National Institute of Standards and Technology • U.S. Department of Commerce

OVERHEAD CRANES AND HOISTS

NIST S 7101.69
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1. PURPOSE

The purpose of this program is to define requirements and associated roles and responsibilities for protecting employees and covered associates from the hazards presented by operating overhead cranes and hoists (see Section 7, **DEFINITIONS**).

2. BACKGROUND

NIST must meet or exceed the requirements established by OSHA in 29 Code of Federal Regulations (CFR) 1910.179, *Overhead and gantry cranes.* Implementation of this suborder through the requirements in Section 6 and the roles and responsibilities in Section 9 meets those requirements.

3. APPLICABILITY

a. The provisions of this suborder apply to all NIST employees and covered associates whose work activities involve operating overhead cranes and hoists at any NIST owned and operated sites. NIST employees and covered associates who work with overhead cranes and hoists at non-NIST sites must follow requirements of the host organization's crane program which must meet or exceed all applicable OSHA requirements. Contact OSHE as needed for assistance in evaluating crane programs from other organizations.

4. REFERENCES

a. 29 CFR 1910.179, *Overhead and Gantry Cranes*

b. 29 CFR 1910.184, *Slings*

[1] For revision history, see Appendix A.

c. ANSI B30.2.0-1967, *Overhead and Gantry Cranes*

d. ANSI/ASME B30, *Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings*

5. APPLICABLE NIST DIRECTIVES

The NIST OSH Suborders listed below are incorporated by reference as standard operating procedures for this suborder.

a. NIST S 7101.01: *Safety Rights and Responsibilities*

b. NIST S 7101.02: *Employee Reporting of Unsafe or Unhealthful Working Conditions*

c. NIST S 7101.03: *Stop Work*

d. NIST S 7101.20: *Work and Worker Authorization Based on Hazard Reviews*

e. NIST S 7101.23: *Safety Education and Training*

f. NIST S 7101.73: *Out of Service*

6. REQUIREMENTS

a. Installation and Modification

(1) Installation/set-up must meet:

(a) Manufacturer recommendations;

(b) OSHA 29 CFR 1910.179 requirements; and

(c) Current version of ANSI/ASME B30.

(2) The rated load of a crane must be plainly marked on each side of the crane.

(a) If the crane has more than one hoisting unit, each hoist must have its rated load marked on it or its load block and the marking must be clearly legible from the ground or floor.

(3) Except for floor operated cranes, a gong or other effective warning signal must be provided for each crane equipped with a power traveling mechanism.

(4) Cranes may be modified and rerated provided such modifications and the supporting structure are checked thoroughly for the new rated load by a qualified engineer or the equipment manufacturer.

(a) Modified cranes must be taken out of service until tested and the new rated load is determined and displayed.

(b) The modified crane shall be tested and the new rated load shall be displayed in accordance with this suborder.

b. Inspections

(1) Inspections shall be performed as prescribed below by a designated person in accordance with use.

(a) Initial Inspection – Prior to initial use, all new and altered cranes shall be inspected to ensure compliance with 29 CFR 1910.179, ANSI B30.2.0-1967, and ANSI/ASME B30.

(b) Functional Inspection – A functional test inspection is a visual and audible operational examination of the crane performed on the day it will be used. It shall be conducted at the beginning of each workday shift or beginning of each shift if multiple shifts are used each day. In special applications, where the suspended load is transferred from operator to operator at shift change, the functional test inspection shall be performed when that lift is completed. It will consist of testing operational controls, upper limit devices, and rope condition in accordance with ANSI/ASME B30.

(c) Frequent Inspection – A frequent inspection is a visual and audible examination of the crane performed monthly under normal service, weekly to monthly under heavy service and daily to weekly under severe service. Frequent inspections shall be conducted in accordance with 29 CFR 1910.179(j)(2) and (m).

(d) Periodic Inspection – A periodic inspection is a visual and audible examination of the crane conducted yearly under normal and heavy service; and quarterly under severe service. Periodic inspections shall be conducted in accordance with 29 CFR 1910.179(j)(3).

(2) A crane which has been idle for a period of 1 month or more, but less than 6 months, shall be given an inspection conforming with the above Frequent inspection requirements before placing in service.

(3) A crane which has been idle for a period of over 6 months shall be given a complete inspection conforming with the above Frequent and Periodic inspection requirements before placing in service.

(4) Standby cranes shall be inspected at least every six months in accordance with the above Frequent inspection requirements.

(5) If an inspection finds that the crane or lifting device is not safe for use, an "out of service" tag, warning sign, or lock shall be placed on the crane's controls and/or power source by the person who inspected the crane and found the deficiency. A qualified person shall be contacted to assess the deficiency and effectuate the necessary repair actions before the crane can be placed back into service.

(6) Record retention of inspections.

(a) OUs shall maintain a written record of Frequent and Periodic Inspections for a minimum of one year.

(b) A written record shall be available for inspection which includes the date of inspection, the signature of the person who performed the inspection and an identifier for the equipment which was inspected.

c. Hazard Review

(1) OUs shall perform a hazard assessment in accordance with NIST S 7101.20 for all their crane operations.

(2) Safe Operating Practices for Cranes and Hoists

(a) OUs shall develop and maintain safe operating procedures in accordance with 29 CFR 1910.179 as part of the hazard review for each crane or hoist under their control. The procedures must consider the design and controls of the crane or hoist, the items being lifted, and the conditions, configuration and construction of the area. At a minimum, these safe operating procedures shall address the following:

i. Operation of the equipment by a competent operator or trainee who is under the direct supervision of the competent operator;

ii. Maintaining full attention on the task being performed (*e.g.*, no use of headsets, music);

iii. Training on and use of hand signals during the task being performed;

iv. Restrictions on using cranes placed "out of service" until the appropriate inspection is completed to render it back in service;

v. Restrictions for operators and nearby workers from passing under a suspended load;

vi. Installation of proper guards for exposed gears, belts, electrical equipment, couplings and fans of the crane;

vii. Procedures for keeping suspended loads as low to the work surface as possible and kept clear of obstructions and personnel unless obstructions are unavoidable;

viii. Procedures for ensuring suspended loads are not left unattended unless provisions have been made to provide auxiliary support under the suspended load. Where possible, suspended loads should be either lowered or supported in the event of a building evacuation;

ix. Positioning of hands and/or fingers when the sling is being tightened around the load;

x. Prohibition of shock loading; and

xi. Prohibition of pulling slings from under a load when the load is resting on the sling.

(3) Safe Operating Practices for Slings

(a) OUs shall develop and maintain safe operating procedures in accordance with 29 CFR 1910.184 as part of the hazard review for the use of slings. The procedures must consider the design and construction of the slings, the items being lifted, and the conditions, configuration and construction of the area.

(b) All employees who handle wire slings and hoist cables should wear leather gloves to prevent hand injury.

d. Crane Training

(1) Training shall be provided, documented, and recorded in accordance with the requirements of NIST S 7101.23: *Safety Education and Training*.

(2) Employees and covered associates to whom this suborder applies shall receive the following information and training prior to their initial assignment to operate a crane or hoist:

(a) Training provided by OSHE on crane and hoist safety; and

(b) Activity-specific crane and hoist operator training provided by their OUs in accordance with NIST S 7101.20.

i. This training should consist of crane and lift type(s), communication strategies used during lifts, lifting requirements and personnel needed, basic rigging gear inspection and use, determining load weights, calculating capacities, physical characteristics of the workplace, performance characteristics and complexity of the crane, and crane accident identification and response.

ii. Written and practical examinations shall be conducted that verify that the person has acquired the knowledge and skill to operate the particular crane(s) that will be operated by the person. The examinations shall be defined by the owner/user and in accordance with the type of crane or hoist used.

iii. A certificate, or formal record, that verifies that the person has been trained and has passed the examination required or confirm that the person has a valid certificate or formal record that satisfies the requirements ANSI B30.2.0-1967 shall be issued. The Safety Education and Training System (SETS) can be used to meet this requirement.

(3) Refresher training in relevant topics should be provided to the crane/hoist operator when:

(a) The operator has been observed to operate the crane or hoist in an unsafe manner; or

(b) The operator has been involved in an accident or near-miss incident.

7. DEFINITIONS

Definitions common to all NIST OSH suborders can be found in Section 6 of NIST O 7101.00: Occupational Safety and Health Management System. The definitions specific to this suborder are as follows:

a. Abnormal Operating Conditions – Environmental conditions that are unfavorable, harmful, or detrimental to or for crane operations (e.g., excessively high or low ambient temperatures, corrosive fumes, moisture-laden atmospheres).

b. Crane - A "crane" is defined by OSHA 29 CFR 1910.179 as a machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine. Cranes whether fixed or mobile are driven manually or by power, e.g. overhead gantry crane.

c. Crane Service, Heavy – Service that involves operating at 85 to 100% of rated load or in excess of 10 lift cycles/hr as a regular specified procedure.

d. Crane Service, Normal – Service that involves operating at less than 85% of rated load and not more than 10 lift cycles/hr except for isolated instances.

e. Crane Service, Severe – Service that involves normal or heavy service with abnormal operating conditions.

f. Designated Person – A person selected or assigned by the employer or the employer's representative as being competent to perform specific duties.

g. Hoist – A machinery unit that is used for lifting or lowering a freely suspended (unguided) load.

h. Qualified Person – A person who, by possession of a recognized degree in an applicable field or a certificate of professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.

i. Shock Loading - Occurs when a load is quickly jerked in any direction or if it is allowed to free-fall before the rigging catches it. Rapid acceleration increases the force put on the rigging system, and if the acceleration is too severe, it can overload the capacity of the system.

j. Sling - An assembly which connects the load to the material handling equipment.

k. Standby Crane – A crane not in regular service that is used intermittently as required.

8. ACRONYMS

Acronyms common to all NIST OSH suborders can be found in Section 7 of NIST O 7101.00: Occupational Safety and Health Management System. The acronyms specific to this suborder are as follows:

a. ANSI – American National Standards Institute

b. CFR – Code of Federal Regulations

c. NIST – National Institute of Standards and Technology

d. OSHE – Office of Safety, Health, and Environment

e. OU – Organizational Unit

9. RESPONSIBILITIES

Roles and responsibilities common to all NIST OSH suborders can be found in Section 8 of NIST O 7101.00: Occupational Safety and Health Management System. The roles and responsibilities specific to this suborder are as follows:

a. OU Directors are responsible for:

(1) Establishing policies and procedures, as needed, for the requirements of this program to be met as it applies to their employees and covered associates and to cranes and hoists operated during their OU operations and ensuring that those policies and procedures are implemented; and

(2) Ensuring subordinate managers have the authority, resources, and training needed to implement OU-established policies and procedures.

b. Division Chiefs (or Equivalents)[2] are responsible for:

(1) Implementing this program as it applies to activities involving their personnel in accordance with any applicable OU-established policies and procedures;

[2] Some NIST OUs do not have Division Chiefs; these OUs shall designate other individuals to carry out these responsibilities.

(2) Allocating budgetary and other resources capable of ensuring the health and safety of employees, covered associates, and visitors in divisional work areas;

(3) Providing support to divisional group leaders, safety personnel, employees, and covered associates in carrying out their responsibilities with respect to implementing the requirements of this suborder and managing cranes and hoists within the division; and

(4) Acting on all incidents involving cranes and hoists and related safety concerns reported by divisional personnel quickly and completely to protect employees and covered associates from the health and physical hazards presented by cranes and hoists in divisional work areas.

c. Line Management is responsible for:

(1) Reviewing crane and hoist procurement requests to ensure hazards have been identified and evaluated prior to procurement;

(2) Reviewing crane and hoist procurement requests to ensure equipment will be procured only when their design and construction meets 29 CFR 1910.179;

(3) Ensuring required training has been completed by affected employees and covered associates;

(4) Ensuring inspections are conducted at the proper frequency by the appropriate personnel; and

(5) Providing oversight as necessary aimed at ensuring that employees and covered associates who operate cranes and hoists do so in accordance with this suborder.

d. Employees and Covered Associates are responsible for:

(1) Completing the training required by this program and their OUs/divisions;

(2) Requesting additional training as needed or as conditions change; and

(3) Operating cranes and hoists in accordance with their training and the requirements of this suborder.

10. AUTHORITIES

There are no authorities specific to this suborder alone. For authorities applicable to all NIST OSH suborders, see section 9 of NIST O 7101.00: Occupational Safety and Health Management System.

11. DIRECTIVE OWNER

Chief Safety Officer

12. APPENDICES

A. Revision History

Appendix A. Revision History

Revision No.	Approval Date	Deployment Start Date	Effective Date	Brief Description of Change; Rationale
0	10/05/20	03/02/22	06/30/23	• None – Initial document • NOTE: Effective date was originally TBD due to the COVID-19 pandemic. It was updated on 4/17/23.