembly transfers power between…

A. the generator and the controller
B. none of the listed connections
C. the stationary and rotating portion of the crane
D. the controller and the motor

5. Select the best answer.

A device that allows monitory of the weight being lifted is a…

A. limit switch
B. potentiometer
C. hoist interlock
D. load indicator

6. Select the best answer.

You can verify a hoist limit switch setting by comparing the specifications to…

A. measured from center of rotation, to the center of the shaft of the boom tip sheave
B. the load chart
C. actual weight being picked
D. physical measurement

7. Select all that apply.

Where would mechanical personnel find policies and component ratings regarding low voltage work on cranes?

A. American Society of Mechanical Engineers (ASME)
B. activity safety organization
C. NFPA/NEC
D. activity engineering organization

8. Select the best answer.

Radius indicators shall be checked at:

A. maximum boom radius
B. minimum and maximum boom radii
C. minimum boom radius
D. 30^{o}, 45^{o} and 60^{o} boom angle radii

9. 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.

Things to look for while checking resistors:

A. evidence of overheating
B. proper operation
C. damage
D. loose or missing fasteners

SIGMA INSPECTION SIGN-OFFS

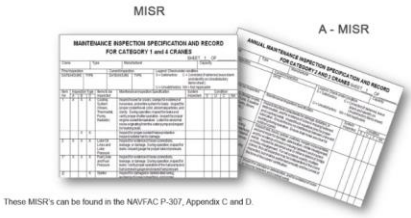
SIGMA INSPECTION SIGN-OFFS

Sigma Inspections

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.

To view the presentation, click the link located on the screen titled: Sigma Inspections. It may take more than a minute to load. Once the presentation is loaded it will run automatically. Navigational buttons are available in the presentation that allow you to pause or resume play, go back or move forward one screen, and view or hide the narration.

MISR and AMISR

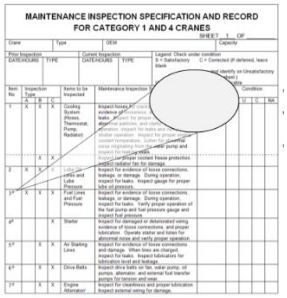


Shown here are copies of the Maintenance Inspection Specification and Record for Category 1 and 4 cranes and the Annual Maintenance Inspection Specification and Record for Category 2 and 3 cranes which are commonly referred as MISR and AMISR. For illustration purposes we show the MISR. The AMISR is completed the same way as the MISR. They both can be found in the NAVFAC P-307, Appendixes C and D.

MISR – Sigma's

Note 11 of each appendix states:

"Items marked with a lower case sigma (σ) after the item number may be inspected by a mechanic or electrician in lieu of an inspector."



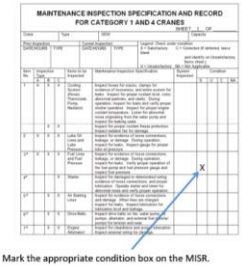
MISR - Example

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

MISR – 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.

For a satisfactory condition:



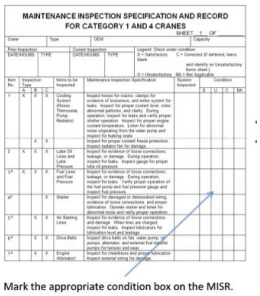
MISR – When inspection is complete

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.

MISR – Unsatisfactory Condition

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

For an unsatisfactory condition:



MISR – Unsatisfactory Items Sheet

All Unsatisfactory items shall be recorded on the Unsatisfactory Items Sheet.

1. 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.

2. The next block is for the Deficiency.

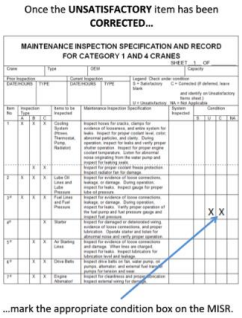
A brief yet concise statement of condition observed is entered here.

3. The next block is for the SRO number.

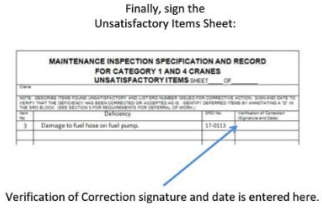
Corrective action in terms of adjustments, repairs, or replacements of items shall be detailed on a TWD, SRO, or other appropriate document and the document number entered here.

MISR – Corrected Item

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.



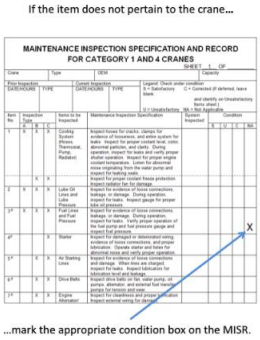
MISR – Sign the Unsatisfactory Items Sheet



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

MISR – Marking NA

Where "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.



KNOWLEDGE CHECK

Online exam questions may appear in a different order than those shown below.

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.

The mechanic and electrician inspection attributes are identified how?

A. Only on the first page of the MISR after the signature block
B. Only by those identified with a lower case sigma after the item number
C. Only on the first page of the AMISR after the signature block
D. Only on the first page of the MISR

3. True or False

If an item is found unsatisfactory then you must mark the item unsatisfactory and complete the MISR or AMISR unsatisfactory items sheet.

A. True
B. False

4. True or False

When completing the MISR or AMISR unsatisfactory items sheet you must describe in detail the problem and sign-off as complete.

A. True
B. False

5. Select all that apply.

After correcting the unsatisfactory item sheet you:

A. mark the item on the MISR as complete
B. complete the MISR unsatisfactory sheet
C. Review the test procedure
D. sign and date the verification of correction

NAVFAC
Naval Facilities Engineering Command
NAVY CRANE CENTER

LOAD TEST DIRECTOR COURSE EVALUATION SHEET

Student Name: _____ Command: _____

Course Title: _____ Date: _____

Instructor: _____

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_____

Naval Facilities Engineering Command
Navy Crane Center
Norfolk Naval Shipyard, Bldg. 491
Portsmouth, VA 23709-5000
Comm. Phone: 757.967.3803, DSN: 387
Fax: 757.967.3808
http://www.navfac.navy.mil/ncc