



TEXAS TECH UNIVERSITY™

Operating Policy and Procedure

OP 60.21: Fixed Cranes and Hoists

DATE: August 11, 2021

PURPOSE: The purpose of the Texas Tech University crane and hoist program is to ensure the safety of all employees required to use a crane or hoist while performing their duties.

REVIEW: This OP will be reviewed in September of every fourth year by the Assistant Vice President for Environmental Health & Safety with substantive revisions forwarded through the Associate Vice President for Research (Research Integrity) to the Vice President for Research & Innovation. This OP will be reviewed again in 2025.

POLICY/PROCEDURE

1. References

Title 29 Code of Federal Regulations § 1910.179, ([29 CFR 1910.179](#)) and [29 CFR 1910.184](#).
[American Society of Mechanical Engineers \(ASME\) B30.2-2016](#).

2. Introduction

A crane is designed to lift and lower a load and move it horizontally. Materials being moved by cranes are attached to a hoisting mechanism. These cranes are often custom-built by a manufacturer and should be constructed according to ASME B30.2-2016 standards.

3. Scope and Application

The Crane and Hoist program applies to all fixed cranes and slings used to move loads operated on TTU property or for TTU-funded projects. The program covers the safe operation of these cranes and slings by establishing design criteria, periodic crane and rope inspections, equipment maintenance, material handling, and operator training.

4. Terms and Definitions

Most of the terms and definitions in this program are taken from [29 CFR 1910.179, “Overhead Cranes.”](#)

- a. Crane – 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.
- b. Designated – Selected or assigned by the employer or the employer’s representative as being qualified to perform specific duties.
- c. Hoist – An apparatus which may be a part of a crane, exerting a force for lifting or lowering.

- d. Hoist chain – The load bearing chain in a hoist.
- e. Hoist motion – That motion of a crane which raises and lowers a load.
- f. Load – The total superimposed weight on the load block or hook.
- g. Load block – The assembly of hook or shackle, swivel, bearing, sheaves, pins, and frame suspended by the hoisting rope.
- h. Overhead crane – A crane with a movable bridge carrying a movable or fixed hoisting mechanism and traveling on an overhead fixed runway structure.
- i. Rated capacity or working load limit – The maximum working load permitted.
- j. Rated load – The maximum load for which a crane or individual hoist is designed and built by the manufacturer and shown on the equipment nameplate(s).
- k. Side pull – That portion of the hoist pull acting horizontally when the hoist lines are not operated vertically.
- l. Sling – An assembly which connects the load to the material handling equipment.

5. Responsibilities

- a. The primary responsibilities of the department heads and chairs are to
 - (1) Be familiar with this program and its contents and objectives;
 - (2) Support the program and oversee its implementation; and
 - (3) Develop a department plan for any activity involving crane use.
- b. Responsibilities of managers and supervisors are to
 - (1) Be familiar with this program and its contents and objectives;
 - (2) Know the location and operational requirements of departmental cranes;
 - (3) Designate employees (operators) responsible for the safe operation of cranes and those who may assist in crane lifts (riggers);
 - (4) Limit the use of the crane to only responsible and trained individuals;
 - (5) Ensure documentation associated with cranes is kept for at least five years; and
 - (6) Ensure personnel working in areas where cranes are employed are aware of overhead hazards and know how to avoid them.
- c. Operators and riggers will
 - (1) Be familiar with this program;
 - (2) Conduct each task in accordance with their training or departmental SOP;

- (3) Follow established university procedures;
 - (4) Complete the required training or demonstrate competencies before starting work;
 - (5) Complete and document the required periodic inspections of crane equipment; and
 - (6) Report to their manager or supervisor any deficiencies and equipment concerns.
- d. Environmental Health & Safety is responsible for
- (1) Developing and implementing the program;
 - (2) Giving guidance to departments concerning safe crane operations;
 - (3) Providing general training to departments and supervisors as requested;
 - (4) Reviewing departmental crane activity plans; and
 - (5) Conducting regular work-site surveys and informing departments of results.

6. Installation of Cranes

Newly installed cranes must be designed and installed according to the ASME B30.2 current standard.

7. Inspections and Modifications

- a. Modifications may be done if they are checked thoroughly for the new rated load by a qualified structural engineer or the equipment manufacturer. The crane shall be tested at not more than 125 percent of the rated load unless recommended differently by the manufacturer. The test results will be on file and readily available.
- b. Rated load markings shall be clearly marked on each side of the crane or hoist. If the crane or hoist has more than one hoisting unit, each shall have the rated load marked so it can be clearly seen from the ground or floor.
- c. There will be an initial certification by the manufacturer prior to use of all new and altered cranes or hoists to ensure compliance with provisions of all standards and regulations. Records of this inspection will be maintained while the crane remains in use.
- d. Inspections are divided into two general classifications: *frequent* and *periodic*. The intervals for inspections are dependent upon the nature and degree of exposure to wear, deterioration, or malfunction.
- e. Frequent inspections are performed and documented by competent personnel before each operation and include:
 - (1) All functional operational mechanisms for maladjustment – performed daily;
 - (2) Deterioration or leakage in lines, tanks, valves, drain pumps, and other parts of air or hydraulic systems – checked daily;

- (3) Hooks with deformation or cracks, or with safety latches missing – visual inspection daily; monthly inspection with a certification record, which includes the date of inspection, name, and signature of inspector and serial number or other identifier of the hook inspected. If the hook is cracked or has more than 15 percent excess throat opening or more than 10 percent twist, the hook shall be replaced;
 - (4) Hoist chains will follow the same guidelines as the hook inspection above; and
 - (5) Crane or hoist ropes will be inspected for reeving according to manufacturer recommendations.
- f. Periodic inspections are performed annually and include:
- (1) Deformed, cracked, or corroded members;
 - (2) Loose bolts or rivets;
 - (3) Cracked or worn sheaves and drums;
 - (4) Worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers, and locking and clamping devices;
 - (5) Excessive brake wear;
 - (6) Excessive wear of chain drive sprockets and excessive chain stretch; and
 - (7) Electrical apparatus for deterioration, limit switches, and push button stations.
- g. A crane or hoist that has been idle for more than one month but less than six months shall be inspected using the *frequent* inspection checklist, and the inspector's name, the date of inspection, and identification of the crane or hoist inspected will be documented.
- h. A crane or hoist that has been idle for more than six months shall be given a complete inspection conforming to *frequent* and *periodic* inspections, to include the inspector's name and the date of inspection. This documentation must be kept on file and readily available.

8. Testing

- a. Prior to use, all new or altered cranes or hoists shall be tested to ensure compliance by checking the following functions:
- (1) Hoisting and lowering;
 - (2) Trolley travel;
 - (3) Bridge travel; and
 - (4) Limit switches.
- b. Locking and safety devices are to be checked with an empty hook and by increasing speeds up to the maximum. The actuating components shall be set to trip the switch under all conditions in sufficient time to prevent the hook from hitting the trolley.

- c. All cranes and hoists will be tested as per these guidelines. The operators of all electric cranes and hoists will follow these guidelines. The operators of all manual cranes and hoists will follow the guidelines for *frequent* inspections given above.

9. Maintenance

Preventive maintenance shall be based on the crane or hoist manufacturer's recommendations.

Prior to all maintenance, the following shall be done:

- a. Locate the crane or hoist so it does not interfere with operations in the area;
- b. Place all controllers in the *off* position;
- c. Lock out the main power supply; and
- d. Tag-out the crane or hoist to inform other employees that maintenance is being performed on the equipment.
- e. After maintenance, all guards shall be replaced, safety devices reactivated, and tools removed before checking operation of the equipment.
- f. All maintenance will be conducted by competent individuals; maintenance documentation will remain on file and be readily available while crane remains in use.

10. Rope Inspection

Inspection of the wire rope shall be performed monthly and a record kept with date of inspection, name and signature of inspector, and identification of the ropes inspected. This information shall be kept on file and readily accessible. The following items shall be checked or observed:

- a. Reduction of rope diameter;
- b. Corrosion of internal or external wires;
- c. Number of broken outside wires and the degree of distribution and concentration on the rope;
- d. Worn or corroded wires at the end connectors;
- e. Corroded, cracked, or improperly attached connections; and
- f. Severe kinking.

Any rope that has been idle for a month or more will receive a full inspection with the date of inspection, name and signature of inspector, and identification of the rope. This will be documented and remain on file and readily available while crane remains in use.

11. Handling Loads

The following procedures will apply while handling a load:

- a. No load shall exceed the crane's rated load except for test purposes.

- b. The crane, hoist chain, or rope will not be wrapped around the load.
- c. The load should be attached using a sling or other approved device.
- d. The load shall be balanced in the sling or lifting device before lifting it more than a couple of inches.
- e. The crane or hoist rope shall not be kinked.
- f. The crane or hoist should not be used for side pulls.
- g. No load should be hoisted while employees or contractors are on the load.
- h. Loads should not be carried over individuals.
- i. Loads should be kept clear of all obstructions.
- j. The brake shall be tested each time a load is moved at the rated capacity of crane or hoist.
- k. A load should not be lowered below the point where there are less than two full wraps of rope left on the drum.
- l. The operator shall not leave her/his position at the controls while the load is suspended.

12. Material Handling Devices (Slings)

- a. The following practices in accordance with [29 CFR 1910.184](#) shall be followed when a sling is used:
 - (1) Slings that are damaged shall be immediately removed from service.
 - (2) Knots shall not be used to shorten a sling.
 - (3) Slings shall not be loaded above their rated capacity, which should be permanently labeled on the sling.
 - (4) Slings shall be protected from sharp edges on the load.
 - (5) Sling legs shall not be kinked when used.
 - (6) Hands or fingers shall not be placed between load and sling while the sling is being tightened around the load.
 - (7) Shock loading is prohibited.
 - (8) Slings should not be pulled out from under a load while it is sitting on the sling.
- b. Slings shall be visually inspected before each use. The fasteners and attachments shall be inspected for damage by a competent person. Each sling in use must be marked with legible identification markings and rated load capacity. The slings shall also be inspected during use to ensure that they are not being damaged from the load. Any damaged sling shall be removed from service immediately. A competent person is one who is knowledgeable, experienced, and capable to perform the outlined skills of this policy.

c. Repairs and reconditioning:

- (1) Mechanical coupling links or low carbon steel repair links shall not be used to repair broken chains.
- (2) Slings shall be removed from service if the hook is cracked or has 15 percent or more throat opening past normal, or if the hook is twisted more than 10 degrees past plane of the hook.
- (3) All new, repaired, or reconditioned alloy steel chain slings, including all welded components, must be proof tested by the sling manufacturer or equivalent entity. The proof testing will be in accordance with paragraph 5.2 of the American Society of Testing and Materials Specification A 391-65 (ANSI G 61.1-1968). The proof test shall be maintained on file for examination.

d. Slings shall be removed from service for the following defects:

- (1) Broken wires or strands;
- (2) Wear or scraping of one-third diameter of rope or wire;
- (3) Distortions of the structure of a wire rope sling;
- (4) Evidence of heat damage;
- (5) Evidence of chemical corrosion;
- (6) Broken welds in chain or wire mesh slings.

13. Crane and Hoist Limit Switches

The following procedure will be followed while checking limit switches:

- a. At the beginning of the operations shift, the empty hook shall be raised slowly to ensure that the upper limit switch is operational. If not, a repair shall be made before using the equipment.
- b. The upper limit switch shall never be used as an operational control.

14. Ladders and Stairways

- a. Ladders and stairways shall be securely fastened and comply with [29 CFR, 1910.27](#).
- b. Stairways will be equipped with handrails and stair surfaces will be anti-slip material.

15. Holding Brakes

- a. Holding brakes shall be applied automatically when power is disconnected.
- b. Holding brakes shall have an adjustment means.
- c. All brake drums shall be maintained with a smooth surface.

- d. Brakes may be applied by mechanical, electrical, pneumatic, gravity, or hydraulic means.

16. Electric Equipment

- a. All wiring shall adhere to the [National Electrical Code](#).
- b. The control circuit shall not exceed 600 volts.
- c. The pendant control voltage shall not exceed 150 volts AC and 300 volts DC.
- d. The pendant shall be supported by some means to prevent strain on the electric wire.
- e. The pendant control buttons shall be clearly marked as to their function.
- f. Lockout and tagout procedures will be used while maintenance is being done.

17. Personnel Competencies and Training

- a. Only personnel who demonstrate appropriate competencies, skills, and knowledge will be allowed to operate, inspect, and maintain cranes or assist in their operation.
- b. Personnel will be trained and competent to operate, service, or support the type of equipment they will be using. Training will be completed prior to any activities involving cranes and will be refreshed at least once every three years or if (1) a crane incident occurs or (2) the work environment changes significantly.