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MARSHALL PROCEDURAL REQUIREMENTS

AS01

LIFTING EQUIPMENT AND OPERATIONS

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Baseline		12/20/2013	Document converted from MWI 6430.1 to an MPR.

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PREFACE

P.1 PURPOSE

To document Center-specific requirements for using different types of lifting devices and equipment (e.g., overhead cranes, derrick cranes, hoists, hooks, mobile equipment, Hydra-sets; special hoist-supported, personnel lifting devices; slings) in accordance with NPR 8715.3.

P.2 APPLICABILITY

a. This MPR applies to Center personnel, programs, projects, and activities, including contractors and resident agencies to the extent specified in their respective contracts or agreements. ("Contractors," for purposes of this paragraph, include contractors, grantees, Cooperative Agreement recipients, Space Act Agreement partners, or other agreement parties.)

b. This MPR applies to the Michoud Assembly Facility.

c. This MPR applies the following: all mandatory actions (i.e., requirements) are denoted by statements containing the term "shall." The terms "may" or "can" denote 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.

d. This MPR applies the following: all document citations are assumed to be the latest version unless otherwise noted.

e. This MPR applies to the Facilities Management Office (FMO) for overhead and gantry cranes (including top running monorail, underhung, and jib cranes), derricks, and hoists, to the program/project/user organization for special hoist-supported, personnel-lifting devices, Hydra-sets, load measuring devices, hooks, slings and rigging, and jacks (this MPR only applies to jacks used to lift flight hardware or critical lifts), and to the Logistics Services Office (LSO) for mobile aerial platforms, forklifts; and mobile cranes. It does not address elevators or front-end loaders.

P.3 AUTHORITY

NPR 8715.3, "NASA General Safety Program Requirements"

P.4 APPLICABLE DOCUMENTS AND FORMS

a. NPR 1400.1, "NASA Directives and Charters Procedural Requirements"

b. NPR 1441.1, "NASA Records Retention Schedules (NRRS)"

c. MPR 1440.2, "MSFC Records Management Program"

d. MWI 3410.1, "Personnel Certification Program"

e. MWI 6410.1, "Packaging, Handling, and Moving Program Critical Hardware"

f. NASA-STD 8719.9, "Standard for Lifting Devices and Equipment"

g. MSFC Form 248, "Test Preparation Sheet"

h. MSFC Form 4561, "MSFC Handling Classification Form"

i. MSFC-RQMT-3479, "Fracture Control Requirements for Composite and Bonded Vehicle and Payload Structures"

P.5 MEASUREMENT/VERIFICATION

None.

P.6 CANCELLATION

MWI 6430.1G-1, "Lifting Equipment and Operations," dated October 20, 2008.

Original signed by

Patrick E. Scheuermann
Director

CHAPTER 1. RESPONSIBILITIES

1.1 The Center Director designates in writing a Lifting Devices and Equipment Manager (LDEM).

1.2 The LDEM:

1.2.1 Establishes an overall lifting devices program for MSFC.

1.2.2 Establishes and chairs a MSFC Lifting Devices Committee for MSFC.

1.2.3 Reviews and approves certification packages for lifting devices designating the device as rated for critical lifts.

1.2.4 Reviews and approves critical lift plans.

1.2.5 Reviews and approves all leased LDE before use.

1.3 The Safety and Mission Assurance Office (S&MA), Industrial Safety Branch (ISB):

1.3.1 Provides appropriate hazard analyses for cranes to be certified for critical lifts.

1.3.2 Provides crane certification packages.

1.3.3 Reviews multiple-point lifts and determines if they should be deemed a critical lift.

1.3.4 Reviews and approves critical lift plans and procedures.

1.3.5 Approves an engineering/safety analysis documenting specific lifting devices to be used to perform load tests of slings and rigging.

1.3.6 Certifies individuals to use lifting devices.

1.4 The FMO:

1.4.1 Manages fixed lifting systems and related equipment; overhead cranes, derrick cranes, gantry cranes and hoists.

1.4.2 Maintains a records case file for each fixed lifting system.

1.4.3 Establishes a maintenance program for fixed lifting equipment that ensures all requirements of NASA-STD 8719.9 are met. This includes proof load tests, as well as periodic tests and inspections.

1.4.4 Identifies, at the program/project office's request, devices as to whether it can be rated for critical lifts.

1.4.5 Provides the design and installation of all fixed lifting systems.

1.4.6 Tags all lifting equipment including slings and rigging.

1.4.7 Provides notification of load test expiration to user/owner organizations.

1.5 The LSO:

1.5.1 Manages mobile lifting equipment; mobile cranes, forklifts and mobile aerial lift platforms.

1.5.2 Establishes a maintenance program for mobile lifting equipment that ensures all requirements of NASA-STD 8719.9 are met. This includes proof load tests, as well as periodic tests and inspections.

1.5.3 Maintains a records case file for each mobile lifting device.

1.5.4 Identifies, at the program/project office's request, devices as to whether it can be rated for critical lifts.

1.5.5 Procures all special purpose equipment to include mobile cranes, mobile aerial platforms, special hoist support personnel lifting devices, and power industrial trucks (forklifts).

1.6 Program/Project Offices:

1.6.1 Identifies cranes that require critical lift classification and provide necessary resources to comply with this requirement.

1.6.2 Identifies critical lifts.

1.6.3 Provides critical lift documentation per NASA-STD 8719.9.

1.7 User/owner organizations:

1.7.1 Ensures all lifting equipment is certified and tagged prior to use.

1.7.2 Ensures all lifting equipment operators are familiar with the pertinent operations sections of NASA-STD 8719.9.

1.7.3 Performs daily inspections as required by NASA-STD 8719.9.

1.7.4 Prepares critical lift plans and submit to ISB and the LDEM for approval.

1.7.5 Prepares general operating procedures describing crane operation, emergency steps, communication requirements, and special requirements including checklists and inspection requirements for each crane, mobile crane, or forklift.

1.7.6 Determines if the lift is critical or non-critical, refer to Page 2 of MSFC Form 4561, "MSFC Handling Classification Form."

1.7.7 Acquires load tests for hydra-sets and rigging including the initial proof load test and periodic load tests as required by NASA-STD 8719.9. (See 2.5.7.)

CHAPTER 2. Lifting Devices and Equipment Requirements

Introduction

The Lifting Devises and Equipment (LDE) Committee is chaired by the Lifting Devices and Equipment Manager (LDEM) to control the use of different types of lifting devices and equipment (e.g., overhead cranes, derrick cranes, hoists, hooks, mobile equipment, Hydra-sets; special hoist-supported, personnel lifting devices; slings) and meet the requirements of NASA-STD 8719.9.

2.1 LDE Load Test Cycles

2.1.1 Load test cycles for critical LDE shall be performed annually by an approved organization as identified in 2.5.7.

2.1.2 Load test cycles for non-critical LDE shall be performed every four years by an approved organization as identified in 2.5.7 unless a shorter time is required by OSHA.

2.2 Critical LDE Certification

2.2.1 Powered critical LDE, i.e., overhead cranes; mobile cranes; powered industrial trucks, shall have a certification package prepared by S&MA Office, ISB, and approved by the LDEM prior to use for a critical lift.

2.2.2. The certification package shall contain an appropriate hazard analysis as required in NASA-STD 8719.9 and the Hazard Analysis Closure Sheet.

2.2.3 The certification package shall be documented by S&MA Office and ISB using MSFC Form 4330, “MSFC Certification for Lifting Devices and Equipment.”

2.2.4 The certification package shall be approved by the LDEM, ISB, FMO, and LSO.

2.2.5 The requirement for critical lift certification is driven by programmatic need. Program/Project offices will identify LDE to be certified and provide the resources to meet critical classification.

2.2.6 The original certification package shall be placed in the records case file by FMO or LSO.

2.3 Critical Lifts

2.3.1 Program/Project offices will identify critical lifts as defined in 1.6.1 above. Page 2 of MSFC Form 4561 is shown in Appendix E.

2.3.2 Lifts determined to be critical shall be documented by the user/owner organization in a detailed lift procedure, Test Preparation Sheet (MSFC Form 248), or MSFC Handling Classification Form (MSFC Form 4561).

2.3.3 Detailed procedures shall be developed for each critical lift by the user/owner organization and approved by the LDEM and ISB.

2.3.4 MSFC Form 4339 shall be filled out by the user/owner organization and attached to each critical lift procedure.

2.3.5 Multiple point lifts involving more than one crane or other lifting device (i.e. powered industrial truck) shall be considered a critical lift unless ISB reviews the lift and determines that critical lift classification is not necessary.

2.4 LDE Operations

2.4.1 Only operators and riggers listed in CERTRAK shall use LDE.

2.4.2 Operators shall verify that all LDE is currently certified prior to use. Rigging has tags attached and other LDE has a certification sticker located near the operator controls or disconnect switch.

2.4.3 The first operator on a given shift shall perform a daily inspection and fill out the daily inspection checklist located near the operator controls or disconnect switch.

2.4.3.1 Operators shall verify the daily inspection has been performed within eight hours prior to using LDE.

2.4.5 The operator shall establish an area where the lift will be performed and ensure no unauthorized personnel enter this area by erecting barriers or other means to control access.

2.5 LDE Maintenance

2.5.1 A maintenance program shall be developed for each lifting device and equipment incorporating manufacturer's recommended maintenance and load test information by FMO and LSO.

2.5.2 A records case file shall be maintained for each powered lifting device and will contain all required records. (See Appendix D.)

2.5.3 Powered lifting equipment shall be certified for use on an annual basis by FMO and LSO.

2.5.4 Dated certification tags or stickers shall be placed near operator controls or the disconnect switch for each piece of lifting equipment by FMO.

2.5.5 Rigging shall be load tested in accordance with NASA-STD 8719.9 by FMO or Test Laboratory.

2.5.6 Rigging shall have a tag attached containing the safe working load and load test expiration date as a minimum by FMO or the Test Laboratory.

2.5.7 Load tests for LDE are required on frequencies as stated in 2.1.1 above. FMO provides this service through the Facility Work Request system. Test Laboratory provides this service through the Test Preparation Sheet (MSFC Form 248) or an outside source may be utilized provided dated and signed documentation is provided. FMO and the Test Laboratory are the only authorized organizations to perform load tests at MSFC.

2.6 New LDE

2.6.1 FMO shall design and install all new fixed lifting systems.

2.6.2 LSO shall procure and/or lease all special purpose equipment to include mobile cranes, mobile aerial platforms, special hoist support personnel lifting devices, and power industrial trucks (forklifts).

2.6.3 All new rigging shall be provided with proof load documentation by the manufacturer and sent to AS24 at MSFC and AS60 at MAF for initial tagging prior to first use.

2.7 Emergency Procedures

2.7.1 If any event happens during LDE operation such as an un-commanded operation or equipment failure the operator shall:

2.7.1.1 Use the emergency stop to cease all lifting operations.

2.7.1.2 Call Facilities Work Control Desk at 256-544-3919 to report the problem.

2.7.1.3 Remain with the LDE and ensure the area remains clear of all unauthorized personnel until the LDE crew arrives.

2.7.1.4 Inform the LDE crew of all details of the incident.

2.7.2 FMO or LSO will investigate the incident and determine further action to be taken.

APPENDIX A

Definitions

Critical-Lift. Lifting and lowering operations with special, high-dollar items (i.e., spacecraft, one-of-a-kind articles, or major facility components) whose loss would have serious programmatic impact. Critical lifts also include operations with special personnel and equipment safety concerns beyond normal lifting hazards.

Hazard Analysis. A systematic analysis performed on cranes being qualified to handle loads classified as critical or program-critical hardware. The analysis is required for initial certification to handle critical loads and must be updated, as needed, to reflect any changes in operations or crane configuration. The analysis must determine potential sources of danger, identify most probable failure modes, and recommend resolutions for those conditions found in the hardware-facility-environment-human relationship which could cause loss of life, personal injury, or loss of crane, facility, or load. The analysis must include crane description, reference documentation, severity assessment, and assessment of specified passive and structural components between the hook and the holding brakes.

Lifting Devices. For purposes of this instruction, this term is used to refer to overhead and gantry cranes (including top running monorail, underhung, and jib cranes); mobile cranes; derricks; hoists; special hoist-supported, personnel-lifting devices; Hydra-sets; load measuring devices; hooks; slings and rigging; mobile aerial platforms; forklifts; and jacks. It should be noted that NASA-STD 8719.9 uses the terms “lifting device” and “lifting equipment” interchangeably.

Non-critical lift. LDE that is used in normal everyday operations is classified as Non-Critical LDE.

Proof Load Test. A load test performed prior to first use, after major modification of the load path, or at other prescribed times. This test verifies material strength, construction, and workmanship, and uses a load typically greater than the rated load. The percentage above rated load varies with equipment type.

Periodic Load Test or Rated-Load Test. A load test performed at predetermined intervals with a load equal to the rated load. The acceptable tolerance of the periodic load test is +5%/-0%.

APPENDIX B

Reserved for Acronyms

APPENDIX C

Reserved for Verification Matrix

APPENDIX D

Records

Records are retained in accordance with NPR 1441.1, "NASA Records Retention Schedules" (NRRS) and MPR 1440.2, "MSFC Records Management Program." The following records are maintained by the organizations responsible for different types of lifting devices and equipment.

D.1 Design Records are records of engineering review and approval of designs and configuration changes for cranes, hoists, structural slings, and special hoist-supported, personnel-lifting devices. Retain for the life of the equipment, destroy one year after disposal (NRRS 8/56.5/A/1).

D.2 Inspection and Test Records document the completion of required periodic inspections and test activities. Retain records of 2 inspection cycles; destroy records when second subsequent cycle is completed or when no longer needed, whichever is longer (NRRS 8/56.5/A/2).

D.2.1 Nonconformance Reports document deficiencies identified during inspections and tests. These records are maintained for the same period as the associated Inspection and Test Records.

D.2.2 Corrective Action Records are to document the correction of deficiencies identified during inspections and tests. These records are maintained for the same period as the associated Inspection and Test Reports.

D.3 Acceptance Inspection and Test Records document inspections and tests required before placing new or extensively-modified or repaired equipment into service. Retain for the life of the equipment, destroy one year after disposal (NRRS 8/56.5/A/1).

D.4 Critical-Lift Equipment Qualification Records (e.g. MSFC Form 4330, "MSFC Certification for Lifting Devices and Equipment") pertain to the qualification of lifting equipment to handle critical loads. Retain for the life of the equipment, destroy one year after disposal (NRRS 8/56.5/A/1).

D.5 Servicing Records document maintenance and adjustment activities performed for lifting equipment. Retain for at least five years; destroy when 5 years old or when no longer needed, whichever is longer (NRRS 8/56.5/A/3).

D.6 Daily inspection checklists. Retain 3 months; destroy when 3 months old or when no longer needed, whichever is later (NRRS 8/56.5/A/4).

D.7 Record Case Files for powered lifting devices are maintained for the life of the equipment. (Reference paragraph 2.5.2.).

D.8 Personnel Certification Records pertain to personnel certification of operators of lifting equipment, as well as material-handling riggers and flagmen for both critical and non-critical lift

operations and are maintained by the S&MA, ISB, in the S&MA CERTRAK database in accordance with MWI 3410.1, “Personnel Certification Program.”

APPENDIX E

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Critical-Lift Decision Process

Read both questions presented below and answer "YES" or "NO" to all parts of each question.

If all of the responses are "NO," the lift operation is classified as NON-CRITICAL. If the response to at least one question is "YES," the lift operation is classified as CRITICAL.

	YES	NO
1. Does the load to be lifted meet one of the following criteria used to define a critical load?	☐	☐
1a. Assemblies with close tolerances or delicate construction which could be damaged by improper handling and such resulting damage could compromise a flight vehicle, payload, or the safety of personnel, regardless of whether the item is considered "Flight Hardware." (Reference MWI 6410.1.)	☐	☐
1b. Equipment, hardware, software, and items returned from space. A special designation by the assigned program office shall be required for a returned item to be handled as Critical. (Reference MWI 6410.1.)	☐	☐
1c. Lifting or lowering operations with special, high-dollar items (i.e., spacecraft, one-of-a-kind articles, or major facility components) whose loss can have serious programmatic impact. (Reference NASA-STD-8719.9)	☐	☐
1d. Composite or bonded structures (used in the construction of MSFC manned vehicle or payload hardware) which have been identified as being susceptible to impact damage and are defined as such within the applicable Damage Threat Assessment or Impact Damage Protection Plan. (Reference MSFC-RQMT-3479)	☐	☐
2. Does the planned lifting or lowering operation involve special personnel and device/equipment safety concerns beyond normal lifting hazards such as the following? (Reference NASA-STD-8719.9)	☐	☐
2a. Lifting/lowering personnel with cranes.	☐	☐
2b. Lifting/lowering hazardous materials such as explosives.	☐	☐
2c. Performing a two-point lift using two or more cranes or lifting devices (i.e., jacks, fork lifts,) to lift/lower a single load. (See note below.)	☐	☐
2d. Operations that require personnel to be beneath a suspended load. (Reference NASASTD-8719.9, Appendix C.)	☐	☐
2e. There is a high probability of damage to the lifting device or equipment which can result in significant repair costs and/or schedule delays for future lift operations.	☐	☐
2f. The mechanics of the lifting and handling operation itself create a high probability of damage to facilities, devices, equipment, and/or the load.	☐	☐

NOTE: S&MA ISB may review the two-point lift and waive critical-lift requirements at its discretion, due to the mechanics, configuration, and operation to be performed. This is not applicable to two-point lifts designated as "Critical Lifts" meeting the criteria of Question 1.

Page 2 – MSFC Form 4561 (September 2010) Previous Versions Obsolete