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Glenn Safety Manual – Chapter 20

Lifting Devices and Equipment

Approved by: QS/Chief, Safety and Health Division

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**NASA - Glenn Research Center
Cleveland, OH 44135**

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Change Record

Rev.	Effective Date	Expiration Date	GRC25, Change Request #	Description
B	7/19/2012	7/19/2017	104	Further defining critical lifts and the determination process. Insertion of Verification Boxes in the Requirements section. Updated Medical Clearance protocols to reflect latest NASA OCHMO Guidance.
Change 1	4/15/2014	7/19/2017	N/A	Administrative change to add front cover and change history log to comply with NPR 1400.1. Inserted "The GRC shall follow the requirements of NASA-STD-8719.9" in Section 5.0 Responsibilities.
Change 2	9/30/2015	7/19/2017	N/A	Administrative Change to remove hyperlinks.
C	9/16/2016	9/16/2021	16-009	Revision of NASA-STD-8719.11; REDAA gaps and observations; IFO audit findings and observations.

***Include all information for each revision. Do not remove old revision data. Add new rows to table when space runs out by pressing the tab key in the last row, far right column.*

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Chapter 20—Lifting Devices and Equipment

NOTE: The current version of this chapter is maintained and approved by the Safety and Health Division (SHeD). The last revision date of this chapter was September 2016. The current version is located on Glenn intranet with the BMS Library. Approved by: Chief of Safety and Health Division.

1.0 PURPOSE

This program establishes NASA's minimum requirements for the design, construction, testing, inspection, maintenance, personnel certification, and operation of lifting devices and equipment (LDE) at the Glenn Research Center's (GRC) Lewis Field (LF) and Plum Brook Station (PBS). These requirements are established in accordance with the NASA Standard 8719.9A to minimize risk to personnel and property, to ensure that individuals performing lifting functions are trained to perform their work in accordance with applicable safety and health standards, and to ensure that high-risk operations are conducted with the highest standards of safety and performance while supporting the Center's mission.

2.0 APPLICABILITY

This chapter applies to GRC at LF and PBS. The provisions, responsibilities, and requirements as set forth in this chapter apply to all NASA GRC civil servant (CS) employees, NASA support service contractors (SSC), construction and maintenance contractors and subcontractors, other Government agency employees, and other organizations that perform lifting activities within the confines of the GRC. This chapter is applicable to NASA-owned and NASA contractor-supplied equipment.

This program applies to:

- overhead and gantry cranes (including top-running monorail, underhung, and jib cranes)
- mobile cranes
- derricks
- hoists
- winches used for lifting applications
- hoist-supported personnel lifting devices
- load positioning devices and load-measuring devices
- hooks
- slings and rigging hardware
- mobile aerial platforms
- powered industrial trucks
- jacks used for critical lifts

This document does not apply to front-end loaders, elevators, or lifting devices used in non-lifting applications (e.g., jacks serving only to render casters ineffective, balloon launching fixtures.)

In this chapter, "shall" denotes a mandatory action; "may" or "can" denotes discretionary privilege or permission; "should" denotes a good practice and is recommended, but not required; "will" denotes expected outcome; and "are/is" denotes descriptive material.

3.0 BACKGROUND

Fatalities, serious injuries, damaged or lost hardware, and project failure can occur if industrial equipment is not inspected and used properly. Many fatalities can occur when workers are struck by a load, are caught inside the swing radius, or fail to assemble or disassemble the equipment properly.

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The GRC Lifting Device and Equipment program was developed to maintain and preserve the safety of our employees, infrastructure and equipment as well as flight and research hardware and ground support equipment (GSE) by minimizing hazards associated with material handling. The program establishes minimum guidelines for lifting devices, operator training and certification, and hardware design and analysis.

4.0 POLICY AND MEASUREMENT/VERIFICATION

4.1 POLICY

It is GRC's policy that all Lifting Device Equipment (LDE) are designed, analyzed, tested, inspected, maintained, operated and used in accordance with Occupational Safety and Health Administration (OSHA) standards and NASA's Lifting Standard (STD) 8719.9A.

4.2 MEASUREMENT/VERIFICATION

Compliance with the responsibilities and requirements of this chapter are measured and verified through the use of programmatic self-assessments, field inspections and surveys.

5.0 RESPONSIBILITIES

All personnel involved with lifting devices and equipment and operations shall be familiar and follow the policies and requirements of this chapter and NASA-STD 8719.9A. Depending on the situation, the personnel LDE certification process may be managed by either the head of the organization, the facility manager, or the first-line supervisor where the function is being performed.

5.1 Center Director

The Center Director shall appoint in writing at least one Lifting Device and Equipment Manager and an alternate. The selected GRC LDEM and the alternate shall have a background in lifting devices, lifting operations, lifting equipment industry standards, and an understanding of lifting safety.

5.2 GRC Medical Services

- Assists CS staff in obtaining a Medical Clearance as part of becoming a Certified LDE Operator at GRC.
- Notifies existing Certified LDE Operators of their annual physical exam requirements via GRC form GRC142.

5.3 Lifting Device and Equipment Manager (LDEM)

- Formally appointed by the Center Director
- Serves as GRC interface with NASA Headquarters and other NASA centers on matters pertaining to LDE
- Serves as the GRC representative on the NASA LDEC
- Provides technical direction on lifting devices and operations at GRC
- Establishes the training and certification program for LDE operators and supervisors
- Chairs the GRC LDEC
- Provides advice on lifting devices as requested
- Reviews Safety Variance Requests (SVRs) prior to submittal to Center management for approval
- Previews, approves, and monitors the training courses for qualifying LDE operators and defines their training and refresher training requirements
- Performs functional audits of the LDE program by establishing and maintaining a system for periodic inspection of LDE, identification of deficiencies, and completion of corrective actions

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- Maintains overall responsibility for the management, implementation, and enforcement of the Center’s LDE, Mobile Aerial Platform, Powered Industrial Truck and Critical Jack Recertification Program
- Serves as the Certifying Authority for the certification and recertification of LDE to which this directive is applicable
- Maintains a master list of certified crane operators and rigger, forklift operators, and aerial lift operators.
- Make rented or leased LDE used for noncritical lifts exempt from this chapter by written request from the contracting officer and based on an assessment of the associated risk

5.4 Program and Project Assurance

- Provides assistance when required for programmatic audits of the program
- Provides guidance and review of critical lift procedures, and related Safety Hazard Analysis for equipment to be used for critical lifts
- Supports critical lift activities

5.5 Facilities Division (FD)

- Notifies the LDEM of any planned LDE acquisition, installation, upgrade, and/or removal as part of any facilities project
- Submits all LDE designs and specifications to the LDEM for review and approval prior to contract implementation

5.6 Facilities Testing Division: Test Facilities Operations, Maintenance and Engineering (TFOME II)

- Assigns a designated person(s) to perform proof load tests, periodic load tests, and operational tests as well as frequent and periodic inspections on all lifting device equipment according to written procedures- this includes performing proof load tests on newly purchased or modified powered industrial trucks and aerial lift platforms; periodic load tests for aerial lift platforms and critical lift certified powered industrial trucks.
- Inspects, tests, maintains equipment for all NASA-owned LDE at GRC per NASA 8719.9A, OSHA regulations and National Consensus Standards
- Retains LDE records in accordance with NASA Records Retention Schedules 1441.1
- Tracks and controls LDE and its status using a configuration management system
- Responsible for maintaining a database of equipment, its location and a point of contact (POC)
- Ensures that all LDE has the proper tagging and labeling during the load test and maintenance inspections; however, it is the end user who is responsible for ensuring these markings remain with the equipment between load tests and inspections

5.7 Logistics and Technical Information Division (LTID)

- Submits notices to the equipment POC notifying them the equipment is due for inspection and maintenance
- Performs preventative maintenance and inspections on drive components of mobile cranes, aerial lift platforms, and forklifts; marks equipment identifying completion and next due date of required maintenance

5.8 Human Capital Development Division

- In coordination with the LDEM, facilitate training and manage training documentation for CSs and where applicable for SSC in SATERN.

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5.9 Supervisors of Lifting Device and Equipment Operators and Users

- Ensures that personnel who operate lifting devices are trained and certified per the requirements of this chapter and NASA-STD-8719.9A.
- Ensures operator’s medical clearance exam, recertification, and refresher training are kept up to date.
- Maintains a list of operators certified to perform critical lifts and the specific devices employees are trained to operate

5.10 Employees Who Design, Fabricate, Construct, Maintain, and Repair Lifting Devices and Equipment

- Conducts their tasks in a manner that meets the requirements of this chapter and NASA-STD 8719.9A.

5.11 Certified Crane Operators and Riggers

- Performs and documents daily (or first-use) inspections of cranes, hoists, and winches using form GRC144, Operator's Pre-Use Checklist
- Lockout/tagout (LOTO) equipment per the policies stated in Glenn Safety Manual, Chapter 9 Lockout/tagout immediately if any deficiencies are identified during the inspection
- Initiates process to have the equipment repaired per contractual requirements and/or established standard operating procedures
- Inspects hooks, slings, and rigging prior to each use for damage; tag out and/or remove those items found to be unsafe for use
- Ensures rigging and lift equipment are current in load test status; tag out or remove expired items from service; initiate process to have the expired items load tested prior to use
- Maintains daily inspection documents at a location accessible to all operators
- Attends annual crane operator and rigging refresher training, recertify every 4 years by attending classroom and hands on training, and pass the annual medical clearance exam to stay in good standing with program requirements
- Performs all lifting activities in a manner that meets the requirements of this chapter and NASA-STD-8719.9A

5.12 Critical Lift Monitor

The Critical Lift Monitor is responsible for the movement of hardware during a critical lift.

- Provides direction and commands to the crane operator during a lifting operation and as directed in the Critical Lift Procedure
- In the pre-lift briefing, instructs all personnel involved in the preparations, rigging, lifting, and final positioning
- Does not perform rigging activities or hands-on operation of lifting devices
- Shall be a certified crane operator and experienced in lifting operations as determined by their immediate supervisor.

5.13 Certified Powered Industrial Trucks Operators

- Performs and documents inspection prior to first use on each shift for powered industrial trucks and mobile aerial platforms; LOTO equipment immediately if any deficiencies are identified during the inspection; initiate process to have the equipment repaired per contractual requirements and/or established standard operating procedures
- Ensures equipment is on a preventative maintenance (PM) schedule and up-to-date

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- Maintains GRC Form GRC50 Forklift Operator Daily Checklist within red storage clipboard on the forklifts and lift platforms.
- Attends powered industrial truck and/or aerial lift annual refresher training, recertify every 3 years by attending class room and hands on training, and pass the annual medical clearance exam to stay in good standing with program requirements
- Performs all activities in a manner that meets the requirements of this chapter and the NASA-STD-8719.9A

5.14 Certified Aerial Lift Operators

- Performs and documents inspection prior to first use on each shift for mobile aerial platforms; LOTO equipment immediately if any deficiencies are identified during the inspection; initiate process to have the equipment repaired per contractual requirements and/or established standard operating procedures
- Ensures equipment is on a preventative maintenance (PM) schedule and up-to-date
- Maintains GRC Form GRC61 Aerial Lift Platform Daily Checklist, GRC148 Scissor Lift Platform Operator Daily Checklist within red storage clipboard on the lift platforms.
- Attends aerial lift annual refresher training, recertify every 4 years by attending class room and hands on training, and pass the annual medical clearance exam to stay in good standing with program requirements
- Performs all activities in a manner that meets the requirements of this chapter and the NASA-STD-8719.9A

6.0 REQUIREMENTS

6.1 LDE Requirements

The GRC LDE program is managed in accordance with NPR 8715.3, NASA General Safety Program Requirements; NASA-STD-8719.9A, and the GRC specific requirements noted in this section of this chapter.

6.2 Classification of Lifts

There are two categories of lifting operations: critical lifts and noncritical lifts.

The determination of whether or not a lift is considered critical can be made by program or project personnel, a Facility Manager or Facility Operations Engineer, or the GRC LDEM. The critical lift determination and rationale shall be documented on GRC Form GRC195 and submitted to the LDEM for determination. The designation of an item as a critical lift does not require the concurrence of all parties. The GRC LDEM holds the final authority on determining a lift as a critical lift if a dispute were to occur.

Note: It is GRC's policy when a Suspended Load Operation is to occur, the operation must be conducted in accordance with the NASA Alternate Standard for Suspended Load Operations.

6.2.1 Critical Lift Plan

A written lift procedure must be developed for critical lifts regardless of lifting device used (overhead crane, mobile crane, forklift, etc.). The procedure shall be submitted to the LDEM for review at a minimum of five working days prior to the lift taking place. A template for this procedure can be found within the LDE website located on the GRC Safety and Mission Assurance Directorate (SMAD) Web page, but the project or organization may use its own document as long as it falls under the control of its configuration management plan. Although individual procedures are prepared for onetime critical lifts, general procedures may be employed to accomplish routine and recurrent critical lifts. For example, a general procedure may be used to lift an item or series of similar items that are frequently lifted or repeatedly handled in the same manner. At a minimum, the procedure should include the following information: (Also see NASA-STD-8719.9A for additional Critical Lift Plan requirements).

- Description of the item(s) to be moved
- Special precautions (if any)
- Weight of the item(s) and total weight of the load (including rigging)

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- Description, picture, or model of the lift/rigging configuration
- Center of gravity location
- A list of each piece of equipment, accessory, and rigging component to be used for the lift; the list shall identify each piece of equipment by type and rated capacity
- A step-by-step work instruction on the rigging and lift
- Emergency procedures actions such as power loss, brake failure, or other emergencies
- Designated checkpoints and hold points and estimated instrument readings, as relevant, so that job progress can be checked against the plan
- List of personnel (job description or role) who will be present during the lift and their responsibilities
- Approving signatures
- A safety hazard analysis. The safety hazard analysis as a minimum shall identify potential sources of danger and recommend resolutions for those conditions that could cause harm or loss of life, personnel injury, and loss of or damage to the LDE , facility, or load

6.2.2 Critical LDE Operator Requirements

Critical lift equipment operators must demonstrate proficiency and operating finesse with the lifting device to be used for the particular critical lift. This is in addition to the training, examination, licensing, and renewal requirements for noncritical lift operators. The operators must be knowledgeable of the specific hazards and special procedures associated with the critical lift. The operator’s supervisor or facility manager can determine who meets the requirements of a critical lift operator and will maintain a list of specific lifting devices for critical lifts that the operator is certified to operate.

6.3 Safety Variance Process (SVR)

Deviations or waivers from the requirements of this document or NASA-STD-8719.9A (including design and hardware requirements for both new and existing equipment) shall be requested through the LDEM prior to purchase of new equipment and operation of existing equipment. The deviation/waiver documentation shall include the alternatives, special criteria, and/or procedures that will be implemented to ensure safe design and operations for those devices that do not meet current LDE requirements. GRC Form GRC-83 shall be used to request a SVR.

6.4 LDE Inspections, Testing, and Marking

The LDE inspections, testing, and markings shall be completed by TFOME II designated personnel. This person shall, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training and experience, successfully demonstrate the ability to solve/resolve problems relating to LDE. The inspection and testing documents shall be written, dated, and signed reports. These reports shall include a reference to the inspection/testing procedure and adequacy of the LDE inspected/tested. Inadequacies shall be documented and, if determined to be a hazard, corrected prior to further use. These reports shall be filed and made readily available to cognizant personnel and auditors. There are four types of inspections for LDE.

6.4.1 Inspections

There are four types of inspections, each with the common purpose of keeping equipment performing as intended. Each inspection is directed toward a different set of circumstances. The four types of inspection are:

1. Initial Inspection
2. Daily Pre-Use Inspection
3. Monthly Inspection
4. Annual Inspection

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6.4.1.1 Initial Inspection

An initial inspection occurs prior to putting into service new, reinstalled, altered, repaired, and modified equipment. Inspection of altered, repaired, and modified cranes may be limited to the parts of the crane affected by the alteration, repair, or modification, as determined by the LDEM. The cranes shall be tested in accordance with the requirements of NASA-STD-8719.9A. Records of the inspection shall be documented and kept on file indefinitely.

6.4.1.2 Daily Pre-Use Inspections

These inspections shall be performed and documented in accordance with the procedures outlined on the checklist prior to first use each day by the lifting device operator and kept on file for three months. For forklifts, aerial lift platforms, and mobile cranes the form shall be stored within the storage clipboard located on the vehicle. For overhead cranes the forms shall be kept on file in the area. The following GRC forms shall be used:

- GRC144 Overhead Crane Daily Checklist
- GRC50 Forklift Operator Daily Checklist
- GRC61 Aerial Lift Platform Daily Checklist
- GRC142 Scissor Lift Platform Daily Checklist
- GRC187 Mobile Crane Daily Checklist

6.4.1.3 Monthly inspections (frequent inspections)

These inspections shall be performed by the assigned maintenance contractor per the set PM schedule for the specific LDE. These inspections shall be documented and kept on file for two inspection cycles.

6.4.1.4 Annual inspections (periodic inspections)

These inspections of the lifting components and rigging hardware are performed by the TFOME II designated personnel and shall be completed per their set PM schedule. Rigging hardware shall be marked to show when the annual inspection was performed. Annual inspections of the mobile drive components of aerial lift platforms, powered industrial trucks, and mobile cranes are performed by the LTID assigned contractor per their set PM schedules. These devices shall be marked to show when the PM was performed and when the next PM date is due. These inspections shall be documented and kept on file for two inspection cycles.

6.4.2 Testing

Proof load tests and periodic load tests shall be performed and documented by and the tests shall comply with the requirements in NASA-STD-8719.9A.

6.4.3 LDE Marking, Tagging, and Labeling

All LDE equipment shall be legibly marked with a unique identification number, a working load limit, and expiration date.

6.5 LDE Purchasing

All purchase requests for lifting devices, rigging hardware and lifting equipment shall be routed for approval through the LDEM prior to purchase. Identification and specification requirements will be assigned by the LDEM. Upon receipt, the LDE shall be inspected by TFOME II designated personnel for conformance to those requirements. The TFOME II contractors will maintain a database of rigging hardware and equipment that must be inspected and maintained. The database will contain inspection, maintenance, and load test information on each piece of equipment.

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6.6 Mobile Crane Use Request Form

A Crane Request Form (NASA C-185) must be completed as soon as the need for a temporary or permanent crane, derrick or boom truck is known at LF. At PBS a Crane Request Form is required for cranes that will extend to 200 feet or more. In each instance if a hazard to airspace is determined by Facilities Division, a FAA 7460 permit must be obtained.

6.6 LDE Operator Certification Program

The LDE Operator Certification program consists of two main elements: Operator Training and Operator Medical Clearance.

6.6.1 LDE Operator Training

A training, examination, and certification program shall be made available by the Human Capital Development Branch. This may include contracting with an accredited organization that provides the following:

- Training which includes those items that apply to the LDE and the particular application of the LDE and hazards associated with the LDE
- Administer written and practical tests that assess the operator applicant's knowledge for safe operation of the specific type of lifting device the individual will operate.

The operator certification program will be reviewed at least annually by the LDEM to assure that the contents, training material, testing, and examination elements are up-to-date with current methods and techniques, and that any "lessons learned" are adequately addressed. Annual refresher training is required for all equipment and can be completed through SATERN. Renewal of all certifications shall require demonstration of proficiency or approval of supervisor that proficiency is adequate and current. Demonstration of proficiency shall be documented on GRC Form GRC179. Certifications will expire at least every 4 years for all equipment except forklifts, which expire every 3 years.

6.6.2 LDE Operator Medical Clearance (Medical Surveillance)

When required, the medical clearance consists of a physical exams per NASA Procedural Requirement (NPR) 1800.1 and NASA-STD-8719.9A for LDE operators (see below for physical exam requirements). Medical Services will contact civil servant employees when their annual physical becomes due. It is the employee's responsibility to schedule and attend the physical. It is the responsibility of the employee's supervisor to ensure their employees attend and receive their physical. Medical Services will notify the employee and their supervisor of their medical clearance status via GRC form GRC142. Supervisors are required to maintain this information in the employee's personnel records and Employees who are not current with the medical requirements shall refrain from operating LDE where a medical clearance is required. Offsite medical facilities may also perform testing for support service contractors but the requirements of NASA-STD-8719.9A and NPR 1800.1 must be met.

- Frequency
 - Partial annual exam and physical
 - Complete baseline and biennial examination and physical
- Partial Annual Exam Elements
 - Audiogram (no hearing loss in better ear \leq 40 dB at 500, 1000, 2000 Hz with or without a hearing aid)
 - Visual acuity (minimum of at least 20/30 Snellen in one eye and 20/40 Snellen in the other eye with or without corrective lenses)
 - Depth perception
 - Field of vision at least 70 degrees in the horizontal median in each eye
 - Color Vision
 - Urinalysis
- Complete Baseline and Biennial Exam Elements
 - Annual exam elements plus:
 - o ECG
 - o Blood Chemistry

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- ◆ Chem 23
 - ◆ Lipid Panel
 - ◆ CBC and Diff
- Physical Exam Elements
 - History to ascertain any condition that may cause any sudden incapacitation or inability to perform duties
 - Evaluation for reaction time, manual dexterity, and coordination
 - No tendencies to seizures, dizziness, claustrophobia, sudden incapacitation, loss of physical, control, or similar undesirable conditions such as insulin controlled diabetes
 - No evidence of physical defects, or emotional instability, that in the opinion of the examiner, would present a hazard to self or others
- Written opinion
 - Job certification with any limitations or referral for further testing
 - History to ascertain any condition that may cause any sudden incapacitation or inability to perform duties
 - Evaluation for reaction time, manual dexterity, and coordination
 - No tendencies to seizures, dizziness, claustrophobia, sudden incapacitation, loss of physical control, or similar undesirable conditions such as insulin controlled diabetes
 - No evidence of physical defects, or emotional instability, that in the opinion of the examiner, would present a hazard to self or others
- Written opinion
 - Job certification with any limitations or referral for further testing

6.6.3 LDE Operator Certification/License

Upon completing the required LDE training requirements and receiving medical clearance, the LDE operator is certified by the LDEM to operate that particular piece of equipment. Supervisors of LDE operators shall maintain current lists of their certified operators. The LDEM will maintain a master list of certified operators on the SMAD Web site.

Certifications shall indicate the type of LDE the holder is qualified to operate, date of expiration, and who verified and approved the certification.

Exemption: Certifications are not required to manually operate hoists and winches, manually propelled mobile aerial platforms (e.g., access stand/stairs), manually propelled industrial trucks, manually operated load positioning devices, or jacks.

The LDEM reserves the right to suspend or revoke certification for reasons such as negligence, violations of requirements, or failure to meet medical standards.

7.0 RECORDS

Record Name

GRC50 Forklift Operator Daily Pre-Use Checklist
 GRC61 Aerial Lift Operator Daily Pre-Use Checklist
 GRC83 Safety Variance Request (SVR)
 GRC142 Medical Service Physical Exam Notification
 GRC144 Overhead Crane Daily Pre-Use Checklist
 GRC148 Scissor Lift Platform Operator Daily Checklist
 GRC179 Demonstration of LDE Proficiency
 GRC185 Mobile Crane Use Request
 GRC185A Temporary Crane Request or Permanent Structure Notification
 GRC187 Mobile Crane Daily Pre-Use Checklist
 GRC195 Critical Lift Determination

Maintained By

Forklift Operator Division
 Aerial Lift Operator Division
 SMAD
 Medical Services
 Overhead Crane Operator Div.
 Scissor Lift Operator Division
 HCDD/Operator's Division
 Facilities Division
 Facilities Division
 Mobile Crane Operator Div.
 GRC LDEM

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Certified LDE Operator Master List	GRC LDEM
Support Service Contractor Medical Clearance Records	Contractor
Crane Certifications (proof tests and periodic load tests)	TFOME II
Monthly & Annual Crane Inspections	TFOME II
Forklift and Aerial Lift Annual Maintenance	LTID
Forklift and Aerial Lift Proof Test and/or Periodic Load Tests	TFOME II

8.0 REFERENCES

Document number	Document name
29 CFR 1910	Occupational Safety and Health Standard, General Industry
29 CFR 1926	Occupational Safety and Health Standard, Construction
29 CFR 1960	Occupational Safety and Health Standard, Basic Program Elements for Federal Employees
NRRS 1441.1	NASA Records Retention Schedules
NPR-1800.1C	NASA Occupational Health Program Procedures
NPR 8715.1	NASA Occupational Safety and Health Programs
NPR-8715.3C	NASA Procedural Requirements: NASA General Safety Program Requirements
NASA-STD-8719.9A	NASA Lifting Device and Equipment Standard
CP-189-2011	Qualification and Certification of Nondestructive Testing Personnel
SNT-TC-1A-2011	Personnel Qualification and Certification in Nondestructive Testing
ANSI/SAIA A92.2-2009	Vehicle Mounted Elevating and Rotating Aerial Devices
ANSI/SAIA A92.3-2006	Manually Propelled Elevating Aerial Platforms
ANSI/SAIA A92.5-2006	Boom Supported Elevating Work Platforms
ANSI/SAIA A92.6-2006	Self-Propelled Elevating Work Platforms
ANSI/ITSDF B56.1-2012	Safety Standard for Low Lift and High Lift Trucks
ANSI/ITSDF B56.6-2011	Safety Standard for Rough Terrain Forklift Trucks
ANSI/ITSDF B56.10-2012	Safety Standard for Manually Propelled High Lift Industrial Trucks
ASME BTH-1-2014	Design of Below-the-Hook Lifting Devices
ASME B30.1-2009	Jacks, Industrial Rollers, Air Casters, and Hydraulic Gantries
ASME B30.2-2011	Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
ASME B30.3-2012	Tower Cranes
ASME B30.4-2010	Portal and Pedestal Cranes
ASME B30.5-2014	Mobile and Locomotive Cranes
ASME B30.6-2010	Derricks
ASME B30.7-2011	Winches
ASME B30.8-2010	Floating Cranes and Floating Derricks
ASME B30.9-2014	Slings
ASME B30.10-2014	Hooks

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ASME B30.11-2010	Monorails and Underhung Cranes
ASME B30.12-2011	Handling Loads Suspended From Rotorcraft
ASME B30.13-2011	Storage/Retrieval (S/R) Machines and Associated Equipment
ASME B30.14-2010	Side Boom Tractors
ASME B30.16-2012	Overhead Hoists
ASME B30.17-2006	Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)
ASME B30.19-2011	Cableways
ASME B30.20-2013	Below-the-Hook Lifting Devices
ASME B30.21-2014	Lever Hoists
ASME B30.22-2010	Articulating Boom Cranes
ASME B30.23-2011	Personnel Lifting Systems
ASME B30.24-2013	Container Cranes
ASME B30.25-2013	Scrap and Material Handlers
ASME B30.26-2010	Rigging Hardware
ASME B30.28-2010	Balance Lifting Units
ASME B30.29-2012	Self-Erect Tower Cranes
ASME HST-1-2012	Performance Standard for Electric Chain Hoists
ASME HST-2-2014	Performance Standard for Hand Chain Manually Operated Chain Hoists
ASME HST-3-1999	Performance Standard for Manually Lever Operated Chain Hoists
ASME HST-4-1999	Performance Standard for Overhead Electric Wire Rope Hoists
ASME HST-5-2014	Performance Standard for Air Chain Hoists
ASME HST-6-1999	Performance Standard for Air Wire Rope Hoists
WSTDA-WS-1-2015	Recommended Standard for Synthetic Web Slings
WSTDA-RS-1-2010	Recommended Standard for Synthetic Polyester Round Slings
Wire Rope User's Manual-4th Edition	
Wire Rope Sling User's Manual-3rd Edition	

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APPENDIX A.—DEFINITIONS AND ACRONYMS

- GSE** ground support equipment
- LDE** lifting device equipment
- LDEC** Lifting Device Equipment Committee
- LDEM** Lifting Device Equipment Manager
- LOTO** Lock out/tag-out
- LTID** logistics and Technical Information Division
- OSHA** Occupational Safety and Health Administration
- PM** preventative maintenance
- POC** Point of Contact
- SHeD** Safety& Health Division
- SVR** Safety Variance Request
- TFOME** Testing Facilities Operations Maintenance Engineering

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