

## CHAPTER 16

# MISCELLANEOUS LIFTING DEVICES

This chapter provides safety standards designated to sign verify, based on personal observations, certified records, or direct reports, that a specific action has been performed in accordance with specified requirements. For the operation, inspection, testing, and maintenance for miscellaneous lifting devices, (truck mounted cranes – capacity 1 ton or less not covered in ASME B30.5 (“Mobile and Locomotive Cranes”) and implements the requirements of ASME PALD (“Portable Automotive Lifting Devices”) for self contained shop cranes.

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## 16.1 GENERAL

This chapter provides requirements for the operation, inspection, testing, and maintenance of miscellaneous lifting devices including portable A frames (sometimes referred to as portable gantries), Truck mounted cranes with a capacity of 1 ton or less not covered in ASME B30.5 (.Mobile and Locomotive Cranes.) and self contained shop cranes as addressed by ASME PALD (.Portable Automotive Lifting Devices.)

### 16.1.1 OPERATOR TRAINING/QUALIFICATION

- a. Operators of self contained shop cranes and portable A frames shall be familiar with, understand and follow the operating instructions provided by the equipment manufacturer.
- b. Operators of truck mounted cranes with capacities of 1 ton or less shall be trained as required in Chapter 6, "Personnel Qualifications and Training."

### 16.1.2 RATED-LOAD MARKINGS, SAFETY MARKINGS AND OPERATING INSTRUCTIONS

- a. Safety markings shall be legible and conform to the ANSI Z535.
- b. Markings, or decals, etc. must be provided and affixed by the use of durable materials in a location visible to the operator in order to provide a clear understanding of any special warning, capacity information, etc.
- c. Shop cranes shall have the rated capacity for each specified boom and leg position marked in a prominent location on the equipment.
- d. Small cranes 1 ton or less shall have a durable rating chart with legible letters and figures attached in a location accessible to the operator.
- e. Each portable A frame shall have its rated capacity legibly marked on the structure on each side of the primary beam.

- f. The manufacturers name, product serial number, and model number must be permanently and legibly marked on each portable A frame.
- g. Operating instructions developed by the original manufacturer or supplier shall be maintained and readily available to the operator.
- h. For small cranes 1 ton or less, operating instructions may be maintained on the vehicle on which the crane is installed.
- i. Safety instructions for shop cranes and portable A frames should include the following:
  1. Study, understand, and follow all instructions before operating this device.
  2. Do not exceed rated capacity.
  3. Use only on hard level surface.
4. Before moving, lower the load to the lowest possible point.

NOTE: For hoists used in conjunction with portable A frames, see chapter 8 for hoist requirements.

### 16.1.3 MODIFICATIONS

- a. Miscellaneous lifting devices may be modified or re-rated provided that the modifications of supporting structures are analyzed thoroughly by a qualified engineer or by the manufacturer of the lifting device.
- b. A re-rated lifting device, or one whose load-supporting components have been modified, shall be tested in accordance with Section 16.3, "Testing." The new rated capacity shall be displayed in accordance with Section 16.1.2, "Rated-Load Marking, Safety Markings and Operating Instructions."

**16.1.4 LOAD LIMITS**

Miscellaneous lifting devices shall not be loaded beyond its rated capacity, except for test purposes, as described in Section 16.3.

**16.1.5 OPERATING CONTROLS**

- a. Operating controls shall be readily visible and accessible to the operator and shall not subject the operator to pinch points, sharp edges, or snagging hazards.
- b. The release system for shop cranes shall require intentional positive action by the operator for release to prevent accidental lowering.

**16.1.6 LOAD HOOK**

- a. Shop cranes shall be equipped with load hooks and/or chain capable of sustaining the proof load of the crane.
- b. Latch-equipped hooks shall be used for all operations unless the application makes using the latch impractical, unnecessary, or unsafe. The absence of a hook-throat latch is not indiscriminately allowed.

**16.1.7 WIRE ROPE**

- a. Wire rope, (single line capacity) used on small cranes 1 ton or less shall have a minimum design factor of 3.5:1, based upon breaking strength.
- b. Small cranes 1 ton or less shall be equipped with properly sized wire rope sheaves in lieu of flat spools.

**16.1.8 ASSEMBLY**

- a. Portable A frames shall only be assembled by qualified personnel. Manufacturer's instructions shall be adhered to regarding

setup and assembly.

- b. Portable A frame components from different manufacturers shall not be intermixed with components from other A frames regardless of similarities in manufacturers or rated capacities.
- c. Only manufacture-approved methods attaching a hoist to the A frame structure such as approved beam clamp or trolley shall be used. Trolleys or beam clamp working load limits shall not exceed the capacity rating of the A frame and must be designed for the type frame flange (see figures 16-4 and 16-5). Hoists attached to the A frame must have a rated capacity equal to or less than all supporting components. (Down rating of hoist to A frame capacity is acceptable with administrative controls and markings in place)
- d. Load-carrying trolleys must suit the shape and weight of the specific load. Trolley wheel design must be matched properly to the rail shape and size to ensure that trolleys do not slip off the track and drop the load
- e. If a new or replacement trolley is installed on a monorail, the qualified person installing the trolley shall ensure by actual operational verification or measurement that the installed trolley stops on the system are compatible with the new trolley, thereby preventing trolley travel past a point where it could fall from the rail. On those systems where a series of monorails may be connected by a bridge or turntable, verification of functional trolley stops on all accessible rails must be established or administrative controls placed limiting access to a specific work area during the period the trolley is in service.

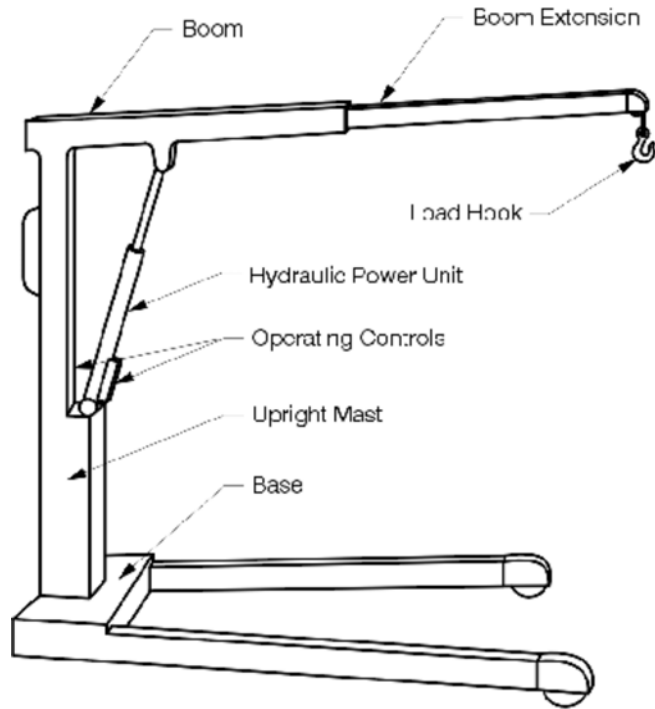


Figure 16-1. Self Contained Shop Crane.

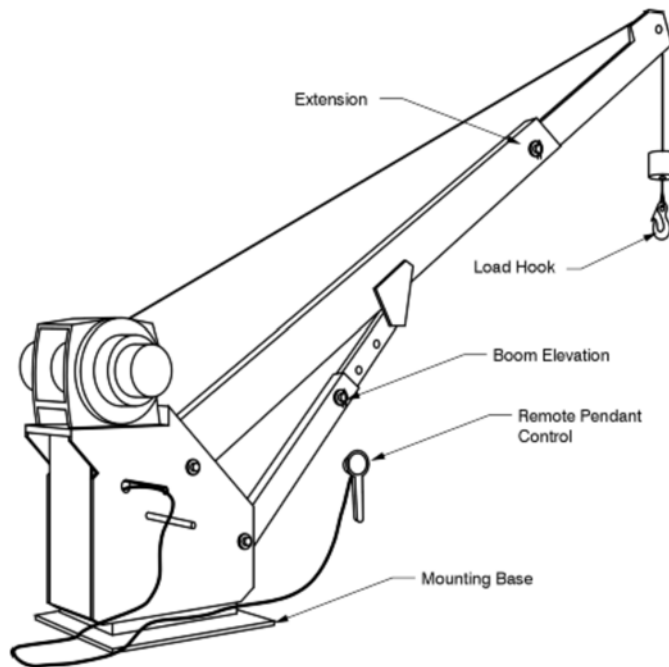


Figure 16-2. Truck Mounted Crane – Capacity 1 Ton or Less.

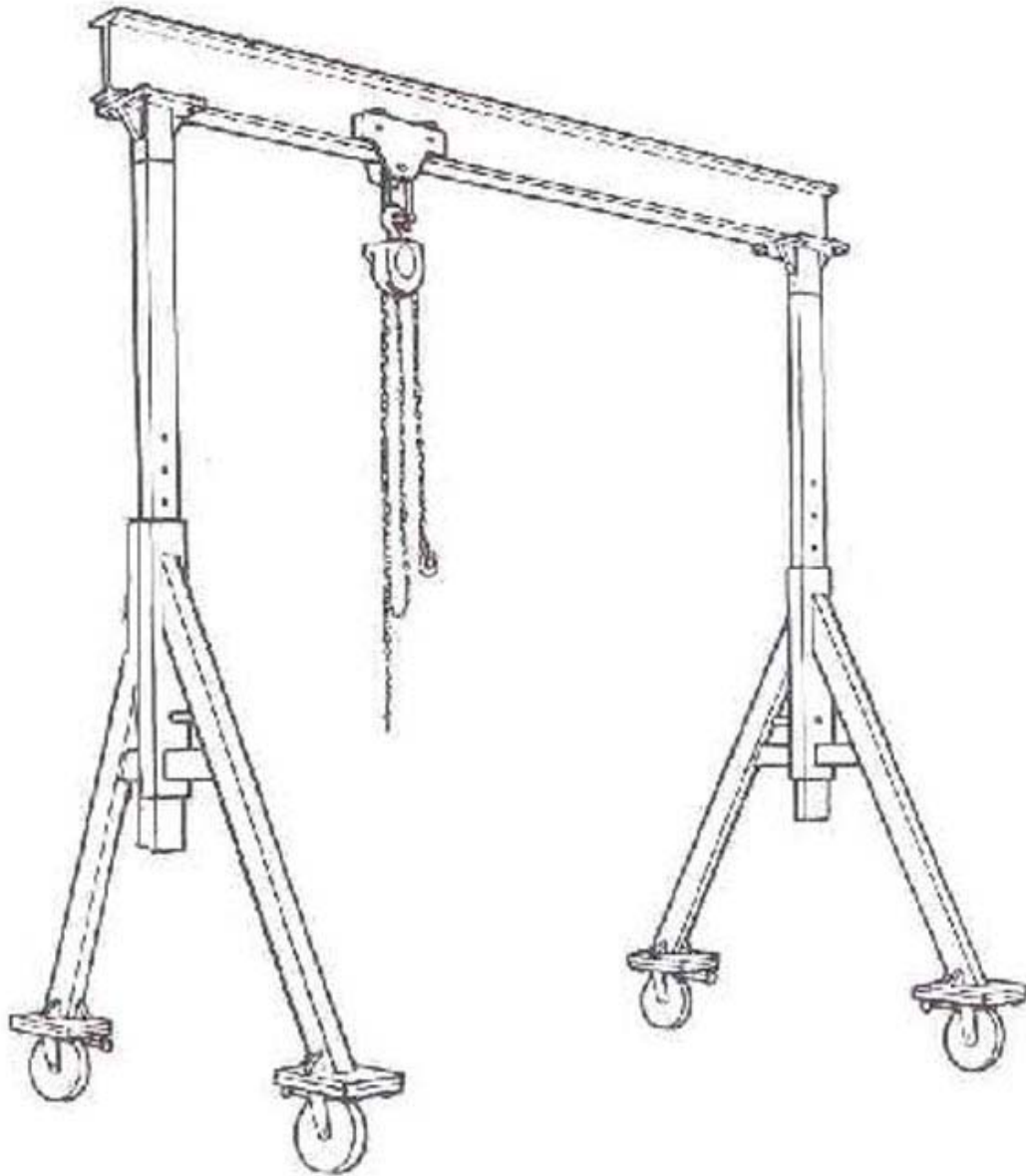


Figure 16-3 Portable A Frame

## 16.2 INSPECTIONS

### 16.2.1 GENERAL

Equipment shall operate with a smooth, regular motion without any hesitation, abnormal vibration, binding, or irregularity. There shall be no apparent damage, excessive wear, or deformation of any load-bearing part of the equipment. All safety devices, controls, and other operating parts of the equipment shall be checked during each inspection and shall be in good working order.

### 16.2.2 INITIAL INSPECTION

A qualified inspector shall inspect all miscellaneous lifting devices prior to initial use, after disassembly and reassembly, and after load testing. The inspection shall be performed in accordance with manufacturer's requirements. If manufacturer's instructions are not available, an engineering evaluation of the equipment shall be performed to establish necessary inspection procedures. Dated and signed inspection reports shall be kept on file and shall be readily available.

### 16.2.3 DAILY PREOPERATIONAL CHECK

- a. Operators or other designated personnel shall visually inspect miscellaneous lifting equipment each day or prior to use if the equipment has not been in regular service (records are not required). The inspection shall include, but not be limited to inspecting the following:
  1. All control mechanisms for maladjustment interfering with proper operation.
  2. Hook and latch for deformation, cracks, and wear.
  3. Hydraulic systems for proper operation.
  4. Wire rope for kinking, crushing, birdcaging, and corrosion.
  5. Chain for bent links, stretched links, cracks, scores, abrasions or heat damage.
  6. All safety devices for malfunction

7. Inspection items identified in manufacturer's operating instructions.
8. Visually inspect for bent, broken, damaged, corroded, cracked or missing parts.
9. Verify the hoist and all components installed on portable A frames do not exceed the rated capacity of the unit
10. Verify required markings are installed and legible.
11. Perform a function test of trolley and hoist installed on portable A frames to ensure proper operation.

- b. Operators or other designated personnel shall examine deficiencies and determine whether they constitute a safety hazard.

### 16.2.4 PERIODIC INSPECTION

- a. Miscellaneous lifting equipment should be thoroughly inspected on a periodic basis in accordance with manufacturer's instructions. If manufacturer's instructions are not available, an engineering evaluation of the equipment should be performed to establish the necessary inspection frequency and procedures.
- b. The qualified inspector shall evaluate identified deficiencies and determine whether they constitute a hazard.
- c. Dated and signed inspection records shall be kept on file and shall be readily available. An external coded mark on the lifting device indicating the completion of the required inspection and the due date for the next inspection is also acceptable documentation.
- d. The following is a list of items frequently included in manufacturer's inspection instructions. If manufacturer's instructions are unavailable, these inspection items should be considered in the engineering evaluation used to establish inspection procedures.
  1. Inspecting for bent, broken, damaged, corroded, cracked or missing parts.
  2. Verifying required markings are

- installed and legible.
3. Ensuring that each lifting device has its rated capacity legibly marked on the structure on each side of the primary beam.
  4. Ensuring that the manufacturer's name and model number are permanently and legibly marked on each lifting device.
  5. Ensuring trolley or beam clamp working load limits do not exceed the capacity rating of the A frame. Hoists attached to the A frame must have a rated capacity equal to or less than all supporting components and be inspected to requirements of chapter 8. (Down rating of hoist to A frame capacity is acceptable with administrative controls and markings in place).
  6. Ensuring A frame components from different manufacturers are not inter-mixed or with components from other A frames regardless of similarities in manufacturers or rated capacities.
7. Validating the proper dimensional relationship between trolley wheels and rail when installed on portable A frames (Refer to Figures 16-4 and 16-5)
  8. Observing trolley side plates for any bending or distortion
  9. Checking for missing or loose bolts, nuts and retaining pins or retaining devices.
- e. In the event any required information is missing or illegible, an attempt shall be made via engineering drawings, prints, evaluations, etc. to establish the lifting device's manufacturer, rated capacity and other pertinent data. If this attempt is unsuccessful, the lifting device shall be removed from service until engineering personnel have thoroughly evaluated the design and adequacy of the structure. Engineering calculations must support all conclusions. The lifting device shall be identified, load tested and marked accordingly.



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## 16.5 TESTING

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### 16.3.1 OPERATIONAL TEST

The load lifting and lowering mechanisms shall be tested during an initial test and after load testing.

### 16.3.2 RATED LOAD TEST

- a. Prior to initial use, all new portable A frames and small cranes (1 ton or less) and those upon which load-sustaining parts have been modified, replaced, or repaired shall be load-tested by a qualified inspector or under the direction of that inspector.
- b. A written report shall be furnished by the inspector showing test procedures and

confirming the adequacy of repairs or alterations. Test reports shall be kept on file and shall be readily available to appointed personnel.

- c. Test loads shall not be less than 100 percent or more than 125 percent of the rated capacity, unless otherwise recommended by the manufacturer or a qualified person.
- d. Shop cranes built to design specifications are proof-tested by the manufacturer in accordance with ASME PALD, "Portable Automotive Lifting Devices," Part 12. After repair or modification, a qualified engineer shall determine if testing is required.

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## **16.4 MAINTENANCE**

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### **16.4.1 MAINTENANCE PROGRAM**

A preventive maintenance program based on the manufacturer's recommendations should be established. Dated records should be made available.

### **16.4.2 REPLACEMENT PARTS**

Replacement parts shall be at least equal to the original manufacturer's specifications.

## 16.5 OPERATIONS

### 16.5.1 CONDUCT OF OPERATOR

- a. Before operating, the operator shall have an understanding of the lifting device's operating safety instructions.
- b. The operator shall not:
  1. Engage in any practice that will divert their attention while operating miscellaneous lifting devices.
  2. Operate the lifting device beyond its rated capacity (except for rated load tests).
  3. Operate miscellaneous lifting devices when physically or mentally unfit.
- c. The operator shall:
  1. Before moving the load, lower the load to the lowest possible point.
  2. Only operate shop cranes on hard, level surfaces capable of sustaining the load.
  3. Ensure the load does not drop suddenly or swing during transportation.
  4. Whenever there is doubt as to safety, consult with the responsible management before operating miscellaneous lifting devices.
  5. If adjustment or repairs are necessary, or any other defects are known, report the potential problem promptly to responsible management.
  6. Ensure inspections are current and required markings are clearly labeled on the A frame and all hoisting components.
  7. Always push the portable A frames, not the load when movement of the A frame is required.
  8. Ensure the load is not attached to the floor or any other component prior to hoisting. Remove all obstacles that impede lifting.
9. When moving a load, keep it as close to the floor as possible. Make sure that no part of the body is placed under the load at any time.
10. Not allow the load to swing or roll against support members.
11. Not adjust the height of portable A frames when the unit is under load.
12. Secure trolley and hoist on portable A frames in center of I beam when adjusting height.
- d. If necessary to leave a shop crane or a portable A frame with a suspended load unattended, the immediate area (about 30 inches) around the shop crane or portable A frame should be posted or barricaded to restrict entry of unauthorized personnel.

**Note:** Set flange-to-flange distance between wheels equal to rail width plus 1/8".

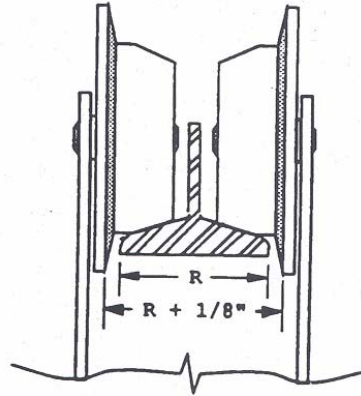


Figure 16-4. Trolley Flange Distance

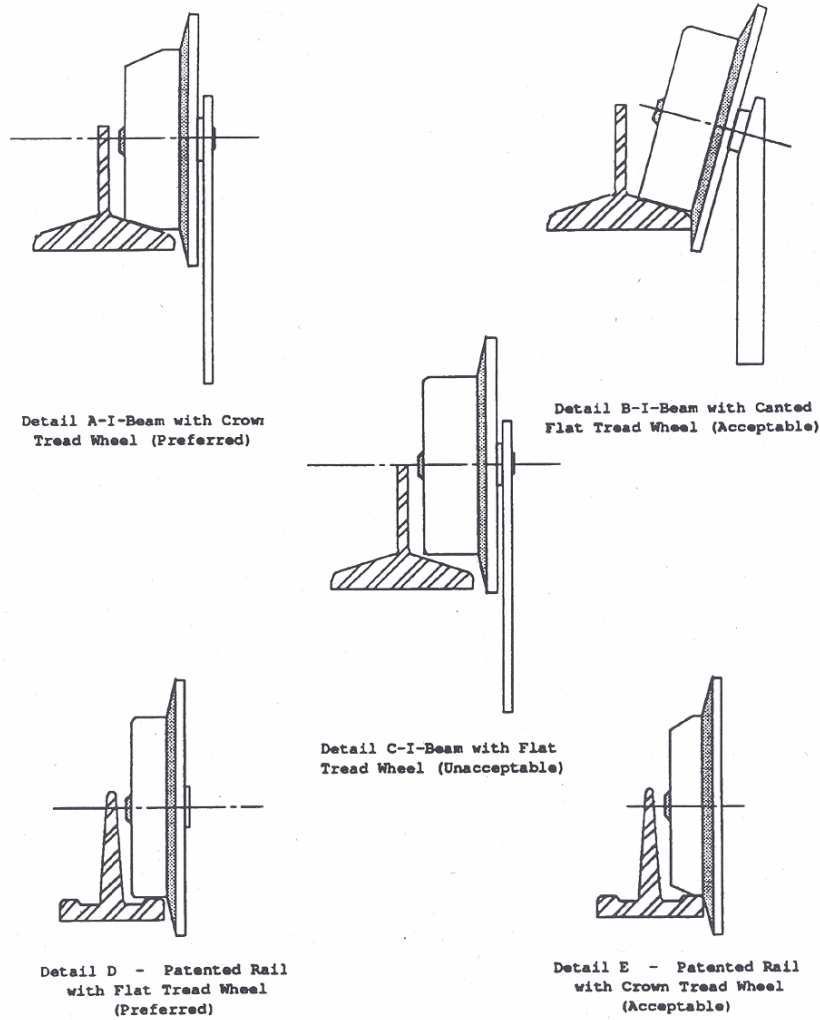


Figure 16-5 Trolley and Rail Compatibility