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NOTE: *This combined chapter shows all requirements for both Chapters 2-2 and 2-17, although section numbers reflect only the compound numbering for Chapter 2-2.*

2-2 OVERHEAD & GANTRY CRANES; CRANES & MONORAILS

2-2.1 Scope

This Hanford Site Hoisting and Rigging Manual (HSHRM) chapter applies to the marking, construction, installation, inspection, testing, maintenance and operation of the following overhead and gantry cranes, including semi-gantry, cantilever gantry, portable gantry (A-Frame), wall cranes, bridge cranes, monorail and jib cranes, and others having the same fundamental characteristics. These cranes may be top-running, under-running, single- or double-girder. Hoist units and trolleys are most commonly electric powered but can be air powered or hand-chain operated. These cranes may be cab operated, pulpit operated, floor operated, or remotely operated. Such cranes are grouped together because all have trolleys and similar travel characteristics.

The proper and safe use of overhead gantry cranes, monorail and jib cranes is governed by the American Society of Mechanical Engineers (ASME) standards and the Occupational Safety and Health Administration (OSHA) regulations. This chapter implements required criteria from the following standards:

- ASME B30.2, *Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)*
- ASME B30.17, *Cranes and Monorails (with Underhung Trolley or Bridge)*
- OSHA 29 CFR 1910.179, *Overhead and Gantry Cranes*
- OSHA 29 CFR 1926 Subpart CC, Section 1926.1438, *Overhead and Gantry Cranes* (only applies to temporarily installed cranes)

2-2.2 Accessing Requirements

a. To access ASME standards, choose one of the following options:

- IHS Engineering Standards, Regulations and Technical Specifications. The contractor must have paid for access to the specific standard.
- Purchase standards directly from ASME.

b. To access OSHA standards, go to:

- OSHA 29 CFR 1910.179, *Overhead and Gantry Cranes*
- OSHA 29 CFR 1926, Subpart CC, *Cranes and Derricks in Construction* (or see Chapter 3-7)

2-2.3 Implementation

Contractors shall comply with OSHA, ASME, this HSHRM, and the manufacturers' requirements. Users of this HSHRM are responsible to implement all applicable requirements. If standards conflict, the user shall adhere to the standard containing the most stringent requirements. In most cases, ASME standards provide the most comprehensive information.

Users should contact a Hanford Site Hoisting and Rigging Committee (HHRC) representative or send an email requesting a formal interpretation. See Chapter 1-10, *Interpretations*, for the process to be followed. Notify the HHRC if any inconsistent standards are identified.

This HSHRM does not intend to require retrofitting of existing equipment. However, when any hoisting or rigging equipment is modified, its performance requirements shall be reviewed relative to the requirements within the current HSHRM. The need to meet the current requirements shall be evaluated by a qualified person selected by the owner (user). Recommended changes shall be made by the owner (user).

The responsible engineer may invoke ASME NOG-1, *Rules for Construction of Overhead and Gantry Cranes (Top Running Bridge, Multiple Girder)*, for cranes used at nuclear facilities. ASME NOG-1 applies to the design, manufacture, testing, inspection, shipment, storage, and erection of overhead and gantry cranes (Top Running Bridge, Multiple Girder).

The responsible engineer may invoke ASME NUM-1, *Rules for Construction of Cranes, Monorails, and Hoists (with Bridge or Trolley or Hoist of the Underhung Type)*, for cranes used at nuclear facilities. ASME NUM-1 applies to the design, manufacture, testing, inspection, shipment, storage, and erection of monorails and hoists (with Bridge or Trolley or Hoist of the Underhung Type).

2-2.4 Inconsistent Standards

No inconsistencies among standards are currently identified.

2-2.5 Hanford Specific Requirements and Practices

CAUTION: *Working on or under a suspended load is prohibited, except when the load can be supported by blocking or cribbing, can be securely braced, or can be supported substantially by some other means that would prevent the load from moving. Some loads being lifted and set in place may require special handling control measures such as inspecting, landing, setting, or controlling the load, that may require personnel to position their hands or other body parts under the load when no other method is feasible. These special handling control activities MUST BE APPROVED by management and industrial safety PRIOR TO BEING PERFORMED.*

2-2.5.1 Load Test Weight

The load-test weight shall be traceable to a recognized standard or verified by engineering calculations. Load tests shall never be less than minimum requirements defined in the applicable ASME Standard. Any one of the following options will meet this requirement:

- Use a calibrated Load-Indicating Device (LID) (± 2% of the maximum rated load) during the load test

- Determine the test load with a calibrated LID before the test
- Calculate the test load based on known unit weights and dimensions of the test fixture. Dimensions and calculations shall be checked (signed and dated) by a qualified engineer

2-2.5.2 Load Test Report

Load or proof tests shall never be less than the minimum requirements defined in the ASME B30 standards. After the test is completed, the load-test report shall be signed and dated by the person in charge of conducting the load test. The person in charge shall ensure that the test is placed in the crane maintenance file.

2-2.5.3 Crane Maintenance Files

The crane maintenance file is a compilation of various documents and records relating to operation, maintenance, inspection, testing, evaluation, and repair of the equipment. The file may be centrally located or proportioned into satellite holding areas. The methods selected for establishing adequate information retention and retrieval shall be determined by the equipment custodian, who is the responsible person for ensuring that a safe and reliable maintenance program is in place.

2-2.5.3.1 Intent of Maintenance Files

The crane maintenance file shall contain, as a minimum, the required current dated inspection records and other documentation to provide the user with evidence of a safe and reliable maintenance program. Inspection records should be retained in a format and location that provides for ease in accessibility. Maintenance file information should provide a source for comparing present conditions with past conditions to determine whether existing conditions show a trending pattern of wear, deterioration, or other comparable factors that may compromise safe, continued use of the equipment. Length of record retention shall be determined by the equipment custodian's established maintenance program.

2-2.5.3.2 Maintenance File Contents

Maintenance files shall contain the following documentation, as applicable:

1. Documented inspection records
2. Load test reports for each crane, trolley, or hoist
3. Documentation of altered, replaced, or repaired load-sustaining parts
4. Records of special inspections on safety-related items such as brakes, hooks, ropes, hydraulic/pneumatic cylinders, and hydraulic/pneumatic pressure relief valves
5. Copies of waivers, exemptions, hostile environment plans, or similar documentation applicable to the equipment (to include manufacturer's safety bulletins, safety alerts, and product recall information)
6. Documentation for replacement ropes (see Chapter 2-30, *Ropes*)
7. Rope manufacturer's certification for replacement ropes

2-2.5.4 Inspections for Portable Gantry Cranes (Including A-Frames and Structural Lifting Systems)

A portable gantry crane shall receive a documented inspection by a qualified inspector prior to being put into service and after reassembly.

The inspection shall consist of a thorough examination of all components with a focus on any abnormality or damage that may affect the integrity or load-carrying capacity of the devices. Nondestructive examinations (i.e., magnetic particle or dye penetrant tests) are not required unless requested by an inspector. Written documentation of the inspection is required.

Manufacturers' instructions for use shall be posted in the area of use or on the portable gantry crane, and personnel shall be trained on the manufacturers' instructions for use.

The portable gantry crane, trolley(s), and hoist(s) shall be marked/tagged in an accessible location indicating the due date for the next periodic inspection.

2-2.5.4.1 Periodic Inspection Tag

Identify each crane, trolley, and hoist with a tag (see sample in Figure 1) or institute a comprehensive marking program (such as color coding) to indicate when the next inspection is required.

Place an inspection tag/mark on each crane component that is designed to be independent (e.g., trolley, hoist, structural frame). A combined, accessible inspection tag/mark is permissible for user verification when components operate together as a system.

2-2.5.4.2 Load-Test Tag (Proof Test)

A tag indicating date of load test may be affixed to the device in an accessible location for verification. See example in Figure 2.

Figure 1: Example Of A Periodic Inspection Tag

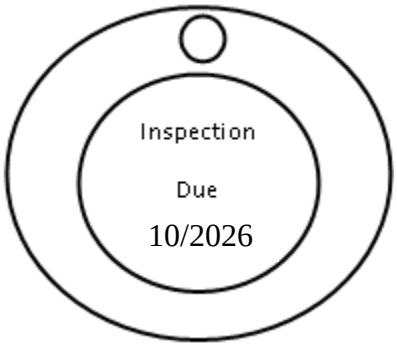
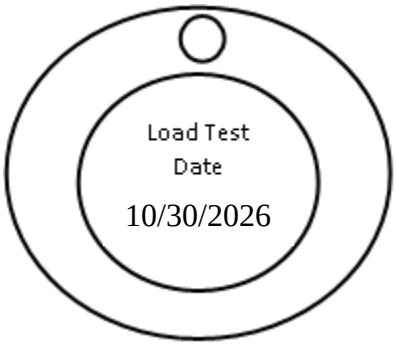


Figure 2: Example Of A Load Test Tag



2-2.5.4.3 Examples of Checklists

See Attachment 1 for a Sample Overhead Crane Daily Inspection Checklist. See Attachment 2 for a Portable Gantry (A-Frame) Preuse Inspection Checksheet Sample.

ATTACHMENT 1: SAMPLE OVERHEAD CRANES DAILY INSPECTION CHECKLIST

BLDG: LOCATION: CRANE #: DATE: / / BY:

COMPONENT	N/A	OK	FAULTY	COMMENTS
Main Hoist				
Controls				
Push Buttons				
Sounds Normal				
Movement Smooth				
Brakes Positive				
Upper Limit				
Lower Limit				
Upper and Lower Blocks				
Sheaves				
Rope and Connections				
Proper Drum Spooling				
Hooks				
Auxiliary Hoist				
Controls				
Pushbuttons				
Sounds Normal				
Movement Smooth				
Brakes Positive				
Upper Limit				
Lower Limit				
Upper and Lower Blocks				
Sheaves				
Rope and Connections				
Proper Drum Spooling				
Hooks				
Trolley				
Controls/Pushbutton				
Travels Smooth				
Sounds Normal				
Brakes Positive				
Trolley and Bridge Obstruction				
Housekeeping				
Ladders and Landings				
Oil Leaks				
Operation of Brakes				
Loose Parts				
Keepers in Place				
Lubrication Requirements				
Fire Extinguisher Locations				
Retaining Latch(es) in Place				
Hooks Swivel Freely				
Obvious Hook Deformations				
Bridge				
Controls/Pushbuttons				
Travels Smooth				
Sounds Normal				
Brakes Positive				
Limits Working				
Alarms				
Lights				
Rigging Capacity				

ATTACHMENT 2: PORTABLE GANTRY (A-FRAME) PRE-USE INSPECTION CHECKSHEET SAMPLE

A-Frame Identification: _____ Date: ____/____/_____

The user shall perform the following checklist prior to performing hoisting and rigging operations with this A-Frame. Correct Unsat items found during this inspection before using this equipment. If Unsat items cannot be corrected, tag the equipment out of use. Mark not applicable (N/A) for items not contained or applicable to this A-Frame.

A-Frame Inspection Areas	N/A	SAT	UNSAT
Manufacturers' instructions for use are posted in the area of use or on the portable A-Frame.			
Look for bent, broken, damaged, corroded, cracked, or missing parts			
Verify required markings are installed and legible: Rated capacity legibly marked on the structure on each side of the primary beam, and a tag indicating the due date of the next inspection is attached to the trolley, A-Frame, and any attached hoist.			
Ensure the trolley, beam clamp, or hoist working load limits do not exceed the capacity rating of the A-Frame			
Perform a function test of the trolley and hoist to ensure proper operation			
If adjustments or repairs are necessary or any defects are found that affect safe operation, stop work and report deficiencies to the equipment custodian.			
Operator is qualified in accordance with the Hanford Site Hoisting and Rigging Manual (HSHRM) to perform H& R operational activities			

Type of hoist used on the A-Frame: None _____ Air _____ Manual _____ Electric _____

Hoist Inspection Areas	N/A	SAT	UNSAT
Unusual sounds			
Brakes working properly			
Hooks inspected in accordance with Chapter 2-10			
Housing integrity intact			
Supporting structure sound			
Load bearing parts (Yoke, Clevis)			
Cable/Chain in operating condition			
Operating controls respond properly			
Load limiting devices functional			
Limit switches work properly			
Warning labels installed in accordance with HSHRM			
Sheaves and Drums inspected for damage/wear			
Lubrication in accordance with manufacturers' instruction manual			
Collectors/Load chain buckets properly affixed			
Evidence of wiring wear or damage			
Supply air system at rated air pressure			

COMMENTS:

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