********** UNCLASSIFIED// **********

Subject: CHANGE 1 TO NAVFAC P-307 DEC 2009
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SUBJ/CHANGE 1 TO NAVFAC P-307 DEC 2009//

REF/A/DOC/NAVFAC P-307 DEC 2009//
REF/B/MSG/NAVCRANECEN PORTSMOUTH VA/041448Z NOV 10//
AMPN/REF A IS MANAGEMENT OF WEIGHT HANDLING EQUIPMENT//
AMPN/REF B IS NEW OSHA REQUIREMENTS AFFECTING NAVY CRANES USED IN CONSTRUCTION//
ATTACHMENT 1/CHANGE 1 TO NAVFAC P-307 DEC 2009//

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GENTEXT/REMARKS/1. THE PURPOSE OF THIS MESSAGE IS TO ANNOUNCE CHANGE 1 TO REFERENCE A.

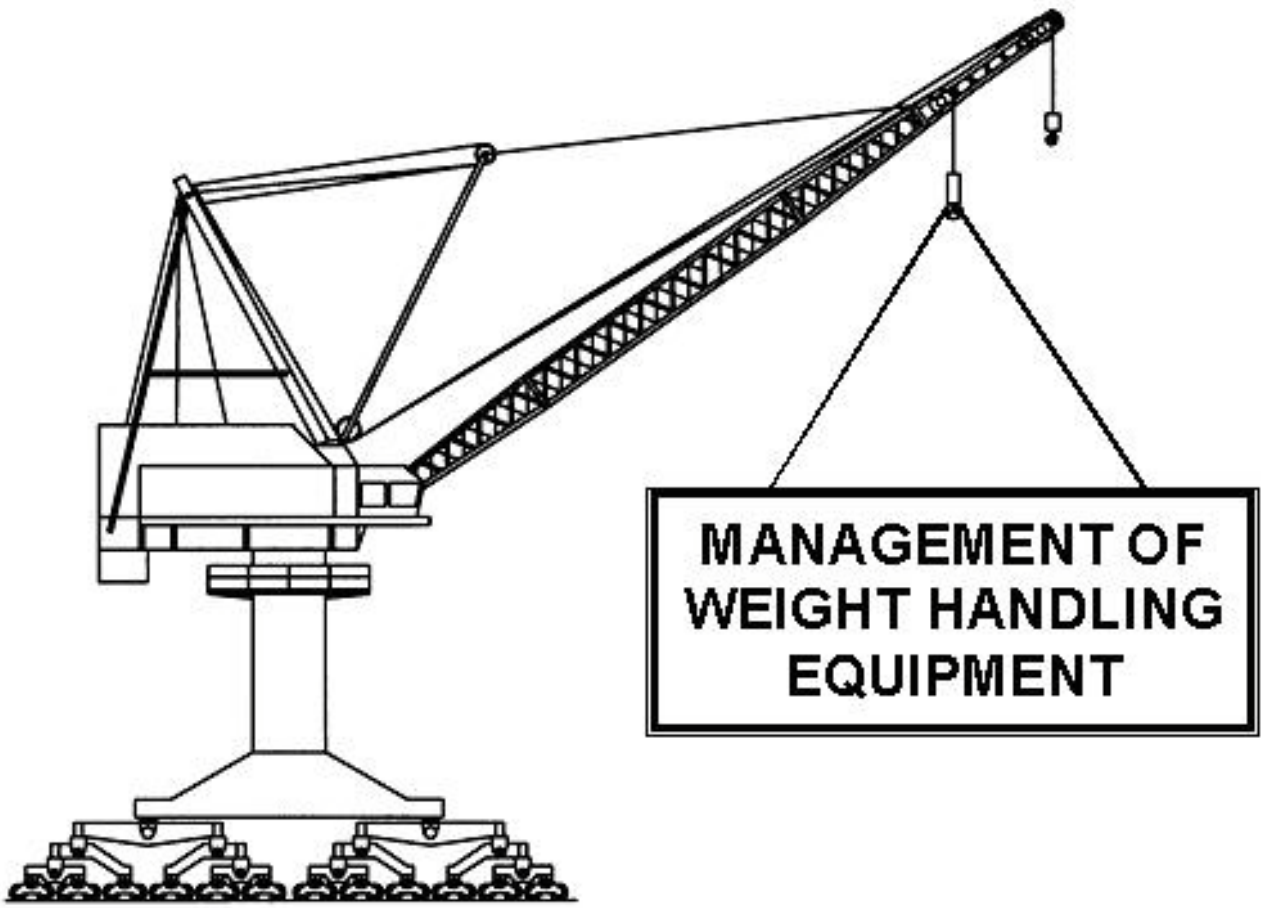
2. THE FULL TEXT OF CHANGE 1 IS INCLUDED AS ATTACHMENT 1 AND CAN ALSO BE DOWNLOADED FROM THE NAVCRANECEN WEB SITE AT HTTPS://PORTAL.NAVFAC.NAVY.MIL/NCC. A SYNOPSIS OF CHANGE 1 IS INCLUDED.

3. THE CHANGES INCLUDE REQUIREMENTS THAT HAVE BEEN MODIFIED TO REFLECT MORE EFFICIENT TESTING OF MOBILE CRANES AND LESS FREQUENT HOOK NDT PERIODICITIES FOR CERTAIN HOOKS BASED ON TESTING. THESE CHANGES WILL ENHANCE EFFICIENCY AND PROVIDE FOR COST AVOIDANCES WITHOUT AFFECTING SAFETY OR RELIABILITY. ALSO INCLUDED IN CHANGE 1 ARE NEW OSHA REQUIREMENTS FOR CRANES USED IN CONSTRUCTION, AND NEW COMPLEX LIFT REQUIREMENTS FOR CRANES HANDLING ORDNANCE.

4. PARAGRAPHS 10.4 AND 10.5 REGARDING COMPLEX LIFT RULES FOR ORDNANCE ARE IN EFFECT IMMEDIATELY. ACTIVITIES HAVE SIX MONTHS FROM THE DATE OF THIS MESSAGE TO BE IN FULL COMPLIANCE WITH ALL OTHER REQUIREMENTS OF THIS CHANGE. DURING THIS TIME, THE REQUIREMENTS OF REF B, NAVCRANECEN MESSAGE 041448Z NOV 2010, NEW OSHA REQUIREMENTS AFFECTING NAVY CRANES USED IN CONSTRUCTION, REMAINS IN EFFECT.

Naval Facilities Engineering Command

NAVY CRANE CENTER



NAVFAC P-307

DECEMBER 2009

CHANGE 1 March 2011

CHANGE RECORD

This page is provided for recording of future changes to this version of P-307.

Change No.	Date	Title or Brief Description	Entered By
1	3/31/2011	NDT Periodicity; Mobile Crane Test; Complex Lift Rules for Ordnance Handling; and OSHA Rules Update for Navy Cranes Used in Construction Changes.	Navy Crane Center

CHANGE SYNOPSIS

This change synopsis is provided to assist the user in determining the changes to the previous version of NAVFAC P-307. Changes in the text are indicated by change bars in the left and right margins. Page number only changes are not identified by change bars but are noted in the change synopsis.

Paragraph 1.4.k Added new OSHA definition of “construction” to special definitions.

Paragraph 1.7.1 Revised to reflect new test load for mobile cranes.

Page 1-7 Page number change only.

Paragraph 1.7.2.c Added requirement for operators of cranes used in construction.

Paragraph 1.7.2.g Updated OSHA references.

Paragraph 1.7.2.j Added signal person requirement for cranes used in construction.

Paragraph 1.7.2.1 Added requirement for tower cranes used in construction.

Page 1-11 Page number change only.

Page 1-12 Page number change only.

Page 1-13 Page number change only.

Page 1-14 Page number change only.

Paragraph 3.3 Revised for clarity. Supplemental Certification Sheet now required for mobile cranes.

Paragraph 3.5.3.h New paragraph cross referencing new additional requirements for assembly/disassembly of cranes.

Paragraph 3.5.3.1.1 Revised for clarity.

Paragraph 3.5.3.1.2 Revised for clarity.

Paragraph 3.5.7 Revised to reflect new test load for mobile cranes.

Paragraph 3.7.1 Revised to reflect new test load for mobile cranes.

Paragraph 3.7.1.1 Clarified that water bag type test weights cannot be used on category 4 cranes.

Paragraph 3.8.2 Revised to reflect new test load for mobile cranes.

Paragraph 3.8.3 Added requirement for barges used to support mobile cranes used in construction.

Page 3-12 Page number change only.

Figure 3-1 Revised to reflect new mobile crane test.

Figure 3-2 Revised to reflect new mobile crane test.

Table 5-1

Item (2) Additional requirements for cranes used in construction.

Item (6) Revised for clarity.

Item (33) New item to keep track of hook material type for new NDT requirements.

Paragraph 6.1.2 New requirements for contractors operating Navy cranes used in construction.

Paragraph 6.1.3 Paragraph number change only.

Page 6-2 Page number change only.

Paragraph 9.1 New requirement of a check each shift for cranes used in construction.

Paragraph 9.1.2.1.5 Additional requirements for pre-use checks for floating cranes used in construction.

Paragraph 9.2 New requirement of a check each shift for cranes used in construction.

Page 9-8 Page number change only.

Page 9-9 Page number change only.

Paragraph 10.2.2.3.1 New requirements for operational safety devices, general safety devices, and operational aids for cranes used in construction.

Paragraph 10.3 Revised for clarity. Clarified requirement for activity to develop operating procedures if not provided by OEM.

Paragraph 10.4.a Clarified relationship between NAVSEA OP-5 and NAVFAC P-307 with respect to complex lifts and lifts of ordnance.

Paragraph 10.4.1, and Deleted Note Clarified exemption to complex lift rule.

Page 10-6 Page number change only.

Paragraph 10.4.1.2.c Clarified that lifts of ordnance using tilt fixtures are complex lifts.

Paragraph 10.5 Clarified type and readout of load indicating device required.

Paragraph 10.5.2 Outlined ground conditions required for crane operations or assembly/disassembly.

Paragraph 10.6 Outlined requirements for voice communication devices and directions.

Paragraph 10.7 Outlined personnel allowed to be in fall zone of the load.

Paragraph 10.7.1 New requirement for work area control.

Paragraph 10.7.2 Paragraph number change.

Paragraph 10.7.3 Additional requirements for assembly/disassembly of cranes.

Paragraph 10.7.3.1 Addressing of potential hazards by supervisor or RIC during assembly/disassembly.

Paragraph 10.7.3.2 Outrigger/Stabilizer requirements during assembly/disassembly.

Paragraph 10.7.3.3 Post-assembly inspection requirements.

Paragraph 10.7.3.4 Special requirements for lattice boom assembly/disassembly.

Paragraph 10.7.3.5 Assembly/disassembly near overhead power lines.

Paragraph 10.8.b Updated OSHA reference.

Paragraph 10.8.c Updated OSHA requirements.

Paragraph 10.8.2 Updated OSHA requirements.

Paragraph 10.8.2.1 Updated OSHA requirements.

Paragraph 10.8.2.2 Updated OSHA requirements.

Paragraph 10.8.2.3 Updated OSHA requirements.

Paragraph 10.11.1 Updated OSHA requirements.

Paragraph 10.11.1.1 Minimum clearance is now 20 feet for voltage less than 350 kV and 50 feet if over 350kV. Work zone definition required.

Paragraph 10.11.1.2 Planning meeting and designated spotter detailed requirements.

Paragraph 10.11.1.3 Detailed additional requirements if operator cannot see elevated warning line.

Paragraph 10.11.1.4 Requirements for operation below a power line.

Paragraph 10.11.1.5 Operations near communications towers.

Paragraph 10.11.1.6 Traveling below a power line.

Page 10-21 Page number change only.

Page 10-22 Page number change only.

Page 10-23 Page number change only.

Page10-24 Page number change only.

Page 10-25 Page number change only.

Page 10-26 Page number change only.

Figure 10-3 Updated minimum required clearances.

Appendix E

Paragraph 1.1 Changed nominal test load. Clarified which cranes test load applies to.

Paragraph 1.4 Required disassembly of hooks to perform NDT.

Paragraph 1.4.1 Updated reference.

Paragraph 1.4.3 and 1.4.3.1 New special disassembly and visual inspection requirements for certain hooks.

Paragraph 1.4.4 Revised hook NDT requirements.

Paragraph 1.4.4.1 Clarified applicability of NDT inside small holes. Updated requirements to match revised NDT requirements.

Paragraph 1.4.5 Revised vendor requirements.

Paragraph 1.4.6 Revised hook identification requirements.

Paragraph 1.5.4 Revised NDT requirement.

Page E-6 Page number change only.

Page E-7 Page number change only.

Page E-8 Page number change only.

Page E-9 Page number change only.

Page E-10 Page number change only.

Page E-11 Page number change only.

Page E-12 Page number change only.

Page E-13 Page number change only.

Page E-14 Page number change only.

Page E-15 Page number change only.

Page E-16 Page number change only.

Paragraph 5 Clarification of which tests apply to which cranes and introductory statement.

Paragraph 5.1 New nominal test load for mobile cranes of 105 percent of rated capacity.

Paragraph 5.2 Updated to reflect load-moment test in lieu of stability test.

Paragraph 5.3 Revised for clarity.

Paragraph 5.4, including all subparagraphs Completely revised test for telescoping boom cranes, including latching boom cranes.

Paragraph 5.5, including subparagraphs Completely revised test for lattice boom cranes.

Paragraph 5.6 Paragraph number change only.

Paragraph 5.7 Revised test to include new reference tests.

Paragraph 5.8 Revised to incorporate new reference paragraphs.

Paragraph 5.8.1 Paragraph number change only.

Paragraph 5.8.1.a Paragraph number change only.

Paragraph 5.8.1.d notes Paragraph number changes only.

Paragraph 5.8.2 Paragraph number change only.

Paragraph 5.8.3 Paragraph number change only.

Paragraph 5.8.4 Paragraph number change only.

Paragraph 5.8.4.1 Revised to incorporate new reference paragraphs.

Paragraph 5.9 Paragraph number change only.

Page E-32 Page number change only.

Page E-33 Page number change only.

Page E-34 Page number change only.

Page E-35 Page number change only.

Page E-36 Page number change only.

Page E-37 Page number change only.

Paragraph 8 Clarification of applicability to rubber-tired gantry cranes.

Paragraph 8.1 Change in test load to 105 percent.

Page E-39 Page number change only.

Page E-40 Page number change only

Appendix N

Paragraph 1.5.i New requirement for construction signal person training.

Paragraph 1.7 Note, c, d, e, and f New requirements for construction signal person training and qualification.

Page N-5 Page number change only.

Appendix P

P-2, Contractor Crane Or Rigging Operation Checklist Item 27 Updated OSHA reference.

P-2, Contractor Crane Or Rigging Operation Checklist Renumbered list of items.

Appendix Q

References 39, 40, 41 Renumbered after deleting SAE J122.

i. Cargo Transfer. The loading, unloading, moving, or handling of cargo into, in, on, or out of any vessel.

j. Ship's Stores. Materials and equipment intended for the use and consumption by a ship in carrying out its mission.

k. Construction. Work activities that are construction, alteration, or repair as defined by OSHA under 29 CFR 1926. This does not include work covered under the general industry standard, 29 CFR 1910, shipyard industry standard, 29 CFR 1915, marine terminal industry standard 29 CFR 1917, or longshoring industry standard 29 CFR 1918. For further clarification, consult the local activity safety office.

1.5 Qualifications of Personnel. Personnel involved in the maintenance, alteration, repair, inspection, testing, and operation of WHE, shall be trained and qualified to perform their assigned duties. All personnel operating Navy-owned WHE shall meet the requirements of this publication. Specific requirements for crane operator qualification and licensing are addressed in sections 6, 7, and 8. For other personnel involved in the WHE program, see section 13 for training and/or qualification requirements.

1.6 Third Party Certification of Cranes, Derricks, and Other Devices used in Cargo Transfer and Floating Cranes and Floating Derricks (Including Barge-Mounted Mobile Cranes) used in Shipbuilding, Ship Repair, and Shipbreaking. Per OSHA regulations, cranes, derricks, and certain other devices (see paragraph 1.6.2) used in cargo transfer and floating cranes and floating derricks used in shipbuilding, ship repair, and shipbreaking shall be certified by an OSHA recognized certification agency. The Navy Crane Center is recognized by OSHA as a third party certifier of Navy owned cranes per the requirements of this publication. Third party certification requirements apply to cranes and other devices at Navy activities in the United States and its territories.

Notes: Non-floating cranes, derricks, and other devices used in shipbuilding, ship repair, and shipbreaking do not require third party certification. Lifting of components, materials, parts, etc. associated with shipbuilding, ship repair, or shipbreaking is not cargo transfer. Loading of ship's stores does not require third party certification. Lifting of hoses and ship's brows does not require third party certification.

In accordance with 29 CFR 1918.1, effective 21 January 1998, cargo transfer performed with the use of shore-based cranes and derricks is governed by 29 CFR 1917. Mobile cranes placed aboard vessels for cargo transfer will continue to be governed by 29 CFR 1918. The following is Navy policy for implementation of the certification requirements of these standards.

1.6.1 Cranes and Derricks. For Navy owned cranes and derricks, third party certification shall be performed by the Navy Crane Center. This third party certification is in addition to certification by the designated certifying official as addressed in section 3. For Navy owned cranes and derricks operated or maintained by contract (e.g., base operating services contracts), certifying officials shall ensure contracting officers include the requirement for Navy Crane Center third party certification of applicable cranes in contracts. See appendix M for certification procedures.

For all other cranes and derricks (including rented, leased, and contractor owned and operated cranes and derricks) used in the above noted operations, third party certification shall be by an OSHA accredited certification agency in accordance with OSHA regulations. A list of currently accredited agencies may be obtained from the area OSHA office.

Note: Cranes and derricks used in cargo transfer shall be fitted with a load indicating (or alternate) device meeting OSHA requirements. The load indicating device may be integral with the crane or may be hung from the hook provided a readout is located in the crane cab. A load indicating device is not required when the crane is used to handle cargo, that is known (i.e., units hoisted are marked) to weigh less than 11,200 pounds and when 11,200 pounds is less than the rated capacity of the crane at the maximum radius possible under the conditions of use at the time. Additionally, portal and bridge cranes used in cargo transfer shall be fitted with a wind indicating device meeting OSHA requirements.

1.6.2 Container Spreaders and Below the Hook Lifting Devices. (Examples of below the hook lifting devices requiring third party certification include spreader beams, lifting devices for unique cargo, and bar pallet bridles that have some components that are not off-the-shelf items.)

Container spreaders and below the hook lifting devices (i.e., does not include common rigging gear) with rated loads greater than 10,000 pounds purchased or manufactured after 21 January 1998 shall have a third party certification by an OSHA recognized agency prior to use. This is a one-time third party certification. For Navy owned devices used in cargo transfer, the certification shall be by the Navy Crane Center and shall include an inspection and load test at the test load percentages noted in table 14-1. Third party certifications shall be retained in the equipment's history file for the life of the gear. For contractor owned devices used in cargo transfer, the requirements of 29 CFR 1917.50(c) apply. Third party certification is not required for devices purchased or manufactured prior to 21 January 1998, or for devices with rated capacities of 10,000 pounds or less.

1.7 Non-Navy Owned Cranes and Rigging Equipment at Naval Activities.

1.7.1 Rented or Leased Cranes Operated by Navy or Base Operating Service (BOS) Contractors and Cranes and Rigging Equipment Owned and Operated by (BOS) Contractors. Cranes shall be inspected, load tested, and certified to the requirements of section 3 prior to use (except for Appendix E hook NDT requirements). For cranes that cannot be load tested to the specified overload tests of this publication due to OEM restrictions or designs that prevent periodic overload tests, the cranes shall be downrated to 90 percent of the OEM's rated capacity (76 percent for non-mobile cranes) and tested to the requirements of this publication. For long term leases (over 4 months) and for BOS contractor owned cranes, the maintenance and inspection requirements of section 2, and Appendix E, hook NDT requirements shall also apply. Additionally, an equipment history file, section 5, containing those documents required by sections 2 and 3 and their applicable appendices shall be maintained on each rented or leased crane. These history files shall be retained for one year after the end of the lease

(seven years if the crane is involved in a crane or rigging accident). These requirements shall be included in applicable contracts.

Crane operators shall be licensed in accordance with the requirements of sections 6 through 8 (or equivalent for BOS contractor personnel). Crane operations shall be in accordance with sections 9 through 12. Rigging equipment and usage practices shall be in accordance with section 14.

1.7.2 Contractor Operated Cranes (and Multi-Purpose Machines, Material Handling Equipment (Forklifts), and Construction Equipment When Used as Cranes to Lift Suspended Loads) and Rigging Equipment in Weight Handling Operations. In addition to cranes rented or leased for operation by an activity, other non-Navy owned cranes, multi-purpose machines, material handling equipment (forklifts), and construction equipment are used on Navy property to lift suspended loads. Rigging equipment may be used with these machines or by itself in weight handling operations. These cranes and equipment can be from a variety of sources and are generally incidental to construction contracts, ship repair contracts, demolition contracts, maintenance and other service contracts, deliveries of supplies and equipment, etc. Numerous organizations, including tenant activities, ships, supply departments, ROICCs, etc., have contracting authority and very often the need for cranes is not anticipated when contract documents are written. The following requirements apply to any contracted work utilizing cranes (and multi-purpose machines, material handling equipment, construction equipment used to lift loads suspended by rigging gear) and to all rigging equipment used in weight handling operations at a naval activity. These requirements do not apply to shipboard cranes or rigging equipment. Navy activity (i.e., host activity) commanding officers shall promulgate the following minimum requirements to tenants and contracting officers for inclusion in contracts, statements of work, purchase orders, etc. (These requirements do not apply to cranes that enter the activity but are not used for lifting, or other machines not used to lift loads suspended by rigging equipment.)

a. Require the contractor to comply with specific activity regulations pertaining to crane safety and operation (including allowable access routes and ground loading limitations), and to notify the contracting officer, in advance, of any cranes entering the activity or of any multi-purpose machines, material handling equipment, or construction equipment that may be used in a crane-like application to lift suspended loads. Require the contractor to comply with applicable ANSI or ASME standards (e.g., ASME B30.5 for mobile cranes, ASME B30.22 for articulating boom cranes, ASME B30.3 for construction tower cranes, and ASME B30.8 for floating cranes, ASME B30.9 for slings, ASME B30.20 for below the hook lifting devices, and ASME B30.26 for rigging hardware, ANSI/ITSDF B56.6 for rough terrain forklifts). For cranes, machines and rigging equipment at naval activities in foreign countries, the cranes, machines and rigging equipment shall comply with the appropriate host country safety standards. For barge-mounted mobile cranes, require a third party certification from an OSHA accredited organization (or a third party certification from a state accredited organization for those states with OSHA approved state plans), a load indicating device, a wind indicating device, and a marine type list and trim

indicator readable in one-half degree increments. Third party certification is not required for barge-mounted mobile cranes at naval activities in foreign countries.

b. Require a certificate of compliance from the contractor (appendix P, figure P-1) that the crane (or other machine if used to lift suspended loads) and the rigging equipment meet applicable OSHA and ANSI/ASME regulations (with the contractor citing which OSHA and ANSI/ASME regulations are applicable, e.g., cranes/multi-purpose machines used in cargo transfer shall comply with 29 CFR 1917; cranes/multi-purpose machines used in construction, demolition, or maintenance shall comply with 29 CFR 1926; cranes/multi-purpose machines used in shipbuilding**,** ship repair, or shipbreaking shall comply with 29 CFR 1915; slings shall comply with ASME B30.9, rigging hardware shall comply with ASME B30.26). For cranes (or other machines used to lift suspended loads) and rigging equipment at naval activities in foreign countries, the contractor shall certify that the crane (or other machine) and the rigging equipment conform to the appropriate host country safety standards. The contractor shall also certify that all of its crane (or other machine) operators working on the naval activity have been trained not to bypass safety devices (e.g., anti-two block devices) during lifting operations. Require that the certifications be posted on the crane.

c. For mobile and commercial truck mounted cranes with OEM rated capacities of greater than 2000 pounds, require that the crane operator be designated as qualified by a source that qualifies crane operators (i.e., a union, a government agency, or an organization that tests and qualifies crane operators). Proof of current qualification shall be provided. Operators of cranes used in construction at activities under US jurisdiction shall follow the qualification and certification requirements of 29 CFR 1926.1427.

d. Require the contractor to certify (appendix P, figure P-1) that the operator is qualified and trained for the operation of the crane or machine to be used.

e. For multi-purpose machines, material handling equipment, and construction equipment used to lift loads suspended by rigging equipment, require proof or authorization from the machine OEM that the machine is capable of making lifts of loads suspended by rigging equipment. Require the contractor to demonstrate that the equipment is properly configured to make such lifts and is equipped with a load chart.

f. Require that all hooks used on cranes, hoists, other machines, and rigging gear shall have self-closing latches or the throat opening shall be "moused" (secured with wire, rope, heavy tape, etc.) or otherwise secured to prevent the attached item from coming free of the hook under a slack condition. The following exceptions apply and shall be approved by the contractor’s technical organization: items where the hook throat is fully obstructed and not available for manual securing and lifts where securing the hook throat increases the danger to personnel such as forge shop, dip tank, or underwater work.

g. Require a critical lift plan for each of the following lifts: lifts over 75 percent of the capacity of the crane, hoist, or other machine (lifts over 50 percent of the capacity of a barge mounted mobile crane's hoists) at any radius of lift; lifts involving more than one crane, hoist, or other machine; lifts of personnel (lifts of personnel suspended by rigging equipment from multi-purpose machines, material handling equipment, or construction equipment shall not be permitted); lifts made in the vicinity of overhead power lines; erection of cranes; and lifts involving non-routine rigging or operation, sensitive equipment, or unusual safety risks. The plan shall include the following as applicable:

(1) The size and weight of the load to be lifted, including crane (or other machine) and rigging equipment that add to the weight. The OEM's maximum load capacities for the entire range of the lift shall also be provided.

(2) The lift geometry, including the crane (or other machine) position, boom length and angle, height of lift, and radius for the entire range of the lift. Applies to both single and multiple crane/machine lifts.

(3) A rigging plan, showing the lift points, rigging equipment, and rigging procedures.

(4) The environmental conditions under which lift operations are to be stopped.

(5) For lifts of personnel, the plan shall demonstrate compliance with the requirements of 29 CFR 1926.1431.

(6) For barge mounted mobile cranes, barge stability calculations identifying crane placement/footprint; barge list and trim based on anticipated loading; and load charts based on calculated list and trim specific to the barge the crane is mounted on. The amount of list and trim shall be within the crane manufacturer's requirements.

(7) For lifts in the vicinity of overhead power lines (i.e., if any part of the crane or other machine, including the fully extended boom of a telescoping boom crane or machine, or the load could approach the distances noted in figure 10-3 during a proposed operation), the plan shall demonstrate compliance to 29 CFR 1926.1408-1411.

h. Require the contractor to notify the contracting officer as soon as practical, but not later than four hours, after any WHE accident. (See definition in section 12.) Require the contractor to secure the accident site and protect evidence until released by the contracting officer. Require the contractor to conduct an accident investigation to establish the root cause(s) of any WHE accident. Crane operations shall not proceed until cause is determined and corrective actions have been implemented to the satisfaction of the contracting officer.

i. Require the contractor to provide the contracting officer within 30 days of any accident a Crane and Rigging Gear Accident Report using the form provided in

section 12 consisting of a summary of circumstances, an explanation of causes(s), photographs (if available), and corrective actions taken. These notifications and reporting requirements are in addition to those promulgated by OPNAVINST 5100.23 and related command instructions.

j. Require the contractor to certify that signal persons used in construction work are qualified in accordance with 29 CFR 1926.1428.

The host activity shall ensure that contracts contain the above requirements, concur with the contracting officer's oversight plan (paragraph 1.7.2.2), ensure that the oversight plan is being carried out, and provide oversight of contractor accident investigations and corrective actions.

1.7.2.1 Additional Requirements For Tower Cranes. Contractor provided tower cranes used in construction must meet the additional requirements of CFR 1926.1435. The following additional documentation is required for contractor provided tower cranes (those cranes defined by ASME B30.3).

a. Foundation design and requirements.
b. Installation instructions.
c. Assembly and disassembly instructions including climbing/jumping instructions if applicable.
d. Operating manual, limitations, and precautions.
e. Periodic inspection and maintenance requirements.

1.7.2.2 Contracting Officer Responsibilities

a. The contracting officer shall include the minimum requirements of paragraph 1.7.2 and 1.7.2.1 for contractor cranes in contracts, ensure compliance with contract requirements, provide oversight of contractor crane and rigging operations, and provide oversight of contractor accident investigations and corrective actions. The degree of oversight shall be based upon the risk to Government personnel and property. Appendix P, figure P-2, provides a checklist that shall be used during oversight of contractor crane and rigging operations. The host activity shall concur with the oversight plan. Copies of appendix P, figure P-2, shall be kept on file for one year.

b. The contracting officer shall notify the host activity of any WHE accident upon notification by the contractor. Additionally, the contracting officer shall notify the Navy Crane Center of an accident involving a fatality, in-patient hospitalization, overturned crane, collapsed boom, or any other major damage to the crane or adjacent property as soon as possible, preferably within 24 hours of notification by the contractor. For all other accidents, notify the Navy Crane Center as soon as practical but no later than three working days after the accident.

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

contractor. These requirements are in addition to any notification and reporting requirements promulgated in OPNAVINST 5100.23 and command instructions. When the contracting office is not in the local area, the contracting officer shall designate a local representative to ensure compliance with the above noted requirements.

1.7.3 WHE Owned by Other Military Services and Other Government Agencies. Where Navy personnel may be exposed to WHE operations of tenant commands of other military services and agencies, the host activity commanding officer shall establish and promulgate a policy to ensure the safe operation of the equipment. The policy shall include, as appropriate, requirements addressed in paragraph 1.7.2 for contractor operated cranes.

1.7.3.1 Non-Navy Owned WHE Inspected, Maintained, Tested, and/or Operated by Navy Personnel. Where Navy personnel inspect, maintain, test, and certify, non-Navy owned WHE, they shall follow the requirements of sections 1, 2, 3, 5, 11, 12, 13, 14, and the applicable appendices as a minimum. For Navy personnel who operate cranes owned by other services and agencies, the training, licensing, and operational requirements of this publication apply.

1.8 WHE at Joint Bases. Shore based WHE that were previously under another military service and that have been turned over to the Navy, or where the Navy performs inspection, maintenance, testing and certification, shall be inspected, maintained, tested, and certified in accordance with this publication at their next regularly scheduled inspection/maintenance period, but no later than one year from turnover or full operational capability (FOC). Personnel of other military services who operate, or perform rigging on, WHE maintained and certified by the Navy shall be trained and qualified in accordance with, and shall follow the operational requirements of, this publication. This paragraph does not apply to Army or Air Force mobile tactical WHE.

1.9 Record Formats. Sample formats shown throughout this publication show the minimum information required to be maintained for record purposes. Activity generated forms may be substituted, provided they include the information required. Activities may delete items from the sample forms provided they are not applicable to the subject equipment. Local reproduction of the forms is authorized.

1.10 Audits and Self-Assessments. As directed by SECNAVINST 11260.2, audits of weight handling programs at Navy shore activities are periodically conducted by the Navy Crane Center in accordance with Navy Crane Center Instruction 11200.33. Activities shall perform a self-assessment and provide the results of the assessment to the Navy Crane Center approximately 30 days prior to the audit. Commands shall coordinate responses and corrective actions resulting from audits with their field activities.

1.11 Implementing Procedures. Activities shall develop standard written procedures for managing their weight handling program that implement the applicable requirements of this publication.

1.12 Request for Clarification, Deviation, or Revision. Requests for clarification, deviation, or revision to this manual shall be documented using a "Request for Clarification, Deviation, or Revision," (RCDR) figure 1-1. Appropriate references, enclosures, background, and reason for request shall be provided. This form may also be used to request clarifications, deviations, or revisions to Crane Safety Advisories, Equipment Deficiency Memoranda, and other directives issued by Navy Crane Center. RCDRs issued prior to the publication date of this revision of NAVFAC P-307 that provide clarifications or general interpretations shall be considered cancelled except for those that remain on Navy Crane Center's web site (https://portal.navfac.navy.mil/ncc). Previous RCDRs issued for one-time deviations or specific equipment remain in effect. Where appropriate, previous RCDRs have been incorporated into this document. RCDRs posted on Navy Crane Center's web site are applicable to all activities.

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	FAX	DATE
	E-MAIL		
APPROVED BY	PHONE	FAX	DATE
	E-MAIL		
CONTRACTING OFFICER'S REPRESENTATIVE (IF PREPARED AND APPROVED BY CONTRACTOR)	PHONE	FAX	DATE
	E-MAIL		

REFERENCE(S)
ENCLOSURE(S)
PURPOSE
BACKGROUND
DISCUSSION
REQUEST

NAVY CRANE CENTER RESPONSE
NAVY CRANE CENTER CONTROL NUMBER

PREPARED BY	PHONE	FAX	DATE
APPROVED BY	PHONE DSN	FAX	DATE

FIGURE 1-1 (1 of 2)

REQUEST FOR CLARIFICATION, DEVIATION, OR REVISION INSTRUCTIONS

This form is designed for fax transmission without a cover page or by e-mail and, with enclosures and signatures, shall be the official document. Electronic submission will be accepted without signatures but the names of the preparer and approver shall be filled in. The e-mail address is m_nfsh_ncc_rcdr@navy.mil. The fax number is (757) 396-1772.

1. Clarification, Deviation, or Revision: Check appropriate block.

2. Activity: Enter the Standard Navy Distribution List (SNDL) plain language address (PLA) and unit identification code (UIC) for your activity.

3. Activity Request Number: Enter the request number from your activity in the following format: UIC-FY-000 i.e., your unit identification code, a dash, the current fiscal year, a dash, and the number of the request from your activity in sequence (use four digits).

4. WHE Number: Self-Explanatory, otherwise mark "N/A" if not WHE specific.

5. Manufacturer: Self-Explanatory, otherwise mark "N/A" if not WHE specific.

6. SPS Crane: SPS as defined by NAVSEA 0989-030-7000. Otherwise mark "N/A" if not WHE specific.

7. Subject: Enter the paragraph or other part of the manual addressed.

8. Prepared by: Self-explanatory.

9. Approved by: Self-explanatory.

10. Contracting Officer's Representative: If the request was prepared and approved by a contractor, indicate concurrence by the contracting officer's representative.

11. Reference(s): Enter the applicable references.

12. Enclosure(s): List the applicable enclosures.

13. Purpose: State the purpose of the request in one or two short sentences.

14. Background: State the background or reason that prompted the request.

15. Discussion: State the rationale behind the request.

16. Request: State the specific request.

17. Navy Crane Center Response, etc.: Reserved for Navy Crane Center use.

FIGURE 1-1 (2 of 2)

SECTION 3
CERTIFICATION

3.1 Certification Program. The commanding officer is responsible for ensuring safety within the activity. He/She shall designate the certifying official(s) who shall ensure the activity's cranes are inspected, tested, and certified in accordance with this section. Certifications shall be based on the condition inspection and tests as prescribed herein. It is the purpose of the condition inspection 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. It is the purpose of the load test 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. 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 tests, a Certification of Load Test and Condition Inspection shall be signed by the test director, inspection personnel, and the certifying official.

3.2 Designation of Certification Personnel. The certifying official(s), including alternates, shall be designated in writing by the commanding officer of the activity, or by written command or regional instruction. The certifying official may be designated by position/title in lieu of name and the designation is considered to remain in effect until cancelled/revised. The certifying official shall, in turn, designate in writing the authorized test directors and condition inspectors involved in the certification process. For activities that obtain weight handling services from other activities, they shall designate in writing the activity and services that are provided in lieu of the specific personnel.

3.3 Certification Action. The Certification of Load Test and Condition Inspection form shall be similar to that shown in figure 3-1. For mobile cranes, locomotive cranes, aircraft crash cranes, and category 4 cranes an attachment shall be provided similar to figure 3-2. A card or tag with the crane identification number, certified capacity, and the certification expiration date, shall be posted in a conspicuous location on or near the crane. The certification expiration date shall be one day prior to the anniversary date of the certification. The crane may remain in service on the expiration date. For example, if a category 1 crane is certified 30 June, the expiration date shall be 29 June of the following year. The date of the certifying official's signature is the official certification date, from which the certification expiration date is determined. The crane shall not be returned to service prior to obtaining the certifying official's signature except as provided in paragraph 3.5.4. The certifying official shall withhold certification pending the correction of all inspection deficiencies existing after the load test that, in his/her judgment, could cause unsafe conditions.

3.4 Certification Requirements. A crane shall not be used in service without a valid certification.

3.4.1 Annual Certification. The certification is valid for one year from the date of signature of the certifying official. The certification process shall include a condition

the installation and removal, and the selective inspection and operational test required after each assembly and disassembly of the ancillary system. The activity procedure and any changes other than minor editorial changes shall be approved by the certifying official and the Navy Crane Center. There shall be sufficient sign-offs in the procedure to ensure critical evolutions are completed. The approved procedure shall be retained in the equipment history file and the crane operator's instructions. The procedure shall be used each time the OEM's ancillary equipment is changed out or the crane is re-reeved. Minor editorial changes shall be forwarded to the Navy Crane Center for information

d. All components (pins, headache ball, hook, etc.) shall be clearly marked to designate their specific location in this system. Their use shall be restricted to the specific mobile crane. Components may not be interchanged unless approved by the OEM.

e. See section 11 for restrictions on the use of wedge sockets for wire rope end connections.

f. For each use of the procedures, the completed procedure shall be filed in the equipment history file.

g. Removal or addition of ancillary equipment from/to the crane without a Navy Crane Center approved procedure is considered a crane alteration and shall be processed in accordance with Section 4.

h. See paragraph 10.7.3 for additional operational and rigging requirements during assembly and disassembly of cranes.

3.5.3.1 Exceptions to Paragraph 3.5.3

3.5.3.1.1 Exception for Removable Outrigger Pads, Counterweights, and Outrigger Extension Pins on Mobile Cranes. Outrigger pads, counterweights, and outrigger extension pins on mobile cranes which are designed to be removed for travel and counterweights that are removable to allow for different crane capacities may be removed and reinstalled without written procedures and without voiding the certification. Removable outrigger pads, counterweights, and extension pins shall be uniquely identified to a specific crane or group of cranes and their use shall be restricted to those cranes. OEM instructions shall be followed when removing or installing outrigger pads, counterweights, and outrigger extension pins. All outrigger pads, counterweights, and extension pins (if load-bearing) shall be load tested at the annual certification.

3.5.3.1.2 Boom Angle and Extension Pins on Category 3 Pedestal Mounted Commercial Boom Assemblies and Category 4 Cranes. Boom angle and extension pins on category 3 pedestal mounted commercial boom assemblies and category 4 cranes may be removed and reinstalled without written procedures and without voiding the certification. The pins shall be uniquely identified to a specific crane and location (boom angle or extension), load tested with that crane, and their use restricted to that

crane. OEM instructions shall be followed when removing or installing the boom angle and extension pins. All boom angle and extension pins shall be load tested at the annual (or quadrennial) load test.

3.5.3.1.3 Gantry Frame Extension Pins on Category 2 and 3 Gantry Cranes. Removable pins used to raise and lower category 2 and 3 gantry cranes may be removed and reinstalled without written procedures and without voiding the certification. The pins shall be uniquely identified to a specific crane (or be designed such that they cannot be separated from their gantry frame), load tested and certified with that crane, and their use restricted to that crane. OEM instructions shall be followed when removing or installing the extension pins. The crane shall be load tested during the certification load test at the highest elevation for which use is anticipated.

3.5.4 Exception for Continuance for Productive Service. The intent of this section is to optimize crane availability for productive service after completion of the pre-certification inspections and load test, provided no deficiencies that could cause an unsafe condition are found during inspections or load test. Crane availability is greatly enhanced when the current annual certification remains in effect. Continuance of the certification is achievable by scheduling the maintenance and condition inspections and tests for the ensuing certification sufficiently in advance of the expiration of the current certification. The following requirements shall apply:

a. The current certification will not be voided by the subsequent maintenance and condition inspections (including adjustments and disassembly of load bearing and load controlling parts) and load test.

b. No deficiencies that can cause an unsafe condition are found during the inspections or load (or operational) test.

c. The current certification is still valid.

d. When the test director has determined that the crane has successfully passed the inspections and load test, it may continue in productive service under the conditions of the current certification.

e. The new certification shall be signed by the certifying official within 10 calendar days of the date of the completion of the new load (or operational) test. If not, the current certification is void and the crane shall be removed from service.

It is acceptable to temporarily interrupt productive service to perform portions of the maintenance and condition inspection then return to productive service provided that disassembly of load bearing or load controlling parts has not occurred and no major deficiencies are found.

3.5.5 Exception for Recalibration of Load/Moment Indicating Devices, Overload Indicators, Radius Indicators, Boom Length Indicators, and Boom Angle Indicators. Recalibration of electronic load/moment indicating devices, overload indicators, load

shutdown devices, hydraulic load indication devices, radius indicators, boom length indicators, and boom angle indicators by comparing with certified test weights, measured distances, angles, etc., will not void the certification, and may be performed without Navy Crane Center approval provided the load does not exceed 110 percent of the crane's certified capacity.

3.5.6 Interim Recertification Requirements for Cranes in Relocatable Buildings or Cranes Being Relocated. Certified WHE installed in relocatable buildings shall be recertified after a relocation of the building and prior to use, as follows:

a. If the crane is installed and secured in the building during building relocation, it shall be condition inspected, operationally tested, and certified.

b. If the crane is removed from the crane rails and reinstalled, it shall be condition inspected, load tested, and certified, unless the removal and reinstallation of the crane does not require disassembly of load bearing components, in which case an operational test may be performed in lieu of a load test. This requirement also applies to cranes that are being relocated in non-relocatable buildings.

If a crane is removed for repair and/or recertification, or if an alternate crane is to be installed, an operational test may be performed after the crane is installed provided there is no disassembly of load bearing components after the crane is certified.

3.5.7 Loading in Excess of Certified Capacity. Except for load tests and planned evolutions during maintenance periods, a crane shall not be planned to be loaded in excess of its certified capacity without Navy Crane Center approval. Requests for loading in excess of certified capacity for production lifts shall verify that there are no other safer means available (including leased equipment) to make the lift.

If overloading occurs inadvertently and does not exceed 110 percent (105 percent for mobile cranes, locomotive cranes, aircraft crash cranes, mobile boat hoists, rubber-tired gantry cranes, and category 4 cranes) of the certified capacity (including appropriate allowance for impact, if any), the effects of the overloading shall be evaluated by the engineering organization and corrective action(s) taken as required. As a minimum, a condition inspection of the affected parts shall be accomplished and the crane shall be operationally tested and recertified. If an inadvertent overload exceeds 110 percent (105 percent for mobile cranes, locomotive cranes, aircraft crash cranes, mobile boat hoists, rubber-tired gantry cranes, and category 4 cranes) of the certified capacity, a load test is required (along with the condition inspection) for recertification. Where only distinct portions of the equipment are affected (e.g., overload of whip hoist), only those portions need to be inspected and tested.

3.6 Condition Inspection. A condition inspection shall be performed before, during, and after the load test. For cranes in the quadrennial load test program in a non-load test year, only the "before" portion of the Crane Condition Inspection Record (CCIR) shall be completed. In this case, the "during" and "after" columns would be marked "N/A". A CCIR

similar to that shown in figure 3-3 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. Where an item or inspection is not applicable, the symbol "NA" shall be used or the appropriate block blanked out. 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. Except for category 2 and 3 cranes, the condition inspection shall be a separate inspection from the maintenance inspection addressed in section 2. 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.

In the event that major deficiencies are identified by these inspections, the deficiencies shall be corrected prior to starting or completing the load test. Corrective action shall be properly documented. If a major deficiency is found after the load test, it shall be corrected, and a selective load test shall be performed to test the component(s) corrected. When a selective load test is performed, a condition inspection shall be performed on all items in the Crane Condition Inspection Record that experienced greater than normal loading to ensure that the load test has not caused any damage. A record of this retest shall be recorded in the "Remarks" portion of the Crane Condition Inspection Record. Elements of the pre-use inspection and the no-load portions of the appendix E tests may be performed simultaneously with the "before" portion of the condition inspection.

For cranes idle for a period greater than six months, a condition inspection and operational test shall be performed prior to placing the crane in service; recertification is not required. The CCIR similar to that shown in figure 3-3 shall be used to record results of the inspection. (This does not apply to jib cranes, pillar cranes, pillar jib cranes, monorails, davits, or fixed overhead hoists.)

3.7. Load Testing. The load test shall be performed in accordance with the procedures set forth in appendix E and any special requirements specified for the particular crane by the OEM or the activity engineering organization. The actual test load(s), in pounds, and actual test load percentage together with a list of the applicable test paragraphs (including all applicable subparagraphs) of appendix E shall be entered on the Certification of Load Test and Condition Inspection. Elements of the pre-use inspection, "before" portion of the CCIR, and no-load portions of the appendix E tests may be performed simultaneously.

3.7.1 Test Loads. The nominal test load shall be 125 percent of the rated capacity (105 percent for mobile cranes, locomotive cranes, aircraft crash cranes, mobile boat hoists, rubber-tired gantry cranes, and category 4 cranes). The actual test load shall be within +5/-0 percent of the nominal test load. For mobile cranes, the actual test load shall be based on the combination of test weights, rigging, and specified crane component

weights (i.e., hooks, blocks, ancillary devices, etc., and for some cranes the hoist wire rope not accounted for in the load charts). Load testing with loads above the limits specified herein is not authorized. Follow OEM load chart instructions. For mobile boat hoists and category 4 cranes, refer to OEM criteria for component weight requirements and values. For other types of cranes, the actual test load shall be the weight of the load, including rigging gear, suspended from the hook. For cranes that cannot be load tested to the specified overload tests of this publication due to OEM restrictions or designs that prevent periodic overload tests, the cranes shall be downrated to 76 percent of the OEM's rated capacity (90 percent for mobile cranes, locomotive cranes, aircraft crash cranes, mobile boat hoists, rubber-tired gantry cranes, and category 4 cranes) and tested to the requirements of this publication. Document reduced capacity by crane alteration in accordance with section 4.

3.7.1.1 Test Weights. Testing of cranes shall be done with the use of test weights. The use of dynamometers in lieu of lifting test weights is not permitted. Test weights for crane tests (and for rigging gear tests where test weights are used) shall be marked with a unique identification number and the weight in pounds. The weight marked shall be the actual weight taken from the scale or other measuring device. Solid weights shall be measured using calibrated equipment traceable to the National Institute of Standards and Technology, with a minimum accuracy of +/- two percent (i.e., indicated weight shall be within +/- two percent of actual weight). Water bag type weights may be used, except for mobile crane and category 4 crane tests. Water bag type weights shall be used and stored in accordance with OEM recommendations. The metering device/gauge used to determine the amount of water in the bag shall be calibrated annually using equipment traceable to the National Institute of Standards and Technology and shall ensure that the weight has a minimum accuracy of +/- two percent. Alternatively, a load indicating device meeting the above calibration and accuracy requirements may be used in lieu of a metering device. A list of test weights, with identification numbers and weights, shall be retained. The list shall include the type and serial number (or other identifier) of the weighing device(s) used to weigh the test weights. Where a lifting attachment supports multiple test weights (e.g., stacked weights or multiple weights suspended from a padeye), the total capacity shall be marked on the attachment.

3.7.2 Hoist Roll Back. When cranes exhibit hoist roll back, as defined in appendix A, the using activity shall ensure:

a. That the roll back condition is determined to be an inherent condition of the crane. If not, appropriate corrective action shall be taken.

b. That the roll back characteristic does not preclude continued use of the equipment in the current application. Documentation of inherent rollback and continued operation determinations shall be included in the equipment's history file.

Note: Testing for this condition is not required for hoists equipped with mechanical load brakes.

3.7.2.1 Hoist Roll Back at the Rated Capacity or Less. For cranes where rollback occurs at or less than the rated capacity of the crane, the using activity shall ensure:

a. That the minimum load where roll back occurs be determined for each speed point. This is a one-time test. The loads where roll back occurs shall be clearly posted on the crane and recorded in the crane's equipment history file.

b. That crane rigging and operational personnel are trained specifically on the equipment characteristics.

c. That procedures are established for handling loads at or near roll back conditions that require special attention in handling or landing loads in close proximity.

3.8 Mobile Cranes Temporarily Mounted on Barges. Mobile cranes certified for use on shore may be mounted on barges after meeting the requirements detailed below.

3.8.1 Selecting and Downrating the Mobile Crane. The activity engineering organization shall select the appropriately sized mobile crane for the job. The OEM's load chart and certification based on load testing on shore are invalid when mounting mobile cranes on barges. Barge stability calculations shall be performed and reduced load charts, if required based on maximum list and trim noted below, shall be established by the activity engineering organization and approved by the certifying official. The activity shall determine if further downrating is necessary based on factors such as weight of the load, sail area of the load, underwater current, etc.

3.8.2 Load Testing. Prior to use, the crane shall be load tested on the barge (to verify list and trim) and recertified. Test loads shall be 105 (+5, -0) percent of the reduced load chart capacities. List and trim shall not exceed 3 degrees during the load test and shall be within the crane manufacturer's requirements. The load test need not be re-performed during the annual certification period if the crane is removed and subsequently replaced on the barge provided the crane/barge configuration remains the same and a controlled assembly procedure, similar to an ancillary equipment installation/removal procedure, is used for the removal/installation of the crane on the barge. The load testing on the barge shall be performed once yearly as a minimum.

3.8.3 Sizing and Analyzing the Barge Deck. The engineering organization shall conduct an analysis of the barge deck structure for the expected crane outrigger (or crawler) and tie-down loads. Except for crawler cranes without outriggers, the crane shall be equipped with and used on outriggers. Outriggers shall rest on wood blocking. The crane carrier frame shall be secured to the barge deck with tie-downs to resist lateral loads. Tie-down sizes shall be calculated by the activity engineering organization based on expected maximum lateral loads and shall have some slack when the crane is fully raised on outriggers. For mobile cranes temporarily mounted on barges used in construction, the activity shall ensure that the barge or pontoon has a subdivided hull with one or more longitudinal watertight bulkheads. The barge shall have access to void compartments to allow for inspection and pumping.

3.8.4 Posting of Load Charts. A load chart shall be posted in the operator's cab that reflects the capacities of the crane on the barge. The operational pitch and roll, and wind speed limitations, as noted below, shall also be posted.

3.8.5 List, Trim, and Wind Indicators. A marine type list and trim indicator, readable in one-half degree increments, shall be installed in the operator's cab. In addition, a wind indicating device shall be provided.

3.8.6 Third Party Certification Requirements. Mobile cranes mounted on barges for shipbuilding, ship repair, shipbreaking, or cargo transfer (at naval activities in the U. S. and its territories) also require a third party certification per appendix M by the Navy Crane Center. Recertification is not required when returning the crane to shore service at full load capacities.

3.8.7 Additional Operational Requirements. The crane shall conduct lifts in calm seas only. Operating pitch and roll of the barge shall not exceed three degrees. The crane shall not operate in excess of wind speeds permitted by the crane OEM for use on barges or, in the absence of OEM guidance, 15 knots.

CERTIFICATION OF LOAD TEST AND CONDITION INSPECTION

Activity			Building/Location	
Crane No.	Type	OEM's Rated Capacity Main _____ lbs. _____ feet Aux _____ lbs. _____ feet Whip _____ lbs. _____ feet		Certified Capacity (If different from OEM's rated capacity, explain in "Remarks") Main _____ lbs. _____ feet Aux _____ lbs. _____ feet Whip _____ lbs. _____ feet

☐ Annual Certification ☐ Quadrennial Load Test

☐ Interim Recertification (Reason_____)

Appendix "E" Applicable Crane Test Procedure Paragraphs
(Include applicable subparagraphs.)

Category 1 or 4 Cranes *					
Boom Length	Test Load	Minimum Radius		Load Moment or Maximum Radius	
Hoist	%	Pounds	Feet	Pounds	Feet
Main					
Aux					
Whip					
Other					

Hook Tram Measurements	Base Meas.	Before Test	After Test
Main Hook			
Aux Hook			
Whip Hook			
Other			

Category 2 Cranes					
Hoist	Test Load %	Pounds	Hook Tram Measurements		
			Base Meas.	Before Test	After Test
Main					
Aux					
Other					

Category 3 Cranes					
Hoist	Test Load %	Pounds	Hook Tram Measurements		
			Base Meas.	Before Test	After Test
Main					
Aux					
Other					

Annual Certifications Since Hook NDT

Certification

This is to certify that inspections and tests have been conducted in accordance with the procedures set forth in the current NAVFAC P-307. It is further certified that the crane identified above is satisfactory to lift its certified capacity.

Test Director (Signature)	Date
Inspector (Signature)	Date
Inspector (Signature)	Date
Certifying Official (Signature)	Date
Expiration Date	

Remarks

* For mobile cranes, list all test loads and configurations (e.g., over side/over rear, boom extended/retracted, lifts on tires, travelling, etc.).

FIGURE 3-1

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

Complete as applicable for the type of crane certified. Indicate "NA" for configurations that do not apply

Crane No.

Lattice Boom Crane			Telescoping Boom Crane			
Boom Length (Feet)						
On Outriggers	Test Load	Radius	On Outriggers	Test Load	Radius	Boom Length
Maximum Certified Capacity			Maximum Certified Capacity			
Load Moment			Load Moment			
Free-Fall Mode			Free-Fall Mode			
On Rubber (Stationary)	Test Load	Radius	On Rubber (Stationary)	Test Load	Radius	Boom Length
Maximum Certified Capacity			Maximum Certified Capacity			
On Tires or Crawler Tracks (Pick and Carry) (Describe configurations and list test loads/radii)			On Tires (Pick and Carry) (Describe configurations and list test loads/radii/boom length)			

Other Configurations, including ancillary equipment if applicable. (Describe and list test loads/radii)

FIGURE 3-2

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 these equipment history files are acceptable.

TABLE 5-1
Equipment History File

	Documentation	**Minimum Retention Time**
1	Maintenance Inspection Specification and Records (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 one
2	Crane Operator's Daily Checklist (Monthly checklist for non-cab operated category 3 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)
3	Shop Repair Orders or Other Work Documents	
3.1	Load Bearing/Load Controlling Parts and Operational Safety Devices	Seven years
3.2	All others	One year
3.3	Work Documents invoking Crane Alterations	Life of crane
4	Non-Destructive Test Reports	Latest (for component)
5	Crane Condition Inspection Record	Current (including interim’s) plus one previous annual record
6	Certification of Load Test And Condition Inspection	Current (including interim’s and extensions) plus one previous load test certification.
7	Third Party Certifications (for applicable cranes)	Current plus one previous certification
8	Wire Rope Breaking Strength Certification for New Cranes and for Replacement Wire Rope on Existing Cranes (including standing ropes) (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) (Note: For cranes used in cargo transfer, a wire rope certification is required for running rope regardless of the age of the crane and it shall be a certification of actual breaking strength.)	Latest

TABLE 5-1
(continued)

	Documentation	Minimum Retention Time
9	Crane Alterations	Life of crane
10	Deficiency Reports (i.e., load bearing or load controlling parts or operational safety devices)	Seven years
11	Purchase Contracts (If available)	Life of crane
12	Accident Reports	Life of Crane
13	Hook Tram Point Base Measurement	Life of hook
14	Operational Lifts Exceeding the Certified Capacity	Life of crane
15	Specification Data Sheets	Life of crane
16	Crane Acceptance Test (If available)	Life of crane
17	Mobile Crane Operating Procedures for Ancillary Equipment	Life of crane
17.1	Completed Procedures When Used	Seven years
18	Crane Roller Clearance Data Standard of Acceptance	Life of crane
19	Slewing bearing clearance readings	Life of bearing
20	Oil analysis/vibration analysis data	Life of component
20.1	(Alternate. Internal gear inspection report)	(Latest)
21	Material Inspection Report for Floating cranes (per OPNAVINST 4780.6)	Latest, including waivers of depot availability
22	Coupling alignment data per appendices C or D	Latest
23	Lubrication Records	One year
24	Hoist Rollback Data	Life of crane
25	Controlled Disassembly Reassembly Procedures	Life of crane
25.1	Completed Procedures When Used	Seven years
26	Hoist brake actuator Belleville torque spring cycle limit	Life of component
27	Individual hoist brake actuator Belleville torque spring number of cycles	Latest
28	Hydraulic mobile crane OEM inspection and replacement intervals for hoist drives. Age of crane/component.	Life of crane/component
29	Setting of load shutdown device (see paragraph 11.5)	Life of crane/component
30	Copy of Rail Certification per NAVFACINST 11230.1	Current certification
31	Maintenance inspection, lubrication, or servicing deferral and justification.	Latest
32	Floating crane barge maintenance documentation (paragraph 2.1)	Latest plus previous year
33	Type of hook material and hook manufacturing method (If available).	Life of hook

SECTION 6
OPERATOR LICENSING PROGRAM

6.1 Applicability. All personnel, except contractor personnel, who are assigned duties involving the operation of Navy shore based category 1, category 2, cab operated category 3, or category 4 cranes shall be qualified and licensed in accordance with these provisions. The licensing requirements of OPNAVINST 4790.2 shall be followed for operators of aircraft and helicopter crash cranes covered by that document. Operators licensed in accordance with these provisions may operate cranes at any naval activity provided that all of the requirements of section 6.2 are followed.

6.1.1 Contractor Personnel. Contractor personnel who operate Navy owned cranes shall be certified by the contractor, at the contractor's expense, as fully qualified. Operator qualifications shall be, as a minimum, equivalent to the requirements of this publication. To achieve licensing equivalency, all actions identified in sections 6, 7, and 8 shall be performed with a few minor exceptions. The initial application for license process is not required and the contractor may use company unique forms for the records identified in section 8. However, all information required by sections 6, 7, and 8 including test questions in the appendices, shall be included on the company forms. Also, the arrangement and control of contractor test facilities on non-government property is the responsibility of the contractor. The contractor shall provide documentation on operator qualifications to the contracting officer prior to an operator engaging in any mode of equipment operation. Documentation shall be retained by the contracting officer in the contract files.

6.1.2 Contractors Operating Navy Cranes Used In Construction. Effective 10 November 2014, contractor personnel (including BOS contractor personnel) who operate Navy cranes while engaged in construction operations shall be certified or licensed in accordance with 29 CFR 1926.1427(b) or (c), in addition to the certification required by paragraph 6.1.1 above. After the effective date, licensing per paragraph 6.1.1 of NAVFAC P-307 will no longer be permitted for contractor operators of Navy cranes if they are engaged in construction operations.

6.1.3 Non-Cab Operated Category 3 Crane Operators. Licensing is not required for operators of non-cab operated category 3 cranes. However, all operators of non-cab operated category 3 cranes shall be trained in accordance with section 13 and demonstrate adequate knowledge of the operation of each specific type of equipment they are authorized to operate.

6.2 Use and Limitations of Licenses

6.2.1 Significance. A Crane Operator License is official evidence that the person named therein has been officially accepted as qualified to operate the types of cranes specified on the license.

6.2.2 Authorized Operation. Possession of a license does not of itself constitute authorization to operate cranes. Such authorization shall be specifically obtained from the supervisor charged with responsibility for crane operations.

6.2.3 Possession of Licenses. Operators shall have such licenses on their person when operating cranes.

6.2.4 Equipment Familiarity Checkouts. The Navy's cranes inventory consists of a wide variety of equipment types, makes, and models with variations in control mechanisms and operational characteristics. For this reason, it is not feasible to devise and administer examinations and issue licenses to cover each equipment variation. The objective of the licensing program is to ensure that operators are qualified to operate cranes having the same essential basic functional characteristics. Possession of a license means that the person holding such license is qualified to operate any crane with the characteristics of the types authorized on the license, provided the operator has been checked out by the crane operations supervisor or work leader (classified as WL) on the specific unit to be operated.

6.2.5 No-Load Licenses for Operation by Maintenance, Inspection, and Engineering Personnel. Crane maintenance, inspection, and engineering personnel who operate cranes incidental to maintenance or troubleshooting of the equipment shall be trained, tested and licensed in accordance with these requirements with the following exceptions:

a. The licensing performance test may be modified to suit appropriate conditions that the maintenance, inspection, and engineering personnel may experience.

b. Lifting of loads is not permitted.

c. The license shall indicate "NO LIFTING OF LOADS ALLOWED."

6.3 Designation of License Program Personnel. The activity commanding officer shall designate in writing the official and organization responsible for the management and administration of the program for instructing, testing, and licensing of operators. The official responsible for the license program shall designate in writing license issuing officials, instructors, and performance examiners. The instructors and examiners shall be qualified to effectively instruct, examine, and test license applicants. This includes the capability to develop and conduct formal courses of classroom instruction on the various aspects of equipment operation and safety. The performance examiner shall be selected from the best-qualified equipment operators. Navy civilian and military performance examiners shall hold a license for the specific equipment for which they are conducting operator testing. Examiners shall be completely familiar with all aspects of its safe and effective operation.

SECTION 9
OPERATOR CHECKS

9.1 Pre-Use Check (Category 1, 2, and 4 Cranes and Cab Operated Category 3 Cranes). A complete check of the crane shall be performed by the operator prior to the first use of the crane each day (whether the crane is used in production, maintenance, testing, or being relocated). For cranes used in construction operations, the check shall be performed each shift. The crane team shall assist the operator in performance of the operation portion of the ODCL as necessary. A Crane Operator's Daily Checklist (ODCL) shall be used for this purpose. If only one hoist will be used on a multiple hoist crane, then the ODCL checks are not required for the unused hoist. This situation shall be documented in the "remarks" section of the ODCL. The operator shall sign the ODCL at the completion of the check. In addition, the first operator in each subsequent shift that day shall perform the operational checks of paragraph 9.1.2.1.4 (except that the boom hoist limit switches need not be checked). All other operators shall review and sign the initial ODCL and review any tags posted on the crane. The ODCL shall be turned in to the supervisor after the last use of the crane each day. The only exceptions to completion of the appropriate check prior to making a lift are when a load is suspended from the hook for a period that spans more than one operator and the lift cannot be practically or safely interrupted or when critical continuous operations are involved where the performance of a subsequent ODCL would adversely affect the safety and integrity of the crane operation (e.g., docking or undocking of a ship). In those instances, the appropriate check shall be performed immediately upon completion of the lift or critical continuous operation, unless the equipment will not be operated again by that operator. For operations not involving a lift (e.g., moving the crane to a new location), the operator shall check those functions applicable to the operation to be performed.

9.1.1 Documentation. Figure 9-1 identifies attributes applicable to most types of cranes. If a crane is equipped with load bearing or load controlling parts or safety devices not shown in figure 9-1, they shall be included in the activity's ODCL. Shortened forms, customized to particular categories of cranes, may be used provided they include all attributes applicable to the particular cranes covered.

9.1.2 Procedure. The operator shall check the items prescribed on the checklist. It is not the intent of this paragraph to require checking of those items that would require additional personnel (such as electricians) or additional equipment (such as man lifts or fall protection equipment) or safety lockouts. The operator's check shall also include operating the machine without load through all motions; using all controls through a range sufficient to ensure their proper operation; and verifying the proper operation of safety devices, gauges, meters, warning signals, limit switches, and other devices.

9.1.2.1 Specific Instructions. The pre-use check is in four parts and is designed to group the items to be checked in their normal sequence of location or area as they would normally be observed. All items and attributes are keyed to the ODCL. The condition observed shall be indicated on the form. The operator may perform the check from the various groupings in parallel.

g. Boom Angle/Radius Indicator. Check operation of boom angle and/or radius indicator.

h. Limit Switches. Checking of limit switches shall be performed at slow speed and include each upper hook hoist primary limit switch and the upper and lower boom hoist primary limit switches. (Verifying the operation of the upper and lower boom hoist limit switches is required only during the initial check of the crane each day.) Checking of hook hoist lower limit switches is not required if the hook can be lowered to its lowest possible position (e.g., bottom of drydock being worked at minimum radius) while still maintaining a minimum of two wraps of rope on the hoist drum (three wraps for ungrooved drums). For cranes that do not have the requisite number of wraps, the hook hoist lower limit switch shall be checked where operationally possible, i.e., if the crane is at a location where the limit switch can be checked (where the lower limit switch is not checked during the pre-use check, it shall be checked if the crane is subsequently relocated to a position where it can be checked). For cranes without hoist upper limit switches, do not check hoist overload clutches if so equipped. (See section 10 for specific precautions for these hoists.)

Checking of secondary limit switches is not required unless a specific operation is planned where the primary limit switch will be bypassed. (See section 10 for controlling the bypassing of safety devices.)

i. Emergency Stop (e.g., Power-Off Button). Check the emergency stop. Know its location and ensure it is working properly. If the emergency stop is checked while a motion is in operation, check at slow speed. (Not applicable to diesel engine shutdowns on portal and floating cranes.)

j. Other Operational Safety Devices. Check any other operational safety devices as directed by the activity engineering organization.

k. General Safety Devices. Check general safety devices and ensure they are functioning.

l. Fleeting Sheaves. Check operation of fleeting sheaves, where visible, to ensure they travel freely on the shaft.

9.1.2.1.5 Additional Pre-Use Checks for Floating Cranes, Including Mobile Cranes on Barges, Used in Construction. The means to secure a mobile crane to the barge shall be inspected each shift for wear, corrosion, loose or missing fasteners, and defective welds.

If the floating crane (including mobile cranes on barges) is engaged in construction operations for a period exceeding a month, a documented monthly inspection shall be performed. The inspection shall include the items covered in the pre-use inspection and the following:

a. The vessel/flotation device is not taking on water.

b. The deck load is properly secured.

c. The vessel/flotation device is watertight based on the condition of the chain lockers, storage, fuel compartments, and hatches.

d. The firefighting and lifesaving equipment is in place and functional.

If the floating crane (including mobile cranes used on barges) is to be used in construction operations for a period of one year or longer, the following shall be included in the annual condition inspection of the barge:

e. Cleats, bitts, chocks, fenders, capstans, ladders, and stanchions, for corrosion, wear, deterioration, or deformation that could impair the function of these items.

f. External evidence of leaks and structural damage; evidence of leaks and damage below the waterline may be determined through internal inspection of the barge.

g. Four-corner draft readings.

h. Firefighting equipment for serviceability.

i. Rescue skiffs, lifelines, work vests, life preservers and ring buoys for proper condition.

9.2 Pre-Use Check (Non-Cab Operated Category 3 Cranes).

a. For all cranes, the operator shall perform a pre-use operational check prior to the first use of the crane each day. For cranes used in construction, the check shall be performed prior to each shift the crane is used. The operational check shall ensure that the crane controls, brakes, and limit switches operate properly. Hooks, hook latches, wire rope, and load chains shall be checked for proper condition and wire rope or load chain reeving. This pre-use check need not be documented. Problems found shall be reported to the supervisor.

b. For bridge, wall, and gantry cranes, a documented pre-use check shall be performed at least once each calendar month the crane is in use. The pre-use check shall be in accordance with paragraph 9.1.2**,** except that the pre-use check may be from the ground. The checklist shall be completed and signed by a qualified operator. The operator shall forward the checklist to the supervisor for review.

9.3 Operator-Detected Deficiencies

9.3.1 Load Bearing Parts, Load Controlling Parts, and Operational Safety Devices. When an operator, during the daily check of equipment or during operation, observes a deficiency of a load bearing part, load controlling part, or operational safety device (e.g., an asterisked item on the ODCL); or an operating condition that could result in uncontrolled movement, failure to move as expected from a control input, or otherwise render the crane unsafe, he/she shall immediately secure the crane from further operation and notify the supervisor of the deficiency observed. This includes leaks with greater than normal seepage. The supervisor shall immediately report the crane deficiency to the crane inspection organization for diagnosis of the deficiency and initiation of corrective repair action, including engineering resolution as necessary. The crane (or affected hoist on cranes with multiple hoists) shall not be returned to service until such deficiencies are either corrected or evaluated by the activity engineering organization as satisfactory for continued operation. If there is no activity engineering organization, the inspection organization shall evaluate the deficiency and the certifying official shall approve continued operation. See sections 2 and 3 for requirements for repair, inspection, and certification. The items shall be marked as unsatisfactory. A note in the remarks block shall identify the specific component and describe the unsatisfactory condition. In the case of a known (and tagged) deficiency, the operator shall mark the appropriate block on the ODCL (e.g., “Electric Motors” for an inoperative portal crane travel motor; “Operation” for an out of service hoist) as unsatisfactory and explain in the remarks block that the crane has been determined satisfactory for operation with the restrictions noted. In such cases, the operator would not need to contact his supervisor.

9.3.2 Other Deficiencies. For any other deficiency noted on the ODCL, the item shall be marked as unsatisfactory and the operator shall describe the deficiency in the remarks block. The operator's supervisor shall provide the ODCL to the organization responsible for corrective action. For non-cab operated category 3 cranes, the activity shall prescribe procedures for notification and corrective action.

CRANE OPERATOR'S DAILY CHECK LIST

CRANE NO.	TYPE/CAPACITY	LOCATION	CERTIFICATION EXPIRATION DATE	SHIFT 1	SHIFT 2	SHIFT 3	HOUR METER START	HOUR METER STOP	HRS OPERATED	DATE

OPERATORS

LEGEND
S = SATISFACTORY U = UNSATISFACTORY NA = NOT APPLICABLE

1 WALK AROUND CHECK		S	U	NA	2 MACHINERY HOUSE CHECK		S	U	NA	3 OPERATOR CAB CHECK		S	U	NA	4 OPERATIONAL CHECK		S	U	NA
a	Safety Guards and Plates				a	Housekeeping				a	Gauges				a	Area Safety *			
b	Carrier Frame and Rotate Base *				b	Diesel Engine and Generator *				b	Indicator and Warning Lights				b	Outriggers and Stabilizers *			
c	General Hardware				c	Leaks				c	Visibility *				c	Unusual Noises			
d	Wire Rope *				d	Lubrication				d	Load Rating Charts *				d	Control Action *			
e	Reeving *				e	Battery				e	List/Trim Indicator (Floating Cranes) *				e	Wire Rope or Chain *			
f	Block *				f	Lights				f	Boom Angle/Radius Indicator *				f	Brakes and Clutches *			
g	Hook *				g	Glass				g	Fire Extinguisher				g	Boom Angle/Radius Indicator *			
h	Sheaves or Sprockets *				h	Clutches and Brakes *				h	Level Indicator (Mobile Cranes) *				h	Limit Switches *			
i	Boom and Jib *				i	Electric Motors *				i	Danger/Caution Tags *				i	Emergency Stop *			
j	Gantry, Pendants, and Boom Stops *				j	Auxiliary Engine and Compressor									j	Other Operational Safety Devices *			
k	Walkways, Ladders, and Handrails				k	Danger/Caution Tags *									k	General Safety Devices			
l	Windlocks, Stops, and Bumpers				l	Fire Extinguishers									l	Fleeting Sheaves			
m	Tires, Wheels and Tracks				m	Hoist Drum Pawls and Rachets *													
n	Leaks																		
o	Outriggers and Stabilizers *																		
p	Load Chain *																		
q	Area Safety *																		

INSTRUCTIONS - Check all applicable items indicated, each shift. Suspend all operations immediately when observing an unsatisfactory condition of any item indicated with an asterisk (*) unless the condition has been reviewed and continued operation has been authorized by the activity engineering organization. In addition, suspend operation when any unsafe condition is observed and immediately notify supervisor. For any unsatisfactory item, identify the specific component and describe the deficiency in the "Remarks" block.

SUPERVISOR'S SIGNATURE

DATE

FIRST OPERATOR'S SIGNATURE	OPERATOR'S SIGNATURE	OPERATOR'S SIGNATURE	OPERATOR'S SIGNATURE
DATE	DATE	DATE	DATE

REMARKS

FIGURE 9-1

other means, permission for bypassing/defeating safety devices (except for performance of the operator's pre-operation inspection) shall be obtained from the operator supervisor. This requirement shall be posted in the operator's cab. For mobile and electric cranes that do not provide protection against two-blocking, activities shall develop crane specific procedures designed to minimize the possibility of two-blocking (e.g., prohibiting hoisting when hook block is within 10 feet of contacting the boom or 3 feet from contacting the hoist frame, providing a rigger to watch the hook block when the hook approaches the boom or hoist frame, prohibiting any simultaneous crane movement while hoisting, etc.). Supervisors shall brief operators on the procedures prior to assignment on such cranes.

10.2.2.3.1 Additional Requirements for Operational Safety Devices, General Safety Devices, and Operational Aids for Cranes Used in Construction. The following operational safety devices, general safety devices, and related equipment are required on cranes used in construction operations, unless otherwise specified:

a. A properly working crane level indicator that is either built into the equipment or is available on the equipment. This requirement does not apply to portal cranes, derricks, floating cranes/derricks and land cranes/derricks on barges, pontoons, vessels or other means of flotation.

b. Boom stops, except for derricks and hydraulic booms.

c. Jib stops (if a jib is attached).

d. Equipment with foot pedal brakes shall have locks on the pedals.

e. Hydraulic outrigger jacks and hydraulic stabilizer jacks shall have an integral holding device/check valve.

f. Hydraulic boom luffing and telescoping cylinders shall have an integral holding device.

g. For equipment manufactured after December 16, 1969, a boom hoist limiting device is required. If the equipment was manufactured on or before December 16, 1969, and is not equipped with a boom hoist limiting device, at least one of the following alternative measures is required:

(i) Use a boom angle indicator.

(ii) Clearly mark the boom hoist cable (so that it can easily be seen by the operator) at a point that will give the operator sufficient time to stop the hoist to keep the boom within the minimum allowable radius. In addition, install mirrors or remote video cameras and displays if necessary for the operator to see the mark.

(iii) Clearly mark the boom hoist cable (so that it can easily be seen by a spotter) at a point that will give the spotter sufficient time to signal the operator and have the operator stop the hoist to keep the boom within the minimum allowable radius.

h. Luffing jib limiting device (for cranes with luffing jibs).

i. Telescopic boom cranes manufactured after February 28, 1992, shall be equipped with anti two-block or two-block damage prevention device(s). The device(s) shall prevent such damage at all points where two-blocking could occur.

j. Lattice boom cranes manufactured after February 28, 1992, shall be equipped with anti two-block or two-block damage prevention device(s), or warns the operator in time for the operator to prevent two-blocking. The device shall prevent such damage/failure or provide adequate warning for all points where two-blocking could occur.

k. Articulating boom cranes manufactured after December 31, 1999 equipped with a load hoist shall be equipped with anti two-block or two-block damage prevention device(s). The device(s) shall prevent such damage at all points where two-blocking could occur.

(l) Boom angle or radius indicator readable from the operator's station. (Not required for articulating boom cranes.)

m. Jib angle indicator if the equipment has a luffing jib. (Not required for articulating boom cranes.)

n. Boom length indicator if the equipment has a telescopic boom, except where the rated capacity is independent of the boom length. (Not required for articulating boom cranes.)

o. Equipment manufactured after March 29, 2003 shall have at least one of the following: load weighing device, load moment (or rated capacity) indicator, or load moment (or rated capacity) limiter.

p. Category 2 or 3 cranes used in construction shall have an anti-two block device.

q. A properly working horn that is either built into the equipment or is on the equipment and immediately available to the operator.

r. Cranes on rails shall have rail clamps and rail stops, except for portal cranes.

s. An accessible fire extinguisher shall be provided on the crane.

Operations shall not begin unless all of the devices noted above are in proper working order. If a device stops working properly during operation, the operator shall safely stop operations. If any of the devices are not in proper working order, the equipment shall be removed from service and operation shall not resume until the device is working properly.

10.3 OEM's Operation Manual. Crane operators shall read, thoroughly understand, and comply with all procedures, safety instructions, and precautions in the OEM's operation manual. This also applies to instructors and supervisors in initial checkout of new cranes. Where operating procedures are unavailable from the manufacturer, the activity shall develop and ensure compliance with all procedures necessary for the safe operation of the equipment and attachments. Procedures that change or develop the capacity of the crane (where the original capacity is not available from the manufacturer) shall be submitted to the Navy Crane Center for approval. The OEM's operation manual shall be on the crane and readily available to the operator for all category 1 and 4 cranes. Where instructions provided by the OEM are in conflict with local safety instructions or safety procedures provided in this document, the operator shall refer such conflicts to his supervisor for resolution.

10.3.1 OEM's Supplemental Safety Information. Manufacturers, particularly of mobile cranes, often issue information more current and supplemental to that in the operation manual furnished with a particular crane. Much of the information (although sometimes addressed in service bulletins) pertains to the safe operation of the crane. Activities shall contact the OEM or authorized distributor for supplemental information applicable to their cranes, and, if practical, be added to the OEM's distribution list for such information.

10.4 Lifting Operations. Lifting operations shall be classified into two basic categories, complex lifts and non-complex lifts.

a. Except as noted, lifts of ammunition and explosives (ordnance) are considered to be a category separate from these criteria for complex/non complex lifts. Ordnance lifts have unique procedures and approved ordnance handling equipment that must be utilized. However, lifts of ordnance involving the use of tilt fixtures; lifts of ordnance onto/from ships where binding may occur, such as VLS/CLS operations; and lifts of ordnance as described in subparagraphs 10.4.1(d) through (i) shall be treated as complex lifts. For all ordnance lifts, follow NAVSEA OP-5 in addition to this manual. A pre-lift brief shall be conducted to ensure the roles and responsibilities of the crane team and the ordnance handling team are understood and fully coordinated.

10.4.1 Complex Lifts. These are lifts with a moderate to high level of risk involving:

a. Hazardous materials, e.g., poisons, corrosives, highly volatile substances, etc. This does not include palletized unit loads of ordnance, nor materials such as oxygen, acetylene, propane, diesel fuel, or gasoline in cans, or tanks that are properly secured in racks or stands designed for lifting and transporting by crane.

b. Large and complex geometric shapes.

c. Lifts of personnel.

d. Lifts exceeding 80 percent of the capacity of the crane's hoist (e.g., main hoist, whip hoist) planned for use (lifts exceeding 50 percent of the hoist capacity for a

mobile crane mounted on a barge). For variable rated cranes, this shall be at the maximum anticipated radius planned for use. (Lifts with jib cranes, pillar jib cranes, fixed overhead hoists, and monorails are excluded. Lifts of test weights during maintenance or testing when directed by a qualified load test director are excluded.)

e. Lifts of submerged or partially submerged objects. The following lifts are not considered complex:

Removal of valves, rotors, pipes, etc., from dip tanks for cleaning or coating purposes.

Lifting boats of known weight from the water if the boats are of open design with bilge compartments accessible for visual inspection; the boats have label plates indicating weights; and the boats have pre-determined lifting points established by the OEM or the activity engineering organization.

Lifting submerged or partially submerged objects that meet the following criteria: the object is verified to not contain fluid in pockets and/or voids that is unaccounted for in the weight of the object; the object is verified or known to not be stuck by suction or adhesion by corrosion, marine growth, excessive surface tension, mud, etc.; and the object is verified to be clear of obstructions such as other objects in the water, underwater cables, etc.

f. Multiple crane or multiple hook lifts on the same crane, except for bridge or gantry cranes with hooks coupled together and specifically designed for simultaneous lifting such as jet engine test stand lifting cranes.

g. Lifts of unusually expensive or one-of-a-kind equipment or components.

h. Lifts of constrained or potentially constrained loads (binding condition). See paragraph 10.5

i. Other lifts involving non-routine operations, difficult operations, sensitive equipment, or unusual safety risks.

10.4.1.1 Identification and Procedures. Activities shall identify complex lifts and prepare procedures (including rigging sketches where required) for conducting these lifts. Procedures may be standard written instructions or detailed procedures specific to a lift.

10.4.1.2 Supervisor or Working Leader Review and Oversight. A rigger supervisor, operator supervisor, or a rigging or crane operator working leader (classified as WL) shall review on-site conditions for complex lifts and shall perform a pre-job briefing before each complex lift to ensure all crane team personnel understand the required procedures for the lift. A rigger supervisor, operator supervisor, or working leader shall personally supervise the following lifts:

a. Lifts exceeding 80 percent of the certified capacity of the crane's hoist used for the lift.

b. Multiple hook lifts when the weight of the object being lifted exceeds 80 percent of the certified capacity of any hoist used for the lift (see exception in paragraph 10.4.1.f).

c. Lifts of ordnance involving the use of tilt fixtures.

If the lifts are repetitive in nature, the supervisor or working leader shall be present during the first evolution of the lift with each rigging crew. Subsequent identical lifts by the same crew may be done under the guidance of the rigger-in-charge.

10.4.2 Non-complex Lifts. These lifts are ordinary in nature and do not require supervisory oversight. They may be made at the discretion of a qualified rigger.

10.5 Pre-lift Preparation. Operators and riggers shall understand and comply with the load rating chart posted on the crane. The rigger giving the signals shall be identified and the type(s) of communication to be used shall be established.

To avoid overloading any equipment (e.g., hoist, rigging gear, container, material handling platform) used in a crane lift, the rigger-in-charge shall know or have a reasonable estimate of the weight to be lifted and, if applicable, the maximum radii at which the load will be picked and positioned. If the weight is estimated to exceed 50 percent of the capacity of the hoist (at the maximum anticipated radius if applicable) or 80 percent of the capacity of the rigging gear, platform/skid, below-the-hook lifting device, etc., the weight shall be verified by performing an engineering evaluation or using a local procedure approved by the certifying official or activity engineering organization. Alternatively, a load indicating device shall be used. Where overloading of the crane or rigging is possible due to binding conditions, a portable load indicating device with a readout readily visible to the signal person or RIC shall be used. When a load indicating device is used, an appropriate stop point shall be established and the load indicating device shall be carefully monitored to ensure the stop point is not exceeded. When necessary, chainfalls or other hoisting control means shall be used to avoid sudden overload of the crane or rigging gear. This is a complex lift.

Note: Electrically powered load indicating or other devices used in the vicinity of ammunitions and explosives shall meet the Hazards of Electromagnetic Radiation to Ordnance (HERO) requirements of NAVSEA OP 3565.

For mobile cranes, the following also applies. The operator shall know the boom and jib length and crane configuration, and thoroughly understand and comply with the crane's load rating charts and accompanying notes. When determining the safe maximum working radius for the load to be handled, the crane team shall consider whether the lift will be made over the side, front, or rear (or any combination), and whether operation will be on tires or outriggers/stabilizers. For lifts exceeding 50 percent of the crane's capacity at the maximum anticipated radius planned for use, verify by actual measurement or by operating the crane with an empty hook through the lift evolution and verifying the radii

from the radius indicator. For lifts exceeding 80 percent, verify by actual measurement where possible (i.e., do not rely solely on the crane radius indicator). Ideally, the crane should be positioned equidistant between the pickup and set down points. This will limit the need for changing boom positions. Verify that the load to be lifted is within the crane's allowable loading (including appropriate deductions for hook, block, ancillary equipment, etc.) for all measured radii. Do not exceed these distances during the actual lift. If a load can not be placed where originally intended, verify the radius (and allowable load) of the new set down location prior to landing the load. Periodically, the operator shall compare known weights and measured radii against load and radius indicating devices on the crane to verify the accuracy of the devices. If accuracy is questionable, notify the supervisor.

10.5.1 Equipment Weights and Marking. Man lifts, aerial platform vehicles, forklifts, mobile cranes, and similar equipment that may be lifted by crane shall be weighed and stenciled with the weight in pounds. For activities located in foreign countries, additional marking of the weights in kilograms is acceptable. OEM marked weights are acceptable. Lifting points and/or lifting configurations shall be identified.

Sand hoppers, tubs, platforms, custom designed skids and pallets, and other large containers that may contain material shall be marked with empty and full weights. For containers utilized for trash or scrap, the safe working load may be marked, provided the container is open or accessible to allow the rigger to determine the type and weight of the material placed in the container. Full weights shall be established by the OEM or the activity engineering organization. If the container's weight is not marked, its weight shall be verified by the use of a load indicating device or dynamometer. The load indicating device, dynamometer, rigging gear, and crane shall be sized to pick up the maximum possible weight of the unmarked load. If a marked container cannot be physically verified as empty or the container is only marked with a full weight, the container shall be considered full or a load indicating device shall be used.

10.5.2 Ground Conditions. Cranes shall not be operated or assembled/disassembled unless ground conditions are firm, drained, and graded to a sufficient extent so that, in conjunction with the use of supporting materials (if necessary), the crane manufacturer's specifications for adequate support and degree of level of the crane are met. The activity shall ensure the operator is aware of the location of known hazards in the vicinity of the crane set-up area, such as voids, tanks, and utilities. If the operator determines that ground conditions are unsatisfactory or questionable, work shall not proceed and the activity engineering organization shall be notified for evaluation.

10.6 Communications. Operators and riggers shall understand and use the Standard Hand Signals shown in figures 10-1 and 10-2 for controlling crane operations. Additional signals (if required) shall be approved by operator and rigger supervisors and shall be included in operator and rigger training programs. All hand signals shall be posted in the crane cab in view of the operator. If pickup and lay down areas are not readily accessible by a single rigger, additional riggers shall be assigned as necessary. A positive means of transferring control of the load between riggers shall be used. Direct voice and radio communications are also acceptable.

When making lifts where hand signals are not feasible, the rigger giving the signals shall remain in constant voice communication with the operator. It shall be understood that if the communication ceases, the operator shall stop operation until communication is reestablished.

The device(s) used to transmit voice signals shall be tested on site before beginning operations to ensure that the signal transmission is effective, clear, and reliable. Signal transmission shall be through a dedicated channel, except multiple cranes and one or more signal persons may share a dedicated channel for the purpose of coordinating operations. The operator's reception of signals shall be by a hands-free system.

Voice directions given to the operator shall be given from the operator's directional perspective. Each voice signal shall contain the following elements, given in the following order: function (such as hoist, boom), direction; distance and/or speed; function, stop command.

Note: The operator shall stop the crane at any time and in any situation judged to be unsafe. In addition, the operator shall immediately respond to a direction from any person to stop his/her crane.

10.7 General Operating Precautions. In all operations, the crane operator shall remain alert because the person directing the operation may not see all hazards. The operator shall remain alert to obstructions, people, and the behavior and feel of the machine. Never allow unauthorized personnel in, on, or around the machine when in operation. Dress appropriately, wearing prescribed safety gear. Do not expose any parts of the body to moving machinery.

The operator shall immediately activate the emergency stop function if he or she senses loss of control of the load.

The operator shall remain at the controls at all times while a load is suspended from the crane. This does not include slings and other gear used to rig the load and does not include a load attached to the crane with slack in the rigging gear. This also does not apply to under-running bridge cranes, jib cranes, pillar cranes, pillar jib cranes, monorails, and fixed overhead hoists used in industrial processes that require a suspended load such as cleaning, degreasing, painting, testing, and similar processes. For such cases, the suspended load shall be less than 80 percent of the crane's rated capacity, the area shall be secured to prevent unauthorized personnel from entering, the crane shall be tagged to indicate this condition, and the load shall not be suspended longer than required. Activities shall assess all potential hazards prior to leaving rigging gear on an unattended crane, such as exposure to personnel, weather conditions, proximity of the crane or gear to obstructions, and potential for collisions. Additionally, any gear left on the crane shall not prevent the performance of the operator's pre-use check when required.

Loads shall not be suspended or moved over personnel. When it is necessary, personnel may reach under suspended loads for a short duration to install/remove

coverings, make attachments, position supports, etc., provided the load is not suspended over the employee's head and the only body parts under the load are the arms. Any reaching under the load shall be approved by the rigger-in-charge. The load shall not be in motion while the employee is reaching under the load. Activities shall minimize the occurrence of reaching under suspended loads. Lifts of multiple objects that are one under the other with each object rigged from the previous object shall not be performed. Except for personnel engaged in rigging/unrigging the load or engaged in attaching/removing the load to/from a structure or another component, personnel shall be kept clear of the fall zone (i.e., the area in which it is reasonably foreseeable that partially or completely suspended materials could fall in the event of an accident). Only personnel needed to receive a load are permitted to be within the fall zone when a load is being landed. During a tilt-up or tilt-down operation, only personnel essential to the operation are permitted in the fall zone (but not directly under the load). A person is essential to the operation if the person is conducting one of the following operations and the supervisor can demonstrate it is infeasible for the person to perform that operation from outside the fall zone: physically guide the load; closely monitor and give instructions regarding the load's movement; or either detach it from or initially attach it to another component or structure (such as, but not limited to, making an initial connection or installing bracing).

Initiate and maintain all crane movements slowly and smoothly watching boom movement to prevent boom "kick back". Eliminate rapid acceleration and braking. These actions put dangerous impact loads on the machine and its components. Speed may be hazardous and it reduces the chance to take corrective action. With a loaded wire rope suspended boom or jib close to boom stops, never rapidly relieve boom of load. Wire ropes stretch when loaded and spring back when load is suddenly removed. This can cause boom to kick back into boom stops and damage the boom. In this situation, both the boom hoist and the hook hoist shall be used in setting down the load. Use power lowering whenever possible.

Hooks used on cranes and hoists shall have self-closing latches or the throat opening shall be "moused" (secured with wire, rope, heavy tape, etc.) or otherwise secured to prevent the attached item from coming free of the hook under a slack condition. The following exceptions apply and shall be approved by the activity engineering organization: items where the hook throat is fully obstructed and not available for manual securing and lifts where securing the hook throat increases the danger to personnel such as forge shop or dip tank work.

10.7.1 Work Area Control. To prevent employees from entering an area where an employee could be struck, pinched, or crushed by the crane's rotating superstructure, the crane team shall erect and maintain control lines, warning lines, railings or similar barriers to mark the boundaries of the hazard areas. Before an employee goes to a location in the hazard area that is out of view of the operator, the employee shall ensure that the operator is informed that he/she is going to that location. Where the operator knows that an employee went to a hazardous location, the operator shall not rotate the superstructure until the operator is informed in accordance with a prearranged system

of communication that the employee is in a safe position. Where any part of a crane/derrick is within the working radius of another crane/derrick, the activity shall institute a system to coordinate operations.

10.7.2 Electromagnetic Interference Susceptibility. Electronic equipment on cranes, including control systems and load indicating devices, may be susceptible to electromagnetic interference (EMI), especially when operating near ships' radar or other radio transmitting sources. Activities need to be aware of the EMI environment in the vicinity of crane operations and assess the impact of such environment on potentially susceptible equipment.

10.7.3 Additional Requirements for Assembly/Disassembly (including re-reeving) of Cranes. When assembling or disassembling equipment or attachments, including removable counterweights, for a construction operation, a supervisor or rigger in charge (RIC) shall direct the operation. For a non-construction operation, the requirements of this subparagraph apply, but an operator or rigger may be substituted for the supervisor or RIC.

The supervisor or RIC shall review the applicable procedures immediately prior to the commencement of assembly/disassembly. The supervisor or RIC shall ensure the crew members (including new crew members and crew members reassigned to different tasks) understand their tasks, the hazards associated with their tasks, and the hazardous positions/locations they need to avoid.

Before a crew member goes to a location that is out of view of the operator and is either in, on, or under the equipment, or near the equipment (or load) where the crew member could be injured by movement of the equipment (or load), the crew member shall inform the operator that he/she is going to that location. Where the operator knows that a crew member went to a location noted above, the operator shall not move any part of the equipment (or load) until the operator is informed in accordance with a prearranged system of communication that the crew member is in a safe position.

When pins (or similar devices) are being removed, employees shall not be under the boom, jib, or other components, except where site constraints require one or more employees to be under the boom, jib, or other components when pins (or similar devices) are being removed. In such cases, the supervisor or RIC shall implement procedures that minimize the risk of unintended dangerous movement and minimize the duration and extent of exposure under the boom.

During all phases of assembly/disassembly, the rated capacity of the crane, equipment components (including rigging), lifting lugs, and equipment accessories shall not be exceeded.

10.7.3.1 Potential Hazards. The supervisor or RIC shall address the following potential hazards associated with the operation, including:

a. Site and ground conditions shall be adequate for safe assembly/disassembly operations and to support the equipment during assembly/disassembly.

b. When used to support lattice booms or components, blocking shall be appropriately placed to protect the structural integrity of the equipment and prevent dangerous movement and collapse.

c. The size, amount, condition and method of stacking the blocking shall be sufficient to sustain the loads and maintain stability.

d. When using an assist crane, the loads that will be imposed on the assist crane at each phase of assembly/disassembly shall be verified before assembly/ disassembly begins.

e. The point(s) of attachment of rigging to a boom (or boom sections or jib or jib sections) shall be suitable for preventing structural damage and facilitating safe handling of these components.

f. The center of gravity of the load shall be identified if that is necessary for the method used for maintaining stability. Where there is insufficient information to accurately identify the center of gravity, measures designed to prevent unintended dangerous movement resulting from an inaccurate identification of the center of gravity shall be used.

g. The boom sections, boom suspension systems (such as gantry A-frames and jib struts), and components shall be rigged or supported to maintain stability upon the removal of the pins.

h. Suspension ropes and pendants shall not be allowed to catch on the boom or jib connection pins, cotter pins, keepers, or locking pins.

i. The potential for unintended movement from inadequately supported counterweights and from hoisting counterweights shall be accounted for.

j. Each time reliance is to be placed on the boom hoist brake to prevent boom movement during assembly/disassembly, the brake shall be tested prior to such reliance to determine if it is sufficient to prevent boom movement. If it is not sufficient, a boom hoist pawl, other locking device/back-up braking device, or another method of preventing dangerous movement of the boom (such as blocking or using an assist crane) from a boom hoist brake failure shall be used.

k. Backward stability shall be addressed before swinging the upper works, travel, and when attaching or removing equipment components.

l. The effect of wind speed and weather on the operation shall be accounted for.

m. Manufacturer limitations on the maximum amount of boom supported only by cantilevering shall not be exceeded. Where these are unavailable, contact the Navy Crane Center.

n. The weight of each component shall be readily available.

10.7.3.2 Outrigger/Stabilizer Requirements. When the load to be handled and the operating radius require the use of outriggers or stabilizers, or at any time when outriggers or stabilizers are used, the following requirements shall be met:

a. The outriggers or stabilizers shall be fully extended.

b. When outrigger floats are used, they shall be attached to the outriggers. When stabilizer floats are used, they shall be attached to the stabilizers.

c. Each outrigger or stabilizer shall be visible to the operator or to a signal person during extension and setting.

d. Outrigger and stabilizer blocking shall meet the requirements noted in paragraph 10.7.3.1.b and 10.7.3.1.c, and shall be placed only under the outrigger or stabilizer float/pad of the jack or, where the outrigger or stabilizer is designed without a jack, under the outer bearing surface of the extended outrigger or stabilizer beam.

10.7.3.3 Post-Assembly Inspection Requirements. Upon completion of the assembly, the equipment shall be inspected. Reusable shipping pins, links, straps, and similar equipment shall be removed and stowed or otherwise stored so that they do not present a falling object hazard.

10.7.3.4 Special Requirements for Lattice Boom Assembly/Disassembly. When dismantling boom sections, none of the pins in the pendants shall be removed (partly or completely) when the pendants are in tension. None of the pins (top or bottom) on boom sections located between the pendant attachment points and the crane/derrick body shall be removed (partly or completely) when the pendants are in tension. None of the pins (top or bottom) on boom sections located between the uppermost boom section and the crane/derrick body shall be removed (partly or completely) while the boom is being supported by the uppermost boom section resting on the ground (or other support). None of the top pins on boom sections located on the cantilevered portion of the boom being removed (the portion being removed ahead of the pendant attachment points) shall be removed (partly or completely) until the cantilevered section to be removed is fully supported.

10.7.3.5 Assembly/Disassembly Near Overhead Power Lines. During assembly/disassembly operations, the crane, attachments, load lines, and other equipment shall be positioned so that no part of the crane, attachments, load lines or other equipment could get closer than 20 feet (for power line voltages of 350kV or less) or 50 feet (for power line voltages over 350 kV) to an energized power line. No

assembly/disassembly is allowed below an energized power line at any distance. Assembly/disassembly is allowed inside the above distances or below a power line only when the activity has confirmed that the utility owner has deenergized the power line and the line has been visibly grounded at the worksite.

10.8 Lifting of Personnel. The lifting of personnel by crane shall only be accomplished when no safer method is available. When lifting personnel, the following requirements apply:

a. This is a complex lift as defined above. Each activity shall have written procedures that conform to these requirements. The activity safety office shall approve these procedures.

b. Cranes, rigging gear, and personnel platforms shall conform to OSHA 29 CFR 1926.1431 requirements and ASME B30.23 for the personnel platform.

c. A body harness and shock absorbing lanyard shall be worn and attached to a structural member within the personnel platform capable of supporting the impact from a fall. (Attachment of the lanyard to the load block is not permitted.) The harness and anchorage system shall conform to CFR 1926.502 requirements. When working over or near water where the danger of drowning exists, employees shall be provided with U.S. Coast Guard-approved life jacket or buoyant work vests. Prior to and after each use, the buoyant work vests or life jackets shall be inspected for defects that would alter their strength or buoyancy. Defective units shall not be used. Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. The distance between ring buoys shall not exceed 200 feet. At least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water during construction operations.

10.8.1 Personnel Platform Loading. The personnel platform shall not be loaded in excess of its rated load capacity (except during the proof test/trial lift). The number of persons occupying the personnel platform shall not exceed the number required for the work being performed. Personnel platforms shall be used only for personnel, their tools, and the materials necessary to do their work and shall not be used to hoist materials or tools when not hoisting personnel. Materials and tools for use during a personnel lift shall be secured to prevent displacement and shall be evenly distributed within the confines of the platform while the platform is suspended.

10.8.2 Operation. Hoisting of the personnel platform shall be performed in a slow, controlled, cautious manner with no sudden movements of the crane. Operation shall be accomplished using one crane function at a time. Load and boom hoist drum brakes, swing brakes, and locking devices such as pawls or dogs shall be engaged when the occupied personnel platform is in a stationary position. The crane shall be uniformly level within one percent of level grade and located on firm footing. Cranes equipped with outriggers or stabilizers shall have them all fully extended and locked (if locks are provided by the crane OEM) when hoisting personnel. The total weight of the

loaded personnel platform and related rigging shall not exceed 50 percent of the rated capacity for the radius and configuration of the crane. Lift and lowering speeds shall not exceed 100 feet per minute.

10.8.2.1 Trial Lift. A trial lift with the unoccupied personnel platform loaded at least to the anticipated weight to be lifted shall be made from ground level, or any other location where personnel will enter the platform to each location at which the personnel platform is to be hoisted and positioned. This trial lift shall be performed immediately prior to placing personnel on the platform. The operator shall determine that all systems, controls and safety devices are activated and functioning properly; that no interference exists; and that all configurations necessary to reach those work locations will allow the operator to remain under the 50 percent limit of the hoist's rated capacity. Where there is more than one location to be reached from a single set up position, either individual trial lifts for each location, or a single trial lift, in which the platform is moved sequentially to each location, shall be performed; the method selected shall be the same method that will be used to hoist the personnel. For mobile cranes, the trial lift shall be repeated prior to hoisting personnel whenever the crane is moved and set up in a new location or returned to a previously used location. Additionally, the trial lift shall be repeated when the lift route is changed unless the operator determines that the route change is not significant (i.e., the route change would not affect the safety of hoisted personnel). After the trial lift, and just prior to hoisting personnel, the platform shall be hoisted a few inches and inspected to ensure that it is secure and properly balanced. Personnel shall not be hoisted unless the following conditions exist: Hoist ropes shall be free of kinks, multiple part lines shall not be twisted around each other, the primary attachment shall be centered over the platform, and the hoisting system shall be inspected if the load rope is slack to ensure all ropes are properly seated on drums and in sheaves.

A visual inspection of the crane, rigging, personnel platform, and the crane base support or ground shall be conducted immediately after the trial lift to determine whether the testing has exposed any defect or produced any adverse effect upon any component or structure. The hoist rope shall be checked in accordance with section 9. Defects found during inspections that create a safety hazard, shall be corrected before hoisting personnel. Upon completion of the trial lift process, verify the test weight has been removed.

Note: For portal and floating cranes used in shipbuilding, ship repair, or ship breaking, a trial lift is not required if it is determined by the rigger and crane operator supervisors that due to the location and nature of the work assignment the conditions do not exist that warrant a trial lift (e.g., identical lifts made on several consecutive days, with the same operator and other personnel, returning to work after lunch with the same personnel, from the deck of a floating crane on the same day). Trial lifts will be required whenever the crane team deems it necessary to do so for the safety of personnel during the lift.

10.8.2.2 Proof Test. At each job site (e.g., drydock, wharf, pier, building, deck of floating crane, etc.), prior to hoisting employees, the platform and rigging shall be proof tested to 125 percent of the platform's rated load. For the proof test, the platform shall

be lowered by controlled load lowering, stopped, and held in position for a minimum of five minutes with the test load evenly distributed on the platform (this may be done concurrently with the trial lift). Any deficiencies found that create a safety hazard shall be corrected and another proof test shall be conducted. When a personnel platform is moved to a new job site, a proof test is required. Only a trial lift is required when the platform is moved to a new location within a job site where the platform has already been proof tested, provided that no visual damage has occurred during transportation. (This paragraph is not applicable to shipbuilding, ship repair, or ship breaking.) Upon completion of the proof test process, verify the test weight has been removed. A proof test of the personnel platform shall be conducted after any repair or alteration.

10.8.2.3 Lift Safety. A meeting attended by the crane team, personnel to be lifted, and the person responsible for the task to be performed shall be held to review the appropriate procedures to be followed. This meeting shall be conducted prior to the trial lift at each new work location, and shall be repeated for any personnel newly assigned to the operation.

Before personnel exit or enter a hoisted platform that is not landed, the platform shall be secured to the structure where the work is to be performed, unless securing to the structure creates an unsafe situation. Personnel shall keep all parts of the body inside the platform during raising, lowering, and positioning. This provision does not apply to an occupant of the platform performing the duties of a signal person. Tag lines shall be used unless their use creates an unsafe condition. The crane operator shall remain at the controls at all times while the platform is occupied. Hoisting of personnel shall be promptly discontinued upon indication of any dangerous weather conditions or other impending danger. Personnel being hoisted shall remain in continuous sight of and in direct communication with the operator or signal person. In those situations where direct visual contact with the operator is not possible, and the use of a signal person would create a greater hazard for the person, direct communication alone such as by radio may be used. No lifts shall be made on another of the crane's load lines while personnel are suspended on a platform. Traveling the crane while personnel are hoisted is prohibited, except for portal and bridge cranes (portal cranes may travel with the boom in any position with respect to the direction of travel, parallel, perpendicular, etc.). A complete trial run shall be performed to test the route of travel before personnel are allowed to occupy the platform. This trial run can be performed at the same time as the trial lift.

When wind speed (sustained or gusts) exceeds 20 miles per hour at the intended height of the personnel platform, the supervisor shall determine if, in light of the wind conditions, it is safe to perform, or continue with, the lift. If it is not, the lifting operation shall not begin (if already in progress, the lift shall be terminated). For other weather and environmental conditions, the supervisor shall determine if, in light of existing or impending hazardous conditions, it is safe to perform, or continue with, the lift. If it is not, the lifting operation shall not begin (if already in progress, the lift shall be terminated).

During the lift, occupants shall not sit or stand on, or work from, the top or intermediate rail or toe board, or use any other means/device to raise their work height. Occupants shall not pull the platform out of plumb in relation to the hoisting equipment. If the platform is secured to a structure, the operator shall not move the platform until the operator receives confirmation that the platform is freely suspended. Personnel shall not be lifted where any part of the crane, rigging gear, or personnel platform can come within 20 feet of an energized overhead power line up to 350 kV or within 50 feet of an overhead power line over 350 kV.

10.9 Adverse Operating Conditions. When an operator observes an adverse operating condition, he/she shall suspend operations and notify the supervisor for resolution. An adverse operating condition may result from climatic conditions (snow, ice, wind, rain, lightning, etc.), inadequate support conditions (loose soil, outrigger/stabilizer bearing on manhole, etc.), congestion or obstructions; improper or inadequate rigging procedures, or any other situation that the operator feels could result in uncontrolled movement or otherwise render the operation unsafe. Activities shall develop instructions for modifying or suspending operations in adverse weather conditions, including high winds. These instructions for adverse weather conditions shall be posted in the operator's cab. Specified wind speeds for reducing allowable loads and for curtailing operations shall be based on control of the load and OEM recommendations for stability of the equipment during high winds. Activities shall have adequate means for monitoring local weather conditions.

10.9.1 Securing of WHE for Adverse Weather Conditions. When severe adverse weather conditions (snow, ice, wind, rain, lightning, etc.) have the potential to develop, actions shall be taken to preclude damage to WHE. Activities shall develop instructions for securing WHE in adverse weather conditions. Securing of equipment shall be based on OEM recommendations and local technical instructions. For each outdoor rail-mounted crane, activities shall determine the wind forces that will cause the crane to move with the brakes set, and ensure the crane is adequately secured against movement from anticipated wind forces. Materials required to secure WHE, should be identified and readily available.

10.10 Positioning the Crane for Stability. Mobile crane operators are responsible for positioning their machines and outriggers/stabilizers on foundations or supports that are capable of safely supporting the crane, and for complying with any machine capacity down rating due to limits of the foundation or support. The activity facilities engineering organization is responsible for identifying limitations and restrictions for operating mobile cranes on piers, wharves, or other structures. When the crane is so equipped, the operator shall set the outriggers/stabilizers unless there is specific authorization to operate on-rubber. Such authorization shall be posted in the cab with special down rating instructions or load charts. (See section 11.) Ensure compliance with all on-rubber-lifting requirements of the OEM. Whenever practical and as permitted by the OEM, when lifting on-rubber, extend outriggers and maintain minimal clearance (3 to 4 inches) above ground as recommended by the OEM. When lifting on outriggers, the operator shall ensure the outriggers are properly extended, support the entire weight of

the crane, and the crane is level. For cranes with stabilizers, the operator shall set the stabilizers in accordance with the OEM's requirements. The operator shall check the outrigger/stabilizer pads to ensure they have satisfactory ground bearing. When operating at radii where stability is the controlling factor, the operator shall be especially alert. The weight of the load to be lifted and the operating radius shall be accurately determined and shall not exceed those safe capacities posted on the rating chart. See paragraph 10.5 for verifying the radii of the lift. Use of the load chart is required instead of waiting for the crane to feel light. Do not lift in front quadrants (over the carrier cab) between the front two outriggers unless OEM's instruction manual or load chart authorizes such lifts. When lifting a capacity load at maximum allowable radius, ensure load does not swing out of allowable radius.

10.11 Proper Clearance. The crane shall be so positioned at the job site as to provide adequate clearance from all obstructions to any part of the crane in any position that it will operate. Particular attention to counterweight clearance is required. Accessible areas within the swing radius of the rotating superstructure of a crane shall be barricaded to prevent personnel from being struck or crushed by the crane.

10.11.1 Overhead Electrical Transmission Lines. When operating in the vicinity of overhead transmission lines, operators and riggers shall be alert to this special hazard. If any part of the crane (including the fully extended boom of a telescoping boom crane) or load could approach the distances noted in figure 10-3 during a proposed operation, the following steps shall be taken. The preferred alternative is to have the power line de-energized and visibly grounded. For long span lines, lateral movement due to wind shall be considered in assessing whether the minimum clearance should be increased. These rules shall be followed even when the crane is equipped with insulators or sensors for detecting high voltage. This paragraph does not apply to insulated shore power cables.

10.11.1.1 Work Zone. Where the voltage is known to be less than 350kV, the minimum required clearance shall be 20 feet. Where the voltage is known to be greater than 350 kV, the minimum clearance shall be 50 feet.

The work zone shall be defined by either:

a. Demarcating boundaries (such as with flags or a device such as a range limit device or range control warning device) and prohibiting the operator from operating the crane past those boundaries.

b. Defining the work zone as the area 360 degrees around the equipment up to its maximum working radius.

10.11.1.2 Designated Spotter. Where the overhead power line is not de-energized, the supervisor shall conduct a planning meeting with the operator and the other workers who will be in the area of the equipment or load to review the location of the power

line(s), and the steps that will be implemented to prevent encroachment/electrocution. The rigger in charge shall erect and maintain an elevated warning line, barricade, or line of signs, in view of the operator, equipped with flags or similar high-visibility markings, at the line of required clearance. The designated spotter shall:

a. Be equipped with a visual aid to assist in identifying the minimum clearance distance. Examples of a visual aid include, but are not limited to: A clearly visible line painted on the ground; a clearly visible line of stanchions; a set of clearly visible line-of-sight landmarks (such as a fence post behind the dedicated spotter and a building corner ahead of the dedicated spotter).

b. Be positioned to effectively gauge the clearance distance.

c. Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.

d. Give timely information to the operator so that the required clearance distance can be maintained.

10.11.1.3 Additional Measures. If the operator is unable to see the elevated warning line, one of the following additional measures shall be used:

a. A proximity alarm set to give the operator sufficient warning to prevent encroachment.

b. A device that automatically warns the operator when to stop movement, such as a range control warning device. Such a device shall be set to give the operator sufficient warning to prevent encroachment.

c. A device that automatically limits range of movement, set to prevent encroachment.

d. An insulated link installed at a point between the end of the load line (or below) and the load.

e. No one shall be permitted to touch the crane or the load unless the above noted designated spotter indicates it is safe to do so. Personnel permitted to touch the crane shall use protective equipment rated for the voltage.

f. Tag lines for load control, when required, shall be of a non-conductive type.

10.11.1.4 Operation Below a Power Line. No part of the equipment, load line, or load is permitted to operate below a power line unless the activity has confirmed that the utility has de-energized and visibly grounded the power line, except for the following:

a. For cranes with non-extensible booms, the uppermost part of the crane with the boom at maximum boom angle would be more than 20 feet below the plane of the power line.

b. For articulating and telescoping boom cranes, the uppermost part of the crane, with the boom in the fully extended position at maximum boom angle, would be more than 20 feet below the plane of the power line.

For voltages greater than 350kV, where “20 feet” is mentioned in (a) and (b) above, the distance “50 feet” shall be substituted.

10.11.1.5 Operations Near Communications Towers. When working near transmitter/communications towers where equipment is close enough for an electrical charge to be induced in the materials to be handled, the transmitter shall be de-energized or the crane shall be provided with an electrical ground. Tag lines shall be non-conductive.

10.11.1.6 Traveling Below a Power Line. Where transiting a crane beneath an energized power line in accordance with figure 10-3, if any part of the crane will get closer than 20 feet to the power line, a dedicated spotter who is in continuous contact with the operator shall:

a. Be positioned to effectively gauge the clearance distance.

b. Where necessary, use equipment that enables the dedicated spotter to communicate directly with the operator.

c. Give timely information to the operator so that the required clearance distance can be maintained.

When traveling at night or in conditions of poor visibility, in addition to the above, the power lines shall be identifiable by illumination or other means to identify them and a safe travel path shall be identified and used.

10.12 Positioning the Boom. Disengage boom hoist pawl (boom dog) if equipped. Ensure there is no side loading on the boom or swinging of the load on lift-off. Never side-load the boom by dragging loads. Use the shortest boom radius practical for maximum stability and capacity. Engage the boom hoist pawl when operation of the boom hoist is not required during a lift evolution. Use caution when lowering the boom and the load line at the same time with a load suspended. This may cause the load to swing out of control or out of stable radius.

10.13 Hoisting and Lowering the Load. For crane hook work, loads shall be lifted vertically only. Side-loads shall not be applied to the hook. Check the load chart for safe load and radius. Upon initial hoisting of the load, the rigger shall signal the operator to stop hoisting when the load becomes completely suspended to ensure the

load is properly balanced and the brake is functioning properly. Operators and riggers shall follow this procedure each time they hoist a load. If the load is not centered correctly or the brakes are not functioning correctly, the operator shall set the load down and cease operations until the deficiency is corrected. If correct, proceed to the height directed by the rigger and await the signal for the next motion. Cranes shall never be used to drag the load. When lowering the load or empty hook, always maintain at least two wraps of wire rope on grooved drums and three wraps on ungrooved drums. Special precautions shall be taken when making lifts out of water. When the load comes out of water, buoyancy is lost and load increases. Also, just as the load leaves the water, the suction can increase the load momentarily. For loads with padeyes attached, loading shall be in the plane of the padeye, unless the activity engineering organization provides guidance for any out of plane loading.

Note: On certain types of mobile boat hoists the hoist drums use a continuous length of wire rope between two hoists. The wire rope shall be equalized (equal amounts of wire rope on each drum) before a lift is made. Follow OEM procedures for equalizing hoist drums (if applicable).

10.14 Rotating the Load. Disengage the swing lock. After hoisting to the height directed by the rigger and upon receiving the signal to rotate, the operator shall begin the rotate very slowly. If the swing brake is found not to be functioning correctly, the operator shall notify the rigger-in-charge who shall direct the operator to land the load at a safe location. If necessary to rotate to a safe location, rotation shall be slow and carefully controlled. After landing the load, secure the crane until the swing brake deficiency is corrected.

10.15 Traveling the Crane. Supervisors shall ensure operators and crane walkers are aware of crane rail travel restrictions for the crane(s) to which they are assigned. Traveling a crane with a suspended load is a hazardous operation. When traveling, always have the boom in the position providing adequate stability in case the load should swing out of radius.

For mobile cranes, the following also apply: Only when permitted by the OEM shall a mobile crane be permitted to travel with a suspended load. On mobile cranes, whenever possible, travel with the boom and load over the rear and parallel with the axis of the crane carrier and with the direction of travel either forward or reverse, with the swing lock/brake engaged. Also, whenever practical and as permitted by the OEM, extend the outriggers and maintain minimal clearance (3 to 4 inches) above the ground. Do not travel truck or cruiser cranes with the load over the side unless specifically permitted by the OEM and authorized by the certifying official. Exceptions and authorizations, with special load limiting and other instructions, shall be posted in the crane. (See section 11.) When traveling, keep loads close to the ground. Avoid sudden starts and stops. Always travel at the slowest possible speed. When traveling with the boom over the side, the travel motion shall be started slowly and smoothly to prevent excessive side loading of the boom. Be sure the ground over which the crane shall travel can support the machine.

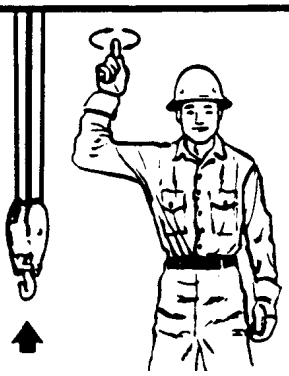
10.16 Load Control. Sufficient tag lines shall be used to minimize load swing and rotation unless their use creates a hazard. Properly sized and inspected chainfalls, turnbuckles, or similar equipment may be used to aid in load control where clearances are limited or where precise load control is required.

10.17 Securing the Crane. The procedure for shutdown will vary with different cranes. Consult the OEM's instruction manual or the activity engineering organization. For building cranes, ensure that the lower block is not an obstruction. Additionally, provide sufficient clearance below the upper sheave assembly or trolley/hoist frame so that the subsequent operator performing an ODCL or pre-use check will be able to stop the hoist motion before a two-block event occurs in case the hoist does not operate in the correct direction upon initiation. For mobile cranes, set the crane carrier brake and chock wheels if the crane is on an incline. When moving a truck, cruiser, or crawler crane to and from job sites, secure the hook and block to the carrier frame to prevent them from swinging into the boom. When securing the hook block, raise it just enough to take up the slack. Do not over tighten. A weak link connection shall be used to secure the hook block to the crane. The breaking strength of the connecting piece shall be less than the rated load of the hook block's wire rope as reeved. When securing the hook blocks for highway travel, add a back up (stronger) tie-back to prevent free swinging in the event of weak link failure. Ensure there are adequate clearances. Complete the ODCL and turn it in to the supervisor.

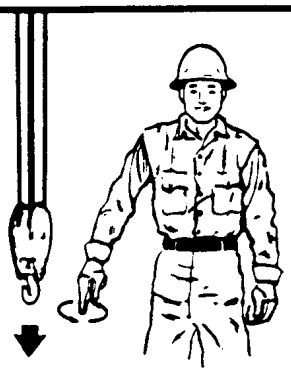
10.18 Special Requirements for Operation of Multi-Purpose Machines, Material Handling Equipment (Forklifts), and Construction Equipment When Configured as Cranes to Lift Loads Suspended by Rigging Equipment. When using a multi-purpose machine configured as a crane for lifting suspended loads, activities shall ensure the machine is authorized by the OEM to make suspended load lifts. Ensure the equipment is equipped with a capacity chart. Operators shall be licensed in accordance with NAVSUP P-538 and shall be trained to make such lifts. Suspended load lifts with multi-purpose machines shall be treated as complex lifts if the loads meet the criteria of paragraph 10.4.1. Lifts of personnel in a suspended platform with these machines is prohibited.

When using material handling equipment and construction equipment to lift suspended loads, ensure the equipment OEM permits such lifts to be made, that the equipment is properly configured to make such lifts, and that such lifts are made in accordance with OEM requirements. Lift capacity shall be posted on the equipment.

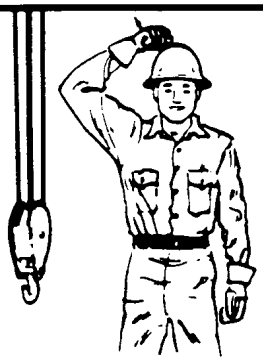
STANDARD HAND SIGNALS FOR CONTROLLING CRANE OPERATIONS.



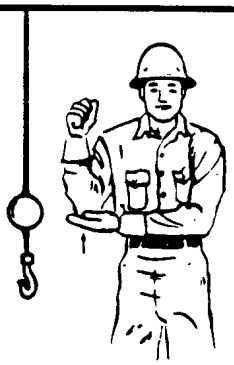
HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circle.



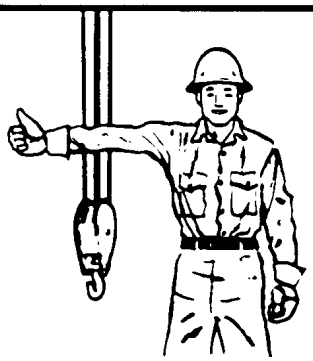
LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circle.



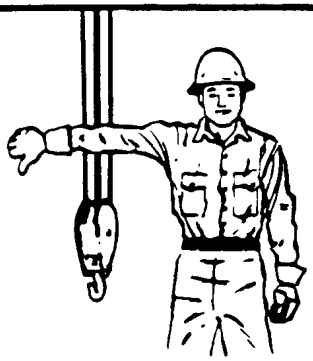
USE MAIN HOIST. Tap fist on head; then use regular signals.



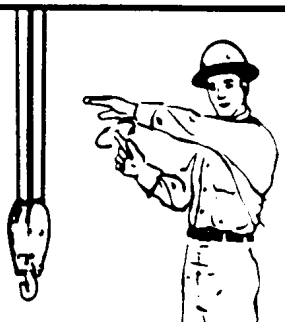
USE WHIP LINE (Auxiliary Hoist). Tap elbow with one hand; then use regular signals.



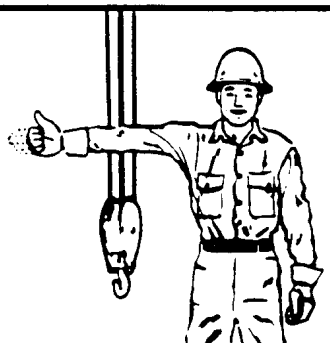
RAISE BOOM. Arm extended, fingers closed, thumb pointing upward.



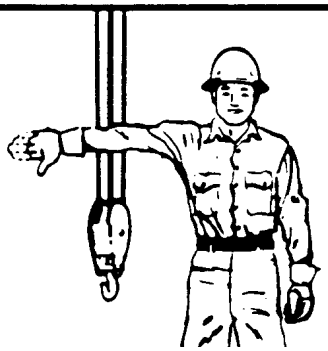
LOWER BOOM. Arm extended, fingers closed, thumb pointing downward.



MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)



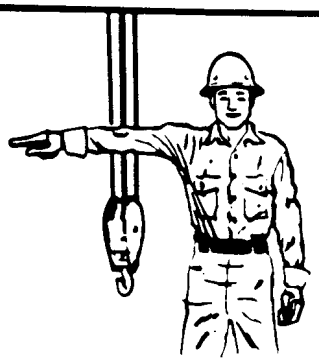
RAISE THE BOOM AND LOWER THE LOAD. With arm extended, thumb pointing up, flex fingers in and out as long as load movement is desired.



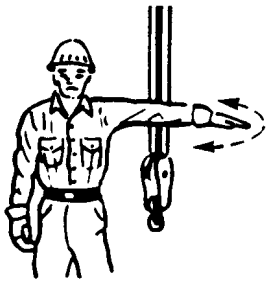
LOWER THE BOOM AND RAISE THE LOAD. With arm extended, thumb pointing down, flex fingers in and out as long as load movement is desired.

FIGURE 10-1 (1 of 3)

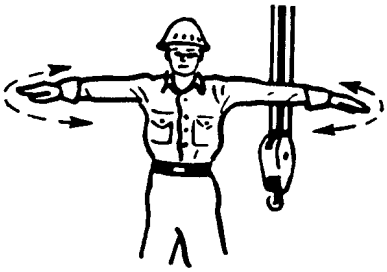
STANDARD HAND SIGNALS FOR CONTROLLING CRANE OPERATIONS (cont'd).



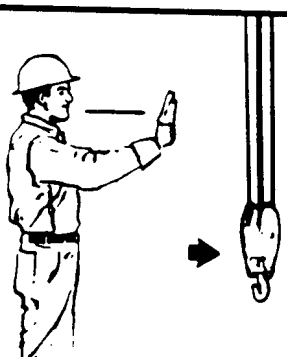
SWING. Arm extended, point with finger in direction of swing of boom.



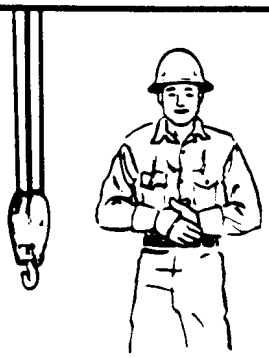
STOP. Arm extended, palm down, move arm back and forth horizontally.



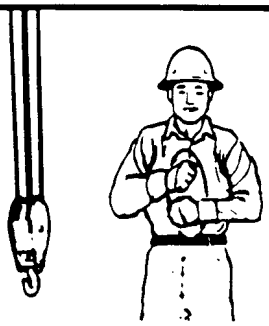
EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.



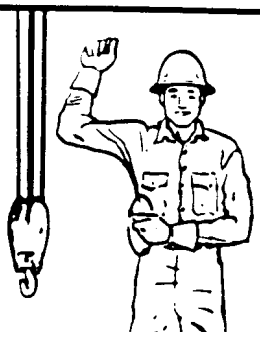
TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.



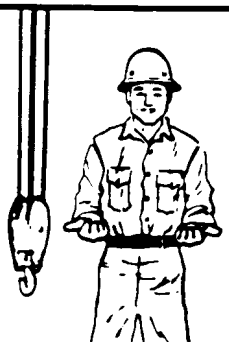
DOG EVERYTHING. Clasp hands in front of body.



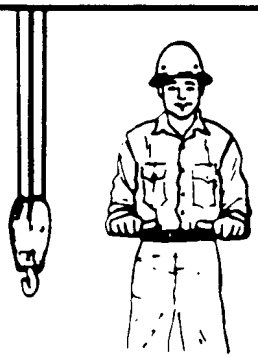
TRAVEL. (Both Tracks) Use both fists in front of body, making a circular motion about each other, indicating direction of travel, forward or backward. (For land cranes only.)



TRAVEL. (One Track) Lock the track on side indicated by raised fist. Travel opposite track in direction indicated by circular motion of other fist, rotated vertically in front of body. *For land cranes only.)

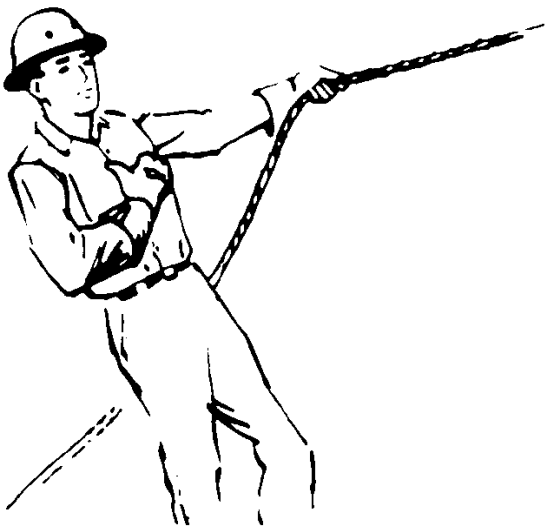


EXTEND BOOM. (Telescoping Booms). Both fists in front of body with thumbs pointing outward.

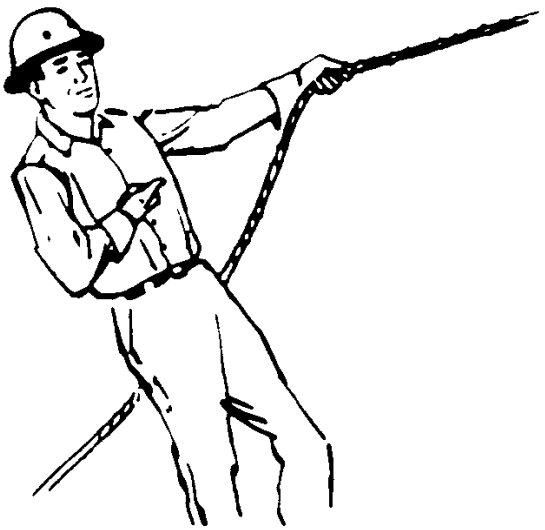


RETRACT BOOM (Telescoping Booms). Both fists in front of body with thumbs pointing toward each other.

FIGURE 10-1 (2 of 3)



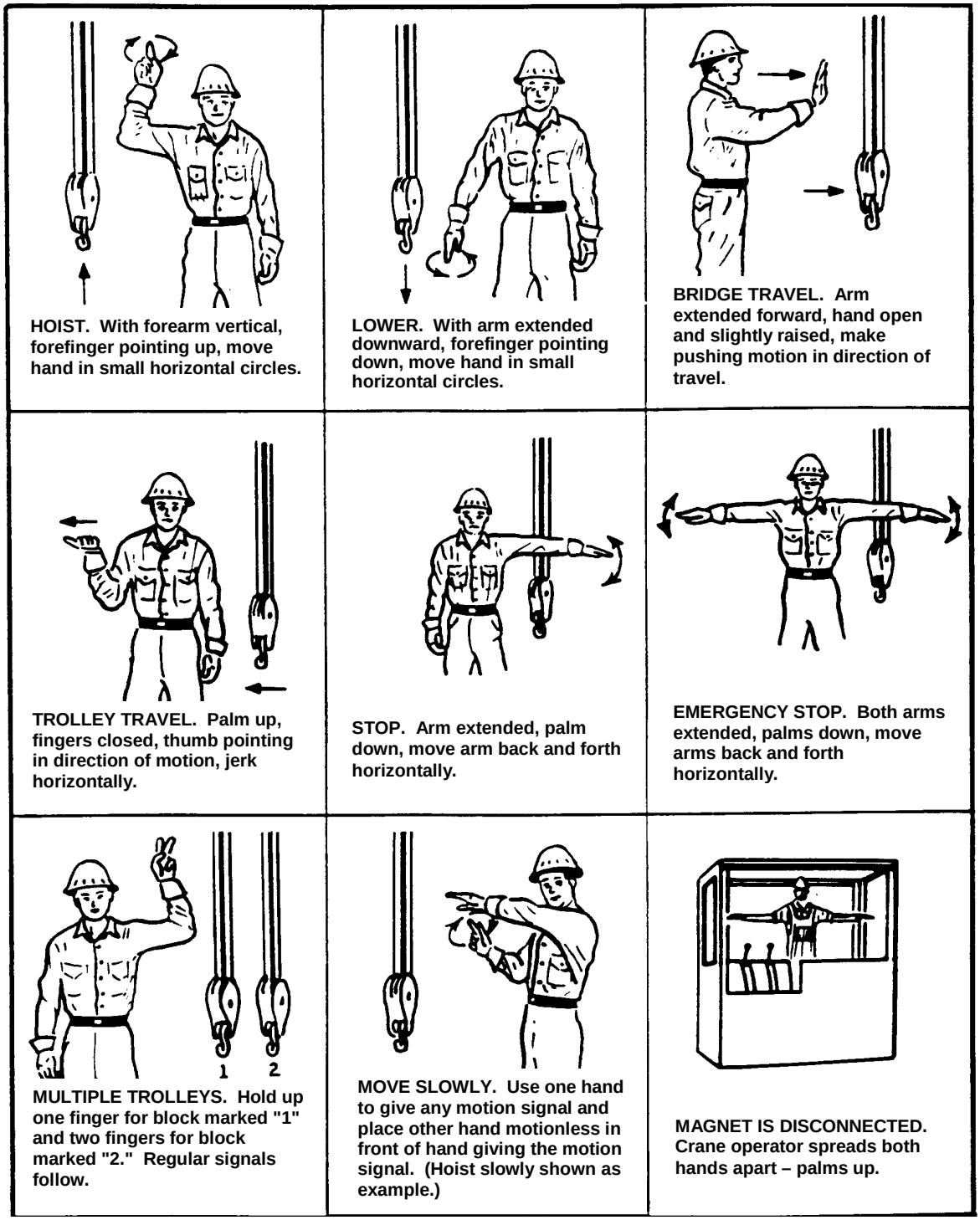
EXTEND BOOM (Telescoping Boom). One Hand Signal. One fist in front of chest with thumb tapping chest.



RETRACT BOOM (Telescoping Boom). One Hand Signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.

FIGURE 10-1 (3 of 3)

STANDARD HAND SIGNALS FOR CONTROLLING
OVERHEAD AND GANTRY CRANES.



HOIST. With forearm vertical, forefinger pointing up, move hand in small horizontal circles.

LOWER. With arm extended downward, forefinger pointing down, move hand in small horizontal circles.

BRIDGE TRAVEL. Arm extended forward, hand open and slightly raised, make pushing motion in direction of travel.

TROLLEY TRAVEL. Palm up, fingers closed, thumb pointing in direction of motion, jerk horizontally.

STOP. Arm extended, palm down, move arm back and forth horizontally.

EMERGENCY STOP. Both arms extended, palms down, move arms back and forth horizontally.

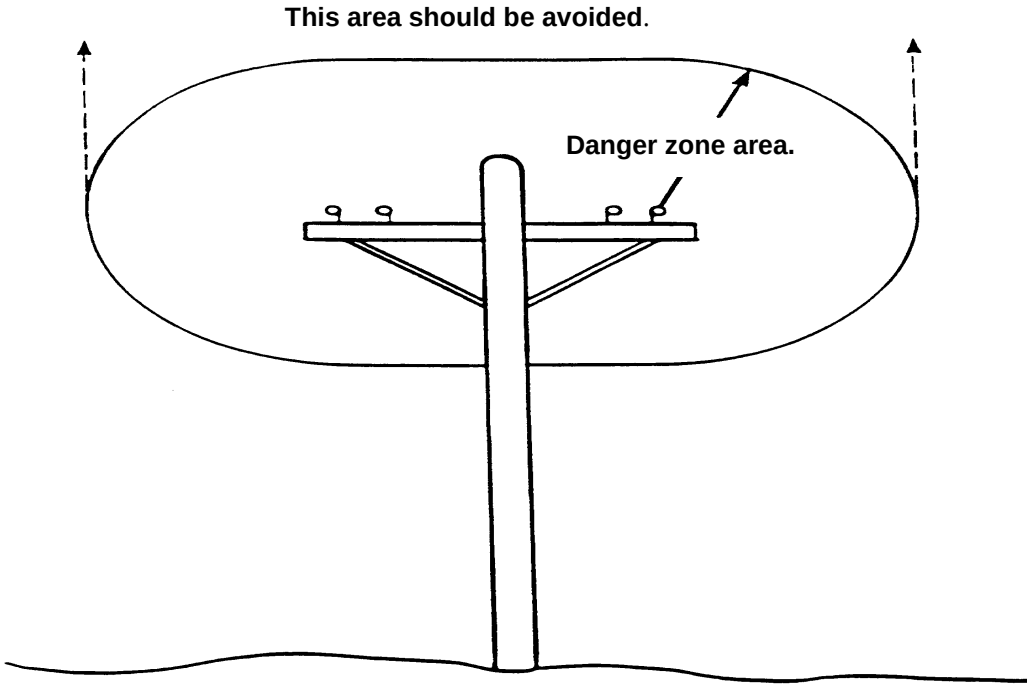
MULTIPLE TROLLEYS. Hold up one finger for block marked "1" and two fingers for block marked "2." Regular signals follow.

MOVE SLOWLY. Use one hand to give any motion signal and place other hand motionless in front of hand giving the motion signal. (Hoist slowly shown as example.)

MAGNET IS DISCONNECTED. Crane operator spreads both hands apart – palms up.

FIGURE 10-2

DANGER ZONE FOR CRANES AND LIFTED LOADS
OPERATING NEAR ELECTRICAL TRANSMISSION LINES.



Required clearance for normal voltage in operation near high voltage power lines and operation in transit with no load and boom or mast lowered.

NORMAL VOLTAGE, KV (PHASE TO PHASE)	MINIMUM REQUIRED CLEARANCE, FT (M)
Operation Near High Voltage Power Lines	
0 to 50	20 (6.10)
Over 50 to 200	20 (6.10)
Over 200 to 350	20 (6.10)
Over 350 to 500	50 (15.24)
Over 500 to 750	50 (15.24)
Over 750 to 1000	50 (15.24)
Operation in Transit with No Load and Boom or Mast Lowered	
0 to 0.75	4 (1.22)
Over 0.75 to 50	6 (1.83)
Over 50 to 345	10 (3.05)
Over 345 to 750	16 (4.87)
Over 750 to 1000	20 (6.10)

FIGURE 10-3

CHANGE 1 March 2011

APPENDIX E - CRANE TEST PROCEDURES

1 General Instructions.

1.1 Weight handling equipment shall be tested according to the appropriate paragraphs of these procedures depending on the type of equipment. The sequence of testing shall be at the option of the test director except that the no-load test shall be performed first. Except as noted, the nominal test load shall be 125 percent of rated capacity (105 percent for mobile cranes, locomotive cranes, aircraft crash cranes, mobile boat hoists, rubber-tired gantry cranes, and category 4 cranes). Because of the various makes and models of cranes in the Navy inventory, it is not possible to include specific tests for each individual crane or component. However, activities shall ensure that all components and features that affect load bearing, load control, or operational safety are properly tested (where testing is practical, as determined by the activity engineering organization and approved by the certifying official) and documented on the certification form. Load testing with loads above the limits specified herein is not authorized.

1.2 All test results shall be entered on the Certification of Load Test and Condition Inspection (figure 3-1) for applicable items according to crane type. Appropriate entries shall be recorded in each space. If a space does not pertain to the particular crane being tested, the entry shall be recorded as Not Applicable (NA).

1.3 The inspector shall assist the test director by checking during the load test for improper operation or poor condition of safety devices, electrical components, mechanical equipment, and structural assemblies. Observed defects critical to continued testing shall be reported immediately to the test director who shall suspend testing until the deficiency is corrected. Where a test paragraph directs the test director to observe for lowering of the load, measurements, markings, or some other direct indication to ensure that the test load has not lowered are required

1.4 Inspection and Testing of Hook Assemblies.

Note: These criteria apply to both the load hook and the hoist mounting hook, if the activity treats hook-mounted hoists as category 2 or 3 cranes. The hook nondestructive test (NDT) noted in paragraph 1.4.4 is not required for manual hoists.

1.4.1 Annual Visual Inspection. Inspect for evidence of wear in swivels and pins, and for proper operation and condition of safety latches. Inspect for corrosion, deformation, and wear. Inspect for such other conditions as nicks, cracks, or gouges. All cracks shall be removed. Other conditions shall be removed or, for questionable conditions, referred to the activity engineering organization for resolution. Removal of defects shall be by grinding only. Correction of defects by use of heat or welding is not permitted. The hook shall be removed from service if there is any bending or twisting of the hook exceeding 10 degrees (or as recommended by the OEM) from the plane of the unbent hook. No attempt shall be made to straighten bent or twisted hooks. Grinding shall follow the contour of the piece, blending with a maximum 1:3 (i.e., maximum rise to run) taper. Removal of cracks shall be verified by nondestructive test as described in paragraph 1.4.4. Removal of defects as specified will not require load test and recertification. Where normal wear or

removal of defects results in a reduction of 10 percent or more of the OEM's nominal dimension (or as recommended by the OEM if more restrictive), the hook shall be discarded. Hooks and nuts shall not be painted or plated, but a clear corrosion preventative coating may be applied.

1.4.2 Hook Throat Spread. Hooks shall be measured for hook throat spread before and after load test. A throat dimension base measurement shall be established by installing two tram points and measuring the distance between these tram points. This base dimension shall be retained in the equipment history file for the life of the hook. The distance between tram points shall be measured before and after load test. Hooks showing an increase in the throat opening by more than five percent from the base measurement shall be discarded.

1.4.3 Hook Disassembly and Visual Inspection. In conjunction with the hook NDT (and as noted below in paragraph 1.4.3.1), the hook, retaining nut or eye pin (and swivel eye bar as applicable), and bearings shall be disassembled from the block and thoroughly inspected. The hook and retaining nut shall be visually inspected for thread wear and all components shall be inspected for corrosion damage. Block bearing plates shall be visually inspected for cracks, wear, or other damage. Bearings shall be inspected for evidence of unusual wear and free rotation. All components shall be lubricated as required during assembly.

1.4.3.1 Special Disassembly Requirements for Forged Carbon Steel Hooks and Hooks on Manual Hoists. For forged carbon steel hooks and for hooks on manual hoists, the following additional disassembly and inspection requirements apply:

a. The activity engineering or inspection organization shall determine whether operating conditions warrant disassembly and inspection of forged carbon steel hooks, nuts, and bearings at a more frequent periodicity than the hook NDT periodicity.

b. For forged carbon steel hooks subject to corrosive environments or outdoor exposures, disassemble for visual inspection the hook, nut, and bearing, as a minimum, every ninth "B" PM for category 1 and 4 cranes, and every second quadrennial load test for category 2 and 3 cranes between NDT's. Disassemble hooks on manual hoists subject to corrosive environments or outdoor exposures, as a minimum, at every second quadrennial load test. The activity engineering organization may authorize the performance of this special disassembly and inspection on a less frequent periodicity based on past experience and inspection findings.

1.4.4 Hook NDT. The entire hook and eye pin or swivel eye bar as applicable, shall be NDT'd for defects according to the following periodicity based on the type of hook noted below. NDT of hook nuts is not required. The type of hook shall be documented in the equipment history file. The NDT is valid for the number of certification periods noted below:

Forged Carbon Steel: 24 certification periods.

Forged Alloy Steel: 8 certification periods.

Cast Carbon Steel or Cast Alloy Steel: 6 certification periods.

Bronze or Stainless Steel: 6 certification periods.

Notes:
1. If the material type and/or manufacturing method cannot be determined: for hook capacities greater than 30 tons, the hook shall be treated as a cast hook; for hook capacities of 30 tons or less, the hook shall be treated as a forged alloy steel hook after it is determined to not be a stainless steel or bronze hook.

2. If the OEM capacity of a forged alloy hook installed on the crane is greater than the certified capacity of the crane, or if the number of lifts performed is documented to be less than 3000 per year, (e.g., a 50,000-pound OEM rated hook, installed on a 20,000-pound certified capacity crane, or a hook with a documented number of lifts at 1000 per year) then it may be possible to perform the required hook NDT on a less frequent periodicity than the above requirements. Requests for less frequent hook NDT periodicities shall be completely detailed and addressed to Navy Crane Center on an RCDR.

1.4.4.1 Hook NDT Methods. NDT shall be magnetic particle method in accordance with NAVSEA Technical Publication T9074-AS-GIB-010/271. ASTM A275 may be used with the following restrictions: DC yokes (including switchable AC/DC yokes used in the DC mode) and permanent magnet yokes shall not be used, automatic powder blowers or any other form of forced air other than from a hand-held bulb shall not be used for the application or removal of dry magnetic particles; arc strikes shall be removed; and equipment ammeters shall have an accuracy of +/- 5 percent of full scale (equipment ammeter accuracy other than that stated is acceptable provided the MT procedure states that a magnetic field indicator is used to establish and verify adequate field strength for all aspects of the inspection). For hooks of non-magnetic material, NDT shall be liquid penetrant (PT) method in accordance with ASTM E 1417 or T9074-AS-GIB-010/271. For PT testing of hooks containing stainless steels, titanium, or nickel-based alloys, total halogens, and sulphur used in the NDT process shall be controlled as specified in T9074-AS-GIB-010/271. If NDT cannot be performed on surfaces inside small holes (e.g. hook/nut captivation roll pin holes), those surfaces shall be visually inspected to the maximum extent practical. Acceptance criterion shall be no linear indications greater than 1/16 inch. Acceptance criteria for external hook threads may be based on the acceptance criteria in SAE standard J123. NDT shall be performed prior to load tests.

The activity engineering organization may evaluate for acceptance linear indications in non-load-bearing areas of the hook such as the hook tip. Additionally, the activity engineering organization may evaluate all linear indications for relevance in accordance with the applicable NAVSEA technical publication noted above.

1.4.5 NDT Quality Assurance Requirements. Navy activities with established NDT quality assurance programs that meet NAVSEA, NAVAIR, Fleet (or equivalent) quality program

requirements should be used as sources for NDT to the maximum extent practical. If a commercial NDT vendor is used for NDT, the following requirements apply:

a. The vendor shall provide a letter certifying that the vendor meets the requirements of ASTM E 543. The certification shall be current, within one year of the date the NDT was performed.

b. The vendor shall develop, and submit for review, procedures, including technique sheets specific to the types, shapes, and sizes of the parts being examined (e.g., shank hook, eye hook, duplex hook, eye pin, swivel eye bar). For the magnetic particle method, the procedures shall adequately describe the orientation of the hook,swivel eye bar, or eye pin with the magnetizing equipment. A Level III examiner who is independent of the vendor and is certified in the applicable NDT method shall review these procedures. Activities that do not staff NDT personnel may utilize another Navy activity or other Government organization, such as the Defense Contract Management Agency or Supervisor of Shipbuilding, for this review on a cost reimbursable basis.

c. Vendor certifications and approved procedures shall be retained on file for the life of the NDT period.

1.4.6 Hook Identification. Each hook and eye pin or swivel eye bar as applicable, shall be uniquely identified with some type of permanent marking in order to provide positive traceability to the NDT report. The marking on the hook and eye pin or swivel eye bar shall be visible with the hook installed on the crane or hoist. Where possible, the marking on the other components shall be visible with the hook installed on the crane or hoist. Markings shall be located where the strength of the hook will not be reduced.

1.5 Inspection and Testing of Insulated Links.

1.5.1 General Inspection. Ensure link surface is clean and that no conductive material exists on the outer surface of the link such as graphite grease, metallic particles, or rust streaks. Check for obvious mechanical damage. Minor nicks, cuts, tears or abrasions are acceptable on the outer cover.

1.5.2 Link Identification. Each link shall be uniquely identified with some type of permanent marking to provide positive traceability to its base tram measurement and NDT report.

1.5.3 Dimensional Inspection. Establish tram points across the dielectric structure of the link and measure base tram reading before initial installation of the link. Measure the distance between the tram points before and after the load test. Compare the measurement to the base tram measurement. Reject link if measurement exceeds the base tram measurement by more than one percent.

1.5.4 Link Disassembly, and Nondestructive Test (NDT). Disassemble the link, connecting stud(s), hook, and nut in conjunction with hook disassembly. Perform a visual inspection of the metal link ends for thread damage, wear, and corrosion. Apply

a temporary sealing tape over the threaded holes to prevent moisture entry into the link during the disassembled period. Perform a magnetic particle inspection of the stud in accordance with ASTM A 275 or NAVSEA Technical Publication T9074-AS-GIB-010/271. Acceptance criterion shall be no linear indications greater than 1/16 inch. The NDT quality assurance requirements noted above for hooks apply.

1.5.5 Electrical Test. After reassembly of the link on the crane, and at every annual certification, apply a minimum of 10,000 volts across the insulated link and measure leakage current. Leakage shall not exceed 70 microamps per 1,000 volts.

1.6 Prerequisites to Load Testing.

1.6.1 Test Area. A safe test area shall be selected and all traffic and unauthorized personnel and equipment shall be cleared from test area. This test area shall be roped off or otherwise secured to prevent entry of unauthorized personnel and equipment.

1.6.2 Rigging. Rigging gear shall conform to the requirements of section 14.

1.6.3 Crane Tracks and Rails. Portal crane tracks (and runway rails for top running bridge cranes, gantry cranes, and wall cranes) to be used during crane load tests shall be certified, along with associated supports and foundations, per NAVFACINST 11230.1. If the crane load test is also the load test for track/rail certification, the track/rail shall be given a control inspection prior to load testing and shall have no catastrophic defects as defined by NAVFACINST 11230.1.

1.6.4 Pre-Test Briefing. The load test director shall conduct a pre-test briefing to ensure all load test team personnel understand the required procedures of the test.

1.7 Precautions During Load Testing. Prescribed tests are overload tests and extreme caution shall be observed at all times. Personnel shall remain clear of suspended loads and areas where they could be struck in the event of boom failure. The test load shall be raised only to a height sufficient to perform the test.

1.7.1 Test Speeds. During tests, normal operating speeds shall be employed. Rated speeds in accordance with specifications need not be attained. Emphasis shall be placed on the ability to safely control loads through all motions at normal speeds.

1.8 Duplex (Sister) Hook with Hole for Shackle Pin. For crane hooks with a hole used for lifting, both the hook barbs and the lifting hole shall be load tested. As a minimum, a ten-minute static test shall be completed. For similar crane attachments (in lieu of hooks) with holes for attachment, a ten-minute static test shall be completed for each hole. The requirements of paragraph 1.4 2 (Hook Throat Spread) do not apply to the lifting hole.

2. Portal and Floating Cranes.

2.1 No-Load Test.

2.1.1 Hoist Operating and Limit Switch Test. Accomplish for all hooks as follows:

Note: Position boom as required.

a. Controller Range. Raise the respective load hook through the controller range, stopping below upper limit switch (where applicable).

b. Upper Limit Switch. Raise load hook slowly into the upper limit switch to establish that limit switch is operating properly.

c. Upper Limit Switch Bypass. Raise hook slowly through the upper limit switch by using limit switch bypass (where applicable).

d. Backup Limit Switch. Raise hook slowly into backup limit switch (where applicable).

e. Lowering Control Range. Lower load hook below the upper limit switch through the lowering control range.

f. Lower Limit Switch. Lower load hook slowly into lower limit switch to establish that limit switch is operating properly.

2.1.1.1 Emergency Brakes on Wire Rope Drums (Shaft Failure Detection System). Simulate a system fault by interrupting (e.g., by use of a test switch) the motor encoder signal while lowering the hoist at the minimum speed necessary to simulate a system fault. Verify that the brake applies within the designed delay and that the hoist control is disabled in each direction. Restore the encoder signal path after the test. Repeat this test using the drum encoder. If the system uses components other than encoders (e.g., resolvers) to provide detection, the activity engineering organization shall develop the method for simulating the fault (e.g., forcing variables).

2.1.2 Boom. Boom operating and limit switch test shall be accomplished as follows:

a. Raise Boom. Raise boom through controller range, stopping below upper limit switch.

b. Upper Limit Switch. Raise boom slowly into the upper limit switch.

c. Limit Switch Bypass. Lower boom below limit switch and raise boom slowly through limit switch by using limit switch bypass (where applicable).

d. Backup Limit Switch. Raise boom slowly into backup limit switch (where applicable).

e. Controller Range. Lower boom through controller range, stopping above boom lower limit switch (where applicable).

f. Lower Limit Switch. Lower the boom slowly into the boom lower limit switch (where applicable).

g. Limit Switch Bypass. Raise boom above the lower limit switch and lower boom through limit switch by using limit switch bypass (where applicable).

2.1.2.1 Emergency Brake on Wire Rope Drum (Shaft Failure Detection System). Simulate a system fault by interrupting (e.g., by use of a test switch) the motor encoder signal while lowering the hoist at the minimum speed necessary to simulate a system fault. Verify that the brake applies within the designed delay and that the hoist control is disabled in each direction. Restore the encoder signal path after the test. Repeat this test using the drum encoder. If the system uses components other than encoders (e.g., resolvers) to provide detection, the activity engineering organization shall develop the method for simulating the fault (e.g., forcing variables).

2.1.3 Luffing Drum Pawl. Check luffing drum pawl for proper engagement in ratchet gear and with limit switch. Check the luffing drum pawl limit switch (if installed) for proper operation. With luffing drum pawl disengaged, check that boom hoist motor shuts off, brake engages, and indicator lights operate correctly (where applicable) by manually activating the limit switch. An alternate method is to engage the luffing drum pawl with the luffing hoist drive de-energized and then ensure that the drive cannot be energized in the downward direction.

CAUTION: Do not engage the luffing drum pawl into a downward rotating ratchet gear.

2.1.4 Rotation Lock (Wind Lock, Spud Lock). Engage rotation lock and inspect to ensure full engagement. Check that rotation lock limit switches (clockwise and counterclockwise) prevent engaging rotation drive (where applicable). Operate rotation lock bypass (clockwise and counterclockwise) to ensure proper operation (where applicable).

CAUTION: Use only enough power to check operation of bypass.

Note: Applicable switches may be operated manually to check for correct operation in lieu of engaging rotation lock.

CAUTION: Ensure rotation lock is disengaged prior to continuing test.

2.1.5 Rotation. Rotate clockwise and counterclockwise with boom at minimum radius.

2.1.6 Travel. Conduct travel test in accordance with paragraph 2.2.3.l, except without load.

2.1.7 Deadman Controls. Test all deadman controls (where installed). Start each motion. Release deadman control. Motion shall stop.

2.2 Load Test. The following is considered to be the most time and cost effective sequence of performing the required tests. Activities may vary the sequence as required.

2.2.1 Load Test for Variable Rated Cranes. All cranes shall be tested in accordance with paragraphs 2.2.2 through 2.2.5. In addition, variable rated cranes shall be tested in accordance with paragraph 2.3 with the appropriate test load at the maximum radius of the crane.

2.2.2 Stability Test. (For balanced deck design cranes only). During static and dynamic configurations with test load (paragraphs 2.2.3.a, b, d, and i) observe for clearance between the rollers and the upper and lower roller rails. If no clearance is observed, stability is satisfactory. If clearance is observed, perform the following:

a. The center pin nut clearance with the steadiment shall be set per crane OEM's specification.

b. In the static mode, position the boom parallel and perpendicular to the track (for floating cranes, position the boom parallel and perpendicular to the athwartships centerline of barge) and examine roller path for clearance.

c. If the loading conditions do not result in contact of the steadiment with the center pin nut, then the activity engineering organization shall evaluate for wear or structural defects. If the mechanical roller and structural assembly condition is determined to be unsatisfactory, then the crane shall be removed from service and corrective action initiated. Should the structural and mechanical roller assembly condition be determined satisfactory, then a record of the roller clearance data for various quadrants shall be recorded and incorporated in the equipment history file as a "crane roller clearance data standard of acceptance" and shall be utilized during future periodic testing. It is not necessary to repeat these roller clearance data readings on an annual basis unless there is a noticeable change with the clearance data or a major change did occur for this crane (e.g., alteration affecting crane stability).

d. If either loading condition noted in paragraph b results in contact of steadiment with the center pin nut, indicating a possible lack of crane stability, the crane shall be removed from service and a request for an engineering evaluation shall be forwarded to the Navy Crane Center.

2.2.3 Main and Boom Hoists, Rotate, and Travel. For the main hoist, rotate, and travel tests, the test load shall be the maximum test load for the crane. For the boom hoist tests, the test load and radius shall be such as to produce the maximum drum line pull. This may require a different test load than for the main hoist test.

a. Hoist and Boom Static Test. Raise test load to clear ground and hold for 10 minutes with boom at the maximum radius for the load lifted. Rotate load and hook

360 degrees clockwise and counter-clockwise to check bearing operation. Do not allow a hoist pawl (dog) to carry the load. Observe lowering of the test load, which may indicate malfunction of boom or hoisting components or holding brakes. If either hoist has primary and secondary holding brakes (i.e., where each brake is designed to individually hold the load), then the following tests shall be performed, for each applicable hoist, in lieu of the single 10 minute holding test noted above:

(1) Raise the test load and observe for proper timing sequence in the application of the primary and secondary brake when the controller is returned to neutral. Visually observe both hoist holding brakes to ensure correct operation. Raise the test load approximately one foot and hold open one of the brakes. Hold the load for 10 minutes and observe for lowering of the load, which may indicate malfunction of hoisting components or brake. Rotate load and hook 360 degrees clockwise and counter-clockwise to check bearing operation. Do not allow a hoist pawl (dog) to carry the load.

(2) Reset the brake held open and open the first brake tested. Again hold the load for 10 minutes observing for malfunctions. Reset the brake and verify the proper timing sequence of the setting of the brakes.

(3) If the brakes are designed to individually hold only the rated capacity (and not 125 percent), then the tests in subparagraphs (1) and (2) may be performed with a test load of 100 (+5/-0) percent of rated capacity and the certification shall be so noted. However, the brakes, acting together, shall demonstrate the ability to hold a 125 percent test load for a 10 minute period.

b. Hoist Dynamic Test. Raise and lower the test load and visually observe smooth control through the range. Stop the load during hoisting and lowering to verify the crane stops and holds the load. Check for proper operation of dynamic braking.

CAUTION: Dynamic braking will not stop motion.

c. Wire Rope Test for New Rope. The maximum working length of new wire rope shall be tested before being put in service. This shall be accomplished during either the static or dynamic test. (For cranes servicing drydocks, this will require lifting the test load into or out of the deepest drydock available.)

d. Boom Hoist Operating Test. Starting from maximum radius and with the load attached, raise the boom to minimum radius. Lower the boom to maximum radius. Visually observe for smooth motion through boom controller range. Stop the hoist during hoisting and lowering to verify the crane stops and holds the load. Check for proper operation of dynamic braking.

e. Hoist Foot Brake Test (Hydraulic or Mechanical). Lower test load, using first control point, then apply the foot brake. This shall stop the lowering motion of the test load.

CAUTION: Not applicable to load-sensitive reactor type hoist controls.

f. Boom Foot Brake Test (Hydraulic or Mechanical). Start with boom near maximum radius and with the test load approximately two feet from the ground surface. Lower test load using the first control point of the boom hoist. Apply the foot brake. This shall stop the lowering motion of the boom and test load.

CAUTION: Not applicable to load-sensitive reactor type hoist controls.

g. Hoist Loss of Power (Panic Test). This test is designed to test the reaction of a hoisting unit in the event of power failure during a lift. Hoist the test load approximately 10 feet above the ground. Lower test load at slow speed and, with the controller in the slow lowering position, disconnect the main power source by pushing the main power stop button or buttons, then return the controller to the neutral position. The test load shall stop lowering when the controller is placed in the neutral position.

CAUTION: This test is not to be performed on cranes that do not have powered down hoists. Additionally, the activity engineering organization shall review the system circuitry for cranes with electronic controls to assure that this test can be performed safely without damaging the control system. For cranes where the controls may be damaged, the activity engineering organization shall document their justification and fully describe the alternate tests performed. Alternate test procedures require Navy Crane Center approval.

h. Boom Loss of Power (Panic Test). This test is designed to test the reaction of the boom hoist in the event of power failure during a lift. Hoist the load approximately 10 feet above the ground with the boom near maximum radius. Lower the boom at slow speed, disconnect the main power source by pushing the main power stop button, then return the controller to the neutral position. The boom shall stop lowering when the controller is placed in the neutral position.

CAUTION: This test is not to be performed on cranes that do not have powered down hoists. Additionally, the activity engineering organization shall review the system circuitry for cranes with electronic controls to assure that this test can be performed safely without damaging the control system. For cranes where the controls may be damaged, the activity engineering organization shall document their justification and fully describe the alternate tests performed. Alternate test procedures require Navy Crane Center approval.

i. Rotation. Start with boom at maximum radius, rotate left and right 360 degrees with the boom hoist pawl (dog) engaged. However, if test area will not permit, two complete revolutions of the swing pinion are considered adequate. Test loads for floating cranes can be rotated over the water.

CAUTION: Exercise care when rotating loads over water. Ensure during the initial load test the floating crane has adequate draft readings per design data. When

testing a floating crane, monitor the radius to ensure the allowable radius is not exceeded due to listing of the barge.

j. Rotate Stopping Test. At maximum radius, rotate left and right at slow speed and apply the foot brake. The foot brake shall demonstrate ability to stop the rotating motion in a smooth, positive manner. For cranes without a foot applied rotate brake, rotate left and right, then return the controller to the neutral position. The rotate brakes or rotate drive, as applicable, shall stop the rotating motion of the crane in a smooth, positive manner. For floating cranes, where space permits, the parking brake shall demonstrate its ability to prevent rotation when applied with the boom at 45 degrees from the centerline of the barge. Hold for 10 minutes with brake applied.

k. Travel Test (Boom over side). This test shall be conducted with the boom at maximum allowable radius positioned 90 degrees with the crane rails and boom dog engaged. With the test load raised to clear the ground and with the boom dog engaged, travel in one direction a minimum of 50 feet. Repeat with boom on opposite side where conditions permit.

CAUTION: Operate crane at very slow travel speed. Ensure track and supporting foundation are sound and free of any obstruction over test travel area. (Not applicable to floating cranes).

l. Travel Test (Boom over front). With the test load raised to clear the ground and with the boom centered between the crane rails and boom dog engaged, travel in one direction a minimum of 50 feet. The crane shall accelerate and decelerate smoothly. All motions shall be smooth and positive. (Not applicable to floating cranes). Repeat with the boom rotated over the opposite end.

2.2.3.1 Emergency Brake on Wire Rope Drum (Shaft Failure Detection System).

a. Static Test. Test the ability of the hoist caliper disc brake to hold the test load after testing the other holding brake(s). Raise the test load approximately one foot off the ground. Do not engage the boom hoist pawl (if applicable). Depress the emergency stop pushbutton to disconnect the main power source and set the brakes. Manually release all brakes except the caliper disc brake. Hold the load for 10 minutes with the caliper disc brake. Observe for lowering of the load, which may indicate a malfunction of the hoisting components or the brake. Reset the other holding brake(s) to the applied condition. Energize the main power source. Verify that the load is held by the holding brake(s). Operate the hoist in each direction and verify proper operation of all controls and brakes.

b. Dynamic Test. Perform with a test load of 100 (+5/-0) percent of rated capacity. Raise the load to a sufficient height to perform the following test. Lower the load at the minimum speed necessary to simulate a shaft failure. Disable all hoist brakes except the wire rope drum brake and simulate a system fault by interrupting (e.g., test switch) the motor or drum encoder. The brake shall stop the load. If the system uses

components other than encoders (e.g., resolvers) to provide detection, the activity engineering organization shall develop the method for simulating the fault (e.g., forcing variables). Reset all brakes and/or programming. (CAUTION: Station appropriately trained personnel at each disabled hoist brake in case of failure of the drum brake to stop the load. These personnel shall be in constant contact with the load test director and prepared to safely engage the hoist brakes when directed.)

CAUTION: The activity engineering organization shall review the system circuitry for cranes with electronic controls to assure that this test can be performed safely without damaging the control system. For cranes where the controls may be damaged, the activity engineering organization shall document their justification and fully describe the alternate tests performed. Alternate test procedures require Navy Crane Center approval.

2.2.4 Auxiliary Hoist. Maximum test load for the hoist.

a. Static Test. Raise test load to clear ground and hold for 10 minutes without hoist pawl (dog) engaged at the maximum radius for that load. Rotate load and hook 360 degrees clockwise and counter-clockwise to check bearing operation. Observe for lowering of the load, which may occur, that may indicate malfunction of hoisting components or holding brakes. If the hoist has primary and secondary holding brakes, then the tests noted in subparagraphs 2.2.3.a (1), (2), and or (3), shall be performed in lieu of the 10 minute holding test noted above.

b. Dynamic Test. Raise and lower test load and visually observe smooth control through the range. Stop the load during hoisting and lowering to verify the crane stops and holds the load. Check for proper operation of dynamic braking.

c. Wire Rope Test for New Rope. The maximum working length of new wire rope shall be tested before being put in service. This shall be accomplished during either the static or dynamic test. (For cranes servicing drydocks, this will require lifting the test load into or out of the deepest drydock available.)

d. Foot Brake Test (Hydraulic or Mechanical). Lower test load using first control point, then apply the foot brake. This shall stop the lowering motion of the test load.

CAUTION: Not applicable to load-sensitive reactor type hoist controls.

e. Loss of Power (Panic Test). This test is designed to test the reaction of the hoisting unit in the event of power failure during a lift. Hoist the test load approximately 10 feet above the ground. Lower test load at slow speed and with the controller in the slow lowering position, disconnect the main power source by pushing the main power stop button or buttons, then return the controller to the neutral position. The test load shall stop lowering when the controller is placed in the neutral position.

CAUTION: This test shall not be performed on cranes that do not have powered down hoists. Additionally, the activity engineering organization shall review the system circuitry for cranes with electronic controls to assure that this test can be performed safely without damaging the control system. For cranes where the controls may be damaged, the activity engineering organization shall document their justification and fully describe the alternate tests performed. Alternate test procedures require Navy Crane Center approval.

2.2.4.1 Emergency Brake on Wire Rope Drum (Shaft Failure Detection System).

a. Static Test. Test the ability of the hoist caliper disc brake to hold the test load after testing the other holding brake(s). Raise the test load approximately one foot off the ground. Do not engage the boom hoist pawl (if applicable). Depress the emergency stop pushbutton to disconnect the main power source and set the brakes. Manually release all brakes except the caliper disc brake. Hold the load for 10 minutes with the caliper disc brake. Observe for lowering of the load, which may indicate a malfunction of the hoisting components or the brake. Reset the other holding brake(s) to the applied condition. Energize the main power source. Verify that the load is held by the holding brake(s). Operate the hoist in each direction and verify proper operation of all controls and brakes.

b. Dynamic Test. Perform with a test load of 100 (+5/-0) percent of rated capacity. Raise the load to a sufficient height to perform the following test. Lower the load at the minimum speed necessary to simulate a shaft failure. Disable all hoist brakes except the wire rope drum brake and simulate a system fault by interrupting (e.g., test switch) the motor or drum encoder. The brake shall stop the load. If the system uses components other than encoders (e.g., resolvers) to provide detection, the activity engineering organization shall develop the method for simulating the fault (e.g., forcing variables). Reset all brakes and/or programming. (CAUTION: Station appropriately trained personnel at each disabled hoist brake in case of failure of the drum brake to stop the load. These personnel shall be in constant contact with the load test director and prepared to safely engage the hoist brakes when directed.)

CAUTION: The activity engineering organization shall review the system circuitry for cranes with electronic controls to assure that this test can be performed safely without damaging the control system. For cranes where the controls may be damaged, the activity engineering organization shall document their justification and fully describe the alternate tests performed. Alternate test procedures require Navy Crane Center approval.

2.2.5 Whip Hoist. Maximum test load for the hoist.

a. Static Test. Raise test load to clear ground and hold for 10 minutes without hoist pawl (dog) engaged at the maximum radius for that load. Rotate load and hook 360 degrees clockwise and counter-clockwise to check operation of bearing. Observe for lowering of the load, which may indicate malfunction of hoisting components or holding brakes. If the hoist has primary and secondary holding

brakes, then the tests noted in subparagraphs 2.2.3.a (1), (2), and/or (3) shall be performed in lieu of the 10 minute holding test noted above.

b. Dynamic Test. Raise and lower test load and visually observe smooth control through the range. Stop the load during hoisting and lowering to verify the crane stops and holds the load. Check for proper operation of dynamic braking.

c. Wire Rope Test for New Rope. The maximum working length of new wire rope shall be tested before being put in service. This shall be accomplished during either the static or dynamic test. (For cranes servicing drydocks, this will require lifting the test load into or out of the deepest drydock available.)

d. Foot Brake Test (Hydraulic or Mechanical). Lower test load using first control point, then apply the foot brake. This shall stop the lowering motion of the test load.

CAUTION: Not applicable to load-sensitive reactor type hoist controls.

e. Loss of Power (Panic Test). This test is designed to test the reaction of a hoisting unit in the event of power failure during a lift. Hoist the test load approximately 10 feet above the ground. Lower test load at slow speed and, with the controller in the slow lowering position, disconnect the main power source by pushing the main power stop button, then return the controller to the neutral position. The test load shall stop lowering when the controller is placed in the neutral position.

CAUTION: This test shall not be performed on cranes that do not have powered down load hoists. Additionally, the activity engineering organization shall review the system circuitry for cranes with electronic controls to assure that this test can be performed safely without damaging the control system. For cranes where the controls may be damaged, the activity engineering organization shall document their justification and fully describe the alternate tests performed. Alternate test procedures require Navy Crane Center approval.

2.2.5.1 Emergency Brake on Wire Rope Drum (Shaft Failure Detection System).

a. Static Test. Test the ability of the hoist caliper disc brake to hold the test load after testing the other holding brake(s). Raise the test load approximately one foot off the ground. Do not engage the boom hoist pawl (if applicable). Depress the emergency stop pushbutton to disconnect the main power source and set the brakes. Manually release all brakes except the caliper disc brake. Hold the load for 10 minutes with the caliper disc brake. Observe for lowering of the load, which may indicate a malfunction of the hoisting components or the brake. Reset the other holding brake(s) to the applied condition. Energize the main power source. Verify that the load is held by the holding brake(s). Operate the hoist in each direction and verify proper operation of all controls and brakes.

b. Dynamic Test. Perform with a test load of 100 (+5/-0) percent of rated capacity. Raise the load to a sufficient height to perform the following test. Lower the load at the minimum speed necessary to simulate a shaft failure. Disable all hoist brakes except the wire rope drum brake and simulate a system fault by interrupting (e.g., test switch) the motor or drum encoder. The brake shall stop the load. If the system uses components other than encoders (e.g., resolvers) to provide detection, the activity engineering organization shall develop the method for simulating the fault (e.g., forcing variables). Reset all brakes and/or programming. (CAUTION: Station appropriately trained personnel at each disabled hoist brake in case of failure of the drum brake to stop the load. These personnel shall be in constant contact with the load test director and prepared to safely engage the hoist brakes when directed.)

CAUTION: The activity engineering organization shall review the system circuitry for cranes with electronic controls to assure that this test can be performed safely without damaging the control system. For cranes where the controls may be damaged, the activity engineering organization shall document their justification and fully describe the alternate tests performed. Alternate test procedures require Navy Crane Center approval.

2.3 Variable Rated Load Test. In addition to the tests prescribed in paragraph 2.2, variable rated cranes shall be tested with the appropriate test load at the maximum radius of the crane on the main hoist as follows:

2.3.1 Stability Test. (For balanced deck design cranes only). During testing in accordance with paragraphs 2.3.2, 2.3.3, and 2.3.6, observe for clearance between the rollers and the upper and lower roller rails. If no clearance is observed, stability is satisfactory. If clearance is observed perform the tests and take the necessary actions noted in paragraphs 2.2.2.a through d.

2.3.2 Static Test. Raise test load to clear ground and hold for 10 minutes with boom at maximum radius. Do not allow a hoist pawl (dog) to carry the load. Observe for lowering of the load, which may indicate malfunction of hoisting components or brakes.

2.3.3 Boom Hoist Operating Test. Starting from maximum radius and with the load attached, raise the boom to the maximum radius for the next higher load. Lower the boom. Observe for smooth hoisting and lowering motions through the controller range. Stop the hoist during hoisting and lowering to verify the crane stops and holds the load.

2.3.4 Boom Foot Brake Test (Hydraulic or Mechanical). Start with boom near maximum radius, and with the test load approximately two feet from the ground surface, lower test load, using first control point of the boom hoist. Apply the foot brake. This shall stop the lowering motion of the boom and test load.

CAUTION: Not applicable to load-sensitive reactor type hoist controls.

2.3.5 Automatic Boom Brake (Where applicable, i.e., Washington Crane Company). This brake is to prevent a "free fall" boom in case of failure of clutch, boom hoist control, and

foot brake. With the test load approximately four inches above the ground, set the brake firmly. Release the mechanical boom dog. Release the boom clutch by operating the boom hoist control. Slowly release the foot brake to the free position. Hold the test load with automatic brake for five minutes then lower test load by applying the boom hoist clutch and lowering with the controller operation.

2.3.6 Rotation. Start with boom at maximum radius, rotate left and right 360 degrees with the boom hoist pawl (dog) engaged. However, if test area will not permit, two complete revolutions of the swing pinion are considered adequate. Test loads for floating cranes can be rotated over the water.

CAUTION: Exercise care when rotating loads over water. Ensure during the initial load test the floating crane has adequate draft readings per design data. When testing a floating crane, monitor the radius to ensure the allowable radius is not exceeded due to listing of the barge.

3 Tower Cranes and Derricks.

3.1 General. Tower cranes and stiff leg derricks shall be tested in accordance with instructions for portal cranes under paragraph 2 (except for rotation testing which is described below).

3.2 Tower Crane and Derrick Rotation. Rotation testing shall be conducted in accordance with the rotation test for portal cranes through normal design operating arc.

4 Hammerhead Cranes.

4.1 Hammerhead Crane Hoists. Hoists shall be tested in combination(s) such that all structural, mechanical, and electrical components are tested in all possible configurations. Hoists shall be tested in accordance with applicable instructions for portal cranes.

4.2 Hammerhead Rotation. Rotation shall be tested in accordance with instructions for portal cranes.

4.3 Hammerhead Trolley Motion.

4.3.1 No-Load. Travel the allowable length of the trolley runway through the control range. Operate trolley into the limit switches at slow speed. Bring trolley back and by using the limit switch bypass, move trolley into the outboard rail stops. Repeat above procedure for inboard limit switches and rail stops.

4.3.2 Load Test. Raise test load to clear ground and move trolley to the maximum allowable radius. Hold test load for 10 minutes. Do not move trolley beyond the trolley limit switch. After the ten-minute holding test, travel the allowable length of the trolley runway.

4.4 Travel. Travel motion shall be tested in accordance with the instructions specified for portal cranes where applicable.

5 Mobile Cranes, Locomotive Cranes, Aircraft Crash Cranes, and Category 4 Cranes. These cranes are complex machines and the following requirements are not designed to test each and every component to its maximum stress state. Instead, the test is configured to safely and efficiently test the greatest number of critical components to the specified load level. Commercial truck mounted telescoping boom cranes shall be tested in accordance with paragraph 5.4. Lattice boom cranes shall be tested in accordance with paragraph 5.5. Articulating boom cranes shall be tested in accordance with paragraph 5.8. Test procedures for other category 4 cranes shall follow OEM procedures and recommendations. Where no procedures are provided by the OEM, procedures shall be developed by the activity engineering organization using the procedures of this subsection as a guide.

5.1 Test Load. The nominal test load shall be 105 percent of rated capacity. The rated capacity shall be the capacity shown on the posted load chart or as limited by other factors such as hook block capacity or wire rope line pull if the crane is not fully reeved. The test load includes the weight of (or deduction values for) the hook, block, slings, and ancillary lifting devices (and for some cranes hoist wire rope not accounted for in load charts), and the combined weight deduction values shall be subtracted from the nominal test load in order to determine the amount of test weights to be used. Follow OEM load chart instructions for weight deduction values. Check accuracy of load indicators where installed. If controlled assembly procedures, as described in section 3, are to be used in lieu of load test and recertification for change-out of ancillary equipment, the applicable ancillary equipment shall be tested during the annual certification testing.

5.2 Mobile Cranes Temporarily Mounted on Barges. The certifying official shall prescribe appropriate test conditions and precautions. Follow all requirements of section 3. During the load moment test, the rotate brake shall be tested to demonstrate its ability to prevent rotation when applied with the boom at 45 degrees from the centerline of the barge. Hold this position for 10 minutes with the brake set.

5.3 Pre-test Preparation. Select a test area that is level and free of ground obstructions. Extend outriggers or stabilizers as specified by the OEM, when so equipped. For cranes with variable outrigger/stabilizer or crawler positions, only the fully extended position requires testing, tests are not required for intermediate outrigger/stabilizer or crawler settings. For most truck and cruiser cranes, crane carrier shall be raised sufficiently to completely unload tires. Level crane as required by OEM's load chart. Ensure machine, including hydraulic system, is brought up to operating temperature before performing tests.

5.3.1 Cautions for Mobile Crane Tests.

a. Test personnel shall remain fully alert to wind, other weather, and visibility conditions that may jeopardize the safe performance of the tests.

b. Lift the test load only high enough to perform the required tests.

c. When lifting test loads, always lift the load well within the maximum radius and slowly boom down to the pre-measured radius stopping at least once to test the effectiveness of the boom brake or holding valve.

d. A crane outrigger may become light (start to rise up within the outrigger pad) and the outrigger pad may clear the ground during load testing (with the boom positioned over the opposite corner) depending on the make and model. Generally, this is normal and not an indication of tipping. However, if two outriggers exhibit this condition simultaneously the activity shall verify with the crane OEM that the crane exhibiting this condition is safe for use

e. Ensure all "on rubber" lifting requirements established by the OEM and activity are followed when lifting loads "on-rubber" (free-rated capacity). Attach taglines to the load to control oscillation. Extend outriggers and maintain minimal clearance (3 to 4 inches) above ground. Test personnel shall stand clear of tires during "on-rubber" load tests.

5.4 Telescoping Boom Cranes.

5.4.1 No-Load Tests.

5.4.1.1 Hoist(s).

a. Raise and lower each hook through the maximum possible working distance of hook travel. After lowering the hook, ensure the wire rope is packed tightly on the drum prior to proceeding with the load tests to prevent wire rope displacement and crushing.

b. Raise each hoist block into the limit switch (where installed) at slow speed. Ensure the anti-two block alarm operates or the hoist is disabled in accordance with the OEM's operating instructions. If the crane is equipped with control lockouts (also known as function limiters or kickouts), carefully ensure all additional functions that could also two block the hoist are disabled (e.g., telescope out, boom down) in accordance with the OEM's operating instructions.

c. Raise each hoist block beyond the limit switch by using the bypass switch (where installed).

5.4.1.2 Boom.

a. Raise and lower the boom through the full working range.

b. Extend and retract telescoping boom sections the full distance of travel. For latching boom cranes, ensure all boom extend modes operate properly and ensure all boom latching/pinning positions engage properly for each section.

5.4.1.3 Other Functions. Other functions including swing shall be operated through a minimum of one full cycle/revolution of major components; e.g. one full revolution of track crawlers, 360 degrees of upper rotation.

a. Test the work area limit switch (area definition device), if applicable.

5.4.2 Load Test. The load test consists of a maximum certified capacity test and a load moment test. In some cases, these tests may be combined. Additionally, a maximum line pull test is required for cranes that use multiple reeving configurations, and other appropriate tests are required for cranes that use ancillary equipment with Ancillary Equipment Procedures (AEPs) during the certification period. The sequence may be varied by the activity, however the following test sequence is recommended. For cranes with multiple reeving configurations, the maximum line pull test (paragraph 5.4.2.4.a) should be performed first.

5.4.2.1 Maximum Certified Capacity Test.

a. The test load shall be 105 percent of the maximum certified capacity of the crane. Determine the maximum permissible radius for the maximum certified capacity. Perform the test at the maximum boom length for this capacity and radius.

b. Raise the test load using the hoist.

c. Lower the test load and test the ability of the brake to control, stop, and hold the test load (10 minute hold).

d. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or outriggers. With the test load raised, rotate the hook 360 degrees clockwise and counter-clockwise to check bearing operation If the size of the test load precludes a full 360 degree rotation of the hook, perform the hook rotation test during the load moment test.

Note: Due to the number of layers of wire rope on the drum, some cranes may not be able to lift the test load per the OEM's load chart.. If the crane cannot lift the test load, check the OEM's hoist line pull for the particular model hoist and layer of rope. If hoist line pull (available torque) is the limiting factor, reduce the test load based on the hoist line pull limitation and perform the required test. Certify the crane based on the reduced test load (i.e., certified capacity is test load divided by 1.05). If the crane cannot lift the reduced test load, verify that the system hydraulic pressure and relief valves are set within OEM specifications. If the settings are within specification, contact the OEM.

e. Operate the boom from maximum radius to minimum radius. Repeat the test, operating the boom from minimum radius to maximum radius for the load applied.

5.4.2.2 Load Moment Test.

a. Test Configuration:

- Boom length - shortest length where all sections are partially extended, but not less than 50 percent total powered boom length (or latching section boom length).
- Maximum radius - the radius that creates the maximum load moment that will safely clear the outriggers/stabilizers/carrier through the complete swing range.
- The test load shall be 105 percent of OEM load chart capacity at this boom length and radius.

Note: For the purposes of this test, load moment is the product of capacity multiplied by radius. Cranes equipped with multiple boom modes must have multiple load charts checked to ensure the maximum load moment is selected.

b. Telescopic Component Slippage. Raise the test load using the hoist. Operate the boom from maximum radius (as defined above) to minimum radius for the load applied. Hold the load for 5 minutes without use of controls by the operator. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or outriggers. Lower the boom from minimum radius to maximum radius (as defined above) before proceeding to the next test.

c. Outrigger/Stabilizer Component Slippage. Swing the test load at slow speed through the complete swing range as allowed by the OEM, and apply the brake periodically during rotation. The brake shall demonstrate its ability to stop the rotating motion in a smooth, positive manner. Hold the load with the boom positioned over (or near as allowed by OEM) each outrigger/stabilizer for 5 minutes (holding over the center front outrigger/stabilizer is not required). Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or outriggers. Swing the crane in the opposite direction through the complete swing range as allowed by the OEM.

Notes for telescopic and outrigger/stabilizer component slippage tests:

1. The significance of any lowering shall be evaluated by the activity engineering organization depending on operating requirements and safety.

2. For cranes equipped with outrigger locking devices but where activity operating procedures permit operation without the use of the locking devices, this test shall be performed with the locking devices disengaged.

3. If a latching boom crane's telescoping cylinder has the capability to telescope, retract or hold the boom while unpinned under load, it shall be tested by repeating the telescopic component slippage test at 105 percent of the maximum telescoping/retracting/unpinned holding capacity with the boom unpinned. However

if the only function of the telescoping capacity is to extend or retract boom sections, ancillary equipment, or rigging hardware, and no loads are telescoped, then the telescoping cylinder does not require a telescopic component slippage test.

5.4.2.3 Auxiliary and Whip Hoist. The test load shall be 105 percent of the maximum certified capacity for the hoist to be tested. Tests shall be performed with the boom fully extended or until 2 wraps of wire rope remain on a grooved hoist drum or 3 wraps of wire rope remain on a smooth hoist drum.

a. Raise the test load using the hoist.

b. Lower the test load and test the ability of the brake to control, stop, and hold the test load (10 minute hold).

c. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or outriggers. With the test load raised, rotate the hook 360 degrees clockwise and counter-clockwise to check bearing operation.

5.4.2.4 Maximum Line Pull Test and Ancillary Equipment Tests. For cranes that will use multiple reeving configurations or ancillary equipment (swing-away jibs, power pinned fly sections, manual extensions, jibs at variable offsets, multiple load blocks, etc.) during the certification period, using procedures per section 3, the following load tests are required:

a. Maximum Line Pull Test.

Note: Testing of all possible reeving configurations is not required. In some cases, this test may be combined with the maximum certified capacity test or load moment test.

1. The reeving configuration to be tested shall be such that the test load produces 105 percent of the maximum allowable wire rope line pull. If the crane cannot lift the test load due to the number of layers of wire rope on the drum, see the Note of paragraph 5.4.2.1.

2. Raise the test load using the hoist.

3. Lower the test load and test the ability of the brake to control, stop, and hold the test load (10 minute hold).

b. Ancillary Equipment Tests.

1. The test load shall be 105 percent of the maximum certified capacity of the equipment, or 105 percent of the maximum allowable wire rope line pull if the equipment is not fully reeved. For jibs with variable offset angles, test at the greatest offset used. For telescoping extensions, test at the fully extended length. Each point of a bifold

swingaway shall be tested. Record each test configuration and test load on the certification supplement form, figure 3-2.

Note:

For cranes with multiple counterweight configurations, testing of all possible counterweight combinations is not required. However, all counterweights that will be used during the certification period shall be tested in some combination during the annual load test.

5.4.2.4.1 Ancillary Equipment Used Without Procedures. As noted in section 3, paragraphs 3.5.3.1.1 and 3.5.3.1.2, ancillary equipment procedures are not required and the existing certification is not voided when removing and reinstalling outrigger pads, counterweights, outrigger extension pins, and boom angle and extension pins, provided all of the components are load tested at the annual certification. The OEM's instructions shall be followed when installing or removing these items.

5.4.2.5 "On-Rubber" (Free-Rated) Load Test. Allowable "on-rubber" rated capacity for over the side lifting for cranes equipped with outriggers shall not exceed 60 percent of the OEM's load chart values per paragraph 11.3. For those cranes, testing over the side "on-rubber" is not required. (For rubber tired cranes without outriggers, contact the Navy Crane Center). See section 11 for allowable "on-rubber" (free rated) capacities and other stability information for used and altered cranes. Check the stability and operation of crane, carrier, wheels, tires, brakes, etc., under load by performing the following tests, when lifting without outriggers and/or traveling with the load are permitted at the activity for the type of crane being tested.

Notes: Some cranes have different ratings for stationary lifts and for traveling with a load. Each allowable configuration shall be tested.

a. Maximum Certified On-Rubber Capacity.

1. Hoist 105 percent of the maximum certified on-rubber capacity at the minimum possible radius over the rear (or over the front as required by the OEM). Slowly boom down to the maximum radius for the maximum certified capacity. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or wheels/tires/axle components.

2. Rotate through the on-rubber working arc as allowed by the OEM. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or wheels/tires/axle components.

3. Travel a minimum of 50 feet with the test load over the rear (or front as required by the OEM) with the boom parallel to the longitudinal axis of the crane carrier. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or wheels/tires/axle components.

5.5 Lattice Boom Cranes.

5.5.1 No-Load Tests.

5.5.1.1 Hoist(s).

a. Raise and lower each hook through the maximum possible working distance of hook travel. After lowering the hook, ensure the wire rope is packed tightly on the drum prior to proceeding with the load tests to prevent wire rope displacement and crushing.

b. Raise each hoist block into the limit switch (where installed) at slow speed. Ensure the anti-two block alarm operates or the hoist is disabled in accordance with the OEM's operating instructions. If the crane is equipped with control lockouts (also known as function limiters or kickouts), carefully ensure all additional functions that could also two block the hoist are disabled (e.g., boom down) in accordance with the OEM's operating instructions.

c. Raise each hoist block beyond the limit switch by using the bypass switch (where installed).

5.5.1.2 Boom.

a. Raise and lower the boom through the full working range.

b. Raise the boom into the upper limit switch (where installed). Raise the boom past the boom upper limit switch using the bypass switch (where installed).

c. Raise the boom into the backup upper limit switch (where installed).

d. Test the lower limit switch (where installed) by the same procedure prescribed for testing the upper limit switch.

5.5.1.3 Other Functions. Other functions including swing shall be operated through a minimum of one full cycle/revolution of major components; e.g. one full revolution of track crawlers, 360 degrees of upper rotation.

a. Test the work area limit switch (area definition device), if applicable

5.5.2 Load Test. The load test consists of a maximum certified capacity test and a load moment test. In some cases, these tests may be combined. Additionally, a maximum line pull test is required for cranes that use multiple reeving configurations, and other appropriate tests are required for cranes that use ancillary equipment with ancillary equipment procedures during the certification period. The sequence may be varied by the activity, however the following test sequence is recommended. For cranes with multiple reeving configurations, the maximum line pull test (paragraph 5.5.2.4.a) should be performed first.

5.5.2.1 Maximum Certified Capacity Test.

a. The test load shall be 105 percent of the maximum certified capacity of the crane. Determine the maximum permissible radius for the maximum certified capacity. Perform the test at this radius.

b. Raise the test load using the hoist.

c. Lower the test load in power down mode (if the hoist does not have power down mode, use the foot brake to control, stop, and hold the load by latching the foot brake pedal) and test the ability of the brake to control, stop, and hold the test load 10 minutes without boom, or load hoist pawls engaged in the teeth (do not disable pawl system).

d. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or outriggers. With the test load raised, rotate the hook 360 degrees clockwise and counter-clockwise to check bearing operation. If the size of the test load precludes a full 360 degree rotation of the hook, perform the hook rotation test during the load moment test.

Note: Due to the number of layers of wire rope on the drum, some cranes may not be able to lift the test load per the OEM's load chart. If the crane cannot lift the test load, check the OEM's hoist line pull for the particular model hoist and layer of rope. If hoist line pull (available torque) is the limiting factor, reduce the test load based on the hoist line pull limitation and perform the required test. Certify the crane based on the reduced test load (i.e., certified capacity is test load divided by 1.05). If the crane cannot lift the reduced test load, verify that the system hydraulic pressure and relief valves, or clutch settings and tolerances, are set within OEM specifications. If the settings are within specification, contact the OEM.

e. Operate the boom from maximum radius to minimum radius for the load applied. Repeat the test, operating the boom from minimum radius to maximum radius for the load applied.

f. Free-Fall Operation Mode Test. If the OEM and activity permits operation of the crane in free-fall mode, test the ability of the brake to stop the load with the friction clutch disengaged. This test shall be performed in strict accordance with OEM and activity instructions and shall not exceed maximum recommended OEM allowances for loads.

5.5.2.2 Load Moment Test.

a. Test Configuration:

- Maximum radius - the radius that creates the maximum load moment that will safely clear the outriggers/stabilizers/carrier/crawler through the complete swing range

- The test load shall be 105 percent of OEM load chart capacity at this radius.

Note: For the purposes of this test, load moment is the product of capacity multiplied by radius.

b. Outrigger/Stabilizer Component Slippage. Raise the test load using the hoist. Swing the test load at slow speed through the complete swing range (at maximum radius as defined above) as allowed by the OEM and apply the brake periodically during rotation. The brake shall demonstrate its ability to stop the rotating motion in a smooth, positive manner. Hold the load over (or near as allowed by OEM) each outrigger/stabilizer for 5 minutes (holding over the center front outrigger/stabilizer is not required). Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes or outriggers. Swing the crane in the opposite direction through the complete swing range as allowed by the OEM.

Notes for outrigger/stabilizer component slippage tests:

1. The significance of any lowering shall be evaluated by the activity engineering organization depending on operating requirements and safety.

2. For cranes equipped with outrigger locking devices but where activity operating procedures permit operation without the use of the locking devices, this test shall be performed with the locking devices disengaged.

c. Crawler Crane Rotation. Raise the test load using the hoist. Swing the test load at slow speed through the complete swing range (at maximum radius as defined above) as allowed by the OEM and apply the brake periodically during rotation. The brake shall demonstrate its ability to stop the rotating motion in a smooth, positive manner. Hold the load with the boom positioned over (or near as allowed by OEM) the corner of each crawler tread for 5 minutes (holding over the center front outrigger/stabilizer, if equipped, is not required). Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, outriggers, or crawler treads. Swing the crane in the opposite direction through the complete swing range as allowed by the OEM.

d. Boom Operation. Operate the boom from maximum radius to minimum radius for the load applied. Repeat the test, operating the boom from minimum radius to maximum radius for the load applied.

5.5.2.3 Auxiliary and Whip Hoist. The test load shall be 105 percent of the maximum certified capacity for the hoist to be tested.

a Raise the test load using the hoist.

b Lower the test load and test the ability of the brake to control, stop, and hold the test load (10 minute hold).

c. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or outriggers. With the test load raised, rotate the hook 360 degrees clockwise and counter-clockwise to check bearing operation.

5.5.2.4 Maximum Line Pull Test and Ancillary Equipment Tests. For cranes that will use multiple reeving configurations or ancillary equipment (fixed jibs, luffing jibs, jib inserts, multiple load blocks, etc.) using procedures per section 3, the following load tests are required:

a Maximum Line Pull Test.

Note. Testing of all possible reeving configurations is not required. In some cases, this test may be combined with the maximum certified capacity test or load moment test.

1. The reeving configuration to be tested shall be such that the test load produces 105 percent of the maximum allowable wire rope line pull. If the crane cannot lift the test load due to the number of layers of wire rope on the drum, see the Note of paragraph 5.5.2.1.

2. Raise the test load using the hoist.

3. Lower the test load and test the ability of the brake to control, stop, and hold the test load (10 minute hold).

b. Ancillary Equipment Tests.

1. The test load shall be 105 percent of the maximum certified capacity of the equipment, or 105 percent of the maximum allowable wire rope line pull if the equipment is not fully reeved. For jibs with variable offset angles and lengths, test at the greatest offset and length used. Record each test configuration and test load on the certification supplement form, figure 3-2.

Notes:

1. For cranes with multiple boom sections, testing of all possible boom insert combinations is not required. However, all sections that will be used during the certification period shall be tested. Repeat the maximum certified capacity test of paragraph 5.5.2.1 at the maximum boom length anticipated for use during the certification period using 105 percent of the maximum capacity for that boom length.

2. For cranes with multiple counterweight configurations, testing of all possible counterweight combinations is not required. However, all counterweights that will be used during the certification period shall be tested in some combination during the annual load test.

5.5.2.4.1 Ancillary Equipment Used Without Procedures. As noted in section 3, paragraphs 3.5.3.1.1 and 3.5.3.1.2, ancillary equipment procedures are not required and the existing certification is not voided when removing and reinstalling outrigger pads, counterweights, outrigger extension pins, and boom angle and extension pins, provided all of the components are load tested at the annual certification. The OEM's instructions shall be followed when installing or removing these items.

5.5.2.5 "On-Rubber" (Free-Rated) Load Test. Allowable "on-rubber" rated capacity for over the side lifting for cranes equipped with outriggers shall not exceed 60 percent of the OEM's load chart values per paragraph 11.3. For those cranes, testing over the side is not required. See section 11 for allowable "on-rubber" (free rated) capacities and other stability information for used and altered cranes. Check the stability and operation of crane, carrier, wheels, tires, brakes, etc., under load by performing the following tests, when lifting without outriggers and/or traveling with the load are permitted at the activity for the type of crane being tested.

Note: Some cranes have different ratings for stationary lifts and for traveling with a load. Each allowable configuration shall be tested.

a. Maximum Certified On-Rubber Capacity.

1. Hoist 105 percent of the maximum certified on-rubber capacity at the minimum possible radius over the rear (or over the front as required by the OEM). Slowly boom down to the maximum radius for the maximum certified capacity. Engage the boom and load hoist pawls, where applicable. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or wheels/tires/axle components.

2. Rotate through the on-rubber working arc as allowed by the OEM. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or wheels/tires/axle components.

3. Travel a minimum of 50 feet with the test load over the rear (or front as required by the OEM) with the boom parallel to the longitudinal axis of the crane carrier. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or wheels/tires/axle components.

5.5.2.6 Crawler Travel Test. Check the stability and operation of carrier, brakes, crawlers, etc., under load by performing the following tests, when traveling with the load is permitted for a crawler crane.

Notes: Some cranes have different ratings for stationary lifts and for traveling with a load.

a. Maximum Certified Travel Capacity.

1. Hoist 105 percent of the maximum certified travel capacity at the minimum possible radius over the rear (or over the front as required by the OEM). Slowly boom down to the maximum radius for the maximum certified travel capacity. Engage the boom and load hoist pawls, where applicable. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or crawler components.

2. Travel a minimum of 50 feet with test load over the rear (or front as required by the OEM) with the boom parallel to the longitudinal axis of the crane carrier. Observe for any lowering that may occur, which may indicate a malfunction of boom or hoisting components, brakes, or crawler components.

5.6 Test After Change or Repair of Tires. For cranes with "on rubber" lift capability, in lieu of a load test the following test may be performed after change or repair of tires. The crane shall be traveled (with no load on hook) a minimum of 100 feet, forward and reverse, with the counterweight positioned over the corner of the crane with the affected tire (if allowed by the OEM) and with the boom at minimum radius or as required by the OEM. This test may also be used for repairs on load bearing axle/suspension components on mobile cranes equipped with counterweights provided the OEM allows the counterweight to be positioned over the area of the crane with the affected repair.

5.7 Wire Rope Test for New Rope. The maximum working length of new wire rope shall be tested before being put in service on any hoist. For the main hoist, this shall be accomplished by performing the maximum certified capacity test of paragraphs 5.4.2.1 or 5.5.2.1 as appropriate and the load moment test of paragraphs 5.4.2.2 or 5.5.2.2 as appropriate, unless the line pull during the load moment test is equal to or greater than the line pull during the maximum certified capacity test in which case the maximum certified capacity test is not required. For the auxiliary and whip hoists, this test shall be accomplished by performing the test of paragraph 5.4.2.3 or 5.5.2.3 as appropriate.

5.8 Articulating Boom Crane. Follow the requirements of paragraphs 5.1, 5.3, and 5.3.1, and perform a no-load test in accordance with paragraph 5.4.1 as applicable. Definitions and nomenclature are extracted from ASME B30.22, Articulating Boom Cranes.

5.8.1 Maximum Test Load for the Outer Hook or Padeye.

CAUTION: Lift the test load only high enough to perform the required tests. Use of long slings or chain falls to maintain a safe load height is recommended.

a. Static Test. Raise the test load to clear the ground with boom sections at either the minimum allowable articulating angle (typically inner boom and secondary boom in a straight line for a 0 degrees articulation angle) or at the maximum allowable articulating angle (knuckled in) for the size of the load, and at the minimum possible radius for the load and hold for ten minutes. Rotate load and hook 360 degrees clockwise and counter-clockwise to check bearing operation, if applicable. Observe for any lowering that may occur, which may indicate a

malfunction of boom or hoisting components, brakes, or outriggers/stabilizers. Tests 5.8.1.a through c shall be performed with any manual or hydraulic telescoping boom sections fully retracted.

Note: The length of the test slings and safety of the lift will govern the actual minimum test radius. Use extreme caution when lifting load for cranes that have no winch (wire rope hoist) to maintain load within radius. See note under 5.4.2.1 for winch, if applicable.

b. Dynamic Test. Raise and lower the test load at normal operating speeds using the winch if so equipped. Test the ability of the winch brake and controls to control and stop the load. If the crane is not equipped with a winch skip this step.

c. Boom Operation. Using the inner and secondary boom lift cylinders, operate the boom from minimum radius to maximum radius for the load applied. Repeat the test in the opposite direction.

d. Hydraulic Component Slippage For Cranes Equipped With Hydraulic Extension (Telescoping) Cylinders. Lift the test load inside the maximum radius and allow time for fluid and component temperatures to stabilize. Hold the load for ten minutes without use of controls by the operator. There shall be no significant lowering of the load, boom, or outrigger/stabilizer beams due to components or systems malfunction or failure during the test.

Notes for hydraulic component slippage test:

1. Test at the maximum hydraulically extended boom length, minimum allowable articulating angle, and minimum radius corresponding to that boom length and articulating angle (long slings or portable manual hoists may be required to keep the load as close to the ground as possible).

2. In addition, for cranes with load chart configurations that allow lifts with the secondary boom (and/or other boom sections) articulated below horizontal (knuckled in), perform the test with all extension (telescoping) cylinders fully retracted, at the maximum articulating angle (knuckled in), and at the minimum radius for that configuration if not previously performed in paragraph 5.8.1.a.

3. For cranes without lockable outriggers/stabilizers, or for cranes with lockable outriggers/stabilizers where the activity allows operation without the use of the locking devices, one of the above tests shall be performed on the opposite side of the crane (and over the front for cranes with front outriggers).

4. For cranes equipped with the same hydraulic holding valve for both directions on the hydraulic extension (telescoping) cylinder(s), the test in paragraph 5.8.1.d note 2 is not required.

5. For cranes without hydraulic telescoping cylinders, the test in paragraph 5.8.1.a may serve as the hydraulic component slippage test for one side and the stability test in paragraph 5.8.2.c will serve as the hydraulic component slippage test for the opposite side.

6. The significance of any lowering shall be evaluated by the activity engineering organization depending on operating requirements and safety.

5.8.2 Stability Test. The test load shall be established based on the maximum hydraulically extended boom length (for cranes equipped with hydraulic extension cylinders), minimum articulation angles, and maximum allowable radius as determined by the posted load chart (typically "straight out"). See exception below.

a. Boom Operation. Raise and lower the boom using the inner boom lift cylinder through a safe working range based on the length of the slings for the length of boom extended and radius as determined below. Visually observe for smooth operation.

b. Rotation. At slow speed, rotate left and right the maximum degrees allowed by the OEM at the radius as determined below with boom and load hoist pawls (dogs) engaged where applicable. The crane shall demonstrate its ability to stop the rotating motion in a smooth, positive manner.

c. Hydraulic Component Slippage For Cranes Equipped Without Hydraulic Extension (Telescoping) Cylinders. Lift the test load inside the maximum radius and allow time for fluid and component temperatures to stabilize. Hold the load for ten minutes without use of controls by the operator. There shall be no significant lowering of the load, boom, or outrigger/stabilizer beams due to components or systems malfunction or failure during the test.

Notes for hydraulic component slippage test:

1. For cranes without lockable outriggers/stabilizers, or for cranes with lockable outriggers/stabilizers where the activity allows operation without the use of the locking devices, one of the above tests shall be performed on the opposite side of the crane (and over the front for cranes with front outriggers).

2. The significance of any lowering shall be evaluated by the activity engineering organization depending on operating requirements and safety.

Notes for stability test:

1. These tests shall be performed over the side of the crane. Stability testing can be extremely hazardous, particularly with long booms. To minimize the hazard, perform the test in the following configurations:

2. If no ratings are governed by stability, perform the above tests with the boom at the maximum hydraulically extended boom length (for cranes equipped with hydraulic extension cylinders), minimum articulation angles, and maximum allowable radius as determined by the posted load chart (typically "straight out"). If some load chart ratings are governed by stability, perform the test with the boom positioned at the first boom length

governed by stability, minimum articulation angle, and maximum allowable radius and load for that boom length.

3. When lifting test loads, always lift the load well within the maximum radius and slowly boom down to the pre-measured radius (as determined above) stopping at least once to test the effectiveness of the boom hydraulic system to control the load. Lift the test load only high enough to perform the required tests.

4. A crane outrigger/stabilizer may become light (start to rise up within the outrigger/stabilizer pad) and the outrigger/stabilizer pad may clear the ground during this procedure (with the boom positioned over the opposite corner) depending on the make and model. Generally, this is normal and not an indication of tipping. However, the activity shall verify with the crane OEM that a crane exhibiting this condition is safe for use.

5.8.3 Maximum Test Load for the Inner Hook or Padeye. If crane is equipped with an inner hook or padeye, that is utilized by the activity, perform the test required by paragraph 5.8.1.a and c, on the inner hook or padeye.

5.8.4 Ancillary Equipment. When authorized, ancillary equipment (manual extensions, etc.) shall be load tested. Test load shall be based on the maximum rated load for the equipment, or as limited by wire rope line pull if the equipment is not fully reeved. Record each test configuration and test load on the certification supplement form, figure 3-2.

5.8.4.1 Ancillary Equipment Used Without Procedures. As described by section 3, paragraphs 3.5.3.1.1 and 3.5.3.1.2, procedures are not required and the existing certification is not voided when removing and reinstalling outrigger pads, counterweights, outrigger extension pins, boom angle and extension pins, etc., provided all of the components are load tested and certified at the annual certification.

5.9 Weight Handling Equipment Used for Other than Lift Crane Service. Locomotive, crawler, truck, and cruiser cranes that are used for clamshell, dragline, magnet, pile driving, or other non-lift crane work shall be tested at the maximum safe working load permitted for the size wire rope being used. This test shall be performed in all working motions except travel. Buckets, magnets, etc., may be removed for testing wire rope. No test is required after reassembly. Retesting is not required when end attachment is changed from original connection (i.e., changed from clamshell use to dragline and so on) during the certification period.

6 Bridge/Overhead Traveling, Wall, Gantry, Cantilever Gantry and Semi-gantry.

6.1 No-Load Test.

6.1.1 Hoist.

a. Raise each load hook slowly into the hoist limit switch.

b. Check for proper operation of the backup limit switch (where applicable).

c. Lower and raise each hook through controller range.

d. Check for proper operation of lower limit switch (where applicable).

6.1.1.1 Emergency Brake on Wire Rope Drum (Shaft Failure Detection System). Simulate a system fault by disconnecting the motor encoder signal while lowering at slow speed. Verify that the brake applies within the designed delay and that the hoist control is disabled in each direction. Reconnect the encoder after the test. Repeat this test with the drum encoder. If the system uses components other than encoders (e.g., resolvers, mechanical overspeeds) to provide detection, the activity engineering organization shall develop the method for simulating the fault (e.g., forcing variables).

6.1.2 Trolley. Operate the trolley through the controller range in both directions. Operate the full distance of the bridge rails and slowly contact the trolley rail stops with the bumpers. Verify proper brake operations.

6.1.3 Bridge. Operate the bridge through the controller range in both directions. Operate the full distance of the runway and slowly contact the runway rail stops with the crane bridge bumpers. Verify proper brake operation.

6.2 Load Test. Test each load hook separately.

6.2.1 Hoist.

a. Static Test. Raise test load approximately one foot and hold for 10 minutes. Rotate load and hook 360 degrees clockwise and counter-clockwise to check bearing operation. Observe for lowering of the load, which may indicate malfunction of hoisting components or brakes. For hoists with primary and secondary holding brakes, perform the tests in paragraph 6.2.1.b in lieu of this test.

b. Primary and Secondary Holding Brakes. For hoists with primary and secondary holding brakes (i.e., where each brake is designed to individually hold the load) raise the test load and observe the proper timing sequence in the application of the primary and secondary brake when the controller is returned to neutral. Visually observe both hoist holding brakes to ensure correct operation.

(1) Raise the test load approximately one foot and inactivate the secondary holding brake while testing the primary holding brake. Hold for 10 minutes. Rotate load and hook to check bearing operation. Observe for lowering of the load, which may indicate malfunction of hoisting components or brakes.

(2) Re-engage secondary holding brake and release the primary holding brake. Hold for 10 minutes. Observe for lowering of the load, which may indicate malfunction of hoisting components or brakes. Re-engage the

primary holding brake. Recheck proper operation of time delay and ensure smooth positive stopping.

(3) If the brakes are designed to individually hold only the rated capacity (and not 125 percent), then the tests in subparagraphs (1) and (2) may be performed with a test load of 100 (+5/-0) percent of rated capacity, and the certification shall be so noted. However, the brakes, acting together, shall demonstrate the ability to hold a 125 percent test load for a 10-minute period.

c. Dynamic Test, Including Dynamic Load Brake. Raise and lower test load and visually observe smooth control and acceleration between points. Stop the load during hoisting and lowering to verify the brake stops and holds the load.

Note: Dynamic load brakes include eddy current brakes, DC regenerative braking, regenerative braking from squirrel cage motors, etc. Dynamic braking will not stop motion.

d. Mechanical Load Brake. Raise test load no more than five feet. With the hoist controller in the neutral position, release the holding brake (see notes). The load brake shall hold the test load. Raise test load the minimum amount to perform the following test. Again, with the holding brake in the released position, start the test load down slowly and return the controller to the neutral position as the test load lowers. The load brake shall stop the test load. If the load brake does not stop the test load, but prevents the test load from accelerating, activities shall contact the OEM or activity engineering organization to ensure that the load brake is operating as designed. This characteristic and OEM or activity engineering organization correspondence shall be documented in the equipment history file.

Note 1: Methods of releasing the holding brake will vary from crane to crane depending upon the design of the brake and hoist. The two general methods of releasing the brake are mechanical and electrical. There are rare examples of holding brakes that may be defeated pneumatically or hydraulically. The following are various examples of releasing a brake that may apply to a particular crane:

a. Using a pry-bar between the pressure plate and housing of a disc brake to release the disc brake.

b. Mechanically forcing a brake solenoid plunger into the released position.

c. Installing a clamp to clamp a disc brake open.

d. Inserting a block into a brake linkage to prevent the brake from applying.

e. Using the brake release levers/handles if the brake is so equipped.

f. Adjusting the brake setting such that no torque is produced by the brake. This method will require a static and dynamic retest of the brake when it is adjusted back to the correct setting after the load brake test.

g. Installing a switched jumper that electrically releases and sets the brake. The switch shall set the brake in the event of a mechanical load brake failure. Temporarily installing the switched jumper is not a crane alteration. Permanent installation of a switched jumper is a crane alteration requiring Navy Crane Center approval.

The activity shall describe in writing how the holding brake will be defeated to test the mechanical load brake (or why the brake cannot be defeated). This description may be in the form of a detailed or standard procedure, or may be annotated on the remarks portion of the crane condition inspection record.

CAUTION**:** Depending on the design of the brake, some of the mechanical methods will require work to be performed in the vicinity of energized electrical circuits. Mechanics and electricians who perform work in energized areas shall be trained by the activity and all work shall meet applicable OSHA requirements. Methods “c,” “e,” and “g” do not necessarily require work in energized areas.

Note 2: For hoists where the holding brake cannot be mechanically or electrically released (such as brakes that are integral to the motor’s rotor which energizes the armature when released or only release by centrifugal force), observe for smooth lowering motion and unusual noise or overheating during lowering.

e. Loss of Power (Panic Test). This test is designed to test the reaction of a hoisting unit in the event of power failure during a lift. Hoist the test load to a convenient distance above the surface. Lower test load at slow speed and with the controller in the slow lowering position, disconnect the main power source and return the controller to the neutral position. The test load shall stop lowering when the controller is placed in the neutral position.

CAUTION: The activity engineering organization shall review the system circuitry for cranes with electronic controls to assure that this test can be performed safely without damaging the control system. For cranes where the controls may be damaged, the activity engineering organization shall document their justification and fully describe the alternate tests performed. Alternate test procedures require Navy Crane Center approval.

6.2.1.1 Emergency Brake on Wire Rope Drum (Shaft Failure Detection System).

a. Static Test. Test the ability of the hoist caliper disc brake to hold the test load after testing the other holding brake(s). Raise the test load approximately one foot off the ground. Depress the emergency stop pushbutton to disconnect the main power source and set the brakes. Manually release all brakes except the caliper disc brake. Hold the load for 10 minutes with the caliper disc brake. Observe for lowering of the load, which may indicate a malfunction of the hoisting components or the brake.

Reset the other holding brake(s) to the applied condition. Energize the main power source. Verify that the load is held by the holding brake(s). Operate the hoist in each direction and verify proper operation of all controls and brakes.

b. Dynamic Test. Perform with a test load of 100 (+5/-0) percent of rated capacity. Raise the load to a sufficient height to perform the following test. Lower the load at the minimum speed necessary to simulate a shaft failure. Disable all hoist brakes except the wire rope drum brake and simulate a system fault by interrupting (e.g., test switch) the motor or drum encoder. If the system uses components other than encoders (e.g., resolvers, mechanical overspeeds) to provide detection, the activity engineering organization shall develop the method for simulating the fault (e.g., forcing variables). The brake shall stop the load. Reset all brakes. (CAUTION: Station appropriately trained personnel at each disabled hoist brake in case of failure of the drum brake to stop the load. These personnel shall be in constant contact with the load test director and prepared to safely engage the hoist brakes when directed.)

6.2.2 Trolley Motion. Operate the trolley with the test load (if space is available) the full distance of the bridge rails using extreme caution. Verify proper brake operation.

6.2.3 Bridge Motion. With the trolley at one end of the bridge, operate the bridge, with test load, the full distance of the runway (if space is available) using extreme caution. With the trolley at the opposite end of the bridge, operate the bridge in the opposite direction using extreme caution. Observe for any binding of the bridge trucks, and verify proper brake operation.

Note: If the crane is equipped with multiple trolleys (or multiple hoists) which are used to achieve the rated load of the crane (e.g., two 10,000 pound trolleys which together allow for a 20,000 pound maximum capacity) then the tests in 6.2.2 and 6.2.3 shall be performed with the multiple trolleys (or hoists) loaded simultaneously.

6.3 Stopping Under Loss of Power (For Cranes without Bridge or Trolley Automatic Brakes). A safety hazard exists in controlling the motion of the bridge and trolley, and therefore the motion of the load, for certain cranes in the event of a power failure. The seriousness of the hazard varies with the speed of bridge or trolley; the size and weight of the load; the surrounding environment; and the operating characteristics of the individual cranes. The major factor in reducing this hazard is the skill and response of the operator because it is not considered either feasible or practical to modify all the existing cranes that are not provided with automatic braking in all travel modes. These requirements do not apply if the bridge crane is exclusively cab operated and has an operator applied brake (e.g., hydraulic foot brake, mechanical foot brake, etc.), or if the crane utilizes self-locking worm gear drives for the bridge or trolley. Accordingly, the following actions shall be taken:

6.3.1 The operating characteristics of the crane under a loss of power shall be determined by operational field testing (with the test load) and recorded. This shall be a one time test unless repairs, or alterations are made that will change the operating characteristics of the crane under the loss of power.

6.3.2 The certifying official shall make a determination that the operating characteristics are within acceptable limits of safety for operations under loss of power.

6.3.3 Instructions, as appropriate, shall be posted in the crane cab and/or on the pendant controller to warn the operator of the characteristics of the crane and the necessary precautions in the event of loss of power.

6.4. Gantry Frame Extension Pins. As described by section 3, paragraph 3.5.3.1.3, procedures are not required and the existing certification is not voided when removing and reinstalling pins used to raise and lower gantry cranes, provided the pins are load tested and certified with the crane at the highest elevation for which use is anticipated.

7 Jib, Pillar, Pillar Jib, Monorail, Davit, and Fixed Overhead Hoist.

7.1 No-Load Test. Test each operation separately.

7.1.1 Hoist.

a. Raise each load hook slowly into the hoist limit switch.

b. Check for proper operation of the backup limit switch (where applicable).

c. Lower and raise each hook through the controller range.

d. Check for proper operation of lower limit switch (where applicable).

7.1.2 Trolley. Operate the trolley through the controller range in both directions. Operate the full length of the monorail or jib and slowly contact the stops. Verify proper brake operations. Operate all rail switches and verify proper operation.

7.1.3 Swing. (Jib, Pillar, and Pillar Jib) Swing through working range (where space is available) at maximum radius.

7.2 Load Test.

7.2.1 Hoist.

a. Static Test. Raise load approximately one foot and hold for 10 minutes. Rotate load and hook 360 degrees clockwise and counter-clockwise to check bearing operation. Observe for lowering of the load, which may indicate malfunction of hoisting component or brake.

b. Dynamic Test, Including Dynamic Load Brake. Raise and lower test load and visually observe smooth control and acceleration between points. Stop the load during hoisting and lowering to verify the brake stops and holds the load.

Note: Dynamic load brakes include eddy current brakes, DC regenerative braking, regenerative braking from squirrel cage motors, etc. Dynamic braking will not stop motion.

c. Mechanical Load Brake. Raise test load no more than five feet. With the hoist controller in the neutral position, release the holding brake (see notes). The load brake shall hold the test load. Raise test load the minimum amount to perform the following test. Again, with the holding brake in the released position, start the test load down slowly and return the controller to the neutral position as the test load lowers. The load brake shall stop the test load. If the load brake does not stop the test load, but prevents the test load from accelerating, activities shall contact the OEM or activity engineering organization to ensure that the load brake is operating as designed. This characteristic and OEM or activity engineering organization correspondence shall be documented in the equipment history file.

Note 1: Methods of releasing the holding brake will vary from crane to crane depending upon the design of the brake and hoist. The two general methods of releasing the brake are mechanical and electrical. There are rare examples of holding brakes that may be defeated pneumatically or hydraulically. The following are various examples of releasing a brake that may apply to a particular crane:

a. Using a pry-bar between the pressure plate and housing of a disc brake to release the disc brake.

b. Mechanically forcing a brake solenoid plunger into the released position.

c. Installing a clamp to clamp a disc brake open.

d. Inserting a block into a brake linkage to prevent the brake from applying

e. Using the brake release levers/handles if the brake is so equipped.

f. Adjusting the brake setting such that no torque is produced by the brake. This method will require a static and dynamic retest of the brake when it is adjusted back to the correct setting after the load brake test.

g. Installing a switched jumper that electrically releases and sets the brake. The switch shall set the brake in the event of a mechanical load brake failure. Temporarily installing the switched jumper is not a crane alteration. Permanent installation of a switched jumper is a crane alteration requiring Navy Crane Center approval.

The activity shall describe in writing how the holding brake will be defeated to test the mechanical load brake (or why the brake cannot be defeated). This description may be in the form of a detailed or standard procedure, or may be annotated on the Remarks portion of the crane condition inspection record.

CAUTION**:** Depending on the design of the brake, some of the mechanical methods will require work to be performed in the vicinity of energized electrical circuits. Mechanics and electricians who perform work in energized areas shall be trained by the activity and all work shall meet applicable OSHA requirements. Methods “c,” “e,” and “g” do not necessarily require work in energized areas.

Note 2: For hoist where the holding brake cannot be mechanically or electrically released (such as brakes that are integral to the motor’s rotor which energizes the armature when released or only release by centrifugal force), observe for smooth lowering motion and unusual noise or overheating during lowering.

d. Loss of Power (Panic Test). Hoist the test load to a convenient distance above the surface and, while slowly lowering test load, cut main power to hoist and return the controller to the neutral position. Load shall stop. The significance of the stopping distance for air hoists shall be evaluated and published by the certifying official depending on operating requirements and safety.

CAUTION: The activity engineering organization shall review the system circuitry for cranes with electronic controls to assure that this test can be performed safely without damaging the control system. For cranes where the controls may be damaged, the activity engineering organization shall document their justification and fully describe the alternate tests performed. Alternate test procedures require Navy Crane Center approval.

7.2.2 Trolley. Operate the trolley, with test load, through the full distance of the monorail or jib (where the space is available). Observe for any malfunctioning of the trolley assembly and alignment of monorail or jib. Verify proper brake operation.

7.2.3 Swing (Where Applicable). Swing the test load (where space is available) through the working range at maximum radius, stopping the load at several points. There shall be no excessive drift of jib or trolley at any of these points. If a horizontal force of 15 pounds or less will restrain the load, then the drift is acceptable.

7.4 Boom Angle and Extension Pins. As described by section 3, paragraph 3.5.3.1.2, procedures are not required and the existing certification is not voided when removing and reinstalling boom angle and extension pins on category 3 pedestal mounted commercial boom assemblies, provided the pins are load tested and certified with the crane.

8 Mobile Boat Hoists Including Self Propelled and Towed Types, and Rubber-Tired Gantry Cranes.

8.1 Test Load. The nominal test load shall be 105 percent of the OEM capacity unless the OEM does not allow testing over 100 percent of the OEM capacity. Depending upon the design of the mobile boat hoist, the test load may include the weight of (or deduction values for) the spreader and sling assemblies below the lower block. Follow OEM or activity engineering instructions for weight deduction values.

8.2 No-Load Test.

8.2.1 Hoist.

a. Raise and lower each block through the maximum working range of hook travel.

CAUTION: After lowering blocks, ensure wire rope is packed tightly, and there is a minimum of two wraps on grooved drums (three wraps on smooth drums) prior to proceeding with load tests.

b. Run each hoist block into the upper limit switch (where installed) at slow speed.

8.2.2 Travel Test. Travel a minimum of 50 feet (if applicable) steering left and right testing for proper steering operation. Verify steering alignment is in accordance with OEM instructions. Test travel alarms and emergency stop switches (where installed). For towed type mobile boat hoists, tow the boatlift a minimum of 50 feet.

8.3 Load Test.

8.3.1 Hoist.

CAUTION: On certain types of mobile boat hoists that use deck fittings for lifting test loads, ensure that the rotation alignments of the deck fittings are aligned in the plane of the sling. Lift the test load only high enough to perform the required tests.

a. Static Test. Raise the test load approximately one foot and hold for 10 minutes. Observe for any lowering that may occur, which may indicate a malfunction of the hoisting components, or hoist brakes.

Notes for paragraph 8.3.1.a:

1. On certain types of mobile boat hoists, the hoist drums use one continuous length of wire rope between two hoists. The wire rope shall be equalized (equal amounts of wire rope on each drum) before a lift is made. Follow OEM procedures for equalizing hoist drums.

2. For certain types of mobile boat hoists the engine shall be at full speed when lifting the test load. Follow the OEM instructions if available.

3. For mobile boat hoists with individual hoists connected to each corner of the test load, ensure that the test load is raised evenly.

4. For mobile boat hoists that have individual load hooks on a single load beam (spreader), the load beam shall be marked with its maximum capacity. If the rated capacity of the load beam is based on the capacity of all hooks, the hooks shall be tested together at the test load percentage shown in paragraph 8.1.

b. Hoist Dynamic Test. Raise and lower the test load at normal operating speeds and visually observe smooth control.

c. Hoist Brake. Test the ability of the hoist brake to control and stop the load while slowly raising and lowering the test load.

8.3.2 Travel Test. For self-propelled mobile boat hoists, travel the mobile boat hoist at slow speed a minimum of 50 feet forward and reverse. At slow speed apply the travel foot brake. While traveling, steer right and left. For towed type mobile boat hoists, tow the mobile boat hoist a minimum of 50 feet.

CAUTION: Attach taglines to the load to control oscillation. Test personnel shall stand clear of tires during load test.

b. Determining the center of gravity of loads.

c. Planning the crane/load path and checking for clearances.

d. Selecting and properly using appropriate rigging equipment.

e. Basic knots, bends, and hitches and their use.

f. Performing necessary calculations to determine the allowable capacity of rigging configurations.

g. Selecting appropriate attachment points on loads to be lifted.

h. Performing prior-to-use visual inspections of rigging equipment.

i. Signal person functions as noted below, including construction signal person as appropriate.

j. Coordinating activities of other personnel assisting in the lift (when designated as Rigger-in-Charge).

k. General knowledge of mobile crane configuration variations and load chart limitations.

l. The requirements of section 10 (as applicable to riggers) and section 14 of this publication.

m. Acceptable rail switch alignment requirements (as applicable).

n. Requirements for inspecting the crane travel path.

1.6 Crane Walker

a. Acceptable methods for initiating emergency stop actions and an understanding of when such actions are appropriate.

b. Acceptable rail switch alignment requirements.

c. Requirements for inspecting the crane travel path.

1.7 Crane Signal Person

a. Proper crane communications, i.e., hand signals (See figures 10-1 and 10-2), radio communications, etc.

b. Acceptable methods for initiating emergency stop actions and an understanding of when such actions are appropriate.

In addition to the above, signal persons used in construction operations, including riggers, shall be qualified by an activity's qualified evaluator. Qualification shall be documented and shall specify each type of signaling for which the signal person is qualified.

Each signal person including riggers giving signals:

(c) Shall know, understand, and be competent in the types of signals used.

(d) Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads.

(e) Know and understand the relevant requirements for radio, telephone, or other electronic transmission of signals as applicable.

(f) Demonstrate to the evaluator that he/she meets the above noted requirements through an oral or written test, and through a practical test.

2 Supervisors

2.1 Operator Supervisors. Crane operator supervisors shall demonstrate adequate knowledge in the following areas:

a. Conducting pre-job briefings.

b. Assessing personnel qualifications to operate specific cranes and how to determine that those qualifications are current.

c. Familiarity with safe operating practices, including the requirements of section 10 of this publication.

2.2 Rigger Supervisors. Rigger Supervisors (for weight handling evolutions) shall demonstrate adequate knowledge in the following areas:

a. Conducting pre-job briefings.

b. Assessing personnel qualifications to perform specific operations and how to determine that those qualifications are current.

c. Knowledge and abilities noted for Rigger in paragraph 1.5 above, including the requirements of sections 10 and 14 of this publication.

2.3 Maintenance, Inspector, and Load Test Director Supervisors. Supervisors shall demonstrate adequate knowledge in the following areas:

a. Conducting pre-job briefings.

b. Assessing personnel qualifications to perform specific operations and how to determine that those qualifications are current.

c. Familiarity with the applicable requirements of this publication.

3 Engineers. Engineers performing work in support of WHE shall:

a. Be technically competent in their particular engineering discipline.

b. For crane engineers, be knowledgeable of the design fundamentals of WHE and UFC 3-320-7N, and the requirements of sections 2 through 5 and appendices C through F of this publication.

c. For rigging engineers, be knowledgeable of ASME B30.9, military and federal standards for rigging gear, and sections 10 and 14 of this publication.

4 WHE Certifying Officials. WHE Certifying Officials shall demonstrate adequate knowledge in the application of the requirements of this publication for inspection, maintenance, testing, and certification of WHE.

CONTRACTOR CRANE OR RIGGING OPERATION CHECKLIST

		YES	NO
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 or stabilizers required?		
6	If outriggers are required, are outriggers fully extended and down, and the crane load off the wheels?		
7	Is the crane/machine level and on firm ground, if the ground is not firm is the crane/machine blocked?		
8	If blocking is required, is the entire surface of the outrigger pad supported and is the blocking material of sufficient strength to safely support the loaded outrigger pad?		
9	If outriggers are not used, is the crane/machine rated for on-rubber lifts by the manufacturer's load chart? If stabilizers are used and not outriggers and the wheels are not off the ground is this the correct setup in accordance with the OEM?		
10	Is the swing radius of the crane counterweight clear of people and obstructions and 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 before it is lifted more than a few inches?		
13	Is the lift and swing path clear of obstructions?		
14	If rotation of the load being lifted is hazardous, is a tag or restraint line being used?		
15	Are personnel prevented from standing or passing under a suspended load?		
16	Is the operator's attention diverted?		
17	Are proper signals being used at all times? Is the operator responding properly to the signals? Are radios used for blind lifts?		
18	Is the load lifted a few inches to ensure it is secure and balanced?		
19	Are empty hooks lashed or otherwise secured during travel to prevent swinging?		
20	Does the operator remain at the controls while the load is suspended?		
21	Do the operations ensure that side loading is prohibited?		
22	Are personnel prevented from riding on a load?		
23	Are start and stop motions in a smooth fluid motion (no sudden acceleration or deceleration)?		
24	If operating near electric power lines, are the rules and guidelines understood and adhered to?		
25	Is the lift a critical lift?		
26	If so, are all regulations understood and check-off sheets initialed and signed off?		
27	Are any overhead power lines in the vicinity?		
28	If so, are complex lift rules and 1926.1407-1411 being followed?		
29	If pick and carry operations are allowed and performed, are OEM directions followed (e.g. rotation lock engaged, boom centered over front or rear, etc.)?		
30	When the crane/machine is left unattended, is it in a safe condition?		
31	Is rigging gear undamaged and acceptable for the application?		

FIGURE P-2 (1 of 2)

32	Does rigging gear meet applicable ASME or host country standards (e.g. ASME B30.9 for slings, B30.10 for hooks, B30.26 for hardware such as shackles, safety hoist rings, eyebolts, etc, B30.20 for below the hook lifting devices, etc.)?		
33	Is the rigging gear inspected prior to use?		
34	Is chafing gear used to protect slings (especially synthetic slings) and equipment from damage due to sharp corners and edges?		
35	Is the rigging gear used in accordance with its working load limit? Is the load limit visible?		
36	Are positive latching devices used on crane and rigging hooks, or are the hooks "moused"?		

Contractor:	Subcontractor:
Location:	Date:
Notes:	
Signature of Contracting Officer's Representative:	

FIGURE P-2 (2 of 2)

37. MIL-STD-1625, *Safety Certification Program for Drydocking Facilities and Shipbuilding Ways for U. S. Navy Ships*, Naval Sea Systems Command, Washington, D.C.

38. SAE J429, *Mechanical and Material Requirements for Externally Threaded Fasteners,* Society of Automotive Engineers, Inc., Warrendale, PA.

39. SAE J123, Surface Discontinuities On Bolts, Screws, And Studs In Fatigue Applications, Society of Automotive Engineers, Inc, Warrendale, PA.

40. SAE J159, Rated Capacity System, Society of Automotive Engineers, Inc, Warrendale, PA.

41. ISO 4039, Cranes -Wire Ropes -Care Maintenance, Installation, Examination, and Discard, International Organization for Standardization (ISO), 1, ch. de la Voie-Creuse, Case postale 56 CH-1211 Geneva 20, Switzerland