



Material Handling - Cranes, Hoists, Slings, Chain Falls, and Ratchet Hoists

University Facilities

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Approved by: Bob Wells

1.0 Purpose

- 1.1 The policy of Clemson University Facilities (UF) is to protect personnel, equipment and facilities during the operating and use of cranes, hoists, slings, chain falls, and ratchet hoist through compliance with this safety standard. These regulations shall be incorporated in all operating instructions requiring the use of cranes, hoists, slings, chain falls, and ratchet hoists.

2.0 Scope

- 2.1 This standard covers the general procedures for safe operation and requirements for inspection, maintenance, and testing of cranes, hoists, slings, chain falls and ratchet hoists.

3.0 Definitions

- 3.1 *Crane* - A machine for lifting or lowering a load and moving it horizontally, with the hoisting mechanism an integral part of the machine. Cranes, whether fixed or mobile, may be manual or powered.
- 3.2 *Hoist* - An apparatus which may be a part of a crane, exerting a force for lifting or lowering.
- 3.3 *Sling* - An assembly which connects the load to the crane or hoist.
- 3.4 *Chain fall* - A temporary rigging device used to lift or lower a load vertically.
- 3.5 *Ratchet Hoist* - (Pull lift, chain jack, pull jack, come-a-long), a device for pulling, lifting, or lowering a load.
- 3.6 *Frequent Inspection* - **Daily** external inspection for obvious defects. See attachment 1.
- 3.7 *Periodic Inspection* - An **annual** thorough inspection for determining reliability and may include disassembly. See attachment 2.

4.0 Requirements

4.1.1 Labeling/Inspection

- 4.1.1.1 All cranes, hoists, chain falls, ratchet hoists, and supporting structures shall be clearly labeled to indicate capacity ratings. Such labeling shall be clearly visible to the operator.
- 4.1.1.2 An inspection of all cranes, hoists, slings, chain falls, and ratchet hoists shall be made on a daily basis or before each use when used less frequently than on a daily basis. Frequent (**daily**) inspections shall be performed by the assigned operator. The operator shall complete the necessary checklist. (See attachment 1)
- 4.1.1.3 A periodic inspection of all cranes and hoists shall be made on an **annual** basis. Periodic inspections shall be performed by qualified Maintenance personnel and may involve complete disassembly to permit close inspection of all working parts. (See attachment 2)
- 4.1.1.4 Electronic records of all periodic inspections shall be maintained on the UF file server. In addition, a sticker with the next due date shall be displayed on the hoist in a conspicuous location.
- 4.1.1.5 Requests for periodic inspections of cranes and hoists shall be initiated by the Preventive Maintenance Scheduler through an annual contract to a certified inspector.
- 4.1.1.6 Prior to initial use, new cranes and hoists shall be tested and certified by the manufacturer. Such certification shall not be more than 125 percent of the rated load unless otherwise recommended by the manufacturer. Testing of extensively repaired or altered cranes and hoists shall be performed by the Repair Organization. Manufacturers and maintenance test certification documents shall be kept on file by the owning department.
- 4.1.1.7 Supporting structure for cranes and hoists shall be designed and installed for the appropriate rated load, by a qualified engineer or the equipment manufacturer.
- 4.1.1.8 The rated load shall be plainly marked on the supporting structure and this marking shall be clearly legible from the ground or floor.
- 4.1.1.9 Only wire rope slings and synthetic web slings shall be used in UF. Synthetic web slings shall be marked/coded to show rated capacities for each type hitch and the type synthetic web material. Wire rope slings do not have to have an individual marking but prior to use the user must determine the capacity of the sling to be used. This can be done by knowing what is to be lifted and the method of lift (vertical, choker, or vertical basket) and then refer to wire rope sling capacity chart for capacity of the wire rope sling. This chart is to

contain information about wire rope sling capacities as found in OSHA Regulations 1910.184 and shall be available where wire rope slings are stored.

4.1.1.10 Equipment which has been idle for a period of over 6 months shall be given a complete annual inspection before use.

4.1.1.11 Equipment which has been idle for a period of 1 month or more, but less than 6 months, shall be given an inspection conforming to the requirements of a frequent inspection. All rope shall be given a thorough inspection before it is used. This inspection shall be for all types of deterioration. A certification record shall be made which includes the date of inspection, the signature of the person who performed the inspection and an identifier for the rope which was inspected.

5.0 Operation

- 5.1 No crane, hoist, sling, chain fall or ratchet hoist shall be loaded beyond the rated load.
- 5.2 No person shall operate a crane, hoist, chain fall or ratchet hoist unless such operation is in connection with his/her job and only then after a determination of his/her qualifications.
- 5.3 Crane and hoist cables, slings, chain falls or ratchet hoist chains shall not be shortened by knotting.
- 5.4 Personnel operating equipment shall ensure no one, including himself, is under the load.
- 5.5 The load-bearing ropes, cables, or chains shall not be used as slings.
- 5.6 Cranes, hoists, chain falls, and ratchet hoists shall not be used for lifting, lowering, or moving personnel unless approved attaching devices are used to ensure the safety of such personnel.
- 5.7 All hoisting hooks shall be safety hooks.
- 5.8 Lifting equipment shall only be attached to supporting structures of at least five times the heaviest permissible load for the equipment.
- 5.9 During the frequent inspection, the upper limit switch, or equivalent, of each hoist shall be tested under no load to ensure no further hoist travel.
- 5.10 No person shall use a defective, or suspected defective, crane, hoist, sling, chain fall, or ratchet hoist. Such equipment shall be removed from service and red tagged.
- 5.11 The operator shall ensure the hoist cables/slings are not kinked.

- 5.12 Extreme caution must be exercised when operating near aerial power lines. In no case shall any part of the crane or hoist be closer than 10 feet to any energized aerial power line.
- 5.13 Loaded hoists shall not be left unattended.
- 5.14 Crane and hoist cables and wire rope slings shall be immediately removed from service if any of the following conditions are present:
 - 5.14.1 In running ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay;
 - 5.14.2 Wear or scraping of one-third the original diameter of outside individual wires;
 - 5.14.3 Kinking, crushing, bird caging or any other damage resulting in distortion of the wire rope structure;
 - 5.14.4 Evidence of heat damage;
 - 5.14.5 End attachments that are cracked, deformed or worn; or
 - 5.14.6 Corrosion of the rope or end attachments.
- 5.15 Load hooks shall not be used when there exists a 10% or more twist or 115% or more opening from the normal hook configuration.
- 5.16 Synthetic web slings shall be immediately removed from service if any of the following conditions are present:
 - 5.16.1 Acid or caustic burns;
 - 5.16.2 Melting or charring of any part of the sling surface;
 - 5.16.3 Snags, punctures, tears or cuts;
 - 5.16.4 Broken or worn stitches; or
 - 5.16.5 Distortion of fittings.
- 5.17 Chain slings shall not be used.

6.0 Training

- 6.1 The immediate Supervisor is responsible to provide initial training to those individuals who perform the frequent inspections.
- 6.2 Refresher training for those who perform periodic inspections should be conducted every three years by the Preventive Maintenance Group or an outside certified instructor.
- 6.3 All training shall be documented.

7.0 Responsibilities

- 7.1 Department Managers shall be responsible for insuring that cranes, hoists, slings, chain falls and ratchet hoists are properly maintained and receive frequent and/or periodic inspections as required. Department Managers are also responsible to insure that each crane and hoist is permanently identified through the equipment numbering system in DataStream 7i (D7i) to permit record keeping and scheduling

- of periodic inspections.
- 7.2 It is the responsibility of personnel using cranes, hoists, slings, chain falls, and ratchet hoists to perform the frequent inspection on such equipment prior to each use. Personnel shall use only equipment that is in safe working condition.
 - 7.3 It is the responsibility of personnel using cranes, hoists, slings, chain falls, and ratchet hoists to determine the weight of the material to be lifted or moved to insure that it is below the capacity rating of the lifting equipment.

8.0 Related Documents

- 8.1 OSHA, 29CFR 1910.179, Overhead and Gantry Cranes.
- 8.2 Attachment 1 – Hoist Daily Checklist

