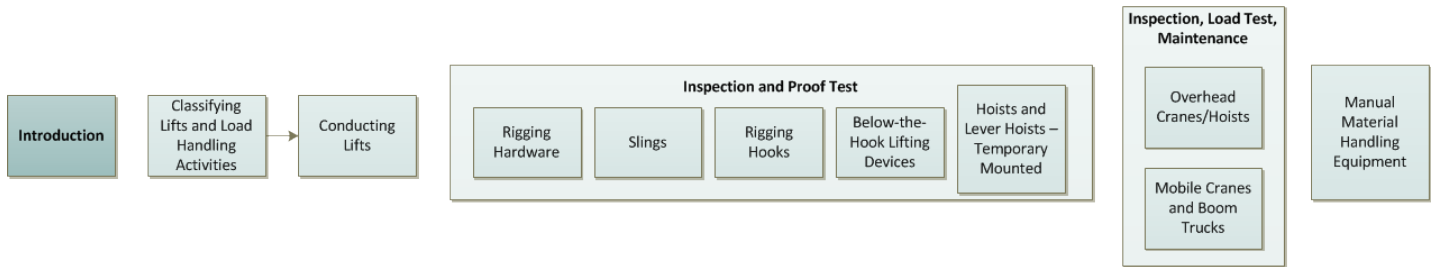


SUBJECT AREA CONTENT

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Lifting Safety Subject Area
Effective Date: Jan 16, 2018, (Rev. 9.0)
Periodic Review Due: Jan 16, 2023



Introduction

This subject area describes the procedures for conducting ordinary, pre-engineered, and critical lifts. It discusses the requirements for

- Conducting a lift assessment to determine the type of lift;
- Preparing a Critical Lift Evaluation Form (CLEF) and a Critical Lift Plan or Pre-engineered Lift Procedure;
- Reviewing and approving the plan;
- Conducting lifts;
- Inspecting, testing, and maintaining lifting and material handling equipment;
- Operating, inspecting and maintaining manual material handling equipment.

Equipment must be operated, inspected, maintained, and tested in accordance with the manufacturer's specifications. In the absence of such specifications, obtain guidance from the BNL Lifting Safety Committee.

This subject area contains the following sections:

[Classifying Lifts and Load Handling Activities](#)

[Conducting Lifts](#)

[Inspection and Proof Test Requirements of Rigging Hardware](#)

[Inspection and Proof Test Requirements for Slings](#)

[Inspection and Proof Test Requirements of Rigging Hooks](#)

[Inspection and Proof Test Requirements of Below-the-Hook Lifting Devices](#)

[Inspection and Proof Test Requirements of Overhead \(Underhung\) and Stationary Chain Hoists and Lever Hoists – Temporary Mounted](#)

[Inspection, Load Test Requirements, Preventive Maintenance, and Operating Practices for Overhead Cranes/Hoists](#)

[Inspection, Load Test Requirements, Preventive Maintenance, and Operating Practices for Mobile Cranes and Boom Trucks](#)

[Inspection, Operation, and Maintenance of Manual Material Handling Equipment](#)

See the [Forklift Safety](#) Subject Area for procedures on safely operating forklifts.

See the [Aerial Lifts](#) Subject Area for procedures on safely operating aerial lifts.

Standards of Performance

Managers shall analyze work for hazards, authorize work to proceed, and ensure that work is performed within established controls.

Managers shall develop, maintain, communicate, and manage appropriate plans, i.e., project plans, program plans, operations plans, and business plans.

All staff and users shall ensure that they are trained and qualified to carry out their assigned responsibilities, and shall inform their supervisor if they are assigned to perform work for which they are not properly trained or qualified.

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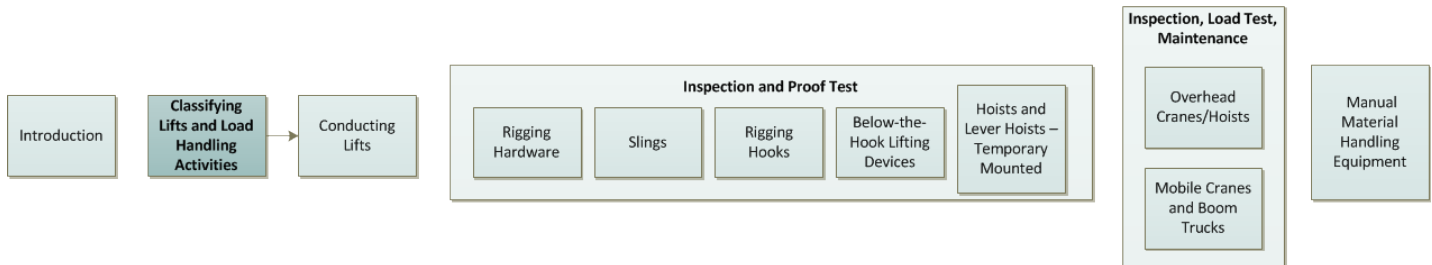
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Lifting Safety Subject Area
Effective Date: Jan 16, 2018 (Rev. 9.0)
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This information applies to all BNL staff and non-BNL staff who perform or supervise critical and pre-engineered lifts using hoisting and rigging equipment.

Classifying Lifts and Load Handling Activities

Line organizations that are responsible for conducting below the hook lifts (i.e., lifts that require crane hooks and hoisting and rigging equipment) designate a point of contact (POC) to interface with the Laboratory's Lifting Safety Committee.

Note: No organizational POC is required for material handling operations, which are performed by industrial trucks, or if rigging is performed by another group, such as BNL's Production Division or outside contractors.

All lifts at BNL must be classified prior to being performed. The responsible manager or designee determines the type of lift by conducting a lift assessment. Lifts are classified as: Ordinary, Pre-engineered (Special), or Critical (single use or reoccurring). Contact the Lifting Safety Committee for assistance in classifying lifts. This procedure does not cover lifting and load handling activities that have been classified as a Hostile Work Environment as defined by Department of Energy Standard DOE-STD-1090 (i.e., high radiation levels, high temperature exposure). Contact the Lifting Safety Committee if lifting and load handling activities are to be performed in a Hostile Work Environment.

Note: This procedure is not applicable to **Personnel Lifts**. **Personnel Lifts** must be conducted in accordance with 29 CFR 1926.1431 and ASME B30.23 and approved by the Lifting Safety SME.

Under special circumstances, for example in a life-threatening, or emergency situation, the BNL Incident Commander will take charge of the emergency and will secure input from the Lifting Safety Committee Chair, subject matter experts, F&O supervisors, or BNL Hoisting and Rigging Inspector, if available, to evaluate and approve a lift regardless of classification.

1. The responsible manager or designee classifies all lifts prior to being performed using the criteria in steps 2 through 4.
2. The responsible manager or designee classifies the lift as **Critical** and follows the requirements in the section [Conducting Lifts](#) if **any** of the following criteria are met:
 - If loss of control of the item being lifted would likely result in the declaration of an emergency as defined by the facility's emergency plan or construction site emergency plan (such as the release of radioactive or hazardous material into the environment exceeding the established permissible environmental limits).
 - The load item is unique and, if damaged, would be irreplaceable or not repairable and is vital to a system, facility or project operation.
 - For example, a one-of-a-kind detector component that is crucial to an experiment/program
 - The cost to replace or repair the load item, or the delay in operations of having the load item damaged would have a negative impact on facility, organizational, or DOE budgets to the extent that it would affect program commitments.
 - For example, if a repair or replacement cost of the lifted item is > \$250K (> 50% of item/material/program cost)
 - For example, if the delay would be 3 or more weeks, or a 30% or greater additional delay to the program schedule
 - If mishandling or dropping of the load would cause any of the above noted consequences to nearby installations or facilities.
 - If the lift exceeds 90% or more of a fixed crane rated capacity (excluding proof testing of up to 125% of rated capacity).

If independent weight verification and a certified scale are used during the lift, the lift may be classified as a **Pre-Engineered Lift** if no other criteria have been met (up to 95% of the crane's rating).

- If the lift exceeds 90% or more of a mobile crane's (configured) rated capacity (excluding proof testing of a fixed crane up to 125% of its rated capacity).
- If the line organization considers the lift to be **Critical** for complexity or programmatic reasons or due to specific policies or procedures such as project safety basis requirements, as well as lifting loads, which require exceptional care in handling because of size, weight, close tolerance installation or high susceptibility to damage.
 - The use of either multiple mobile cranes or transferring/rotating loads on a fixed crane from one hook to another while suspended are not routine and require additional planning, therefore these lifts will be classified as **Critical**.

For conventional steel erection that fall under 29 CFR 1926.751, contact the Lifting Safety SME for critical lift requirements.

Note: Lifts classified as **Critical** can be designated as "Recurring" if the lift will be performed multiple times (using similar rigging hardware and cranes) on either on the same equipment or on equipment that has similar weights, shapes and load characteristics with the concurrence of the Lifting Safety Committee. "Recurring" **Critical Lifts** will document each individual pre-job briefs by the Person-in-Charge prior to each lift.

3. If the lift has not been classified as a **Critical Lift**, the responsible manager or designee classifies the lift as **Pre-Engineered (Special)** and follows the requirements in the section [Conducting Lifts](#) if any of the following criteria are met:
 - If the load will be lifted repeatedly, as part of a process or procedure where detailed lift planning, equipment selection, and lift-specific training is required;
 - If the load will require to be manipulated or rotated while suspended; such as rotating a load on its horizontal or vertical axis;
 - Load transfer, such as transferring a load in mid-air from one lifting device to another;
 - Any load that is not inherently stable such that its center of gravity might be relocated due to the lifting operation, such as if the center of lift is below the center of gravity or a tank filled with liquid (go to the [ESH Guide: Lifting Safety](#) and refer to "Geometric Instability Considerations And Criteria for Below the Load Lifts Using Strong-bacs and Spreader bars" for guidance on load stability);
 - Use of custom-designed or non-standard rigging equipment or hardware;
 - Working near power lines (i.e., within the minimum approach distance permitted under Table A of OSHA 29 CFR 1926.1408);
 - Multiple load line operation;
 - Mobile crane pick and carry operations;
 - If the lift exceeds 90% but less than or equal to 95% or more of a fixed crane rated capacity if independent weight verification and a certified scale are used during the lift;
 - Load testing that does not exceed 125% of rated capacity.
4. If the lift is not classified as a **Critical** or **Pre-engineered Lift**, the responsible manager or designee can classify the lift as **Ordinary** and follows the requirements of the section [Conducting Lifts](#).

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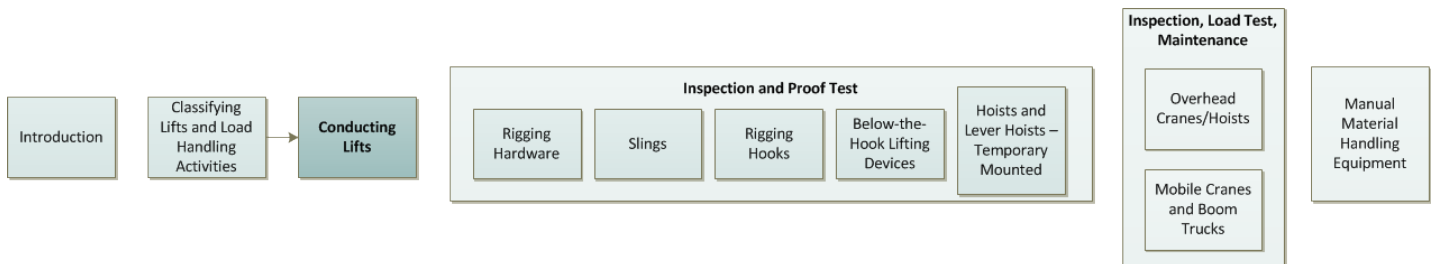
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SUBJECT AREA PROCEDURE CONTENT

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Lifting Safety Subject Area
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This information applies to all BNL staff and non-BNL staff who conduct lifts and operate material handling equipment.

Conducting Lifts

All lifts at BNL must be classified prior to being performed as required in the section [Classifying Lifts and Load Handling Activities](#). The lift follows the requirements listed in this section based on lift classification.

[Conducting Ordinary Lifts by BNL Staff](#)
[Conducting Ordinary Lifts by Contractor](#)
[Conducting Pre-engineered \(Special\) Lifts](#)
[Conducting Critical Lifts](#)

Under special circumstances, for example in a life-threatening, or emergency situation, the BNL Incident Commander will take charge of the emergency and will secure input from the Lifting Safety Committee Chair, subject matter experts, F&O supervisors, or BNL Hoisting and Rigging Inspector, if available, to evaluate and approve a lift regardless of classification.

Conducting Ordinary Lifts by BNL Staff [back to top](#)

1. The responsible manager or designee (e.g., professional engineer, person-in-charge) evaluates the proposed lift requirement in accordance with work planning requirements and authorizes the activity or lift (see the [Work Planning and Control for Experiments and Operations](#) Subject Area).
See the [FSH Guide: Lifting Safety](#), for guidance on Safe Lifting and Operating Practices.

Note: The responsible manager or designee should allow an adequate amount of time in the schedule to permit load testing and feedback to be addressed as needed.

2. The responsible manager or designee ensures all personnel performing hoisting and rigging activities, or other lifting equipment (as applicable), have completed the required training (i.e., Overhead Cranes, Basic Rigging Course, Forklift Operator Course, Rigger Signalman, Mobile Crane Operator). See the [Training and Qualifications](#) website for course information. Contact a [Training Coordinator](#) for assistance.
3. The responsible manager or designee ensures that the operator conducts a pre-use inspection of the equipment to be used (including rigging equipment and accessories). Operators use the operator aid for the Daily (Frequent) Overhead Crane/Hoist Inspection Checklist in the [FSH Guide: Lifting Safety](#), and the manufacturer's manual, as needed. If there are no deficiencies, the operator records their Life Number (Guest Number, if applicable) with the date on the Pre-Use Record Inspection Record Tag (BNL Stk #S33867) affixed to the equipment. The Pre-Use Record Inspection Record Tag must be clearly accessible for the shift the inspection was performed.

Note: Retention of the completed Pre-Use Record Inspection Record Tag is not required past the date that the inspection was performed.

If deficiencies or unsafe conditions are found, immediately tag the equipment "Not for Use" (yellow tag) and inform the equipment owner or the Research Space Manager/Cognizant Space Manager (RSM/CSM). The equipment will not be operated until deficiencies have been corrected and the equipment has been restored to safe operating condition. All repairs will be made by properly trained HEMOs or qualified contractor crane mechanics only.

4. Person-in-charge of the work holds a Pre-lift Meeting, if applicable, to review the plan/procedure.

For mobile crane operations, the crane operator is to review utility site maps to ensure mobile crane set-up location and to avoid potential damage to utilities. Outriggers must be used per manufacturer's load chart requirements. Appropriate outrigger matting must be used on all ground surfaces. See F&O Procedure [DE-FSH-709](#). **Note:** Contact the Lifting Safety SME or the [Modernization Project Office](#), if there is a question about the ground surface support.

5. Establish work control zone to keep unauthorized personnel out of the work area (see the [Signs, Placards, and Labels for Environmental, Safety and Health \(FSH\) Hazards](#), Subject Area for more information).
6. Conduct the lift as planned and make sure that the load is properly secured. The Person-in-Charge ensures all personal protective equipment (PPE) is worn.

If there are any problems during a lift that cause a departure from the lifting plan, abort the lift, redo the planning and review, and conduct the lift after re-approval by the responsible manager or designee.

Conducting Ordinary Lifts by Contractor [back to top](#)

1. The responsible manager or designee (e.g., professional engineer, person-in-charge) evaluates the proposed lift requirement in accordance with work planning requirements and authorizes the activity or lift (see the [Work Planning and Control for Experiments and Operations](#) Subject Area).

Contractors working at BNL must submit a Rigging Plan Worksheet (see the [FSH Guide: Lifting Safety](#)) to the [BNL Hoisting and Rigging Inspector](#). A minimum of four (4) working days is required for

review and approval of the Contractor's Rigging Plan. The Rigging Plan and all lifting and rigging equipment must be approved by the BNL Hoisting and Rigging Inspector or designee before use at BNL. The Contractor can contact the [BNL Hoisting and Rigging Inspector](#) or designee, or the Lifting Safety Committee Chairperson, if there are any questions in the preparation of the Contractor's Rigging Plan.

See the [FSH Guide- Lifting Safety](#) for guidance on Safe Lifting and Operating Practices.

Note: The Rigging Plan Worksheet in the [FSH Guide- Lifting Safety](#) can be used as a template/guidance for contractor work planning efforts.

Note: The responsible contractor manager or designee should allow an adequate amount of time in the schedule to permit load testing and feedback to be addressed as needed.

- The responsible manager or designee ensures the construction contractor and construction sub-contractor staff is trained and authorized to operate any equipment identified in the lifting plan and associated tasks. All construction contractor and construction sub-contractor signal persons must meet the qualification requirements of OSHA 29 CFR 1926.1428.

If mobile cranes are to be used, all construction contractor and sub-contractor mobile crane operators must have a valid New York State Mobile Crane Operator's License or equivalent for the type of equipment they will be operating.

For mobile crane operations, the crane operator is to review utility site maps to ensure mobile crane set-up location and to avoid potential damage to utilities. Outriggers must be used per manufacturer's load chart requirements. Appropriate outrigger matting must be used on all ground surfaces. See F&O Procedure [DF-FSH-709](#). **Note:** Contact the Lifting Safety SME or the [Modernization Project Office](#) if there is a question about the ground surface support.

- The construction contractor and subcontractor ensure all lifting and rigging equipment is inspected annually and prior to use, as required by the manufacturer.
- For construction contractor and construction subcontractor-performed lifts, all precautions required by the approved Lifting Safety Plan to safely complete the task(s) must be noted in the Pre-Lift Meeting, and as a minimum, cover the following:
 - Intended steps in the lift sequence;
 - Work control zone, load path, and unloading area;
 - Potential hazards, hazardous situations in the handling area;
 - How the hazards will be mitigated;
 - Stop Work Authority;
 - Load securement and transportation issues;
 - Use of standard hand signals or verbal communication for controlling crane operations. For operations not covered by standard hand signals, special signals must be agreed upon in advance by both the crane operator and the signal person, and must not conflict with the standard hand signals. See the exhibit [Standard Hand Signals for Controlling Forklift Operations](#) in the [Forklift Safety](#) Subject Area, and the exhibits Standard Hand Signals: Mobile Cranes or Standard Hand Signals: Overhead and Gantry Cranes in the [FSH Guide- Lifting Safety](#), as applicable;
 - Spotter and tagline personnel duties, if used.
- The construction contractor and construction subcontractor establish work control zone to keep unauthorized personnel out of the area all hoisting and rigging, forklift operation, or other material handling as required (see the [Signs, Placards, and Labels for Environmental, Safety and Health \(FSH\) Hazards](#) Subject Area for more information).
- Conduct the lift as planned and make sure that the load is properly secured. Managers ensure that when personnel operate material handling equipment, the proper personal protective equipment (PPE) is worn.

If there are any problems during a lift that cause a departure from the lifting plan, abort the lift, redo the planning and review, and conduct the lift after re-approval by the [BNL Hoisting and Rigging Inspector](#) or designee.

Conducting Pre-engineered (Special) Lifts [back to top](#)

- The responsible manager or designee prepares a Pre-engineered Lift Procedure. See the Critical Lift Plan and Pre-engineered Lift Procedure in the [FSH Guide- Lifting Safety](#) for guidance on developing the procedure.

Note: Use the exhibits Checklist for Lift Planning and Weather Factors in the [FSH Guide- Lifting Safety](#), as tools for evaluating the area of operation and potential hazards when preparing the plan.

- The responsible manager or designee ensures that the operators of the equipment and the riggers involved with the lift have the appropriate training.

All construction contractor and construction subcontractor signal persons must meet the qualification requirements of OSHA 29 CFR 1926.1428.

If mobile cranes are to be used, all construction contractor and sub-contractor mobile crane operators must have a valid New York State Mobile Crane Operator's License or equivalent for the type of equipment they will be operating.

For mobile crane operations, the crane operator is to review utility site maps to ensure mobile crane set-up location and to avoid potential damage to utilities. Outriggers must be used per manufacturer's load chart requirements. Appropriate outrigger matting must be used on all ground surfaces. See F&O Procedure [DF-FSH-709](#). **Note:** Contact the Lifting Safety SME or the [Modernization Project Office](#) if there is a question about the ground surface support.

- The responsible manager or designee (or the contractor, if applicable) submits the Pre-engineered Lift Procedure to the line organization's designated Lifting Safety POC, or the F&O Site Services Rigging Supervisor (if applicable).

For **Pre-engineered Lifts**, the lift plan/procedure needs to be approved by a member of the Lifting Safety Committee who did not generate the lift plan.

Note: The responsible manager or designee (or the contractor, if applicable) should allow an adequate amount of time in the construction schedule for review and approval of critical or pre-engineered lifts.

- Staff participating in the lift holds a Pre-lift Meeting to review the plan/procedure before making a pre-engineered lift. Brief all participants as follows (and as a minimum):

- Intended lift sequence and load path;
- Establishing a Work Control Zone and keeping nonparticipants out;
- Identified hazards;
- Methods of hazard mitigation;
- Load securement;
- Stop Work Authority;
- Use of standard hand signals or verbal communication for controlling crane operations. For operations not covered by standard hand signals, special signals must be agreed upon in advance by both the crane operator and the signal person, and must not conflict with the standard hand signals. See the exhibit [Standard Hand Signals for Controlling Forklift Operations](#) in the [Forklift Safety](#) Subject Area, and the exhibits Standard Hand Signals: Mobile Cranes or Standard Hand Signals: Overhead and Gantry Cranes in the [FSH Guide- Lifting Safety](#), as applicable;
- Spotter and tagline personnel duties, if used.

- Conduct the lift as planned and make sure that the load is properly secured and ensuring all required personal protective equipment (PPE) is worn.

If there are any problems during a lift that cause a departure from the lifting plan, abort the lift, redo the planning and review, and conduct the lift once reapproved.

- If the procedure is used for reoccurring lifts, the responsible manager or designee (or the contractor, if applicable) ensures the Pre-engineered Lift Procedure is placed into the line organization's document control system and is reviewed periodically (periodicity to be established by the line organization, not to exceed one year while the procedure is in affect).

Conducting Critical Lifts [back to top](#)

- If the lift is classified as a **Critical Lift**, the responsible manager or designee (e.g., professional engineer, person-in-charge) prepares the [Critical Lift Evaluation Form \(CLEF\)](#). See the [FSH Guide- Lifting Safety](#) for examples on CLEFs.
- The responsible manager or designee prepares a Critical Lift Plan. See the Critical Lift Plan and Pre-engineered Lift Procedure in the [FSH Guide- Lifting Safety](#) for guidance on developing the plan.

The plan must include the following:

- Confirm that industry-recognized equipment and hardware have been selected for the job and that the equipment is certified for a Critical Lift.
Note: Rigging/hooks used for Critical Lifts may have different Load Test requirements than those required for Ordinary/Pre-Engineered Lifts. Contact the Lifting Safety Committee for assistance.
- Ensure that all inspections are current. Any equipment found not to be in compliance cannot be used at BNL until a new inspection is performed.
- Ensure the crane Preventive Maintenance is current. All Preventive Maintenance must be current prior to conducting the Critical Lift.
- Confirm proper setup and positioning of equipment.

- The location of spotters and taglines when necessary to safely handle a load.
- A utility site map must be included in the plan for mobile crane operations.
- **Note:** Use the exhibits Checklist for Lift Planning and Weather Factors in the [FSH Guide: Lifting Safety](#), as tools for evaluating the area of operation and potential hazards when preparing the plan.

3. The responsible manager or designee ensures that the operators of the equipment and the riggers involved with the lift have the appropriate training.

BNL's Production Division's Riggers are required to perform internal critical lifts.

All contractor and sub-contractor mobile crane operators must have a valid New York State Mobile Crane Operator's License or equivalent for the type of equipment they will be operating. For mobile crane operations, the crane operator is to review utility site maps to ensure mobile crane set-up location and to avoid potential damage to utilities. Outriggers must be used per manufacturer's load chart requirements. Appropriate outrigger matting must be used on all ground surfaces. See F&O Procedure [DE-FSH-709](#). **Note:** Contact the Lifting Safety SME or the [Modernization Project Office](#), if there is a question about the ground surface support.

4. The responsible manager or designee (or the contractor, if applicable) submits the [Critical Lift Evaluation Form \(CLEF\)](#) and the Critical Lift Plan to the line organization's designated Lifting Safety POC, or BNL's Production Division's Rigging Supervisor (if applicable), for review and submittal to the Lifting Safety Committee (LSC) via the LSC Committee Chair.

A critical lift must not be conducted without this review.

Note: The responsible manager or designee (or the contractor, if applicable) should allow an adequate amount of time in the construction schedule for review and approval of critical lifts.

5. The Lifting Safety Committee (LSC) reviews the CLEF and the Critical Lift Plan. When found acceptable, the LSC Committee Chair approves the CLEF and sends the original form to the line organization.

6. Staff participating in the lift holds a Pre-lift Meeting to review the plan/procedure before making a critical or pre-engineered lift. Brief all participants as follows (and as a minimum):

- Intended lift sequence and load path;
- Establishing a Work Control Zone and keeping nonparticipants out;
- Identified hazards;
- Methods of hazard mitigation;
- Load securement;
- Stop Work Authority;
- Use of standard hand signals or verbal communication for controlling crane operations. For operations not covered by standard hand signals, special signals must be agreed upon in advance by both the crane operator and the signal person, and must not conflict with the standard hand signals. See the exhibit [Standard Hand Signals for Controlling Forklift Operations](#) in the [Forklift Safety](#) Subject Area, and the exhibits Standard Hand Signals: Mobile Cranes or Standard Hand Signals: Overhead and Gantry Cranes in the [FSH Guide: Lifting Safety](#), as applicable;
- Spotter and tagline personnel duties, if used.

The professional engineer/qualified person, person-in-charge (as applicable), operator of equipment (as applicable), responsible manager or designee, sign the CLEF at the completion of the Pre-Lift Meeting.

Note: The person-in-charge retains a copy of the approved CLEF during the lift.

Note: If this is a reoccurring critical lift, each occurrence of the lift requires a specific and documented Pre-lift Meeting that identifies, as a minimum, staff assignments and specific environmental, equipment status (i.e., status of inspections).

7. The line organization notifies the LSC Chair or delegate prior to the start of the critical lift.

Note: The LSC Chair will notify the Deputy Director for Operations when a critical lift is being performed when practical.

8. Conduct the lift as planned.

If there are any problems during a lift that cause a departure from the lifting plan, abort the lift, redo the planning and review with the LSC, and conduct the lift once reapproved.

9. Upon completion of the critical lift, submit a copy of the signed CLEF to the Lifting Safety Committee Chair for review.

10. If the procedure is used for reoccurring lifts, the responsible manager or designee (or the contractor, if applicable) ensures that the CLEF is placed into the line organization's document control system and is reviewed periodically (periodicity to be established by the line organization, not to exceed one year while the procedure is in effect).

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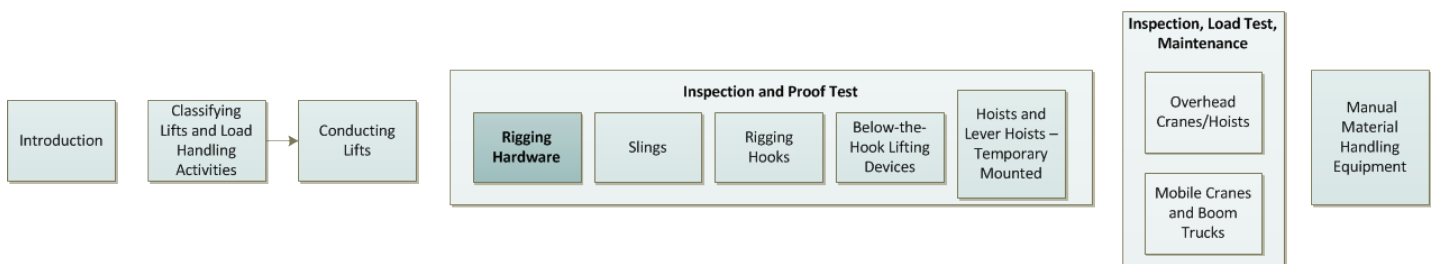
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Lifting Safety Subject Area

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This information applies to all contractors, owners, and operators of lifting, rigging, and material handling equipment used at Brookhaven National Laboratory.

Rigging Hardware

Inspection and Proof Test Requirements of Rigging Hardware

This section provides the requirements for inspection, testing, and use of detachable rigging hardware used for lifting purposes. This hardware includes shackles, links, rings, swivels, turnbuckles, eyebolts and wire rope clips, wedge sockets and rigging blocks. The above equipment must comply with ASME B30.26 and DOE-STD-1090.

All BNL-owned detachable rigging hardware needs to have a certificate of compliance from the manufacturer and receipt inspected by the BNL Hoisting and Rigging Inspector or designee. If it is to be used for critical lifts, the detachable rigging hardware must have had a certified 200-percent proof test by the manufacturer. If no certification is available, contact the Lifting Safety SME or the [BNL Hoisting and Rigging Inspector](#) or designee prior to use.

If any equipment that is required to be certified (load tested) for use and documentation is not provided by the manufacturer, contact the Safety Engineering Group or [BNL Hoisting and Rigging Inspector](#) for conducting and documentation of the load tests. A load test performed by BNL staff must be witnessed by a qualified (authorized) inspected and documented on the equipment specific load test report (see Rigging Hardware Load Test Report in the exhibit [Load Test Reports](#)).

- 1. Initial Inspections:** Prior to use, a Department-Division-qualified person (or the [BNL Hoisting and Rigging Inspector](#) or designee) must inspect all new, altered, modified, or repaired rigging hardware (e.g., shackles, turnbuckles, eyebolts, links, rings, swivels, etc.). To verify compliance with the latest applicable ASME and OSHA standards, check for suspect counterfeit parts and manufacturer's markings (see the exhibit see the exhibit Recognized Rigging Hardware Manufacturer's Marking Guide in the [ESH Guide: Lifting Safety](#)). Document the initial inspection, with initials and date on the shipping receipts. It is recommended that the end user maintain these files and all proof certificates for the life of the equipment.
- 2. Frequent (Pre-Use)/Periodic Inspections:** Before each use, and before each new job, the user or other Department-/Division-designated qualified rigger must perform a visual inspection. To verify compliance with the latest applicable ASME and OSHA standards, check for suspect counterfeit parts and manufacturer's markings (see the exhibit Recognized Rigging Hardware Manufacturer's Marking Guide in the [ESH Guide: Lifting Safety](#)). Remove equipment from service if any conditions are noted that may result in an appreciable loss of original strength. Equipment must not be returned to service until approved by a qualified person (i.e., [BNL Hoisting and Rigging Inspector](#)).

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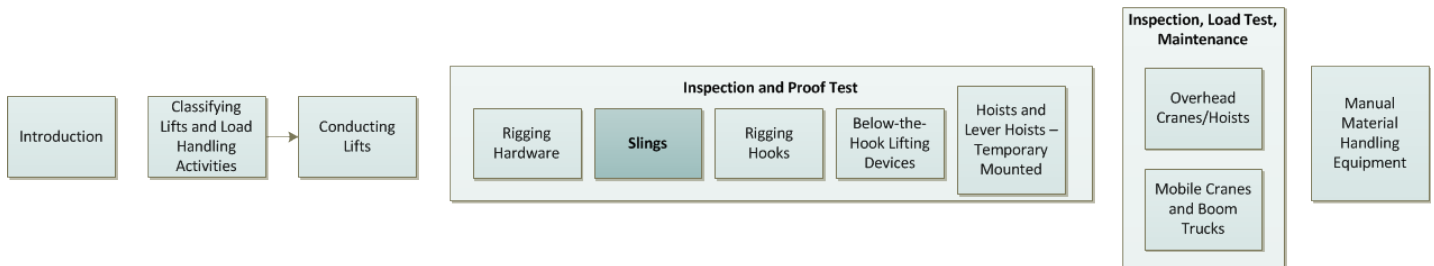
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This information applies to all contractors, owners, and operators of lifting, rigging, and material handling equipment used at Brookhaven National Laboratory.

Slings

Inspection and Proof Test Requirements for Slings

This section provides the requirements for inspection and maintenance of slings used for lifting purposes. The above equipment must comply with 29 CFR 1910.184 and ASME B30.9.

If any equipment that is required to be certified (load tested) for use and documentation is not provided by the manufacturer, contact the Safety Engineering Group or [BNL Hoisting and Rigging Inspector](#) for conducting and documentation of the load tests. Load test performed by BNL staff must be witnessed by a qualified (authorized) Inspector and documented on the equipment specific load test report (see the exhibit [Load Test Reports](#)).

General Sling requirements for all sling types can be found in this subsection. The specific requirements for load testing and marking of each sling type are provided below:

[Alloy Steel Chain Slings](#)
[Wire Rope Slings](#)
[Metal Mesh Slings](#)
[Synthetic Webbing Slings](#)
[Synthetic Roundslings](#)
[Twin-Path Slings](#)

General Sling [△back to top](#).

All slings for use at BNL must be purchased using the Web Requisition System. (**Note:** Credit cards are not permitted for the purchase of slings.) Upon receipt of slings and all rigging hardware, an initial inspection must be performed by the [BNL Hoisting and Rigging Inspector](#) or designee. After completion of a satisfactory receipt inspection, the BNL Hoisting and Rigging Inspector or designee will apply a color-coded inspection tag/tape. The color represents the year that the equipment was inspected. See the [ESH Guide: Lifting Safety](#) for the list of colors and their corresponding years.

Precautions are required to protect slings from damage during lifts. Use only approved sling protection. Contact either the [BNL Hoisting and Rigging Inspector](#) or the Lifting Safety SME if there is a question about if the sling protection is adequate.

1. **Record Retention:** Maintaining records of the initial sling inspections and required proof test is recommended for the life of the equipment. **Note:** This will allow their use for pre-engineered and critical lifts.

Documentation of an initial proof test for slings used for a Critical Lift must be provided. If documentation of initial proof test cannot be verified, the sling must be proof tested prior to use in a Critical Lift. See the applicable sling subsections for the individual sling proof load requirements. Records are required.

Periodic inspection reports must be maintained for a period of three years. Maintain these records with the Department/Division files.

A PM Work Order, F&O Inspection Report, the current year's inspection tag/tape, or Departmental database files indicating the slings condition are acceptable methods of recording periodic inspections.

2. Contractors must certify that all slings and rigging gear in their use comply with OSHA, ASME, and DOE standards for inspection and proof test requirements. It is recommended that the contractor's compliance is recorded on the Rigging Plan Worksheet in the [FSH Guide: Lifting Safety](#).
3. **Frequent (Pre-Use) Inspection:** The user, or other designated person, performs a visual inspection for damage each day or shift the sling is used, and removes the sling from service if any conditions are noted that may result in a loss of original strength. The sling must not be returned to service until approved by a qualified person. The exhibits referenced in the individual frequent (pre-use) sling inspection procedure for each sling type can be used.

Sling identification should be maintained by the user so as to be legible during the life of the sling. Replacement of sling markings is considered a repair, and must be done by the manufacturer.

4. **Periodic Inspection:** A designated person (or the BNL Hoisting and Rigging Inspector) periodically performs a complete inspection for damage of the sling. The sling must be examined for any conditions that will compromise the integrity of the sling. The Daily (Frequent) Sling Inspection Checklist in the [FSH Guide: Lifting Safety](#) provides the criteria for sling removal. The periodic inspection intervals must not exceed one year. After completion of a satisfactory inspection, a color-coded tag or tape must be attached to the sling and marked with its inspection due date. This BNL tag or tape is documentation of both the periodic and satisfactory inspection. See the [FSH Guide: Lifting Safety](#) for the list of colors and their corresponding years.

Alloy Steel Chain Slings [back to top](#)

1. **Alloy Steel Chain Slings:** Prior to use, Department/Division line management must ensure all new and repaired chain and components of alloy steel chain slings, either individually or as an assembly, are proof tested by the sling manufacturer or a qualified person. Proof load requirements are as follows:
 - For single or multiple leg slings, each leg must be proof loaded to a minimum of 2 times the single leg vertical hitch rated load.
 - Master links for double-leg bridle slings must be proof loaded to a minimum of 4 times the single-leg vertical hitch rated load.
 - Master links for triple and quadruple-leg bridle slings must be proof loaded to a minimum of 6 times the single-leg vertical hitch rated load.
2. **Identification Requirements:** Ensure each sling is marked to show a) name or trademark of manufacturer; b) grade; c) nominal chain size; d) number of legs; e) rated load for type of hitch used and the angle upon which it is based; and f) length.

Wire Rope Slings [back to top](#)

1. **Wire Rope Slings:** Prior to use, Department/Division line management must ensure that all new swaged, poured socket, turnback eye, mechanical joint grommets and endless wire rope slings are proof tested by the sling manufacturer or a qualified person. Proof load requirements are as follows: a) mechanical splice, proof load of 2 times the single-leg vertical hitch rated load; b) swaged socket and poured socket, proof load must be a minimum of 2 times and a maximum of 2½ times the single-leg vertical leg rated load. All other wire rope sling assemblies must be proof tested when specified by the purchaser.
2. **Identification Requirements:** Ensure each sling is marked to show: a) name or trademark of manufacturer; b) rated loads for the type of hitch used, and angle it is based on; c) diameter or size and length.

Metal Mesh Slings [back to top](#)

1. **Metal Mesh Slings:** Prior to use, Department/Division line management must ensure that all new and repaired metal mesh slings are proof tested by the sling manufacturer or a qualified person. Coated slings must be proof tested prior to coating. Proof load requirements must be a minimum of two times the vertical hitch rated load. Department/Division line management must maintain records of proof testing for the life of the sling.
2. **Identification Requirements:** Ensure each sling is marked to show a) name or trademark of manufacturer; b) rated loads for the type of hitch used, and angle it is based on; c) width and gauge.

Synthetic Webbing Slings [back to top](#)

1. **Synthetic Webbing Slings:** Prior to use, Department/Division line management must ensure that all synthetic web slings incorporating previously used or welded fittings and all repaired slings are proof tested by the sling manufacturer or a qualified person. All other new synthetic web slings and fittings are not required to be proof tested unless specified by the purchaser. Proof load requirements are as follows: For single- or multiple-leg slings and endless slings, each leg must be proof loaded to 2 times the single-leg vertical hitch rated load. Master links for double-leg bridle slings must be proof loaded to a minimum of 4 times the single-leg vertical hitch rated load. Master links for triple-leg bridle slings must be proof loaded to a minimum of 6 times the single-leg vertical hitch rated load, and master links for four-leg bridle slings must be proof loaded to a minimum of 8 times the single-leg vertical hitch rated load.
2. **Identification Requirements:** Ensure each sling is marked to show a) name or trademark of manufacturer; b) manufacturer's code or stock number; c) rated loads for the type of hitch used, and angle it is based on; d) type of synthetic web material.

Synthetic Roundslings [back to top](#)

1. **Synthetic Roundslings:** Prior to use, Department/Division line management must ensure that all synthetic roundslings incorporating previously used or welded fittings and all repaired slings are proof tested by the sling manufacturer or a qualified person. All other new synthetic web slings and fittings are not required to be proof tested unless specified by the purchaser. Proof load requirements are as follows: For single- or multiple-leg slings and endless slings, each leg must be proof loaded to 2 times the single-leg vertical hitch rated load. Master links for double-leg bridle slings must be proof loaded to a minimum of 4 times the single-leg vertical hitch rated load. Master links for triple-leg bridle slings must be proof loaded to a minimum of 6 times the single-leg vertical hitch rated load, and master links for four-leg bridle slings must be proof loaded to a minimum of 8 times the single-leg vertical hitch rated load.
2. **Identification Requirements:** Ensure each sling is marked to show a) name or trademark of manufacturer; b) manufacturer's code or stock number; c) rated loads for the type of hitch used, and angle it is based on; d) core material; e) cover material, if different from core material.

Twin-Path Slings [back to top](#)

1. **Twin-Path Slings:** Prior to use, Department/Division line management must ensure that all new or repaired Twin-Path slings are proof tested by the sling manufacturer. (The Twin-Path sling manufacturer set standards for proof testing of their slings which must be performed on calibrated equipment that meet standards described in ASME E-4). Proof load requirements are as follows: For proof testing, the pins must be 2" diameter or larger. The proof load must be a minimum of 2 times the vertical hitch rated load for at least 15 seconds. Proof testing must be performed on a certified and currently calibrated testing machine. Repaired slings or fittings must be proof tested before being returned to service.
2. **Identification Requirements:** Ensure each sling is marked to show a) name or trademark of manufacturer; b) manufacturer's code or stock number; c) rated loads for the type of hitch used, and angle it is based on; d) core material; e) cover material if different from core material.

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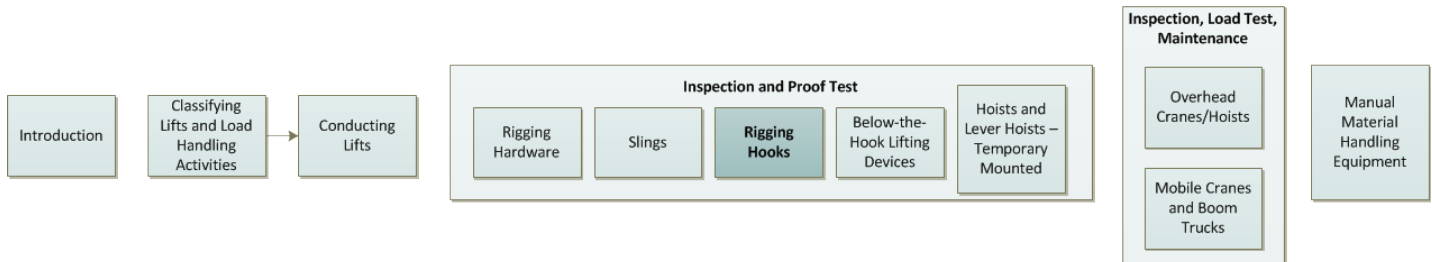
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SUBJECT AREA PROCEDURE CONTENT



Lifting Safety Subject Area

Effective Date: Jan 16, 2018, (Rev. 9.0)
Periodic Review Due: Jan 16, 2023



This information applies to all contractors, owners, and operators of lifting, rigging, and material handling equipment used at Brookhaven National Laboratory.

Rigging Hooks

Inspection and Proof Test Requirements of Rigging Hooks

This section provides the requirements for hooks supporting a load in a direct pull configuration with the load carried in the base (bowl/saddle) of the hook. The equipment must comply with ASME B30.10.

All detachable rigging hardware needs to have a certificate of compliance from the manufacturer and receipt inspected by the BNL Hoisting and Rigging Inspector or designee. If it is to be used for critical lifts, the detachable rigging hardware must have had a certified 200-percent proof test by the manufacturer. If no certification is available, contact the Lifting Safety SME or the [BNL Hoisting and Rigging Inspector](#) or designee prior to use.

If any equipment that is required to be certified (load tested) for use and documentation is not provided by the manufacturer, contact the Safety Engineering Group or [BNL Hoisting and Rigging Inspector](#) for conducting and documentation of the load tests. Load test performed by BNL staff must be witnessed by a qualified (authorized) Inspector and documented on the equipment specific load test report (see the exhibit [Load Test Reports](#)).

- 1. Markings:** The manufacturer's name or trademark must be forged cast or die stamped on a low stress and non-wearing area of the hook.
 - 2. Initial Inspection:** Prior to use, all new and repaired hooks must be inspected by the BNL Hoisting and Rigging Inspector or designee to verify compliance with ASME B30.10 and DOE-STD-1090. Inspection procedures and record-keeping requirements for hooks in regular service are governed by the kind of equipment in which they are used (cranes, hoists, slings etc.).
 - 3. Daily/Frequent Inspection:** The operator or other qualified person must visually inspect the hook daily or prior to first use if the hook is not in regular service for the following conditions: a) cracks, b) deformation, c) damage from chemicals, d) damaged, malfunctioning hook latch, e) evidence of heat damage. Any conditions that may result in a loss of original strength will cause the hook to be removed from service by placing an out-of-service tag and notifying the equipment owner or the BNL Hoisting and Rigger Inspector as soon as practical. Hooks must not be returned to service until approved by the [BNL Hoisting and Rigging Inspector](#) or designee.
 - 4. Periodic Inspection:** A qualified inspector must perform a complete inspection yearly. In addition to the requirements in frequent inspection the inspector will check for a) deformation bending or twisting from original plane, b) distortion causing an increase in the throat opening of 5% not to exceed ¼" of original throat opening, c) any wear exceeding 10% from original, d) cracks.
- Testing:** Performance testing (proof loading) of hooks is not routinely required, except to conform to the requirements for the equipment of which they are a part.

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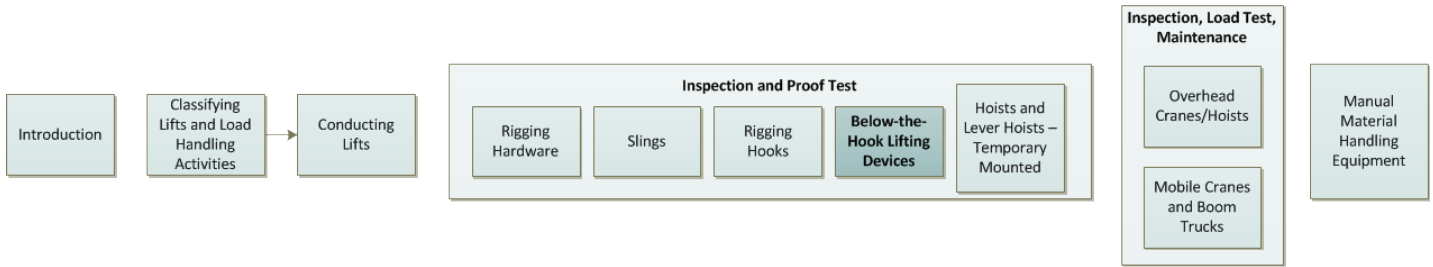
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SUBJECT AREA PROCEDURE CONTENT



Lifting Safety Subject Area

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This information applies to all contractors, owners, and operators of lifting, rigging, and material handling equipment used at Brookhaven National Laboratory.

Below-the-Hook Lifting Devices

Inspection and Proof Test Requirements of Below-the-Hook Lifting Devices

This subsection provides the requirements for below-the-hook lifting devices used in hoisting and rigging, such as spreader bars, lifting yokes, and lifting fixtures. It implements the requirements of ASME B30.20.

If any equipment that is required to be certified (load tested) for use and documentation is not provided by the manufacturer, contact the Safety Engineering Group or [BNL Hoisting and Rigging Inspector](#) for conducting and documentation of the load tests. Load test performed by BNL staff must be witnessed by a qualified (authorized) inspector and documented on the equipment-specific load test report (see the exhibit [Load Test Reports](#)).

- Frequent Inspection:** The operator or other Department-/Division-designated person must visually inspect each lifting device at the beginning of each shift or prior to first use for the following items: a) structural deformation, cracks or excessive wear on any part; b) loose or missing guards, fasteners, covers, stops, or nameplates; c) all operating mechanisms and automatic hold and release mechanisms for misalignments interfering with operations. Records are not required.
- Periodic Inspection:** A designated person (or the [BNL Hoisting and Rigging Inspector](#)) must perform a complete inspection of the lifter to determine whether conditions noted during inspection constitute a hazard. The periodic inspection intervals must not exceed one year. In addition to the requirement of the Frequent Inspection in step 2, the following applies: a) loose bolts or fastener; b) cracked or worn parts; c) excessive wear of pads linkages, or other mechanical parts; d) excessive wear at hoist hooking points and load support devices or pins. A color-coded BNL inspection tag must be attached to the equipment marked with the inspection due date. **Note:** This serves as documentation of the periodic inspection. The color represents the year that the equipment was inspected. See the [FSH Guide- Lifting Safety](#) for the list of colors and their corresponding years.
If deficiencies are found, the Department/Division designated person (or the [BNL Hoisting and Rigging Inspector](#)) must remove the lifter from service. After any corrective measures are taken the lifting device must be re-inspected by the BNL Hoisting and Rigging Inspector or designee to determine if a load test is required prior to use.
- Load Tests:** Below-the-hook lifting devices and accessories constructed at BNL must be designed by a qualified engineer, approved by the Department/Division, and reviewed by the Safety and Health Services Division's Safety Engineering Group. Below-the-hook lifting devices are required to be designed to the current ASME BTH-1. Devices must be load tested to 125% of maximum design capacity and witnessed by the [BNL Hoisting and Rigging Inspector](#) or the Safety Engineering Group. The test load must be certified and the date tested must be identified on the device, along with the rated capacity. The Lifting Bars and Spreaders Load Test Report in the [FSH Guide- Lifting Safety](#) can be used to document these tests.
The unit or the device must have a permanently affixed marking displaying the serial number or drawing number, manufacturer, working load limit (WLL), and lifting device weight.
- Operation:** a) Prior to use, the operator must check the below-the-hook lifting device for a current BNL Inspection tag date. If the tag is missing, or the date is expired or illegible, the equipment must be removed from service until inspected, b) only trained personnel must operate below-the-hook lifting devices. The supervisor ensures that BNL and contractor operators are trained and qualified for the equipment to be used (see the [Training and Qualifications](#) website).

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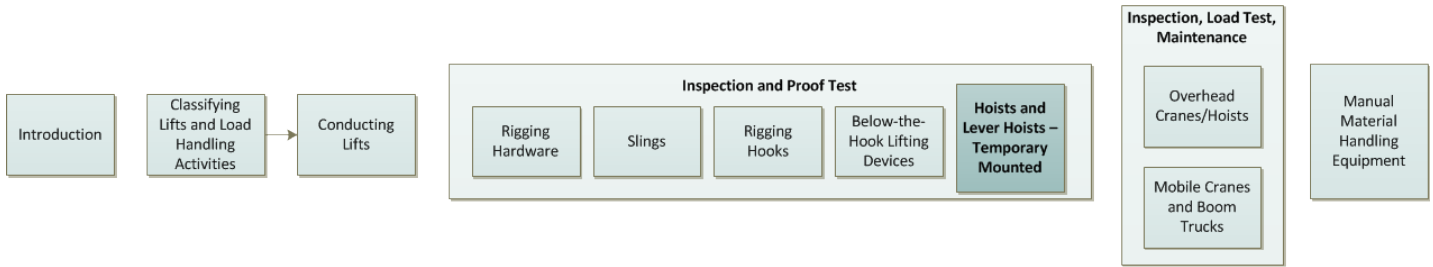
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This information applies to all BNL staff and non-BNL staff who use material handling equipment.

Hoists

Inspection and Proof Test Requirements of Overhead (Underhung) and Stationary Chain Hoists and Lever Hoists – Temporary Mounted

This section provides the requirements for chain hoists and lever hoists that are not part of a permanent material handling system (i.e., gantry crane/jib). The equipment must comply with ASME B30.16 and ASME B31.21.

All detachable rigging Hand Chain Hoists needs to have a certificate of conformance and proof tested from the manufacturer and receipt inspected by the BNL Hoisting and Rigging Inspector or designee. If no proof test certification is available, contact the Lifting Safety SME or the [BNL Hoisting and Rigging Inspector](#) or designee prior to use.

- 1. Markings:** The manufacturer's name or trademark along with the model (serial number) must be affixed by name plate, label, forged cast, or die stamped on the hoist along with the following information:
 - Working Load Limit (WWL)/rating
 - Hoist Duty Service
 - Full Load Amperage (FLA); Voltage (AC/DC) power supply and phase and frequency of AC power supply (for electric hoist).
 - Rated air pressure (air-powered hoist)
- 2. Initial Inspection:** Prior to use, all new and repaired hoists must be inspected by the BNL Hoisting and Rigging Inspector or designee to verify compliance with ASME B30.16 and ASME B30.21, as applicable. This inspection can be documented by using the BNL Crane/Hoist Hook Inspection Report in the [FSH Guide: Lifting Safety](#).

Daily/Frequent Inspection: The user, or other designated person, performs a visual inspection for damage each day or shift the hoist is used, and removes the hoist from service if any conditions are noted that may result in a loss of original strength (disassembly of the hoist is not required). The hoist must not be returned to service until approved by [BNL Hoisting and Rigging Inspector](#) or designee. See the [FSH Guide: Lifting Safety](#) for the pre-use checklist that can be used as an operator aid in performing the Daily/Frequent Inspection.

Note: Due to the environmental use of these hoists and the need to inspect the hoist for each installation, the pre-use Inspection Record Tag is not required to be affixed or completed for temporary hoists.
- 3. Periodic Inspection:** A qualified person (or the BNL Hoisting and Rigging Inspector) periodically performs a complete inspection for damage of the hoist. After completion of a satisfactory inspection, a color coded tag must be attached to the hoist and marked with its inspection due date. This BNL inspection tag is documentation of both the periodic and satisfactory inspection. See the [FSH Guide: Lifting Safety](#) for the list of colors and their corresponding years.
- 4. Testing:** Performance testing (proof loading) of hoists are not routinely required, except to conform to the requirements for the equipment of which they are a part. If any equipment that is required to be certified (load tested) for use and documentation is not provided by the manufacturer, contact the Safety Engineering Group or [BNL Hoisting and Rigging Inspector](#) for conducting and documentation of the load tests. Load test performed by BNL staff must be witnessed by the BNL Hoisting Inspector or designee and documented on the equipment specific load test report (see the Hoist Load Test Report in the exhibit [Load Test Reports](#)).

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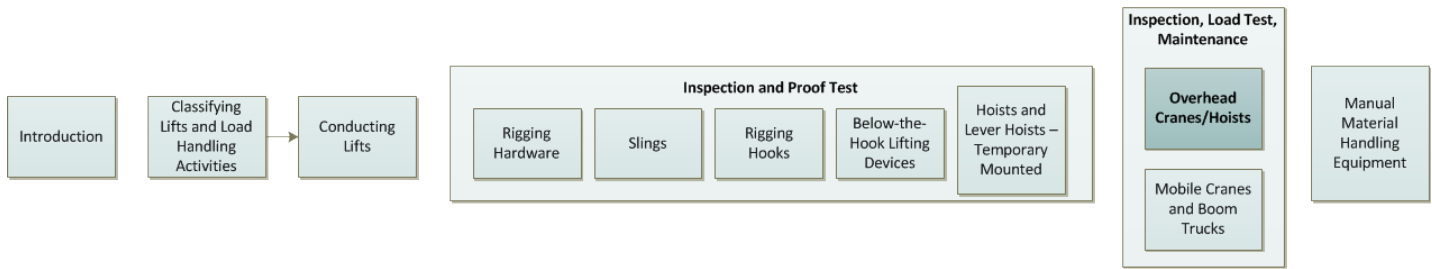
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This information applies to all contractors, owners, and operators of lifting, rigging, and material handling equipment used at Brookhaven National Laboratory.

Overhead Cranes/Hoists

Inspection, Load Test Requirements, Preventive Maintenance, and Operating Practices for Overhead Cranes/Hoists

This subsection specifies the inspection, testing, preventive maintenance, and operation requirements for the use of Overhead Cranes and implements the requirements of the applicable 29 CFR 1910.179 and ASME B30. Requirements for temporary mounted chain hoists are found in the section [Inspection and Proof Test Requirements of Overhead \(Underhung\) and Stationary Chain Hoist and Level Hoist – Temporary Mounted](#).

If any equipment that is required to be certified (load tested) for use and documentation is not provided by the manufacturer, contact the Safety Engineering Group or [BNL Hoisting and Rigging Inspector](#) for conducting and documentation of the load tests. Load test performed by BNL staff must be witnessed by a qualified (authorized) inspector and documented on the equipment specific load test report (see the exhibit [Load Test Reports](#)).

1. The owner of the Overhead Crane/Hoist is responsible for ensuring that

- The equipment is inspected and maintained as required;
- For BNL owned equipment, the equipment information is sent to the F&O Facility Operations Center (FOC) for entry into their periodic maintenance and inspection system;
- An approved operator aid for the Daily (Frequent) Overhead Crane/Hoist Inspection (see the [FSH Guide: Lifting Safety](#)) is available on the equipment control; and
- An Pre-use Inspection Record Tag (BNL Stk # S33867) is affixed to the equipment.

Note: Prior to use of contractor equipment on-site, the equipment must be inspected by a designated BNL inspector. Contact the BNL Construction Safety Engineer or call 631-344-8201; or contact the [BNL Hoisting and Rigging Inspector](#) or call 631 344-5456 to schedule the inspection--minimum 48-hour notice is required.

2. The Facilities & Operations (F&O) Facility Operations Center is responsible for ensuring that

- The equipment information provided by the equipment owner has been entered into the Facilities & Operations (F&O) Maintenance System for periodic maintenance and inspections of BNL-owned equipment;
- Facility Project Managers are notified in a timely manner that the annual inspection and preventive maintenance is due.

3. **Initial Inspection:** Prior to initial use, the [BNL Hoisting and Rigging Inspector](#) or designee must inspect and witness the load test for all new, reinstalled, altered, repaired, and modified cranes. Inspection of altered, repaired, and modified cranes may be limited to the provisions affected by the alteration, repair, or modification, as determined by the [BNL Hoisting and Rigging Inspector](#) or designee. This inspection includes the guidelines found in OSHA/ANSI standards. These inspections are to include inspection of bolts for SCI (see the exhibit [Suspect Bolt Head Marking Card](#) in the [Suspect/Counterfeit Items](#) Subject Area) for list of unacceptable bolt headmarks. Records of the initial inspection and load test are required and must be maintained by the BNL Hoisting and Rigging Inspector for the life of the equipment. After a satisfactory inspection, a color-coded BNL Inspection Tag must be installed on the equipment at this time. The color represents the year that the equipment was inspected. See the [FSH Guide: Lifting Safety](#) for the list of colors and their corresponding years.

4. **Load Test Requirements:** The F&O riggers and the BNL Hoisting and Rigging Inspector or designee must load test all new or reinstalled cranes and cranes in which load sustaining parts have been altered, modified, repaired, or replaced. The load test results must be documented and retained by the BNL Hoisting and Rigging Inspector for the life of the equipment. The Bridge, Wall, Gantry Crane Load Test Report or the Hoist Load Test Report (see the exhibit [Load Test Reports](#)) must be used to document the Load Test.

Test loads must not be less than 100 percent or more than 125 percent of the rated capacity of the crane.

Note: The replacement of wire rope and load chain is excluded from this requirement, however an operational test must be made in accordance with the following: a) lifting and lowering, b) trolley travel, c) bridge travel, d) hoist limit switches, e) travel limiting devices, f) locking and indicating devices. If wire rope clips or wedged socket end connection are used in the wire rope replacement, the crane should be cycled several times with a load equal to or greater than the normal operating load.

5. **Daily Pre-use Operational Check:** The operator, or other designated qualified personnel, must perform a visual and operational check of the crane daily, or prior to its first use, if the hoist has not been in regular service (the exhibits Daily [Frequent] Overhead Crane/Hoist Inspection Checklist or Overhead Crane Monthly Inspection Checklist in the [FSH Guide: Lifting Safety](#) are available for use as an aid to perform the pre-operational check).

If there are no deficiencies, the operator's Life Number and the dates on the Pre-use Inspection Record Tag (BNL Stk # S33867) are evidence of a satisfactory pre-use inspection. The Pre-use Inspection Record Tag is affixed to the crane control or general area. The tag must be completed for the shift the inspection was performed. If any of the items on the operational aid (Daily [Frequent] Overhead Crane/Hoist Inspection Checklist in the [FSH Guide: Lifting Safety](#)), including the annual inspection and preventive maintenance, are found to be deficient, the crane must be removed from service until the deficiencies are corrected.

Note: Retention of the completed Pre-use Inspection Record Tag after the applicable shift is not required.

If deficiencies or unsafe conditions are found, immediately tag the equipment "Not for Use" (yellow tag) and inform the Research Space Manager/Cognizant Space Manager (RSM/CSM). The crane will not be operated until deficiencies have been corrected and the crane restored to safe operating condition. Contact the [BNL Hoisting and Rigging Inspector](#) or designee to evaluate the deficiencies. All repairs will be made by properly trained HEMOs or contract mechanics only.

Note: The pre-use operational check (Daily [Frequent] Overhead Crane/Hoist Inspection Checklist in the [FSH Guide: Lifting Safety](#)) can be used to satisfy the regulatory requirements for both frequent and monthly inspections. Line organizations may use the Overhead Crane Monthly Inspection Report in the [FSH Guide: Lifting Safety](#) to manage their inspections.

6. **Periodic Inspections:** The owner of the Overhead Crane/Hoist, via the Research Space Manager/Cognizant Space Manager (RSM/CSM) for BNL-owned equipment, is responsible for ensuring the Periodic Inspections are current. The RSM/CSM must immediately tag the equipment "Not For Use" (Yellow Tag) and inform the BNL Hoisting and Rigging Inspector. The BNL Hoisting and Rigging Inspector or designee performs the Periodic Inspections. The inspector must determine whether deficiencies noted during inspection constitute a hazard and whether disassembly is required for additional inspection. The Periodic Inspection intervals must not exceed one year. Records of Periodic Inspections must be maintained by the BNL Hoisting and Rigging Inspector for at least 3 years. The color-coded BNL inspection tag must be attached to the equipment marked with the inspection due date.

7. The BNL Hoisting and Rigging Inspector submits a copy of the inspection report to the F&O Facility Project Manager or designee, responsible for corrective measures. If deficiencies are noted on critical components of the crane the equipment must be locked out (using a yellow lock and a "do not use" yellow tag) until the deficiency is repaired and the equipment is re-inspected.

8. **Preventive Maintenance:** The F&O Facility Project Manager is responsible for scheduling the preventive maintenance with the responsible supervisor, as required. **Overhead crane/hoists are permitted a grace period of up to 6 months after the due date for preventive maintenance. The overhead crane/hoists must be maintained before the end of the 6 month grace period.** Overhead cranes/hoists must be locked out (using a yellow lock and a "do not use" yellow tag) when the grace period expires if preventive maintenance has not been satisfactorily completed. Once locked out, the overhead crane/hoist may not be used until preventive maintenance is satisfactorily completed.

9. **Operation:** The supervisor ensures BNL and contractor overhead crane or hoist operators are trained and qualified for the equipment to be used (see the [Training and Qualifications](#) website). Prior to contractors using BNL equipment, they must show proof of operator qualification and an understanding of BNL's requirements with the concurrence of the Lifting Safety SME.

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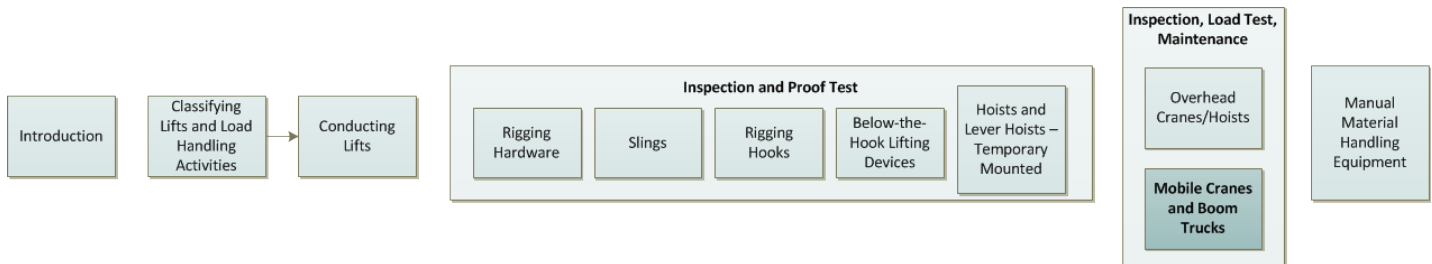
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This information applies to all contractors, owners, and operators of lifting, rigging, and material handling equipment used at Brookhaven National Laboratory.

Mobile Cranes and Boom Trucks

Inspection, Load Test Requirements, Preventive Maintenance, and Operating Practices for Mobile Cranes and Boom Trucks

This subsection specifies the inspection, testing, preventive maintenance, and operation requirements for the use of mobile cranes and implements the requirements of 29 CFR 1910.180, 29 CFR 1926 Subpart CC, and ASME B30.5.

If any equipment that is required to be certified (load tested) for use and documentation is not provided by the manufacturer, contact the Safety Engineering Group or [BNL Hoisting and Rigging Inspector](#) for conducting and documentation of the load tests. Load test performed by BNL staff must be witnessed by the [BNL Hoisting and Rigging Inspector](#), or designee and documented on the equipment specific load test report (see the Rigging Hardware Load Test Report in the exhibit [Load Test Reports](#)).

1. The HEMO Supervisor or designee is responsible for ensuring that

- The equipment is inspected and maintained as required;
- For BNL owned and rented equipment, the equipment information is sent to the F&O Facility Operations Center (FOC) for entry into their periodic maintenance and inspection system;
- An approved operator aid for the Daily/Monthly/Frequent Mobile Crane and Boom Truck Inspection Report in the [FSH Guide: Lifting Safety](#), is available with the equipment; and
- A Pre-use Inspection Record Tag (BNL Stk # S33867) is available in the equipment.

Note: Prior to use of contractor equipment on-site, the equipment must be inspected by an authorized BNL inspector. Contact the BNL Construction Equipment Engineer or call 631 344-8201; or contact the [BNL Hoisting and Rigging Inspector](#) or call 631 344-5456 to schedule the inspection--minimum 48-hour notice is required.

2. The F&O Facility Operations Center is responsible for ensuring that

- The equipment information provided by the equipment owner has been entered into the Facilities & Operations (F&O) Maintenance System for periodic maintenance and inspections for BNL owned and rented equipment;
- Equipment owners are notified in a timely manner that the annual inspection and preventive maintenance is due.

3. **Initial Inspection:** Prior to initial use, the [BNL Hoisting and Rigging Inspector](#) or designee must inspect and witness the load test for all new, reinstalled, altered, repaired, and modified cranes.

Inspection of altered, repaired, and modified cranes may be limited to the provisions affected by the alteration, repair, or modification, as determined by the BNL Hoisting and Rigging Inspector or designee. The Mobile Crane and Boom Truck Periodic Inspection Report in the [FSH Guide: Lifting Safety](#) can be used to document this inspection. After satisfactory inspection, the BNL annual inspection decal is affixed to the crane identifying the month and year of next inspection due.

4. **Load Test Requirements:** Each new production crane must be tested by the manufacturer to the extent necessary to ensure compliance with ASME B.30.5 and this subject area. Certified production crane test results should be made available by the vendor at time of receipt. The request for these reports must be addressed by the Buyers on the Purchase Requisition.

Prior to initial use, the [BNL Hoisting and Rigging Inspector](#) or designee must load test all cranes in which load sustaining parts have been modified, replaced, or repaired. A determination can be made by those persons if repairs made to a crane are extensive and require a rated load test or if repairs are routine maintenance and require only an operation test. Test weight must not exceed 110% of the rated capacity and must be accurate to within -5 percent, +0 percent of stipulated values. The load test must not be conducted in locations where the lift meets the definition of a "critical lift". The Mobile Crane Load Test Report (see the exhibit [Load Test Reports](#)) can be used to document the test. Written reports must be furnished by the inspector showing test procedures and confirming the adequacy of any repairs. Test reports are kept on file with the BNL Hoisting and Rigging Inspector for the life of the equipment and must be readily available.

5. **Daily Pre-Operational Check:** Operators or other designated personnel must visually inspect items listed on the Daily/Monthly/Frequent Mobile Crane and Boom Truck Inspection Report in the [FSH Guide: Lifting Safety](#) each day or prior to first use if the crane has not been in regular service. Operators or other designated qualified personnel examine any deficiency noted and determine whether they constitute a safety hazard.

Operators use the operator aid for the Daily/Monthly/Frequent Mobile Crane and Boom Truck Inspection Report in the [FSH Guide: Lifting Safety](#) and use the owner's manual as needed. If there are no deficiencies, the operator records their Life Number (Guest Number, if applicable) with the date on the Inspection Record (BNL Stk # S33867) affixed to the crane. The Inspection Record must be clearly accessible on the crane for the shift the inspection was performed. If any of the items on the operational aid (Daily/Monthly/Frequent Mobile Crane and Boom Truck Inspection Report in the [FSH Guide: Lifting Safety](#)), including the annual inspection and preventive maintenance, are found to be deficient, the crane must be removed from service until the deficiencies are corrected.

Note: Retention of the completed Inspection Record is not required.

If deficiencies or unsafe conditions are found, immediately tag the equipment "Not for Use" (yellow tag) and inform the HEMO Supervisor. The crane will not be operated until deficiencies have been corrected and the crane restored to safe operating condition. Contact the [BNL Hoisting and Rigging Inspector](#) to evaluate the deficiencies. All repairs will be made by properly trained HEMOs or contract mechanics only.

6. **Monthly Inspection:** The operator or other designated personnel must visually inspect the following items for damage, wear, or other deficiency that might reduce capacity or adversely affect the safety of the crane:

- Critical items such as brakes and crane hooks;
- Hoist ropes.

The Daily/Monthly/Frequent Mobile Crane and Boom Truck Inspection Report in the [FSH Guide: Lifting Safety](#) can be used to document this inspection and records are required. Records of the most recent report must be maintained with the equipment.

7. **Frequent Inspection:** The operator, or other designated personnel, visually inspect the crane at daily to monthly intervals. These inspections, in addition to the requirement in the Daily/Monthly/Frequent Mobile Crane and Boom Truck Inspection Report in the [FSH Guide: Lifting Safety](#), include the following: a) all control mechanisms for proper operation, excessive wear; b) all safety devices; c) rope reeving for noncompliance with manufacturer's recommendations; d) electrical apparatus for malfunctioning, signs of excessive deterioration and accumulation of excessive dirt or moisture; e) tires for recommended inflation pressure; f) boom sections for damage, deformed, or missing structural members or parts. Operators, or other designated qualified personnel, must examine any deficiency noted and determine whether they constitute a safety hazard and records are not required. If deficiencies are noted on critical components of the crane, the equipment must be locked out (using a yellow lock and a "do not use" yellow tag) until repaired and re-inspected. For such deficiencies, contact the BNL Hoisting and Rigging Inspector. Records of the Frequent Inspection are not required.
8. **Periodic Inspection:** The [BNL Hoisting and Rigging Inspector](#), or a person designated by the Facility & Operations' Environment, Safety, Health, Training & Quality Group, must perform a complete inspection of the crane. Inspection intervals must not exceed 12 months. In addition to the requirement in the Frequent Inspection (see step 4 above) and the Daily/Monthly/Frequent Mobile Crane and Boom Truck Inspection Report (see the [FSH Guide: Lifting Safety](#)) this inspection must include the Mobile Crane and Boom Truck Periodic Inspection Report (see the [FSH Guide: Lifting Safety](#)). If deficiencies are noted, copies of the report must be sent to the F&O (HEMO) Supervisor for corrective action. If deficiencies are noted on critical components of the crane the equipment must be locked out (using a yellow lock and a "do not use" yellow tag) until repaired and re-inspected. After the satisfactory completion of the Periodic Inspection, a BNL inspection tag dated with the inspection due date will be attached to the equipment. Dated and signed inspection records must be kept on file for three years with the BNL Hoisting and Rigging Inspector and MMC.
9. **Preventive Maintenance:** F&O FOC must provide notification to the C-AD and F&O responsible supervisors when preventive maintenance is required. It is the HEMO Supervisor's responsibility to ensure preventive maintenance is performed. Mobile cranes are permitted a grace period of up to one month after the due date for preventive maintenance. The crane must be maintained before the end of the one month grace period. Mobile cranes must be locked out (using a yellow lock and a "do not use" yellow tag) when the grace period expires if preventive maintenance has not been satisfactorily completed. Once locked out the mobile crane may not be used until preventive maintenance is satisfactorily completed.
10. **Training and Operations:** The supervisor ensures that BNL mobile crane and boom trucks operators are trained and qualified for the specific type of equipment in which they are operating. This training reflects the physical requirements and training criteria of the DOE-STD-1090, Chapter 6 - Personnel Qualifications & Training. BNL operator trainees can operate only under the direct supervision of a qualified operator. All Contractor operators of mobile cranes and boom trucks must have a current New York State crane operator's license for the specific type of equipment they are operating. The physical requirements and training criteria of the DOE-STD-1090, Hoisting and Rigging and ASME B30.5, Mobile and Locomotive Cranes standards must also apply.

Conduct of Operators: a) prior to use of equipment a verification that the BNL inspection tag date is current must be confirmed; b) operators must not engage in any practice that diverts their attention while operating a crane; c) each operator must be held responsible for those operations under their direct control; d) before leaving a crane unattended the operator must: 1) land any load on the hook; 2) disengage the master clutch; 3) set travel, swing, boom brakes, and other locking devices; 4) set controls in the natural or off position; 5) secure the crane against accidental travel and stop the engine.
11. **Contractor Mobile Crane and Rigging Gear:** Prior to coming on-site, all contractor cranes or boom trucks working at BNL must provide the [BNL Hoisting and Rigging Inspector](#) with a copy of the annual and monthly inspection documentation that reflects compliance with the OSHA 1910.180 and ASME B30.5. A Rigging Plan Worksheet (see the [FSH Guide: Lifting Safety](#)) describing the rigging gear to be used and the method of accomplishment must be submitted to the [BNL Hoisting and Rigging Inspector](#) for approval. This rigging plan must be submitted for review and approval at least four working days prior to the planned lift. The contractor must certify (sign off) on the rigging plan that their rigging gear complies with the OSHA, ASME and DOE inspection and proof test requirements.

Note: The [BNL Hoisting and Rigging Inspector](#) must be given a minimum of 48 hours notice to schedule the inspection of contractor's equipment. It is preferred this inspection be performed off-site or at the contractors facility.

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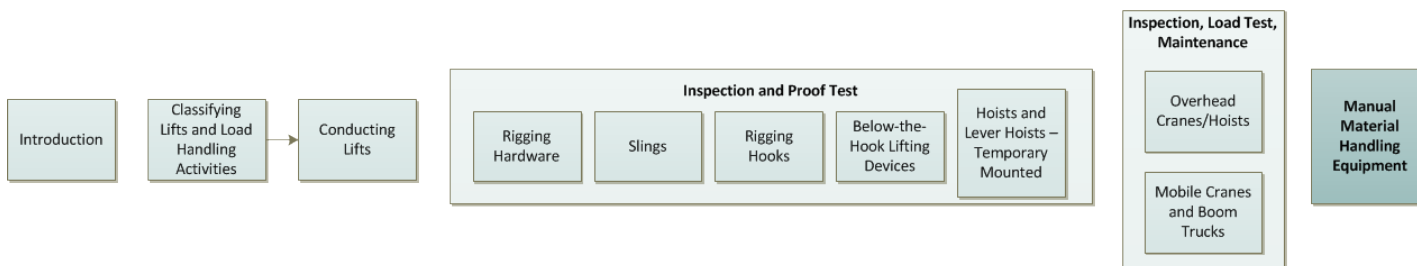
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SUBJECT AREA PROCEDURE CONTENT

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Lifting Safety Subject Area
Effective Date: Jan 16, 2018 (Rev. 9.0)
Periodic Review Due: Jan 16, 2023



This information applies to all contractors, owners, and operators of lifting, rigging, and material handling equipment used at Brookhaven National Laboratory.

Manual Material Handling Equipment

General Requirements for Manual Material Handling Equipment

This subsection provides the general requirements for the use of manual material handling equipment. These type of devices include table lifts and portable automobile lifting device (PALD). Contact the Lifting Safety SME to determine if these requirements apply to the equipment being used.

1. The owner of the material lifts must inspect, operate, and maintain manual material-handling equipment in accordance with manufacturer's recommendations. Scheduled inspections must be completed either by a qualified operator or a Department/Division designated person. Refer to the equipment manufacturer's Parts and Service Manual for recommended inspection/maintenance checklist items and frequencies.

If the manufacturer's maintenance or inspection procedures are not used, the owner will document alternate procedures and submit them to the BNL Lifting Safety Committee for concurrence.

2. The owner must ensure that operators are authorized, and those operators have read, understand and comply with the manufacturer's operator's manual.
3. The owner and operators must maintain copies of the operator's manual with the equipment or have them readily available to operators. Maintain all safety and or warning decals posted on the equipment.

Note: See the manufacturer's manual for required labels and replacement.

4. Operators will observe basic safety principles while using equipment, which include

- Performing the Pre-operation Inspection and functional test prior to use.
- Inspecting the work site and the material to be lifted.
- Avoiding hazardous situations.
- Using the equipment only as intended by the manufacturer.



Failure on the operator's part to follow the instructions and safety precautions of the equipment's Operator's Manual, departmental procedures, or the Lifting Safety Subject Area, may result in damage to equipment and/or serious personnel injury.

Inspection

This subsection provides the requirements for the inspection of manual material handling equipment.

1. **Initial Inspection:** The owner is responsible for ensuring that the equipment has operational/maintenance manuals, posted load ratings, and is compliant with the requirements in the [Suspect/Counterfeit Items](#) Subject Area. The owner is also responsible for assembling the unit per the manufacturer's requirements.
2. **Pre-Operational/Functional Inspection:** The Pre-operational inspection is a visual inspection performed by the operator prior to the day's first use or each work shift. This inspection is designed to discover if anything is visibly wrong with equipment prior to an operational test. If the manufacturer's manual is not available or does not provide a pre-operational/functional inspection checklist, the Manual Material Handling Equipment Pre-operational/Functional Inspection Checklist in the [FSH Guide- Lifting Safety](#), may be used as an operation aid to perform these inspections.
3. **Inspection Deficiencies:** If the operator experiences any deficiencies or malfunctions during the Pre-operational/Functional Inspection, the equipment must be taken out of service. The operator must give notification to his immediate supervisor of the deficiencies noted. The supervisor will have the Department/Division perform the repair, or issue a Work Order with F&O Facility Operations Center (FOC) for repairs.

After repairs are completed the operator must perform a Pre-operational/Functional Inspection before putting the equipment into service.

Operating

This subsection provides the requirements for operating manual material handling equipment.

1. BNL and contractor operators of manual material handling equipment must read and understand the operator's manual, and check that it is complete and accessible if needed. **Do not operate** equipment unless you learn and practice the principles of safe equipment operation.
 - Read and understand the operator's manual, and check that it is complete and accessible if needed.
 - Be sure that all decals are legible and in place.
 - Ensure that attachments have been approved by the manufacturer and are installed and operated correctly.
 - Verify that the manufacturer's data plate weight capacity is adequate for the lift.
2. **Do not operate** equipment unless you learn and practice the principles of safe equipment operation.
 - Avoid hazardous situations.
 - Perform a Pre-operational/Functional Inspection.
 - Inspect the workplace for hazardous conditions.
 - Ensure working surfaces are in adequate condition and rated for the load.
 - Inspect the material to be lifted for its weight, center of gravity, condition of material. When moving loose material, individual pieces, etc., make sure they are wrapped securely or otherwise contained to prevent falling.
 - Only use the material handling equipment as it was intended by the manufacturer.

Note: If the Operator's Manual requirements conflict with the requirements of this subject area, the requirements of the Operator's Manual take precedence.

If more than one operator is expected to use a machine at different times in the same work shift, each operator must follow all safety rules and instructions in the operator's manual.

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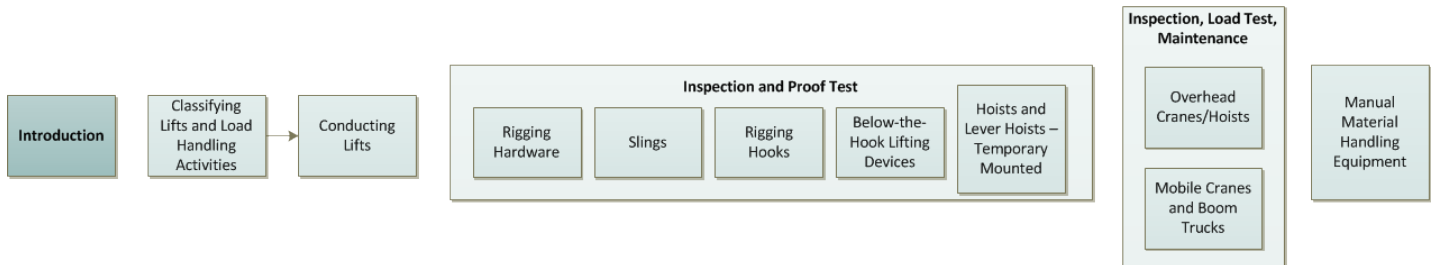
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Reporting Obligations

None

Active Internal Waiver(s)

ID	Waiver	Supporting Document	Additional Files
2015-02	ACTIVE AFFIRMED 2017 Photon Sciences Internal Waiver: Lifting Safety Subject Area, Periodic inspection of Overhead Bridge/Gantry/Jib Cranes - PERMANENT		AFFIRMED 2017 2015-02 biannual 2017.pdf AFFIRMED 2017 2015-02 biannual 2017(MG).pdf

External/Internal Requirements

BNL has to abide by all applicable Prime Contract clauses, DOE directives, industry standards, as well as Federal, state, and local laws. BNL develops its policies and procedures based on an evaluation of these external requirements. This Subject Area implements the following requirements:

Requirement Number	Requirement Title
10 CFR 830, Subpart A	Energy, Nuclear Safety Management, Quality Assurance Requirements
29 CFR 1910	Labor/Occupational Safety and Health Standards
29 CFR 1926	Labor/Safety and Health Regulations for Construction
ANSI/ASME B 30 Series	American National Standards Institute (ANSI)/American Society of Mechanical Engineers (ASME)/ASME/ANSI B30 Crane and Hoist Series of Standards
ASSE A 10.5; ANSI/ASSE A 10.5 (1969) IIBR 29 CFR 1926.552	Safety Requirements for Material Hoists [IBR 29 CFR 1926.552]
AWS D 1.1D/AWS D 1.1M (2002) IIBR 29 CFR 1926.1436	Structural Welding Code - Steel [IBR 29 CFR 1926.1436]
BSA Contract No. DE-SC0012704 - Clause C.4	Statement Of Work
BSA Contract No. DE-SC0012704 - Clause H.27 (ACT)	Non-Federal Agreements for Commercializing Technology (Pilot) (ACT)
BSA Contract No. DE-SC0012704 - Clause I.131 (DEAR 970.5223-1)	INTEGRATION OF ENVIRONMENT, SAFETY, AND HEALTH INTO WORK PLANNING AND EXECUTION (DEC 2000)
CMAA 1B61: CMAA Specification 61	Specifications for Electric Overhead Traveling Cranes [IBR 29 CRF 1910.179]
DOE-STD-1090-07	Hoisting and Rigging
ISO 11660-2 (1994) IIBR 29 CFR 1926.1423	Cranes - Access, Guards, and Restraints Part 2L Mobile Cranes [IBR 1926.1423]
ISO 11660-3 (2008) IIBR 29 CFR 1926.1423	Cranes - Access, Guards, and Restraints Part 3: Tower Cranes [IBR 29 1926.1423]
O 414.1D Admin Chg 1 (May 8, 2013)	Quality Assurance

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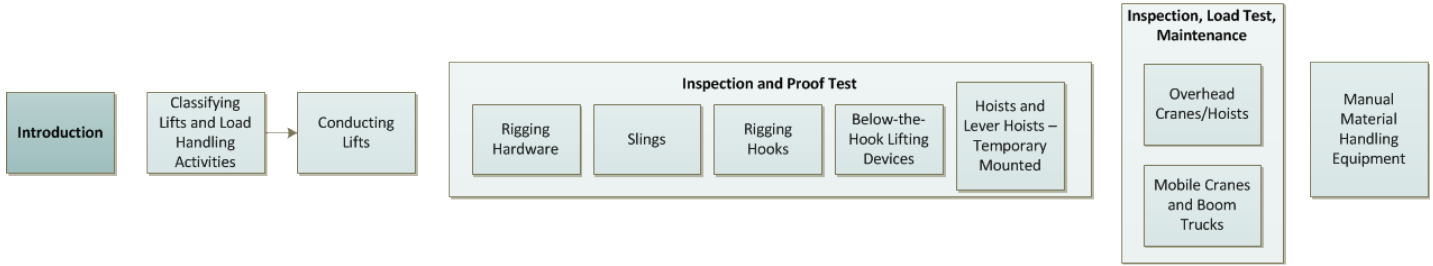
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Training

This section provides the training requirements for riggers and signal person activities including OSHA CFR 1926 Construction, 1910. General Industry. The above requirements must comply with DOE-STD-1910 Hoisting & Rigging, OSHA 1926 Subpart CC Cranes & Derricks in Construction and ANSI A10.42 Safety Requirements for Rigging Qualifications.

Incidental or Ordinary (Incidental) Rigging

JTA: XX-XXX Technicians and BNL Craft Personnel			
Course Title	Course No.	Delivery Method	Requalification Period (months)
Basic Rigging for Crane Operators	TQ-RIG-C	Web-based	No requal required
Rigging and Crane Practical TQ-RIG-P	TQ-RIG-P	Web-based	36

JTA: XX-XXX Signal Person			
Course Title	Course No.	Delivery Method	Requalification Period (months)
Basic Rigging for Crane Operators	TQ-RIG-C	Web-based	No requal required
Basic Rigging Workbook			

BNL Site Resources Riggers

Training: The Supervisor ensures BNL riggers/signal persons and Contractor riggers/signal persons are trained and qualified for the task at hand and in the selection, inspection, cautions to personnel, effects of environment, and rigging practices.

JTA: XX-XXX Provisionally Qualified			
Course Title	Course No.	Delivery Method	Requalification Period (months)
Basic Rigging for Crane Operators	TQ-RIG-C	Web-based	No requal required
Rigging and Crane Practical TQ-RIG-P	TQ-RIG-P	Web-based	36

JTA: XX-XXX Qualified Rigger			
Course Title	Course No.	Delivery Method	Requalification Period (months)
Basic Rigging for Crane Operators	TQ-RIG-C	Web-based	No requal required
Rigging and Crane Practical TQ-RIG-P	TQ-RIG-P	Web-based	36
Plus a Forty-Hour Basic Rigging Course or Rigger/Signal Person Certification Program		Provided by a Nationally Recognized Certifying organization. Crane Institute of America (CIA), National Commission for the Certification of Crane Operators (NCCCO), or equivalent.	

JTA: XX-XXX Signal Person			
Training	Delivery Method	Requalification Period (months)	
Qualified/certified signal person training for Site Resources Riggers.	Provided by a Nationally Recognized Certifying organization. Crane Institute of America (CIA), National Commission for the Certification of Crane Operators (NCCCO), or equivalent.		Note: Staff previously qualified outside of

Contractor Personnel

The BNL Contractor POC ensures that the Contractor performing Rigging/Signal Person duties is qualified/certified by a training program that is a Nationally Recognized Certifying organization (CIA, NCCCO) and has met the basic training qualification requirements.

Note: The Contractor's HASP or SWP needs to identify how the Contractor will meet this requirement.

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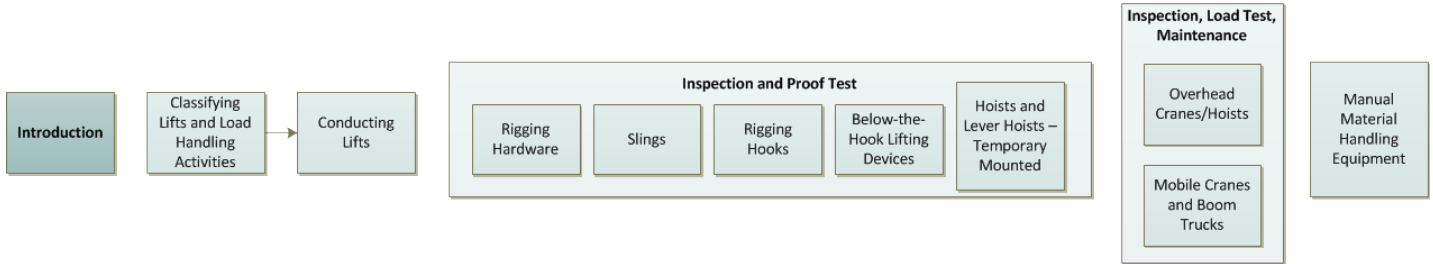
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Revision History

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Revision Number	Revision Type	Revision Date	Revision Description
9.0	Major	01/16/2018	<p>This was a complete review and major revision of the Lifting Safety Subject Area into the new format. The subject area includes procedures for conducting ordinary, pre-engineered, and critical lifts. It discusses the requirements for</p> <ul style="list-style-type: none"> • Conducting a lift assessment to determine the type of lift; • Preparing a Critical Lift Evaluation Form (CLEF) and a Critical Lift Plan or Pre-engineered Lift Procedure; • Reviewing and approving the plan; • Conducting lifts; • Inspecting, testing, and maintaining lifting and material handling equipment; • Operating, inspecting, and maintaining manual material handling equipment. <p>The requirements of F&O Procedure DF-ESH-703 were incorporated into the subject area. The Pre-Use Record Inspection Record Tag (BNL Stk #S33867) is used to record the monthly crane inspection. The Critical Lift Evaluation Form (CLEF) and the Load Test Reports remain in the subject area and other exhibits and forms were migrated to the ESH Guide: Lifting Safety.</p>
8.0	Major	04/07/2014	<p>This was a major revision to remove the internal requirement for the Deputy Director for Operations (DDO) to review and approve Critical Lifts in the section Conducting Critical and Pre-engineered Lifts.</p>
7.2	Minor	11/22/2013	<p>This was a minor revision to section 2. Conducting Ordinary Lifts and Operating Material Handling Equipment, step 1, and section 4. 6 Inspection, Load Test Requirements, Preventive Maintenance, and Operating Practices for Mobile Cranes and Boom Trucks, step 6, to have operators who perform the check to record their Life Number (Guest Number, if applicable) with the date on the Pre-Use Inspection Record Tag.</p>
7.1	Minor	10/17/2012	<p>This was a minor revision to modify the Inspection Record stock number from BNL Stk # S33865 to BNL Stk # S33867 in step 1 of section 2. Conducting Ordinary Lifts and Operating Material Handling Equipment and steps 1, 2, and 6 in subsections 4.5 and 4.6 of section 4. Inspecting and Maintaining Lifting and Material Handling Equipment. Step 2 in subsection 6.4 of section 6. Manual Material Handling Equipment was modified to remove "(i.e., Facilities & Operations HEMO or Equipment Manufacturer)".</p>
7.0	Major	08/30/2012	<p>The subject area was completely reviewed and revised to address findings from a BHSO assessment of Institutional Phase II Material Handling Operations and Equipment and the Building 701 (BGRR) Scissor Lift Fall Corrective Action Plan. Other updates and clarifications were also made. Significant changes include the following</p> <p>BHSO Assessment 2010</p> <ul style="list-style-type: none"> • Defined the grace period of up to 6 months after the due date for preventive maintenance of cranes used to conduct critical and ordinary lifts and the requirements for removal from service after grace period; • Added the responsibility for maintaining record of monthly inspection, and removal from service if past due (owner/department); • Added requirements for hand signals and the new exhibits Standard Hand Signals for Mobile Cranes and Standard Hand Signals for Overhead and Gantry Cranes. <p>Scissor Lift Fall Corrective Action Plan</p> <ul style="list-style-type: none"> • Equipment information for BNL owned and rented cranes must be entered into Maximo (periodic maintenance and inspection system); • Added requirements on removal from service when inspection is past due; • F&O Facility Operations Center (FOC) is responsible for ensuring that equipment owners are notified in a timely manner when cranes are due for inspection and maintenance; • Added requirements for operator aid, inspection record tag, and operator response for deficiencies, including past due inspection; • Added requirements for crane operators and signalmen for construction contractors (OSHA 1926 Subpart CC, Cranes & Derricks in Construction). <p>Clarifications</p> <p>Added requirements for consideration of spotters and tag line personnel in step 4 of the section Conducting Critical and Pre-engineered Lifts.</p> <p>Additional changes</p> <ul style="list-style-type: none"> • Added the new section Manual Material Handling Equipment to address manual material handling equipment; • Updated the color coding for inspections for the next five years in the section Inspecting and Maintaining Lifting and Material Handling Equipment; • Updated the Rigging Plan Worksheet;

			<ul style="list-style-type: none"> Updated the Periodic Inspection of Overhead Bridge/Gantry/Jib Cranes in the Inspection Reports; The following terms and their definitions were added to the Definitions section: hoist, owner, and Portable Automotive Lifting Device (PALD).
6.6	Minor	12/01/2010	This was a minor revision to update the Periodic Inspection of Bridge/Gantry/Monorail/Jib Cranes report.
6.5	Minor	10/01/2010	This is a minor revision to incorporate changes resulting from the implementation of Integrated Facility Management (IFM). Building Manager was replaced with F&O Facility Project Manager throughout and F&O Facility Project Manager was added to the section Definitions.
6.4	Minor	04/26/2010	This minor revision removes requirements/recommendations for use on aerial lifts and references the newly published Aerial Lifts Subject Area. Aerial lift best practices were deleted from the exhibit Safe Lifting and Operating Practices and moved to the Safety and Health Services Fall Protection Program Area.
6.3	Minor	03/02/2010	The following changes were made in response to the BHSO Material Handling Operations and Equipment Assessment: A grace period was incorporated for preventive maintenance of overhead cranes/hoists and mobile cranes and boom trucks in the section Inspecting and Maintaining Lifting and Material Handling Equipment. In the section Conducting Critical and Pre-engineered Lifts, the following clarification was made to the Required Procedure: A Pre-engineered Lift Procedure must address the same elements as a Critical Lift Plan. The Overhead Crane Monthly Inspection Checklist was added as a new exhibit to the subject area.
6.2	Minor	03/21/2008	This subject area was revised to clarify the classification of crane Proof Tests. Proof Tests are not Critical Lifts. Proof Tests are engineering tests that are conducted under controlled conditions by the BNL Hoisting & Rigging Inspector or members of the Lifting Safety Committee only. The following were revised: Classifying Lifts, Lift Assessment, and Critical Lift Evaluation Form.
6.1	Minor	12/11/2007	Step 5 in subsection 4.2 in the section Inspecting and Maintaining Lifting and Material Handling Equipment, and the following inspection reports and load test reports were revised: the BNL Crane/Hoist Hook Inspection Report; Periodic Inspection of Bridge/Gantry/Monorail/Jib Cranes; Bridge, Wall, Gantry Crane Load Test Report; Chain Sling Load Test Report; Hoist Load Test Report; Mobile Crane Load Test Report; Rigging Accessories Load Test Report and Inspection; and Wire Rope Sling Inspection and Load Test Report. These revisions were made because of changes to ASME B30.10 Hooks and to DOE-STD-1090-07 Standards. The revisions were made on the wear and throat opening criteria: 1. distortion or twist from 10% of the plane of the hook to "Any Visible Distortion from the original plane;" 2. throat opening of the hook from 15% of the original to "distortion causing an increase in throat opening of 5% not to exceed ¼" of the original throat opening." These changes only affect the BNL Hoisting and Rigging Inspector.
6.0	Major	07/31/2007	This was a major revision to the Lifting Safety Subject Area to implement corrective and preventive actions resulting from suspect counterfeit (SCI) bolts found during crane inspections. In the section Inspecting and Maintaining Lifting and Material Handling Equipment, subsection Inspection, Load Test Requirements, and Operating Practices for Overhead Cranes/Hoists, the step for Initial Inspection was revised to include inspection of bolts for SCI. In the step for Periodic Inspection, loose, missing, or SCI bolts were included. The exhibit DOE Headmark List was added to provide a list of unacceptable bolt headmarks. The Inspection Reports for Periodic Inspection of Bridge/Gantry/Monorail/Jib Cranes and Mobile Crane and Boom Truck Periodic Inspection Report were revised to incorporate a reference area for the inspection of SCI bolts. The following Load Test Reports were revised to incorporate a reference area for the inspection of SCI bolts: Mobile Crane Load Test Report; Lifting Bars and Spreaders Load Test Report; Hoist Load Test Report; and Bridge, Wall, Gantry Crane Load Test Report. A line was provided for the inspector's name in print, in addition to the existing signature line for the revised Inspection Reports and Load Test Reports. The Safety Awareness Certificate (SAC) was removed from the subject area since it is no longer issued to equipment operators for safety awareness training. The BNL training records database entry is the official record to show current qualification status.
5.1	Minor	07/25/2007	In the exhibit Classifying Lifts, the link to the exhibit Screening Guidelines for Work Planning & Control and Application of the Quality Graded Approach in the Work Planning and Control for Experiments and Operations Subject Area was changed to the exhibit Application of the Graded Approach in the Graded Approach for Quality Requirements Subject Area.
5.0	Major	01/18/2007	The section Operating Powered Industrial Trucks (Forklifts) was rescinded and replaced by the Forklift Safety Subject Area. The following forms were also deleted: • Fork Inspection Log • Forklift Attachment Capacity Request Form • Powered Industrial Forklift Information • Under Inspection Reports: Electric DC Motor Forklift, Internal Combustion Engine Forklift, and Periodic Inspection Report for Forklifts. The Do's and Don'ts on forklifts were deleted from the exhibit Safe Lifting and Operating Practices. Finally, in the section Inspecting and Maintaining Lifting and Material Handling Equipment, language on the inspection tag color code was clarified to stop users' confusion over the inspection tag color and date. The following was changed in subsections 4.3, 4.4, 4.5, and 4.6 from "The color code for all hoisting and rigging equipment must rotate annually, as follows: 2006-Blue; 2007-Orange; 2008-Green; 2009-Red; and 2010-Blue, etc." to: "The inspection tag color code for all hoisting and rigging equipment inspections rotates annually. The inspection tag color code is dependent on the year the equipment is inspected as follows 2006-Blue; 2007-Orange; 2008-Green; 2009-Red; and 2010-Blue; etc."
4.0	Major	11/09/2006	This revision to the Lifting Safety Subject Area defines proof testing and certification requirements for hoisting and rigging equipment used for Critical Lifts. It also defines the inspection requirements for hoisting and rigging equipment and includes specific requirements for frequency and documentation. It clarifies the crane and hoist inspection tagging system by defining the period for which the inspections are valid, and requires that the tag must be marked with the expiration date for the equipment. Finally, it defines inspection, training, and operation requirements for Contractor hoisting and rigging equipment. The section Inspecting and Maintaining Lifting and Material Handling Equipment was revised to ensure compliance with the requirements and includes the following modified or additional subsections: 4.1 Inspection and Proof Test Requirements of Rigging and Material Handling Hardware; 4.2 Inspection and Proof Test Requirements of Rigging Hooks; 4.3 Inspection, Proof Test Requirements, and Operating Practices for Slings; 4.4 Inspection and Proof Test Requirements of Below-the-Hook Lifting Devices; 4.5 Inspection, Load Test Requirements, and Operating Practices for Overhead Cranes/Hoists; 4.6 Inspection, Load Test Requirements, and Operating Practices for Mobile Cranes and Boom Trucks; 4.7 Contractor's Heavy Construction Equipment; and 4.8 Maintaining Lifting and Material Handling Equipment. The exhibit Weather Factors was revised. The Rigging Hardware Inspection/Removal Criteria and the Recognized Manufacturer Markings and Fork Inspection Log exhibits were added to the subject area. The exhibit Slings: Inspection Criteria was revised to rename existing files (Alloy Steel Chain Sling Inspection and Removal Criteria was formerly Removal and Repair; Inspection Criteria for Roundslings was formerly Round Slings; Inspection Criteria for Web Slings was formerly Web Slings; and Inspection Criteria for Wire Rope Slings was formerly Wire Rope Slings) and add the following new ones: Daily (Frequent) Sling Inspection Checklist; Inspection Criteria for Metal Mesh Slings; and Inspection Criteria for Twin-Path Slings. The Overhead Crane/Hoist Inspection Checklist was moved from Inspection Reports, revised, and renamed the Daily (Frequent) Overhead Crane/Hoist Inspection Checklist. The Frequent Inspection Guide for Aerial Lifts and the Periodic Inspection Report for Aerial Lifts were deleted from the exhibit Inspection Reports. The remaining forms in Inspection Reports were updated and/or renamed and the following inspection reports were added: BNL Sling and Accessory Initial and Periodic Inspection Report and Rigging Hardware Initial/Periodic Inspection Report. The Rigging Plan Worksheet was revised. The existing Load Test Report was unchanged and the following new reports were added: Bridge, Wall, Gantry Crane Load Test Report; Chain Sling Load Test Report; Hoist Load Test Report; Lifting Bars and Spreaders Load Test Report; Mobile Crane Load Test Report; Rigging Accessories Load Test Report and Inspection (shackles, rings, eye-bolts, turnbuckles, etc.); Synthetic Web and Roundslings Load Test Report; and Wire Rope Sling Inspection and Load Test Report. The Definitions section was revised and the following terms were added and defined: crane service, cranes not in regular service, designated person, manufacturer, proof load, proof test, and sling component.
3.3	Minor	02/21/2006	The Frequent Inspection Guide for Forklifts (Electric) and the Frequent Inspection Guide for Forklifts (Internal Combustion) forms were deleted from the exhibit Inspection Reports. The Electric (DC) Motor Forklift and the Internal Combustion Engine Forklift forms were moved to the exhibit Inspection Reports.
3.2	Minor	01/12/2006	Changed links to retired RAD subject areas to direct user to radiological control procedures.
3.1	Minor	11/10/2005	Section 6 - Step 6 was revised to properly designate the operator of the Forklift as the person responsible to conduct the pre-use inspections, instead of the manager.
3.0	Major	10/18/2005	Section 1 was re-written and expanded to include considerations for the Lift Plan, and what is to be covered in the Pre-lift Meeting. Section 2 was also revised to describe what is covered in the Pre-Lift Meeting. Section 3 now includes a note that all below-the-hook gear to be used on Critical Lifts must be certified by the manufacturer to have been proof-tested to 200% of the rated capacity. Step 2 refers specifically to visual inspections. Step 3 addresses load testing. Steps 4 and 5 were added. Section 4 and its subsections were revised to include specifics about inspections and their required frequencies. Section 4.1 includes initial and frequent inspection requirements, who does the inspections, and related recordkeeping. NOTE: Before each use, and prior to each new job, the operator or other qualified person must conduct a visual inspection of the lifting equipment. Documentation is up to the Line and is not mandatory unless deficiencies are found. Section 4.2 clarifies annual and periodic inspections and load test specifics, and contains additional steps on how to follow up and recordkeeping. NOTE: The BNL Hoisting and Rigging Inspector conducts the annual inspections and these are formally tracked. Operators and other qualified persons conduct monthly inspections of overhead cranes. Dated and signed records are mandatory. Section 4.4 was expanded to include reference to addressing issues involving modified equipment. NOTE: Only a qualified engineer can give approval for any modification; the user determines the frequency of maintenance based on manufacturer's recommendations, and Section 6 Operating Powered Industrial Truck (Forklifts) was added. It refers to types, attachments, modifications and free rigging from tines, and to operator protection. One new definition, qualified person, was added. On the Forms and Exhibits: The allowable percentage of rated capacity on overhead and mobile cranes before becoming a Critical Lift was revised. The Checklist for Lift Planning now includes a reference to load securement. Some inspection forms were changed. New exhibits on Slings: Inspection Criteria; Examples on CLEFs for Mobile and Overhead Cranes; and Safe Lifting and Operating Practices were added. Two new forms were added: Forklift Attachment Capacity Request Form and Powered Industrial Truck Information.

2.0	Major	04/19/2004	The subject area was revised to include the following procedures: Conducting ordinary lifts and operating material handling equipment; Certifying material handling equipment; Inspecting and maintaining lifting and material handling equipment; Inspecting shielding blocks. The sections Conducting Ordinary Lifts and Operating Material Handling Equipment; Certifying Material Handling Equipment for Use; Inspecting and Maintaining Lifting and Material Handling Equipment; and Inspecting Shielding Blocks were added. The exhibit Critical Lift Plan was renamed the Critical Lift Plan and Pre-engineered Lift Procedure and includes the lift plan for a pre-engineered lift. The new exhibits AGS Shielding Block 24' x 2' Roof Beam and Criteria for Resubmittal of Pre-engineered Lifts were added. The Critical Lift Evaluation Form (CLEF) was revised to reflect an increase in the load for mobile crane rated capacity from greater than 85% to greater than 95% and to include a documented Critical Lift Plan or Pre-engineered Lift Procedure in the lifting operation. The new forms Electric (DC) Motor Forklift, Inspection Reports, Internal Combustion Engine Forklift, Load Test Report, Rigging Plan Worksheet, and Safety Awareness Certificate (SAC) were added. This subject area revision replaces the remaining parts of ES&H Standard 1.6.0, Material Handling: Equipment & Procedures. It also replaces ES&H Standard 1.6.1, Material Handling: Operator Training and Qualifications.
1.1	Minor	01/14/2003	Minor Change.
1.0	Major	05/20/2002	The subject area describes the procedures for conducting critical and pre-engineered lifts at BNL. It also defines the requirements for conducting these lifts. It discusses the procedures for Conducting a lift assessment to determine the type of lift; Preparing a Critical Lift Evaluation Form (CLEF) and a Critical Lift Plan; Reviewing and approving the plan. This subject area meets the requirements of DOE Standard Hoisting and Rigging (DOE-STD-1090-2001), and it replaces parts of ES&H Standard 1.6.0, Material Handling: Equipment & Procedures that described critical and pre-engineered lifts.

NOTE: The dates for "Major Revisions" match the Subject Area Effective Date. Major and/or Minor revisions may not always match with the "Last Modified Date", since this date could reflect changes to links or spelling. Records of changes are maintained in the SBMS documentation for each subject area.

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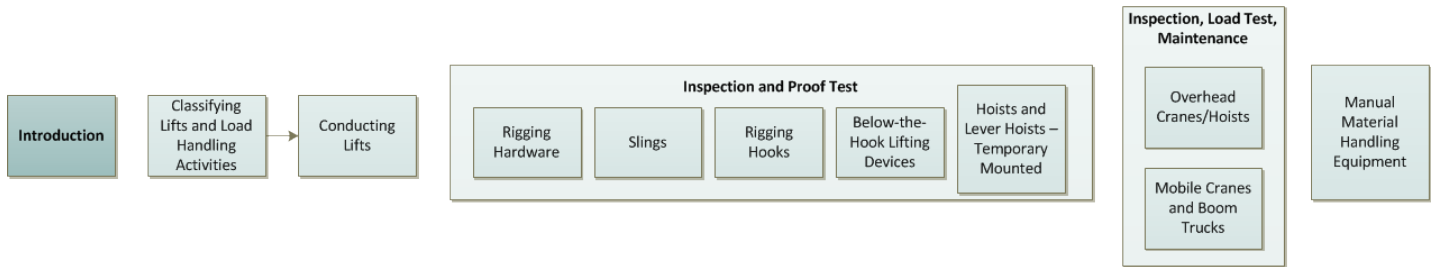
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DEFINITION CONTENT

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Definitions

Term	Definition
crane service	<p>Crane service is defined as the following:</p> <p>Normal Service – operating at less than 85% of the rated capacity and not more than 10 lift cycles/hr.</p> <p>Heavy Service – operating at 85 to 100 % of rated capacity or in excess of 10 lift cycles/hr as a regular specified procedure.</p> <p>Severe Service – operating at normal or heavy service under abnormal operating conditions (i.e., extreme temperatures, corrosive atmospheres).</p>
cranes not in regular service	<p>Cranes not in regular service is defined as the following: a) cranes that have been idle for a period of 1 month or more but less than 6 months, must be inspected according to the requirements of the Monthly and Frequent Inspections; b) cranes that have been idle for a period of 6 months or longer must be inspected according to the requirements of the Periodic Inspection, prior to being placed back into service.</p>
critical lifts	<p>Lifting operations that require confirmation of engineering, or merit additional engineering input. These lifts could be either ordinary lifts or pre-engineered lifts, but with additional hazards (e.g., extremely heavy loads, confined spaces, lifting over unprotected equipment). Parts, components, assemblies, or lifting operations are so designated because the effect of their being dropped, upset, or in a collision could</p> <ul style="list-style-type: none"> • Result in damage which could significantly delay the work scheduled or significantly affect the program, such as the loss of vital data; • Cause undetectable damage resulting in future operational or safety problems; • Result in a significant release of radioactivity, other hazardous material, or other undesirable conditions; • Present a potentially unacceptable risk of injury to personnel or adverse health impact (on-site or off-site); or • Require exceptional care in handling because of size, weight, close-tolerance installation, and high susceptibility to damage, based on the judgment of personnel. <p>These lifts must be made by F&O riggers or by contractors that use a professional rigging firm, or employ professional riggers, with exceptions to be made by the Lifting Safety Committee on a case-by-case basis. These lifts may also need engineering support as deemed necessary.</p>
designated person	A person who is selected or assigned by the employer or employer’s representative as being competent to perform specific duties.
F&O Facility Project Manager	<p>Manages and operates specific facility(s) within a designated complex area, related equipment and systems; ensuring resolution of problems, maintaining safe and reliable operations. Serves as the single point of contact for the execution of the obligations agreed to between the approving parties of the Facility Use Agreements (FUA).</p> <p>Note: This is not a one to one replacement of all the responsibilities of the former Building Manager, but contains many of the Building Managers’ responsibilities as described in the Building Manager R2A2.</p>
hoist	A machinery unit that is used for lifting or lowering a freely suspended (unguided) load.
manufacturer	The entity responsible for the physical production of an item.
ordinary lifts	<p>Lifts that involve the use of basic lifting, hoisting, rigging, equipment, e.g., a crane, forklift truck, or manual hoist (suspended from dedicated lifting structures such as pad eyes or runway beams) directly above the load. The load (item being lifted) would also be required to have certified lifting points, or be considered routine, or relatively easy to lift using slings. These include what DOE calls pre-engineered production lifts.</p> <p>Contractors working at BNL must submit a Rigging Plan Worksheet to the BNL Hoisting and Rigging Inspector. The rigging plan and equipment to be used must be approved by the BNL Hoisting and Rigging Inspector before use at BNL.</p>
owner	The Department/Division that is responsible for the custody, control, use, maintenance, and repair of the powered industrial truck, whether owned or leased.
person-in-charge (PIC)	<p>A PIC is appointed by the responsible manager or designee to direct and supervise the lifting operation. The PIC must be present during the entire lifting operation and must have experience in handling similar types of equipment. The designated PIC, when required for a Critical or Pre-engineering Lift, may be either</p> <ul style="list-style-type: none"> • A supervisor familiar with critical lift operations; or • A person with special knowledge of the equipment and handling.

portable automotive lifting device (PALD)	Any one of the various types of portable automotive lifting devices, including <ul style="list-style-type: none"> (a) hydraulic hand jacks (b) transmission jacks (c) engine stands (d) vehicle support stands (e) emergency tire changing jacks (f) upright type mobile lifts (g) service jacks (h) wheel dollies (i) shop cranes (j) swing type mobile lifts (k) scissors type mobile lifts (l) auxiliary stands (m) automotive ramps (n) high reach supplementary stands (o) fork lift jacks (p) high reach fixed stands (q) vehicle transport lifts (r) attachments, adapters, and accessories.
pre-engineered lifts	A lift, or group of lifts, that are repetitive, and which meet(s) the definition of a critical lift. However, if it can be demonstrated through the use of tooling, fixtures, sketches, and analyses, with written procedures that the possibility of dropping, upset, or collision can be reduced to an acceptable level, as determined by the Lifting Safety Committee, the lift may be designated as a pre-engineered lift.
proof load	The specific load applied in performance of the proof test.
proof test	A nondestructive load test made to a specific multiple of the rated load of a crane or rigging gear.
qualified person	A person who has a recognized degree, certificate, professional standing, or extensive knowledge, training, and experience that can successfully demonstrate the ability to resolve problems relating to the subject matter and work. The cognizant manager has the right to approve or reject based on the person's qualifications.
slings component	Hardware at the end of a sling.

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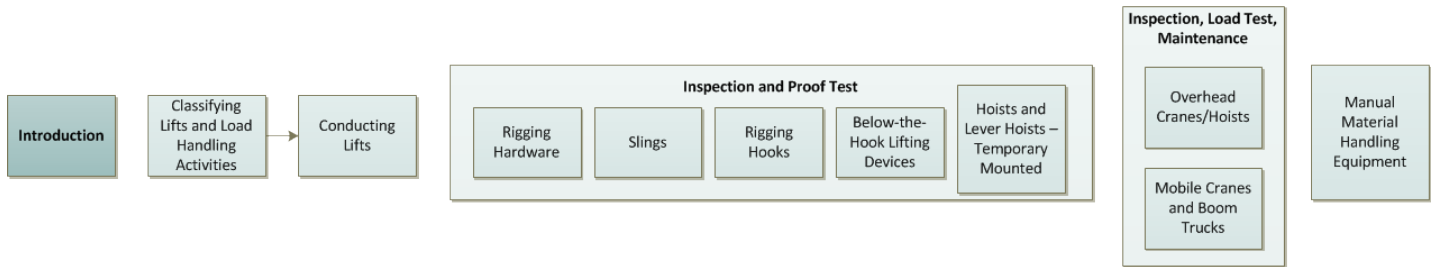
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LESSONS LEARNED CONTENT

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Lessons Learned

BNL's Lessons Learned Program supports ongoing learning by collecting and sharing work experiences and good practices. This allows us to better understand risks and hazards and develop strategies to control them. Many managers share selected Lessons Learned with their staff at daily briefings and morning meetings to update everyone's knowledge and skills. The Program draws information from BNL, the DOE complex, and private industry. For more, [see the BNL Lessons Learned Program website](#).

Here is a selection of recent Lessons Learned related to this particular Subject Area:

Title	Date
Failure to Call a Work Time Out Results in Lift Limit Violation and Near Miss to an Injury	Jul 22 2011
From CNS Y-12: Equipment Damaged during Offloading	Nov 30 2015
Improper Chafing Protection Causes Sling Failure	Jan 18 2002
Improper Material Handling Results in Near Misses	Jun 06 2006
Near Miss - Failure of Forklift Chain that Controls Tine Movement and Stabilization	Feb 26 2001
Quick Read Lessons Learned - From Oak Ridge National Laboratory: Suspended Load safety	Mar 21 2013
Rigging, Lifting, Material Handling Events at Commercial Nuclear Stations	Oct 17 2006
Round Sling Inspection	Feb 09 2007

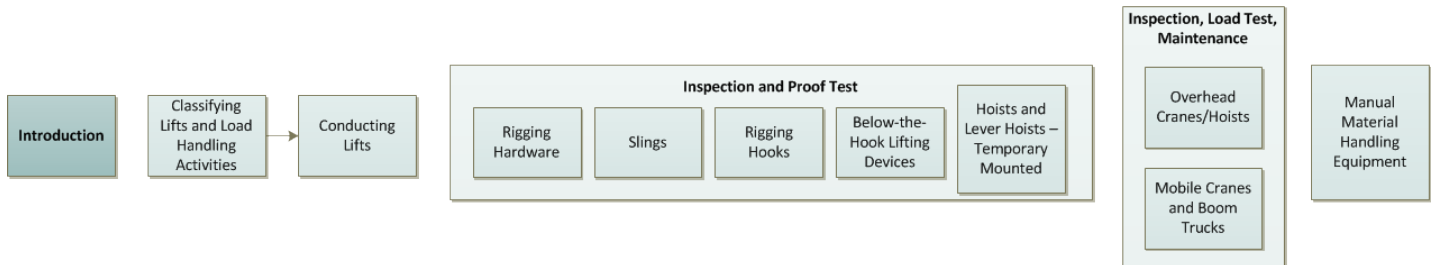
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FORMS/EXHIBITS CONTENT



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Critical Lift Evaluation Form (CLEF)

Effective Date: [Jan 16, 2018](#)

[Critical Lift Evaluation Form \(CLEF\)](#)

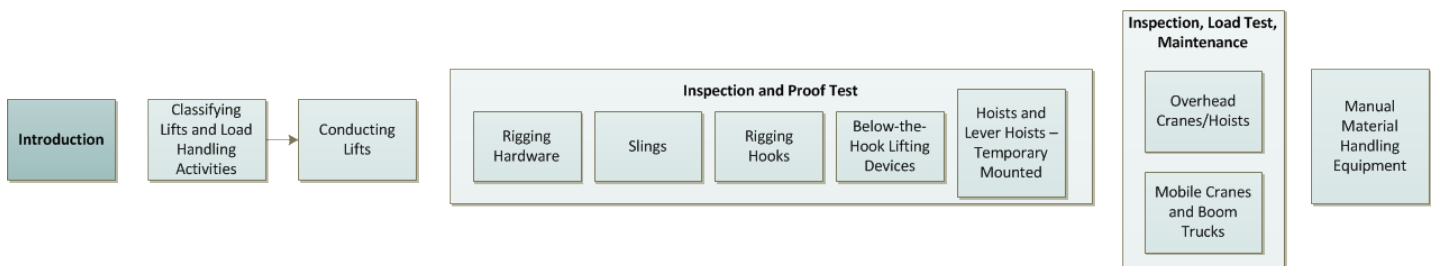
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FORMS/EXHIBITS CONTENT



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Load Test Reports

Effective Date: [Jan 16, 2018](#)

Choose and complete the applicable load test report.

[Bridge, Wall, Gantry Crane Load Test Report](#)

[Chain Sling Load Test Report](#)

[Hoist Load Test Report](#)

[Lifting Bars and Spreaders Load Test Report](#)

[Mobile Crane Load Test Report](#)

[Rigging Hardware Load Test Report](#)

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Questions/Comments

Critical Lift Evaluation Form (CLEF)

Title: _____

REQUESTER: _____ **Dept./Div.** _____ **Date** _____

BRIEF DESCRIPTION OF ITEMS TO BE LIFTED (Provide Lifting Procedure as attachment)

Frequency:

Single Occurrence **Recurring**

DETERMINING FACTOR FOR CRITICAL LIFT

(See Lifting Safety Subject Area for details)

Lifting Considerations	Programmatic Considerations
<input type="checkbox"/> Loss of control would result in emergency or hazardous exposure.	<input type="checkbox"/> Item is irreplaceable/not repairable and vital to the program.
<input type="checkbox"/> Load is greater than 90% of crane capacity*.	<input type="checkbox"/> Cost or Delay to replace or repair the load would have significant impact to operations.
<input type="checkbox"/> Loss of control could cause critical damage or hazard to nearby installations or facilities	<input type="checkbox"/> If the line organization considers the lift to be critical due to other factors (i.e., use of multiple hooks).

* Excludes crane 125% proof testing. If no other critical lift criteria are identified, fixed crane rated capacity limits may be raised to 95% if load weight has been determined using certified scales and lift may be classified as a Pre-Engineered Lift.

OPERATING EQUIPMENT

Type of Crane: _____

Manufacturer: _____

Model No: _____

Serial No: _____

Capacity: _____

Latest Calibration Date of Instruments: _____

Date of Latest Annual/Monthly Inspection* _____

Date of latest Maintenance PM*: _____

MOBILE CRANE SET-UP INFORMATION EQUIPMENT AND LIFT RELATIONSHIP

Manufacturer Restriction for WIND SPEED _____ (no lifts at wind speeds \geq 20 mph unless permitted by manufacturer)

Crane Equipped with Anemometer: Y/N (if no, use BNL Weather Station)

- Maximum Operating Radius: _____
- Planned Operating Radius: _____
- Allowable load at maximum lift radius anticipated (from Load Chart): _____
- Clearance between Boom & Lift: _____
- Clearance to Surrounding
 - Facilities/Utilities: _____
- Clear Path for Load Movement: _____

STABILITY OF GROUND AREA

Soil Bearing Capacity: _____ Source: _____

Ratio of Soil Bearing Capacity to Actual: _____ Mats Required (Size and Number): _____

Underground Utilities Location* (BNL Utility Site-map less than 30 days old): _____

HOW WEIGHT OF OBJECT OBTAINED

A. Certified Weight Scale _____ Ticket #* _____

B. Calculated Independently by More than One Source**

1. Weight _____ Source* _____

2. Weight _____ Source* _____

C. If lift is an existing item (being removed or demolished), the weight must be recalculated, taking into account all modifications, including internal, as well as an Allowance for Scale, Sediment, Sludge, and Insulation. Calculation Work Sheets MUST be included in the LIFT PLAN and have a PE stamp or be signed off by a QUALIFIED PERSON.

D. Shipping Manifest's Weight _____ Manufacturer Data Weight _____

**** When weights are calculated, a 10% tolerance margin must be added. This value may be increased at the discretion of the Lifting Safety Committee.**

DETERMINATION OF THE CENTER OF GRAVITY (CG)

Control drawing of the load with CG marked unless CG is marked directly onto load.

IDENTIFICATION AND WEIGHT OF ALL RIGGING EQUIPMENT AND CRANE ATTACHMENTS

Type (Number/ Size)	Rated Capacity (lbs.) <i>Individual</i>	Component Weight (lbs.) <i>Combined Weight</i>
Slings / Hitch		
Shackles*		
Lifting Rings*		
Eyebolts*		
Rigging Hooks*		
Load Block/Jib		
Other:		
Spreader Bars/Below the Hook Lifting Device ¹		
Total Weight of Rigging Equipment/Crane Attachments:		
200 % Proof Test Documentation required* ¹ Must comply with ASME B30.20 and BTH-1 for Design, Testing, and Appropriate Markings. (125% Proof Test Documentation required)		
Note: It is the responsibility of the PIC to ensure all rigging components are properly rated with required documentation and that the certifications for all equipment used is attached to the CLEF.		

WEIGHT OF OBJECT, RIGGING EQUIPMENT, AND CRANE ATTACHMENTS

Total Weight _____ Ratio of Lift to Allowable Load (Crane): _____ Source _____

LIFTING OPERATION*

A detailed drawing, to scale, MUST be included showing the Set-up Area, Lifting Area, Load Placement Area, and Sling Attachment Points with sling angle reduction factor. A documented Critical Lift Plan or Pre-engineered Lift Procedure, as applicable, must be included.

Note: The BNL Rigging Supervisor may alter rigging plans to suit field conditions existing at the time of work execution – explanation MUST be included as part of the Post-Lift comments.

INSPECTION OF CONTRACTORS EQUIPMENT

All Lifting and Rigging Equipment must be designed/maintained and inspected as required by the applicable ASME B30.X codes. To schedule a review of required inspection records, prior to bringing equipment onto the BNL site, contact the BNL Hoisting and Rigging Inspector at (631) 344-5456.

LINE ORGANIZATION APPROVAL SIGNATURES

Requester: _____
Responsible Manager or Designee: _____

LIFTING SAFETY COMMITTEE

Approved **Disapproved**

LSC Committee Chair (Signature and Date) _____

LIST OF ALL ATTACHMENTS

(Including copies of required lift plans, load weight determination, load tests, and inspection and maintenance records must be verified and submitted as part of the PRE-LIFT MEETING RECORD SHEET)

PRE-LIFT MEETING RECORD SHEET
(Use supplemental sheets for multiple occurrences)

PRE-LIFT MEETING:

Date: _____ Time: _____ Location: _____

List Name and assignment:

Person-In Charge (PIC): _____

PIC Initials for

- Verify all rigging hardware is inspected and load tested as required: _____
- Verify the Equipment Operator is qualified for equipment and training is current*: _____
- Verify all maintenance items (i.e., mechanical and electrical PMs) are current*: _____

Equipment Operator: _____

Equipment Licensed/Certification Training Expiration Date: _____

Other assignments:

Notifications:

LSC Committee Chair *Prior to Start of Lift*: _____

LSC Committee Chair *Completion of Lift*: _____

POST-LIFT COMMENTS:

* Proof required to be submitted as part of the attachments



BRIDGE, WALL, GANTRY CRANE LOAD TEST REPORT

MANUFACTURE: _____ **SN.** _____

BLDG. # _____ **EQUIPMENT #** _____ **CAPACITY:** _____

LOAD TEST INSPECTION REPORT:

The following checklist identifies the items to be inspected before the load test. Any unusual conditions observed during the inspection should be noted in the Remarks section.

NOTE: 1. Qualified inspector must verify all steps before load test.

CRANE ITEM DEFECT, OK, SR, NA:

_____	1 Load Hook & Blocks	_____	18 Controllers
_____	2 Wire Rope and End Connections	_____	19 Relays and Coils
_____	3 Handrails, Walkways, and Ladders	_____	20 Conductors and Collectors
_____	4 Bridge and Trucks	_____	21 Panel Wiring
_____	5 Bridge Wheels and Bearings	_____	22 Resistors
_____	6 Trolley and Rails	_____	23 Bypass Switches
_____	7 Trolley Wheels and Bearings	_____	24 Limit Switches
_____	8 Crane Alignment	_____	25 Contactor (Electrical)
_____	9 Runway Rail & Clamps	_____	26 Motors
_____	10 Bumpers/End Stops	_____	27 Gauges
_____	11 Brake System	_____	28 Lighting System
_____	12 Drive Shafts, Gears, Couplings & Bearings	_____	29 Heater and Switches
_____	13 Pawls, Ratchets, Spuds, & Windlocks	_____	30 Operator's Cab
_____	14 Sheaves	_____	31 Safety
_____	15 Warning Devices	_____	32 Chain and Sprockets
_____	16 Capacity Signs	_____	33 Structural
_____	17 Main Disconnect	_____	34 Wire Rope Drum and Machinery Foundation

REMARKS (unusual conditions – noises, structural cracks, misalignment, etc).

BRIDGE CRANE AND FOLLOW-UP CHECKS

- NOTES:**
1. Qualified inspector must verify all steps below.
 2. Load test must be performed on all new, repaired, or modified cranes before initial use.
 3. Load test crane at 125% of rated capacity. In no case shall the load test exceed 125% of rated capacity. Test weights must be accurate to -5%, +0% of stipulated values.

INITIAL

- _____ 1. Set crane up for load test; qualified inspector verifies inspection is complete prior to load test.
- _____ 2. The trip setting of hoist-limit devices must be determined by tests, with an empty hook traveling at increasing speeds up to the maximum speed. The actuating mechanism of the limit device must be located so that it will trip the device under all conditions and in sufficient time to prevent contact of the hook or load block with any part of the trolley or crane.
- _____ 3. Rig test weight to hoist hook using appropriate slings.
- _____ 4. Hoist the test load a sufficient distance to ensure that the load is supported by the crane and held by the hoist brakes.
- _____ 5. Transport the test load by means of the trolley for the full length of the bridge. Ensure during operation that the trolley runs true on the bridge. Check trolley motor, brake, and gear case for overheating.
- _____ 6. Transport the test load by means of the bridge for the full length of the runway, first in one direction with the trolley as close to the extreme right-hand end of the crane as practical, and then in the other direction with the trolley as close to the extreme left-hand end of the crane as practical. Ensure that the bridge runs true on the runway rails and that no undue girder deflection occurs. Check for bridge motor, brake, and gear-case overheating.
- _____ 7. Move the test load back into the original position and lower the test load, stopping by the brakes. Hold the load for 10 minutes or the time required to check all primary load-bearing parts while under load for slippage, damage, or permanent deformation.
- _____ 8. Slowly lower the test load to the floor.
- _____ 9. At the completion of the load test, visually inspect the following load-bearing parts for signs of wear, deformation, and deterioration:

DEFECTIVE/OK/SRNA

- | | |
|-------------------------|--------------------------|
| _____ a. Bridge track | _____ e. Gears |
| _____ b. Bridge wheels | _____ f. Magnetic brakes |
| _____ c. Trolley track | _____ g. Blocks |
| _____ d. Trolley wheels | |

VISUALLY INSPECT ROPE

- _____ a. Rope diameter: (Previous) _____ (Present) _____
- _____ b. Wear
- _____ c. Kinks
- _____ d. Broken wires
- _____ e. Other signs of deterioration.

VISUALLY INSPECT ROPE DRUM

- _____ a. Wear
- _____ b. Deformation
- _____ c. Deterioration.

INITIAL

_____ 10. Qualified inspector must perform nondestructive tests on hook by visual examination, liquid penetrant examination or magnetic-particle examination. Acceptance: No cracks, linear indications, laps, or seams.

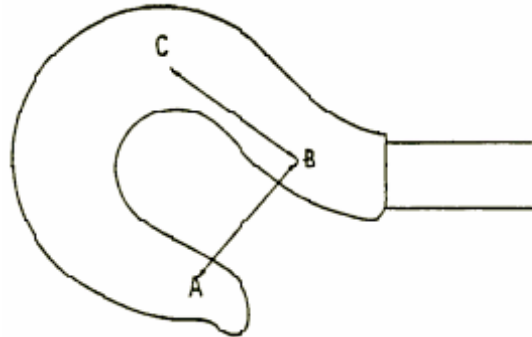
Hooks with any distortion causing an increase in the throat opening of 5% not to exceed 1/4" of original throat opening, hooks with any visible bend or twist from the original plane of the hook, and hooks having any wear exceeding 10% of original must be replaced. Lubricate hook bearing and latch pin, as applicable.

Establish three marks, A, B, and C, with center punch. For ease in measuring, set distances on an even number of inches.

BEFORE LOAD TEST
North #1

Length AB _____ in.

Length BC _____ in.



AFTER LOAD TEST

Length AB _____ in.

Length BC _____ in.

Check for:

- 1. Wear and deformation
- 2. Cracks and twisting
- 3. Signs of opening between Point A and Point B

Qualified Inspector: _____

Operated By: _____

Actual Load Test lbs. _____

Percent of Rated Capacity: _____

Load Test Insp. Date: _____

BNL Inspection Tag # _____

Remarks:

CHAIN SLING LOAD TEST REPORT (Rigging Tackle Load Test Report)

- Notes:**
1. Qualified inspector must witness and verify all steps below.
 2. Proof-test to 200% of rated capacity to certify new equipment procured without manufacturers certification. Test loads must be accurate to within -5%, +0% of the stipulated values.

INSPECTION

- _____ 1. Hang chain in a vertical position, if practical, for preliminary inspection. Chain should hang reasonably straight if links are not distorted.
- _____ 2. Accurately measure the reach (inside of crane ring to inside of hook) under no load when new and at each inspection, and keep a record of increase in length.
- _____ 3. Check for localized stretch and wear. Lift each link from its seat and visually inspect for grooving. If grooving is noticed, then verify stock diameter of links to be within the minimum safe dimension in the table below.
- _____ 4. Sharp transverse nicks should be rounded out by grinding.
- _____ 5. Check for evidence of heat damage.

Chain slings must be immediately removed from service if any of the following conditions are present:

- a. Cracked or deformed master links, coupling links, etc.
- b. Hooks with any distortion causing an increase in the throat opening of 5% not to exceed 1/4" of original throat opening, hooks with any visible bend or twist from the original plane of the hook, and hooks having any wear exceeding 10% of original must be replaced.
- c. Wear at any point of any chain link exceeding that shown in the table below.

Maximum allowable wear at any point of link

Chain size (in.)	Maximum allowable wear (in.)
1/4	3/64
3/8	5/64
1/2	7/64
5/8	9/64
3/4	10/64
7/8	11/64
1	12/64
1-1/4	16/64

NOTE: For other sizes, consult chain or sling manufacturer.

CHAIN SLING LOAD TEST REPORT
(Rigging Tackle Load Test Report)

Manufacturer: _____ **Serial #** _____

Size and Length: _____ **Capacity (SWL):** _____

Actual Load Test: _____ **Load Test %:** _____

Operator: _____ **BNL Insp. Tag #:** _____

Remarks _____

Qualified inspector must inspect hook by visual examination, liquid penetrant examination, or magnetic particle examination.

QUALIFIED INSPECTOR _____ **DATE** _____



HOIST LOAD TEST REPORT

MANUFACTURER: _____

SN. _____

BLDG. # _____ EQUIPMENT # _____

CAPACITY: _____

Notes:

1. Load test prior to initial use, at 125% of rated capacity, all new hoists or hoists in which load-sustaining parts have been modified, repaired, or replaced. Test weights must be accurate to within -5%, +0% of stipulated values. Load test at 100% of rated capacity hoists with overload devices. Test the function of the overload device.
2. Qualified inspector must verify all steps as listed below.

_____ 1. **Perform the periodic inspection. Check unit for proper operation.**

_____ 2. **HAND-CHAIN-OPERATED HOISTS ONLY.** Check brake mechanism for work glazed, or contaminated disks, worn pawls, cams, or ratchets. Check for broken, corroded, or stretched pawl springs. Repair as needed.

_____ 3. **ELECTRIC-AND AIR-POWERED HOISTS. Check:**

- a. All functional operating mechanisms for maladjustment interfering with proper operation
- b. Limit switches or devices for proper operation
- c. External evidence of damage or excessive wear of load sprockets, idler sprockets, and drums or sheaves
- d. External evidence of wear on motor or load brake
- e. Electrical apparatus for signs of pitting or any deterioration of visible controller contacts
- f. All anchorage or hoist suspensions.

_____ 4. Set hoist up for load test and inspection. Where applicable, ensure that the load chart is legible.

_____ 5. Perform load test using the required test weights (See Note 1) and appropriate slings.

_____ 6. Measure a length of the load chain under tension; measure a length of 15 links. If wire rope is used, then measure the diameter.

IF HOIST IS EQUIPPED WITH A TROLLEY:

_____ 1. Mount hoist on a monorail.

_____ 2. Rig test weight to load hook

_____ 3. Perform load test raise and hold load for 10 minutes check brakes during hoisting and lowering, moving weight along monorail. Observe hoist and trolley. Observe performance of all load-bearing components.

_____ 4. Lower test weight to floor. Note performance of hoist during lowering operation. Remove rigging.

At the completion of the load test, inspect the following items:

1. Visually inspect and remeasure the load chain and/or hoist rope after the load test. Check for deformed or broken links, stretch, etc. No more than a 10% permanent stretch in load chain is acceptable, and a wire rope decrease of 1/64 up to 5/16", 1/32 up to 1/2 ", 3/64 up to 3/4 " 1/16 up to 1 1/8" and 3/32 up to 1 1/2".
2. Inspect load hook and suspension hook for bending or twisting.

LOAD HOOK:	PREVIOUS	PRESENT
Qualified Inspector Verify _____ Throat Opening _____	_____	_____
Qualified Inspector Verify _____ Hook Twist _____	_____	_____

SUSPENSION HOOK:

Qualified Inspector Verify _____ Throat Opening _____	_____	_____
Qualified Inspector Verify _____ Hook Twist _____	_____	_____

Qualified inspector must perform nondestructive tests on hook by visual examination, liquid penetrant examination, or magnetic particle examination.

Acceptance: No cracks, linear indications, laps, or seams.

Hooks with any distortion causing an increase in the throat opening of 5% not to exceed 1/4" of original throat opening, hooks with any visible bend or twist from the original plane of the hook, and hooks having any wear exceeding 10% of original must be replaced. Lubricate hook bearing and latch pin, as applicable.

Establish three marks, A, B, and C, with a center punch. For ease in measuring, set distances on a whole number of inches. A to B measurement should equal B to C measurement.

BEFORE LOAD TEST

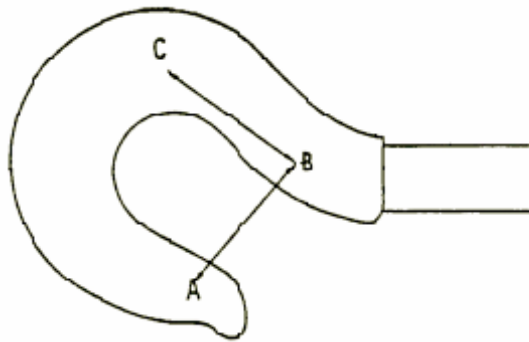
Length AB _____ in
Length BC _____ in

AFTER LOAD TEST

Length AB _____ in
Length BC _____ in

Check for:

1. Wear and deformation
2. Cracks
3. Signs of opening between Point A and Point B (use the B to C marks as a reference)



Qualified Inspector: _____

Equipment Operator: _____

Actual Load Test: _____

Percentage of Rated Capacity: _____

Load Test Inspection Date: _____

BNL Inspection Tag # _____

Remarks:

**LIFTING BARS AND SPREADERS
LOAD TEST REPORT**

MANUFACTURER: _____ **SN.** _____

BLDG. # _____ **EQUIP. #** _____ **CAPACITY:** _____

NOTES:

1. Inspect Lifting Bar bolts for SCI (see exhibit DOE Headmark List)
2. Proof-test to not more than 125 percent of rated capacity. The test load must be accurate to within -5%, + 0% of stipulated values.
3. Qualified inspector must witness all steps below.

1) INSPECTION:

Lifting bars and spreaders must be checked for signs of incipient failure in bending and must be replaced if permanently bent more than 1/2 inch in 10 feet, or twisted more than 5 degrees out of the original plan.

Load bearing welds must be examined for cracks, and signs of failure in tension.

Qualified inspector must perform test by visual examination, liquid-penetrant examination, or magnetic particle examination.

Acceptance: No cracks, linear indication, laps, or seams.

2) STATIC TEST:

Hold weight for 10 minutes and visually inspect for deformation.

Type: _____ **Size:** _____

Actual Test Weight: _____ **% of Rated Capacity:** _____

Weight of Lifter: _____ **Operator:** _____

BNL Inspection Tag # _____

Remarks:

Qualified Inspector (Print Name): _____

Qualified Inspector (Signature): _____ **Date:** _____

MOBILE CRANE LOAD TEST

EQUIPMENT NO. _____ MAKE _____ DATE _____

SERIAL NO. _____ BNL INSPECTION TAG NO. _____

HOUR METER-ODOMETER TOTAL _____ RATED CAPACITY _____

LOAD TEST INSPECTION REPORT

The following checklist identifies the items to be inspected prior to the load test. Any unusual conditions observed during the inspection should be noted in the Remarks section. Equipment must be inspected by maintenance personnel prior to load test.

NOTES: 1. Qualified inspector must verify the inspection is completed.

No.	CRANE ITEM	DEFECT	OK	NA	NO.	CRANE ITEM	DEFECT	OK	NA
1	Wire Rope				13	Hoist Clutch Lining			
2	Cracked or Worn Sheave or Drum				14	Hoist Drum Brake Bands			
3	Limit Switch (Anti-Two Blocking)				15	Open Gears			
4	Boom				16	Boom Jib (as applicable)			
5	Master Clutch				NO	Carrier Items	DEFECT	OK	NA
6	Steering Clutches				1	Steering Gears and Connections			
7	Hydraulic Pump				2	Brakes (service and hand)			
8	Hydraulic Controls				3	Tires and Wheels			
9	Hydraulic Hoses				4	Lubrication			
10	Mechanical Controls					OPERATING TEST			
11	Drive Chains					OVERALL CONDITION			
12	Swing Clutches								

REMARKS (Unusual conditions – noises, structural cracks, misalignment, etc.)

SAFETY ITEMS: (Fire extinguisher, signs, guards, etc.)

MOBILE CRANE LOAD TEST AND FOLLOW-UP CHECKS

NOTES: 1. Qualified inspector must verify all steps below.

- _____ 1. Set crane up for load test and inspection.
- _____ 2. Perform operations test without load to verify proper function of the following:
 - Load lifting and lowering mechanisms
 - Boom lifting and lowering mechanism
 - Boom extension and retraction mechanisms
 - Swinging mechanism
 - Travel mechanism
 - Safety devices.
- _____ 3. Test loads must not exceed 110% of rated capacity. Refer to load chart for load test capacity at maximum and minimum working radius. Check boom angle indicators for accuracy.
- _____ 4. Rig test weights to hook using appropriate slings.
- _____ 5. Hoist the test load a sufficient distance to ensure that the load is supported by the crane and held by the hoist brakes. Hold the load for 10 min or the time required to check all primary load-bearing parts while under load without slippage, damage, or permanent deformation.
- _____ 6. At least once during the lifting portion of the hoisting cycle and once during the lowering cycle, power to the hoisting equipment must be completely turned off. There must be no slippage of the load or overheating of the brakes.
- _____ 7. Lower the load to approximately 2 in. off the ground to check for swing-roller operation and outrigger stability. Slowly swing test load between outriggers locations.
- _____ 8. Move the load back to the original position and slowly lower to ground.
- _____ 9. At the completion of the load test, inspect the following:

MOBILE CRANE LOAD TEST AND FOLLOW-UP CHECKS

DEFECTIVE/OK/NA

- _____ a. Rope diameter: (Previous) _____ (Present) _____
- _____ b. Wear
- _____ c. Kinks
- _____ d. Broken wires
- _____ e. Other signs of deterioration

Visually inspect the rope drum for:

- _____ a. Wear
- _____ b. Deformation
- _____ c. Deterioration
- _____ d. Have qualified inspector perform nondestructive tests on hook by visual examination, liquid penetrant examination, or magnetic-particle examination.
Acceptance: No cracks, linear indications, laps, or seams.

Hooks with any distortion causing an increase in the throat opening of 5% not to exceed $\frac{1}{4}$ " of original throat opening, hooks with any visible bend or twist from the original plane of the hook, and hooks having any wear exceeding 10% of original must be replaced.
Lubricate hook bearing and latch pin, as applicable.

Establish three marks; A, B, and C, with a center punch. For ease in measuring, set distances on an even number of inches.

BEFORE LOAD TEST

Length AB _____ in

Length BC _____ in

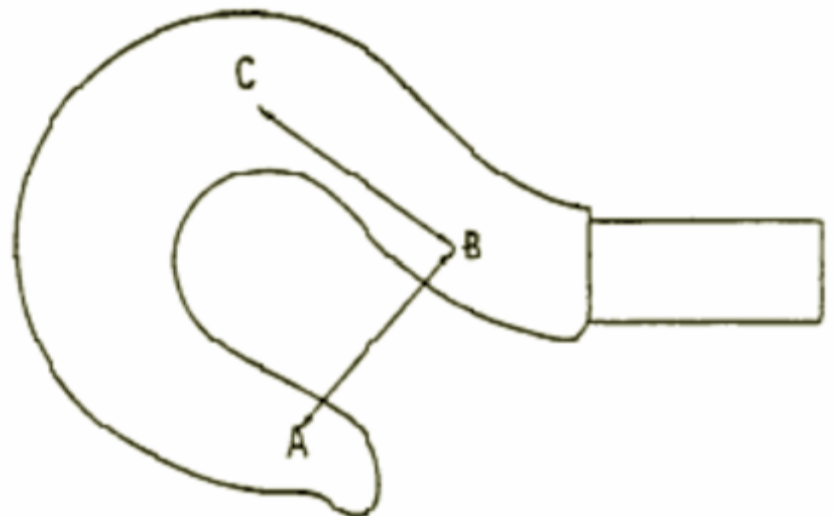
After Load Test

Length AB _____ in

Length BC _____ in

Check for:

1. Wear and deformation
2. Cracks and twisting
3. Signs of opening between Point A and Point B



MOBILE CRANE LOAD TEST LOAD AND FOLLOW-UP CHECKS

This information should be retained with the equipment.
Record the following:

BLOCK WEIGHT _____ **lb.**

TEST WEIGHT _____ **lb.**

RADIUS/CENTER PIN TO LOAD _____ **ft.**

% OF TEST WEIGHT COMPAIRED TO CHART _____ **%**

PARTS LINE _____ **quantity**

BOOM LENGTH _____ **ft.**

Load Test Inspection Date _____

Qualified Inspector _____

Operated By _____

Remarks:

RIGGING HARDWARE LOAD TEST AND INSPECTION REPORT
(shackles, rings, eye-bolts, turnbuckles, etc.)

MANUFACTURER: _____ **SERIAL #:** _____

BLDG. # _____ **EQUIP. #** _____ **CAPACITY:** _____

NOTES:

1. Proof test to 200% of rated capacity for critical lift service to certify new equipment procured without manufacturer's certification. Test loads must be accurate to within -5%, +0% of the stipulated values.

2. Qualified inspector must witness all steps below.

A - Inspect hardware prior to load test for any condition that would cause doubt of the integrity of the rigging hardware:

- missing or illegible manufacturer markings
- evidence of unauthorized welding or modification
- distorted components, corrosion, damage, or undue wear

B - Accept/reject data should be to manufacturer's specifications.

- perform Load Test with appropriate weights
- raise load off of ground to check stability
- hold for 10 minutes

3. **Post Test Inspection:** Shackles, rings, eye-bolts and turnbuckles must be removed from service and discarded if any of the following conditions are present that would cause doubt of the continued integrity of the hardware:

- cracks, twists, or significant change in openings
- incomplete pin engagement
- bent, twisted, distorted, elongated or broken load bearing components
- 10% reduction of the original or catalog dimensions
- any visible condition to cause doubt as to the continued use of the hardware

Type Accessory: _____ **Size:** _____

Actual Load Test: _____ lbs, **Load Test %** _____

Remarks:

QUALIFIED INSPECTOR: _____ **INSP. DATE** _____

SYNTHETIC WEB AND ROUND SLINGS LOAD TEST REPORT (RIGGING TACKLE LOAD TEST REPORT)

- Notes:**
1. Proof-test to 200% of rated capacity to certify new equipment (when required) procured without manufacturer's certification. Test loads must be accurate to within -5%, +0% of the stipulated values.
 2. Qualified inspector must witness all steps below.

Synthetic-web slings must be immediately removed from service if any of the following conditions are present that would give doubt to the integrity of the sling:

- _____ a. Acid or caustic burns.
- _____ b. Melting or charring of any part of the sling surface.
- _____ c. Snags, punctures, tears, or cuts.
- _____ d. Broken or worn stitches.
- _____ e. Distortion of fittings
- _____ f. Wear or elongation exceeding manufacturer's recommendation.

Manufacturer: _____ Serial #: _____

Sling Type: _____

SIZE: (Length, Diameter, Etc.) _____ Capacity (SWL) _____

Actual Load Test: _____ Load Test %: _____

Operator: _____ BNL Insp. Tag #: _____

REMARKS: _____

QUALIFIED INSPECTOR _____ **DATE** _____

WIRE-ROPE SLING INSPECTION AND LOAD TEST REPORT

- Notes:** 1. Qualified inspector must witness and verify all steps below.
2. When required, proof-test to 200% for mechanical-splice and endless slings and 125% for hand tucked slings of rated capacity to certify new equipment procured without manufacturer's certification. Test loads must be accurate to within -5%, +0% of the stipulated values.

Wire rope must be immediately removed from service if any of the following conditions are present:

INSPECTION

- _____ 1. Ten randomly distributed broken wires in one rope lay or five broken wires in one stranding one rope lay.
- _____ 2. Wear or scraping of 1/3 the original diameter of the outside individual wire.
- _____ 3. Kinking, crushing, birdcaging, or any other damage resulting in distortion of the wire rope structure.
- _____ 4. Heat damage.
- _____ 5. Cracked, deformed, or worn end attachments.
- _____ 6. Hooks with any distortion causing an increase in the throat opening of 5% not to exceed 1/4" of original throat opening, hooks with any visible bend or twist from the original plane of the hook, and hooks having any wear exceeding 10% of original shall be replaced.
- _____ 7. Corrosion of the rope or end attachments.

Manufacturer: _____ Serial # _____

Size: (Length, Diameter, Etc.) _____ Capacity (SWL) _____

Actual Load Test: _____ lb. Load Test % _____

Operator: _____ BNL Insp. Tag # _____

REMARKS _____

A qualified inspector must inspect hook/rings by visual examination, liquid penetrant examination or magnetic particle examination.

Acceptance: No cracks, linear indications, laps, or seams.

QUALIFIED INSPECTOR _____ **DATE** _____