ASME B30.6-2003
(Revision of ASME B30.6-1995)

DERRICKS

AN AMERICAN NATIONAL STANDARD



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ASME B30.6-2003

(Revision of ASME B30.6-1995)

SAFETY STANDARD FOR CABLEWAYS, CRANES, DERRICKS, HOISTS, HOOKS, JACKS, AND SLINGS

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The next edition of this Standard is scheduled for publication in 2008. There will be no addenda issued to this edition.

ASME issues written replies to inquiries concerning interpretations of technical aspects of this Standard. Interpretations are published on the ASME Web site under Committee Pages at http://www.asme.org/codes as they are issued, and will also be published within the next edition of the Standard.

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CONTENTS

Foreword iv
Committee Roster v
Introduction vi
Summary of Changes ix

Chapter 6-0 Scope, Definitions, and References
Section 6-0.1 Scope of B30.6 1
Section 6-0.2 Definitions 1
Section 6-0.3 References 5

Chapter 6-1 Construction and Installation
Section 6-1.1 Load Ratings 6
Section 6-1.2 Construction 6
Section 6-1.3 Ropes and Reeving Accessories 7
Section 6-1.4 Anchoring and Guying 8
Section 6-1.5 Hoists and Swingers 8
Section 6-1.6 General Requirements 8

Chapter 6-2 Inspection, Testing, and Maintenance
Section 6-2.1 Inspection 9
Section 6-2.2 Testing 10
Section 6-2.3 Maintenance 10
Section 6-2.4 Rope Inspection, Replacement, and Maintenance 11

Chapter 6-3 Operation
Section 6-3.1 Qualifications for and Conduct of Director and Operating Practices 13
Section 6-3.2 Operator Qualifications and Operating Practices 13
Section 6-3.3 Handling the Load 14
Section 6-3.4 Signals 16
Section 6-3.5 Miscellaneous 16

Figures
1 A-Frame Derrick 1
2 Basket Derrick 2
3 Breast Derrick 2
4 Chicago Boom Derrick 2
5 Gin Pole Derrick 3
6 Guy Derrick 3
7 Shearleg Derrick 4
8 Stiffleg Derrick 4
9 Dead Ending Rope in a Socket 8
10 Standard Hand Signals for Controlling Derricks 17
11 Danger Zone for Derricks and Lifted Loads Operating Near Electrical Transmission Lines 19

Table
1 Required Clearance for Normal Voltage in Operation Near High Voltage Power Lines 20

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FOREWORD

This American National Standard, Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings, has been developed under the procedures accredited by the American National Standards Institute (formerly the United States of America Standards Institute). This Standard had its beginning in December 1916 when an eight-page Code of Safety Standards for Cranes, prepared by an ASME Committee on the Protection of Industrial Workers, was presented to the annual meeting of the ASME.

Meetings and discussions regarding safety on cranes, derricks, and hoists were held from 1920 to 1925, involving the ASME Safety Code Correlating Committee, the Association of Iron and Steel Electrical Engineers, the American Museum of Safety, the American Engineering Standards Committee (later changed to American Standards Association and subsequently to the USA Standards Institute), Department of Labor — State of New Jersey, Department of Labor and Industry — State of Pennsylvania, and the Locomotive Crane Manufacturers Association. On June 11, 1925, the American Engineering Standards Committee approved the ASME Safety Code Correlating Committee's recommendation and authorized the project with the U.S. Department of the Navy, Bureau of Yards and Docks, and ASME as sponsors.

In March 1926, invitations were issued to 50 organizations to appoint representatives to a Sectional Committee. The call for organization of this Sectional Committee was sent out October 2, 1926, and the committee organized November 4, 1926, with 57 members representing 29 national organizations. The Safety Code for Cranes, Derricks, and Hoists, ASA B30.2-1943, was created from the eight-page document referred to in the first paragraph. This document was reaffirmed in 1952 and widely accepted as a safety standard.

Due to changes in design, advancement in techniques, and general interest of labor and industry in safety, the Sectional Committee, under the joint sponsorship of ASME and the Naval Facilities Engineering Command, U.S. Department of the Navy, was reorganized as an American National Standards Committee on January 31, 1962, with 39 members representing 27 national organizations.

The format of the previous code was changed so that separate standards (each complete as to construction and installation; inspection, testing, and maintenance; and operation) would cover the different types of equipment included in the scope of B30.

In 1982, the Committee was reorganized as an Accredited Organization Committee, operating under procedures developed by the ASME and accredited by the American National Standards Institute.

This Standard presents a coordinated set of rules that may serve as a guide to government and other regulatory bodies and municipal authorities responsible for the guarding and inspection of the equipment falling within its scope. The suggestions leading to accident prevention are give both as mandatory and advisory provisions; compliance with both types may be required by employers of their employees.

In case of practical difficulties, new developments, or unnecessary hardship, the administrative or regulatory authority may grant variances from the literal requirements or permit the use of other devices or methods, but only when it is clearly evident that an equivalent degree of protection is thereby secured. To secure uniform application and interpretation of this Standard, administrative or regulatory authorities are urged to consult the B30 Committee, in accordance with the format described in Section III, before rendering decisions on disputed points.

This volume of the Standard, which was approved by the B30 Standards Committee and by ASME, was approved by ANSI and designated as an American National Standard on February 19, 2003.

Safety codes and standards are intended to enhance public safety. Revisions result from committee consideration of factors such as technological advances, new data, and changing environmental and industry needs. Revisions do not imply that previous editions were inadequate.

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ASME B30 STANDARDS COMMITTEE
Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings

(The following is the roster of the Committee at the time of approval of this Standard.)

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J. D. Wendler, *Secretary*

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SAFETY STANDARD FOR CABLEWAYS, CRANES, DERRICKS, HOISTS, HOOKS, JACKS, AND SLINGS

B30 SERIES INTRODUCTION

(03)

GENERAL

This Standard is one of a series of safety standards on various subjects that have been formulated under the general auspices of the American National Standards Institute. One purpose of the Standard is to serve as a guide to governmental authorities having jurisdiction over subjects within the scope of the Standard. It is expected, however, that the Standard will find a major application in industry, serving as a guide to manufacturers, purchasers, and users of the equipment.

For the convenience of the user, the Standard has been divided into separate volumes.

B30.1 Jacks
B30.2 Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
B30.3 Construction Tower Cranes
B30.4 Portal, Tower, and Pillar Cranes
B30.5 Mobile and Locomotive Cranes
B30.6 Derricks
B30.7 Base Mounted Drum Hoists
B30.8 Floating Cranes and Floating Derricks
B30.9 Slings
B30.10 Hooks
B30.11 Monorails and Underhung Cranes
B30.12 Handling Loads Suspended From Rotorcraft
B30.13 Storage/Retrieval (S/R) Machines and Associated Equipment
B30.14 Side Boom Tractors
B30.15 Mobile Hydraulic Cranes
Note: B30.15-1973 has been withdrawn. The revision of B30.15 is included in the latest edition of B30.5.
B30.16 Overhead Hoists (Underhung)
B30.17 Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)
B30.18 Stacker Cranes (Top or Under Running Bridge, Multiple Girder With Top or Under Running Trolley Hoist)
B30.19 Cableways
B30.20 Below-the-Hook Lifting Devices
B30.21 Manually Lever Operated Hoists
B30.22 Articulating Boom Cranes
B30.23 Personnel Lifting Systems
B30.24 Container Cranes[1]
B30.25 Scrap and Material Handlers
B30.26 Rigging Hardware[1]
B30.27 Material Placement Systems[1]
B30.28 Balance-Lifting Units[1]

If these standards are adopted for governmental use, the references to other national codes and standards in the specific volumes may be changed to refer to the corresponding regulations of the governmental authorities.

The use of cableways, cranes, derricks, hoists, hooks, jacks, and slings is subject to certain hazards that cannot be met by mechanical means but only by the exercise of intelligence, care, and common sense. It is therefore essential to have personnel involved in the use and operation of equipment who are competent, careful, physically and mentally qualified, and trained in the safe operation of the equipment and the handling of the loads. Serious hazards are overloading, dropping or slipping of the load caused by improper hitching or slinging, obstructing the free passage of the load, and using equipment for a purpose for which it was not intended or designed.

The Standards Committee fully realizes the importance of proper design factors, minimum or maximum sizes, and other limiting dimensions of wire rope or chain and their fastenings, sheaves, sprockets, drums, and similar equipment covered by the Standard, all of which are closely connected with safety. Sizes, strengths, and similar criteria depend on many different factors, often varying with the installation and uses. These factors depend on the condition of the equipment or material; the loads; the acceleration or speed of the ropes, chains, sheaves, sprockets, or drums; the type of attachments; the number, size, and arrangement of sheaves or other parts; environmental conditions causing corrosion or wear; and many variables that must be considered in each individual case. The rules given in the Standard must be interpreted accordingly, and judgment must be used in determining their application.

The Standards Committee will be glad to receive criticisms of this Standard's requirements and suggestions

[1] B30.24, B30.26, B30.27, and B30.28 are in the developmental stage.

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for its improvement, especially those based on actual experience in application of the rules.

Suggestions for changes to the Standard should be submitted to the Secretary of the B30 Committee, ASME, Three Park Avenue, New York, NY 10016-5990, and should be in accordance with the following format:

(a) Cite the specific paragraph designation of the pertinent volume.

(b) Indicate the suggested change (addition, deletion, revision, etc.).

(c) Briefly state the reason and/or evidence for the suggested change.

(d) Submit suggested changes to more than one paragraph in the order that the paragraphs appear in the volume.

The B30 Committee will consider each suggested change in a timely manner in accordance with its procedures.

(03) SECTION I: SCOPE

This Standard applies to the construction, installation, operation, inspection, maintenance, and safe use of lifting equipment used in construction and industrial settings. This includes, but is not limited to: articulating-boom, container, gantry, mobile, pedestal, portal, tower, and stacker cranes; balance-lifting units; below-the-hook lifting devices; cableways; derricks; jacks; hoists; hooks; loads suspended from rotorcraft; material placement systems; monorails; rigging hardware; slings; and scrap material handlers.

This Standard does not apply to track and automotive jacks, railway or automobile wrecking cranes, shipboard cranes, shipboard cargo-handling equipment, well-drilling derricks, skip hoists, mine hoists, truck body hoists, car or barge pullers, conveyors, excavating equipment, or equipment falling within the scope of the following Committees: A10, A17, A90, A92, A120, B20, B56, and B77.

SECTION II: PURPOSE

This Standard is designed to

(a) guard against and minimize injury to workers, and otherwise provide for the protection of life, limb, and property by prescribing safety requirements

(b) provide direction to owners, employers, supervisors, and others concerned with, or responsible for, its application

(c) guide governments and other regulatory bodies in the development, promulgation, and enforcement of appropriate safety directives

SECTION III: INTERPRETATIONS

Upon request, the B30 Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the B30 Committee, ASME, Three Park Avenue, New York, NY 10016-5990.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his request utilizing the following format.

Subject: Cite the applicable paragraph number(s) and provide a concise description.

Edition: Cite the applicable edition of the pertinent volume for which the interpretation is being requested.

Question: Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for approval of a proprietary design or situation. The inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain any proprietary names or information.

Requests that are not in this format will be rewritten in this format by the Committee prior to being answered, which could change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

SECTION IV: NEW AND EXISTING INSTALLATIONS

(a) Effective Date. The effective date of this volume for the purpose of defining new and existing installations shall be 1 year after its date of issuance.

(b) New Installations. Construction, installation, inspection, testing, maintenance, and operation of equipment manufactured and facilities constructed after the effective date of this volume shall conform to the mandatory requirements of this volume.

(c) Existing Installations. Inspection, testing, maintenance, and operation of equipment manufactured and facilities constructed prior to the effective date of this volume shall be done, as applicable, in accordance with the requirements of this volume.

It is not the intent of this volume to require retrofitting of existing equipment. However, when an item is being modified, its performance requirement shall be reviewed relative to the current volume. If the performance differs substantially, the need to meet the current requirement shall be evaluated by a qualified person selected by the

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owner (user). Recommended changes shall be made by the owner (user) within 1 year.

SECTION V: MANDATORY AND ADVISORY RULES

Mandatory rules of this volume are characterized by use of the word *shall*. If a provision is of an advisory nature, it is indicated by use of the word *should* and is a recommendation to be considered, the advisability of which depends on the facts in each situation.

SECTION VI: METRIC CONVERSIONS

The values stated in U.S. Customary units are to be regarded as the standard.

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ASME B30.6-2003
SUMMARY OF CHANGES

Following approval by the ASME B30 Committee and ASME, and after public review, ASME B30.6-2003 was approved by the American National Standards Institute on February 19, 2003.

ASME B30.6-2003 includes editorial changes, revisions, and corrections introduced in ASME B30.6a-1998, ASME B30.6b-1999, and ASME B30.6c-2001, as well as the following changes identified by a margin note, **(03)**.

Page	*Location*	*Change*
vi	General	List of B30 volumes updated
vii	Section I: Scope	First paragraph revised

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DERRICKS

Chapter 6-0
Scope, Definitions, and References

SECTION 6-0.1: SCOPE OF B30.6

Volume B30.6 includes provisions which apply to the construction, installation, operation, inspection, testing, and maintenance of guy, stiffleg, basket, breast, gin pole, Chicago boom, shearleg, and A-frame derricks. These derricks, powered by hoists through systems of wire rope reeving, are used for lifting, lowering, and horizontal movement of freely suspended unguided loads. Derricks are usually stationary mounted and may be temporarily or permanently installed. The provisions included in this volume also apply to any variations of these types of derricks with the same fundamental characteristics, except those specified for floating derricks in ASME B30.8, Floating Cranes and Floating Derricks.

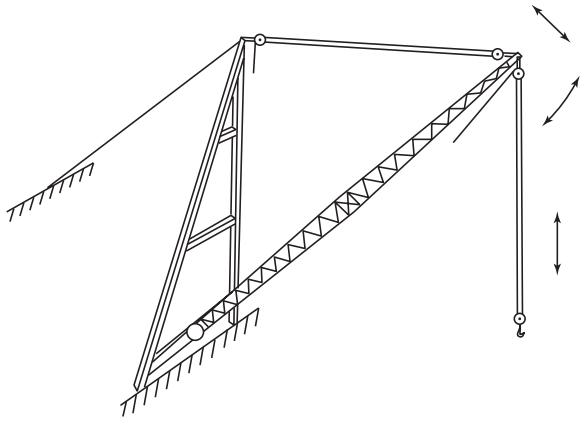


Fig. 1 A-Frame Derrick

SECTION 6-0.2: DEFINITIONS

6-0.2.1 Types of Equipment

derrick: an apparatus consisting of a mast or equivalent member held at the end by guys or braces, with or without a boom, for use with a hoisting mechanism and operating ropes.

derrick, A-frame: a derrick in which the boom is hinged from a cross member or pedestal between the bottom ends of 2 upright members spread apart at the lower ends and joined at the top, the boom point secured to the junction of the side members, and the side members are braced or guyed from this junction point (see Fig. 1).

derrick, basket: a derrick without a boom, similar to a gin pole, with its base supported by ropes attached to corner posts or other parts of the structure. The base is at a lower elevation than its supports. The location of the base of a basket derrick can be changed by varying the length of the rope supports. The top of the pole is secured with multiple reeved guys to position the top of the pole to the desired location by varying the length of the upper guy lines. The load is lifted and lowered by ropes through a sheave or block secured to the top of the pole (see Fig. 2).

derrick, breast: a derrick without a boom. The mast consists of 2 side members spread farther apart at the base than at the top, and tied together at the top and bottom by rigid members. The mast is prevented from tipping forward by guys connected to its top. The load is lifted and lowered by ropes through a sheave or block secured to the top of the crosspiece (see Fig. 3).

derrick, Chicago boom: a boom which is attached to a structure, an outside upright member of the host structure serving as the mast, and the boom being mounted in a pivoting seat secured to the upright. The derrick is complete with load, boom, and boom point swing line falls (see Fig. 4).

derrick, gin pole: a boom without a mast which has guys arranged from its top to permit leaning the mast in one or more directions. The load is lifted and lowered by ropes reeved through sheaves or blocks at the top of the mast and the lower block (see Fig. 5).

derrick, guy: a fixed derrick consisting of a mast capable of being rotated 360 deg, but not continuous rotation, supported in a vertical position by guys and a boom, the bottom end of which is hinged or pivoted to move in a vertical plane with a reeved rope between the head of the mast and the boom harness for lifting and lowering the boom, and a reeved rope from the boom point for lifting and lowering the load (see Fig. 6).

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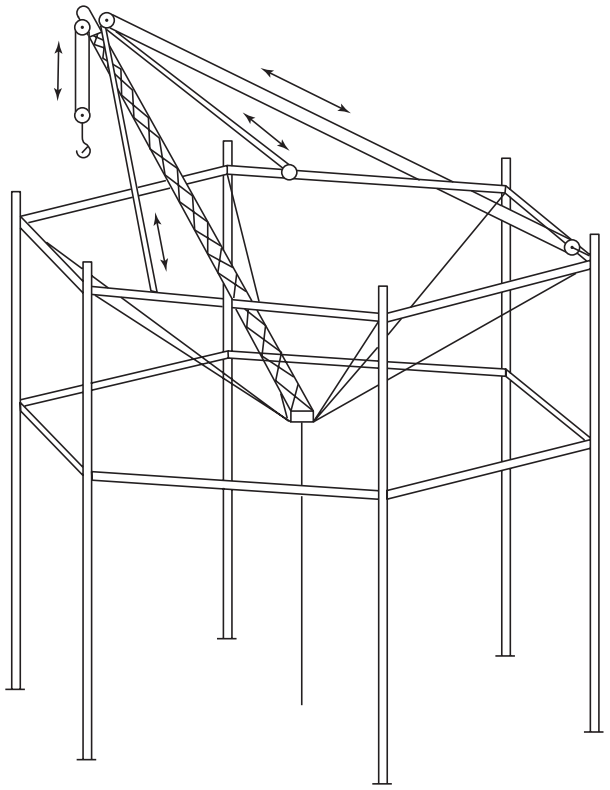


Fig. 2 Basket Derrick

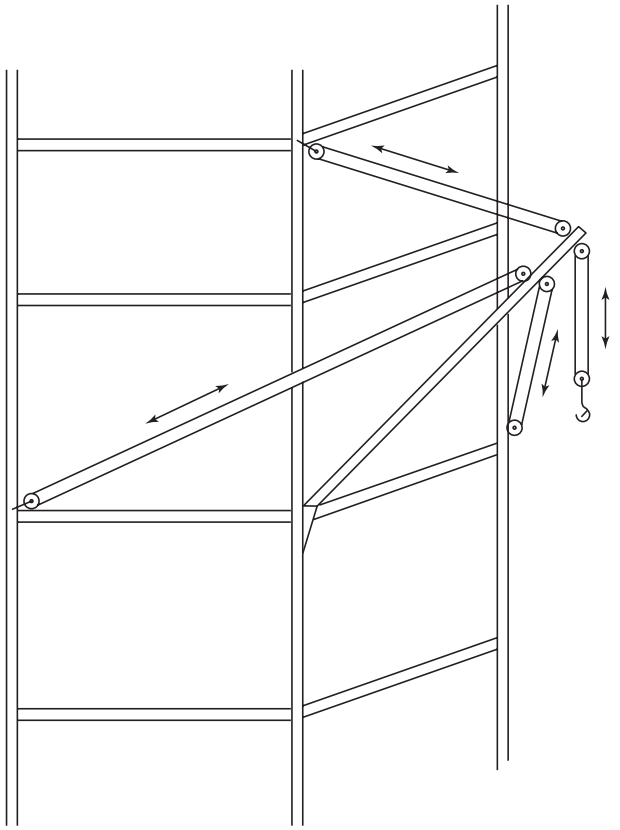


Fig. 4 Chicago Boom Derrick

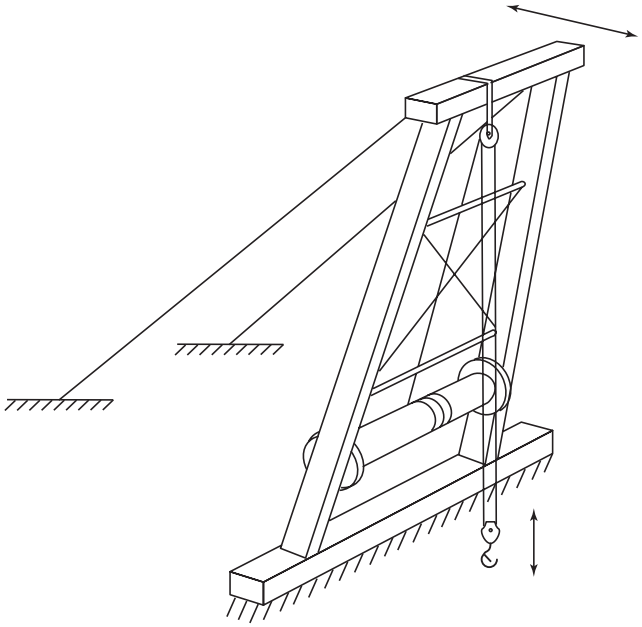


Fig. 3 Breast Derrick

derrick, shearleg: a boom with or without a mast, not capable of swinging, hinged at the bottom and raised and lowered by a boom hoist mechanism or a hydraulic cylinder (see Fig. 7).

derrick, stiffleg: a derrick similar to a guy derrick, except that the mast is supported or held in place by 2 or more stiff members, called stifflegs, which are capable of resisting either tensile or compressive forces. Sills are generally provided to connect the lower ends of the stifflegs to the foot of the mast (see Fig. 8).

6-0.2.2 General

abnormal operating conditions: environmental conditions that are unfavorable, harmful, or detrimental to or for the operation of a derrick, such as excessively high or low ambient temperatures, exposure to adverse weather, corrosive fumes, dust-laden or moisture-laden atmospheres, and hazardous locations.

administrative or regulatory authority: governmental agency, or the employer in the absence of governmental jurisdiction.

appointed: assigned specific responsibilities by the employer or the employer's representative.

authorized: appointed by a duly constituted administrative or regulatory authority.

boom: a timber or metal section or strut, pivoted or hinged at the heel (lower end) at a location fixed in

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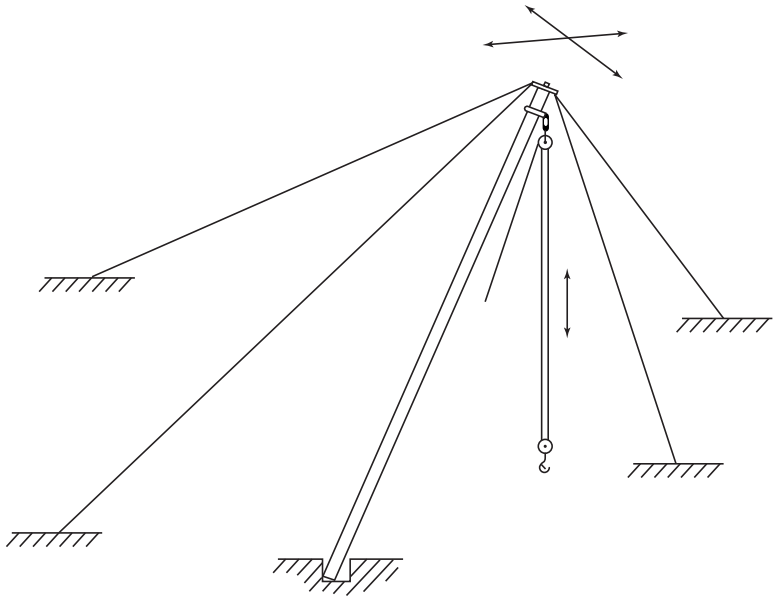


Fig. 5 Gin Pole Derrick

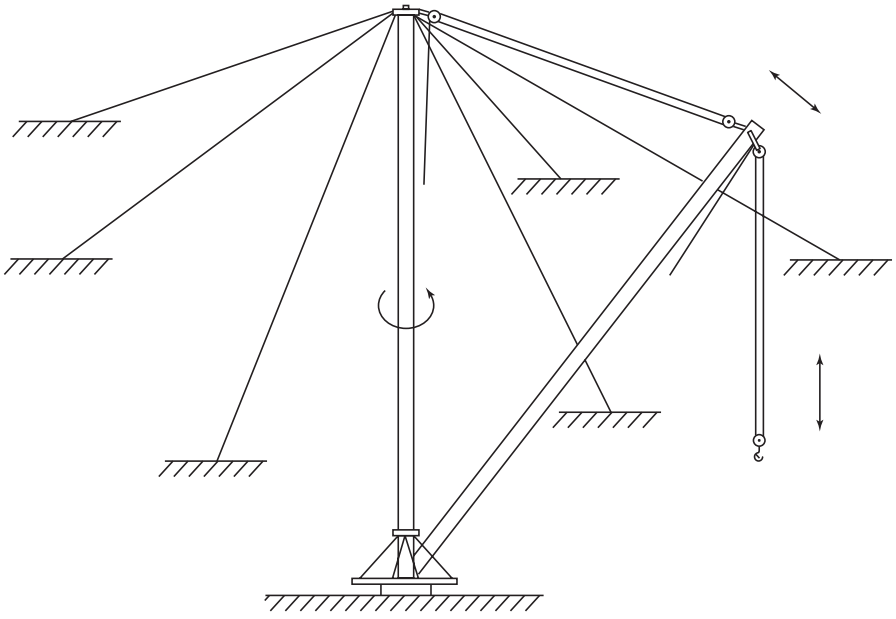


Fig. 6 Guy Derrick

height on a frame, mast, or vertical member, with its point (upper end) supported by chains, ropes, or rods to the upper end of the frame, mast, or vertical member. A rope for lifting and lowering the load is reeved through the sheaves or a block at the boom point and the load block. The length of the boom shall be taken as the straight line distance between the axis of the foot pin and the axis of the boom point sheave pin, or where used, the axis of the upper load block attachment pin.

boom angle: the angle above or below horizontal of the longitudinal axis of the boom base section.

boom angle indicator: an accessory device that measures the angle of the boom base section center line to the horizontal.

boom harness: the block and sheave arrangement on the boom point to which the topping lift cable is reeved for changing the boom angle.

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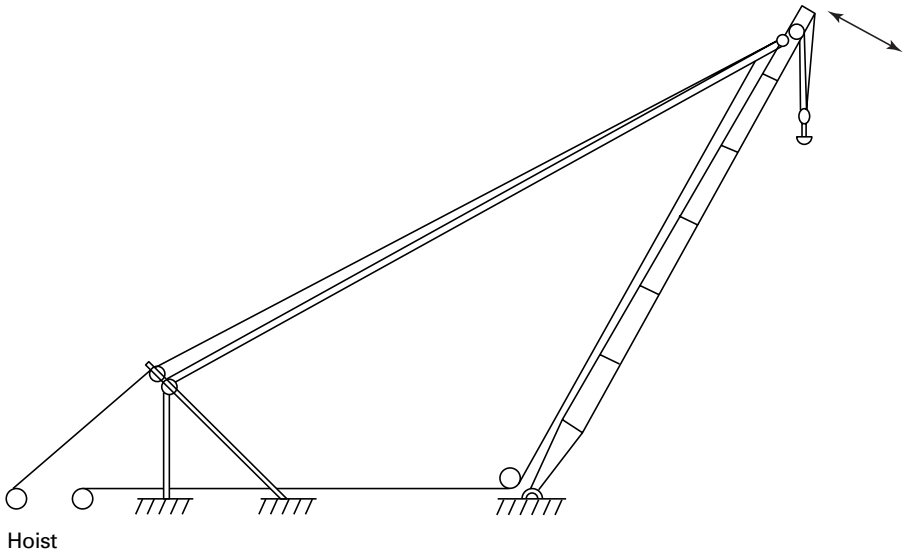


Fig. 7 Shearleg Derrick

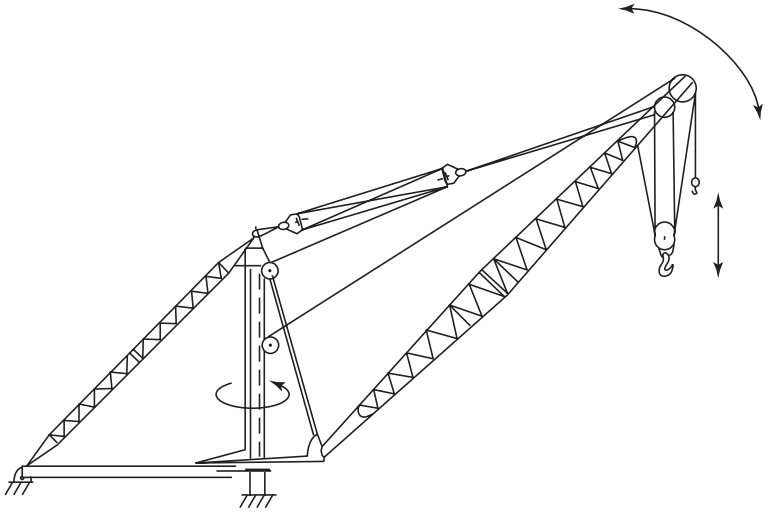


Fig. 8 Stiffleg Derrick

boom point: the outward end of the top section of the boom.

crossover points: in multiple layer spooling of rope on a drum, those points of rope contact where the rope crosses the preceding rope layer.

derrick bullwheel: a horizontal ring or wheel fastened to the mast base of a derrick for the purpose of swinging the derrick by means of ropes leading from this wheel to a powered drum.

derrick service:

(a) normal: that service which involves operating at less than 85% rated capacity and not more than 10 lift cycles per hour except for isolated instances.

(b) heavy: that service which involves operating at 85% to 100% of rated capacity, or in excess of 10 lift cycles per hour as a regular specified procedure.

(c) severe: that service which involves normal or heavy service with abnormal operating conditions.

designated person: a person selected or assigned by the employer or the employer's representative as being competent to perform specific duties.

director: designated person in charge of derrick operation.

eye: a loop formed at the end of a rope by securing the dead end to the live end at the base of the loop.

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fiddle block: a block consisting of sheaves held in place by the same cheek plates; at least 2 sheaves are not on the same shaft.

flange point: a point of contact between rope and drum flange where the rope changes layers.

foot bearing or block (still block): the lower support on which the mast rotates.

gudgeon pin: a pin connecting the mast cap to the mast allowing rotation of the mast.

guy: a rope used to steady or secure the mast, boom, or other member in the desired position.

hairpin anchor: a hairpin-shaped, guy-supporting anchor that is placed in footings or walls before concrete is poured and is held in place by the cured concrete.

latch, hook: a device used to bridge the throat opening of a hook.

load, rated: the maximum allowable working load in pounds (kilograms) established by the manufacturer in accordance with Section 6-1.1.

load, working: the external load in pounds (kilograms) applied to the derrick, including the weight of load attaching equipment such as hoisting ropes, lower load block, shackles, and slings.

load block, lower: the assembly of shackle, swivel, sheaves, pins, and frame suspended by the hoisting rope.

load block, upper: the assembly of sheaves, pins, and frame suspended from the boom.

mast: the upright member of the derrick.

mast cap (spider): the fitting at the top of the mast to which the guys are connected.

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

reeving: a rope system in which the rope travels around drums and sheaves.

repetitive pickup point: when operating on a repetitive cycle operation, that part of the rope which is leaving the drum when the load is first applied to the rope.

rock anchor: an anchoring device inserted in a hole drilled into rock or concrete. The device is secured in the hole to withstand a predetermined load.

rope: refers to wire rope unless otherwise specified.

rotation resistant rope: a wire rope consisting of an inner layer of strand laid in one direction covered by a layer of strand laid in the opposite direction. This has the effect of counteracting torque by reducing the tendency of the finished rope to rotate.

side loading: a load applied at an angle to the vertical plane of the boom.

sill: a member connecting the foot block and stiffleg, or a member connecting the lower ends of a double member mast.

standby derrick: a derrick not in regular service which is used occasionally or intermittently as required.

stiffleg: a rigid member supporting the mast at the head.

swing: rotation of the mast or boom for movements of loads in a horizontal direction about the axis of rotation.

two-blocking: the condition in which the lower load block or hook assembly comes in contact with the upper load block or boom point sheave assembly.

SECTION 6-0.3: REFERENCES

The following is a list of standards and specifications referenced in this Standard, showing the year of approval.

ANSI/AWS D14.3-94, Specification for Welding Earthmoving and Construction Equipment[1]

ANSI/AWS D1.1-02, Structural Welding Code — Steel[1]

Publisher: American Welding Society (AWS), 550 NW LeJeune Road, Miami, FL 33135

ASME B30.7-2001, Base Mounted Drum Hoists[1]

ASME B30.8-1999, Floating Cranes and Floating Derricks[1]

ASME B30.10-1999, Hooks[1]

Publisher: The American Society of Mechanical Engineers (ASME International), Three Park Avenue, New York, NY 10016-5990; Order Department, 22 Law Drive, Box 2300, Fairfield, NJ 07007-2300

ANSI A1264.1-1995, Safety Requirements for Workplace Floor and Wall Openings, Stairs, and Railing Systems

Publisher: American National Standards Institute, Inc. (ANSI), 25 West 43rd Street, New York, NY 10036

[1] May also be obtained from the American National Standards Institute, Inc., 25 West 43rd Street, New York, NY 10036.

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Chapter 6-1
Construction and Installation

SECTION 6-1.1: LOAD RATINGS

6-1.1.1 Basis

Load ratings are dependent on such factors as anchorage, structural competence, rope strength, hoist rating, supports, and guy lengths.

6-1.1.2 Rated Load (Working Load) Marking

(a) For permanently installed derricks with fixed lengths of boom, guy, and mast, a substantial, durable, and clearly legible rating chart shall be provided with each derrick and affixed where it is visible to personnel responsible for the operation of the equipment. The chart shall include, but not necessarily be limited to, the following data:

(1) manufacturer's approved load ratings at corresponding ranges of boom angle or operating radii

(2) specific lengths of components on which the load ratings are based

(3) required parts for hoist reeving. Size and construction of rope may be shown either on the rating chart or in the operating manual

(b) For nonpermanent installations, the manufacturer shall provide information from which rated load charts can be prepared by a qualified person for the particular installation. The rated load charts shall be located either at the derrick or at the job site office.

SECTION 6-1.2: CONSTRUCTION

6-1.2.1 General

(a) Derricks shall be constructed to meet all stresses imposed on members and components under normal operating conditions when properly installed and handling loads not exceeding manufacturer's load ratings with recommended reeving.

(b) Welding of load sustaining members shall conform to recommended practices of the American Welding Society as outlined in ANSI/AWS D14.3 or ANSI/AWS D1.1.

6-1.2.2 Guy Derricks

(a) The recommended minimum number of guys is six. Preferably, guy length and spacing should be equal. Variations from these requirements are acceptable provided original rated load or rerated load is calculated by a qualified person or derrick manufacturer to compensate for these variations.

(b) For published ratings, the manufacturer shall furnish complete guy information recommending

(1) the number

(2) the spacing around the mast

(3) the maximum vertical slope

(4) the size, grade, and construction of rope to be used in each

(5) initial sag or tension

(6) tension in guy line rope at anchor

(c) The mast base shall permit free rotation of the mast with allowance for slight tilting of the mast caused by guy slack.

(d) The mast cap shall

(1) permit free rotation of the mast

(2) withstand tilting and cramping action imposed by the guy loads

(3) be secured to the mast to prevent disengagement during erection

(4) be provided with means for attachment of guy ropes

6-1.2.3 Stiffleg Derricks

(a) The mast shall be supported in the vertical position by at least two stifflegs, one end of each being connected to the top of the mast and the other end securely anchored. The stifflegs shall be capable of withstanding the loads imposed at any point of operation within the rated load chart range.

(b) The mast base shall

(1) permit free rotation of the mast, when required

(2) permit deflection of the mast without binding

(3) provide means to prevent the mast from lifting out of its socket when the mast is in tension

(c) The stiffleg connecting member at the top of the mast shall

(1) permit free rotation of the mast, when required

(2) withstand the loads imposed by the action of the stifflegs

(3) be so secured as to oppose separating forces at all times

6-1.2.4 Gin Pole Derricks

(a) Guy lines should be sized and spaced so as to make the gin pole stable in both boomed and vertical positions.

(b) The base of the gin pole shall

(1) permit movement of the pole, when required

(2) provide means to anchor the pole against horizontal forces, when required

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6-1.2.5 Chicago Boom Derricks

The fittings for stepping the boom and for attachment of the topping lift shall be arranged to

(a) permit the derrick to swing at all permitted operating radii and mounting heights between fittings

(b) accommodate attachment to the upright member of the host structure

(c) withstand the forces applied during normal operation with rated loads at permitted operating configurations

(d) prevent the boom or topping lift from lifting out under tensile forces

SECTION 6-1.3: ROPES AND REEVING ACCESSORIES

6-1.3.1 General

Wherever exposed to temperatures in excess of 180°F (82°C), rope having an independent wire rope core, wire strand core, or other temperature damage-resistant core shall be used.

6-1.3.2 Guy Ropes

(a) Guy ropes shall be of a size, grade, and construction to withstand the maximum load imposed.

(b) The minimum breaking strength of each rope shall not be less than 3 times the static load applied to the rope.

(c) Guy attachments such as turnbuckles shall have provision to prevent loosening during usage.

6-1.3.3 Boom Hoist Ropes

(a) Boom hoist ropes shall be of a size, grade, and construction to withstand the maximum load imposed.

(b) The live rope reeving system in a boom suspension shall withstand the maximum load imposed and be of a length to permit lowering the boom point to horizontal position with at least two full wraps of rope remaining on the hoist drum.

(c) The nominal breaking strength of the most heavily loaded rope in a system shall not be less than $3\frac{1}{2}$ times the load applied to that rope.

(d) Rotation resistant ropes shall not be used for boom hoist reeving.

6-1.3.4 Load Hoist Ropes

(a) Load hoist ropes shall be of a size, grade, and construction to withstand the maximum load imposed.

(b) Ropes in the load hoisting systems shall be of a length for the entire range of movement specified for the application with at least two full wraps of rope remaining on the hoist drum.

(c) The nominal breaking strength of the most heavily loaded rope in a system shall not be less than $3\frac{1}{2}$ times the load applied to that rope, except as specified in para. 6-1.3.4(d).

NOTE: The rope design factors, as given in paras. 6-1.3.2, 6-1.3.3, and 6-1.3.4 above, shall be determined on the basis of rope loads resulting from rated loads, specified reeving, and published nominal breaking strength of new rope. Consideration shall be given to frictional losses where appropriate.

Ropes of material other than steel may be used only in accordance with the manufacturer's, or a qualified person's, recommendation.

(d) Rotation resistant ropes shall have a design factor of 5 or greater. [The design factor of 5 or greater for rotation resistant ropes may be modified by the derrick user by complying with the provisions of para. 6-3.3.1(c)].

(e) Rotation resistant ropes shall be given special care in installation as they are more susceptible to damage than other types of rope.

6-1.3.5 Reeving Accessories

(a) Poured, swaged, compressed, or wedge socket fittings shall be applied as recommended by the rope, derrick, or fitting manufacturer. Any new poured socket or swaged socket assembly used as a boom pendant shall be proof tested to the crane or fitting manufacturer's recommendation, but in no case greater than 50% of the component wire ropes, structural strands, or fittings nominal strength.

(b) Rope end shall be anchored to the drum.

(c) Eyes shall be made in a recommended manner and rope thimbles should be used in the eye.

(d) Rope clips attached with U-bolts shall have the U-bolt on the dead or short end of the rope. Spacing and number of all types of clips shall be in accordance with the clip manufacturer's recommendations. Nuts on clip bolts shall be tightened evenly to the manufacturer's recommended torque. After the initial load is applied to newly installed rope and the rope is under tension, the nuts on the clip bolts should be tightened again to the required torque in order to compensate for any decrease in rope diameter caused by the load.

(e) Where a half wedge socket is used, it shall be of a positive locking type.

(f) Wire rope clips used in conjunction with wedge sockets shall be attached to the unloaded dead end of the rope only (see Fig. 9).

(g) If a load is supported by more than one part of rope, the tension in the parts shall be equalized.

6-1.3.6 Sheaves

(a) Sheave grooves shall be smooth and free from surface conditions that could cause rope damage or accelerated rope wear. The cross-sectional radius at the bottom of the groove should be such as to form a close-fitting saddle for the size rope used, and the sides of the groove should be tapered outward to facilitate

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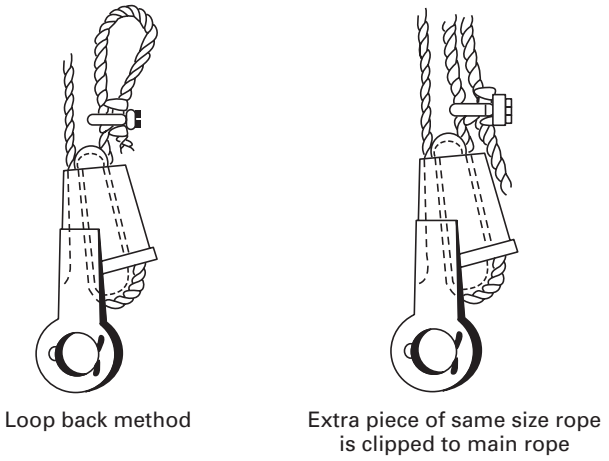


Fig. 9 Dead Ending Rope in a Socket

entrance of the rope into the groove. Flange corners should be rounded, and the rims should run true about the axis of rotation.

(b) Sheaves carrying ropes that can be momentarily unloaded shall be provided with close-fitting guards or other devices to guide the rope back into the groove when the load is applied again.

(c) The sheaves in the lower load block should be equipped with close-fitting guards that will reduce the possibility of ropes becoming fouled when the block is lying on the ground with the ropes loose.

(d) Means should be provided, if necessary, to prevent chafing of the ropes.

(e) All running sheaves shall be equipped with means for lubrication or with permanently lubricated, sealed, or shielded bearings.

(f) Hoisting sheaves shall have pitch diameters not less than 18 times the nominal diameter of the rope used.

(g) Boom point sheaves should be provided with guides to limit the offlead angle of the rope when entering the grooves from either side.

(h) Boom hoist sheaves shall have pitch diameters not less than 15 times the nominal diameter of the rope used.

SECTION 6-1.4: ANCHORING AND GUYING

6-1.4.1 Guy Derricks

(a) The mast base shall be anchored. Maximum horizontal and vertical forces encountered when handling rated loads with the particular guy slope and spacing stipulated for the application are among the design factors for which provision shall be made.

(b) The guys shall be secured to the ground or other firm anchorage. Maximum horizontal and vertical forces encountered while handling rated loads with the particular guy slope and spacing stipulated for the application are among the factors for which provision shall be made.

6-1.4.2 Stiffleg Derricks

(a) The mast base shall be anchored. Maximum horizontal and vertical forces encountered while handling rated loads stipulated for the application with the particular stiffleg spacing and slope are among the design factors for which provision shall be made.

(b) The stifflegs shall be anchored. Maximum horizontal and vertical forces encountered while handling rated loads with the particular stiffleg arrangement stipulated for the application are among the factors for which provision shall be made.

6-1.4.3 Load Anchoring Data

For permanent fixed installations, the owner shall provide load anchoring data referred to in paras. 6-1.4.1 and 6-1.4.2 for the conditions stipulated for the application. For nonpermanent installations, such data shall be determined by a qualified person.

SECTION 6-1.5: HOISTS AND SWINGERS

(a) The boom, load hoists, and swinger mechanisms shall be suitable for the derrick work intended and shall be anchored to prevent displacement from the imposed loads. Caution should be exercised in the use of hoists having excessive line pull or braking capacity for the application.

(b) Base mounted drum hoist requirements of ASME B30.7 shall apply.

SECTION 6-1.6: GENERAL REQUIREMENTS

6-1.6.1 Guards

(a) Exposed moving parts, such as gears, ropes, set screws, projecting keys, chains, chain sprockets, and reciprocating components, that constitute a hazard under normal operating conditions, shall be guarded.

(b) Guards shall be fastened in place.

(c) Each guard shall be capable of supporting, without permanent distortion, the weight of a 200 lb (90 kg) person, unless the guard is located where it is not probable that a person will step on it.

6-1.6.2 Lubrication

Lubricating points should be accessible without removing guards or other parts.

6-1.6.3 Hooks

(a) Hooks shall meet the manufacturer's recommendations and shall not be overloaded. If hooks are of the swiveling type, they should rotate freely. Refer to ASME B30.10.

(b) Hooks with latches should be used wherever possible.

6-1.6.4 Boom Angle Indicator

Boom angle indicator should be provided and be readable by the operator or the signal person, unless the derrick has one rating for all boom angles.

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Chapter 6-2
Inspection, Testing, and Maintenance

SECTION 6-2.1: INSPECTION

6-2.1.1 Inspection Classification

(a) Initial Inspection. Prior to initial use, all new, reinstalled, altered, or modified derricks shall be inspected by a designated person to verify compliance with the provisions of this volume.

(b) Inspection Procedure. Inspection procedure for derricks in regular service is divided into two general classifications based upon the intervals at which the inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the derrick and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are herein designated as *frequent* and *periodic,* with respective intervals between inspections as defined below.

(1) Frequent Inspection. Visual examinations by the operator or other designated personnel with records not required.

(a) normal service — monthly

(b) heavy service — weekly to monthly

(c) severe service — daily to weekly

(d) special or infrequent service — as recommended by a qualified individual before and after each occurrence

(2) Periodic Inspection. Visual inspection by an appointed person making records of apparent external conditions to provide the basis for a continuing evaluation.

(a) normal service — equipment in place: yearly

(b) heavy service — equipment in place: yearly

(c) severe service — as in (b); quarterly

(d) special or infrequent service — as authorized by a qualified person: before the first such occurrence and as directed by the qualified person for any subsequent occurrences

6-2.1.2 Frequent Inspection

Items such as the following shall be inspected for deficiencies and damage at intervals as defined in para. 6-2.1.1(b)(1), or as specifically indicated, including observation during operation for any deficiencies and damage which might appear between regular inspections. Any deficiencies, such as those listed, shall be carefully examined, and a determination shall be made as to whether they constitute a hazard:

(a) all control mechanisms — inspect daily for adjustment, wear, and lubrication

(b) all chords and lacing — inspect daily, visually

(c) tension in guys — inspect daily, by observation

(d) plumb of the mast — inspect visually

(e) external indication of deterioration or leakage in air or hydraulic systems — inspect daily, visually

(f) derrick hooks for deformation or cracks — for hooks with cracks or having more than 15% in excess of normal throat opening or more than 10 deg twist from the plane of the unbent hook, refer to para. 6-2.3.3(c)(1)

(g) rope reeving — visual inspection for noncompliance with derrick manufacturer's recommendations

(h) hoist brakes, clutches, and operating levers — check daily for proper functioning before beginning operations

(i) electrical apparatus — for malfunctioning, signs of excessive deterioration, dirt and moisture accumulation

6-2.1.3 Periodic Inspection

(a) Complete inspections of the derrick shall be performed at intervals, as defined in para. 6-2.1.1(b)(2). Any deficiencies, such as those listed, shall be examined, and a determination made by a designated person as to whether they constitute a hazard. These inspections shall include the requirements of para. 6-2.1.2 and, in addition, items such as the following:

(1) structural members for deformation, cracks, and corrosion

(2) bolts and rivets for tightness

(3) parts such as pins, bearings, shafts, gears, sheaves, drums, rollers, locking and clamping devices, for wear, cracks, and distortion

(4) gudgeon pin for cracks, wear, and distortion

(5) power plants for performance and compliance with applicable safety requirements

(b) Foundation or supports shall be inspected for continued ability to sustain the imposed loads.

6-2.1.4 Derricks Not in Regular Use

(a) A derrick which has been idle for 1 month or more, but less than 6 months, shall be given an inspection conforming with the requirements of paras. 6-2.1.2 and 6-2.4.1(a) before being placed in service.

(b) A derrick which has been idle for more than 6 months shall be given a complete inspection conforming

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with the requirements of paras. 6-2.1.2, 6-2.1.3, and 6-2.4.1(d).

(c) Standby derricks, before being used, shall be inspected in accordance with paras. 6-2.1.4(a) or (b), depending upon the interval since they were last used.

6-2.1.5 Inspection Records (for Periodic Inspections)

Dated inspection reports or comparable records shall be made on critical items, such as hoisting machinery, sheaves, hooks, chains, ropes, and other lifting devices. Dated records should be kept where readily available to appointed personnel.

SECTION 6-2.2: TESTING

6-2.2.1 Operational Tests

(a) New or Reinstalled Derricks. Prior to initial use, all new or reinstalled derricks shall be tested with no hook load, under the direction of a designated person to verify compliance with this volume, including, but not limited to, the following:

(1) lift and lower the hook(s) through full range of hook travel.

(2) raising and lowering the boom through full range of boom travel.

(3) swing each direction full range of swing.

(4) operate hoist clutches and brakes.

(5) operate over-hoist limit devices (when provided). The actuating mechanism of the limit device shall be located so it will trip the device under all conditions in sufficient time to prevent two-blocking.

(6) operate locking, limiting, and indicating devices, when provided.

(b) Anchorages. All anchorages shall be approved by a qualified person. Rock and hairpin anchorages may require special testing.

(c) Repaired, Altered, or Modified Derricks. Prior to use, a repaired, altered, or modified derrick shall be tested. Testing may be limited to the function(s) affected by the repair.

6-2.2.2 Load Test

(a) New or Reinstalled Derricks

(1) Prior to initial use all new or reinstalled derricks shall be inspected and load tested by or under the direction of a designated person. A written test report shall be prepared by the designated person and placed on file. Test loads shall not be less than 100% or more than 110% of the rated load, unless otherwise recommended by the manufacturer or a qualified person.

(2) The load test shall consist of the following operations as a minimum requirement:

(a) hoist the test load a few inches and hold to verify that the load is supported by the derrick and held by the hoist brake(s)

(b) swing the derrick, if applicable, the full range of its swing, at the maximum allowable working radius for the test load

(c) boom the derrick up and down within the allowable working radius for the test load

(d) lower the test load, stop and hold the load with the brake(s)

(b) Repaired, Altered, or Modified Derricks. The need for load testing a repaired, altered, or modified derrick shall be determined by a qualified person. When a load test is required, testing shall be in accordance with para. 6-2.2.2(a)(1).

SECTION 6-2.3: MAINTENANCE

6-2.3.1 Preventive Maintenance

(a) A preventive maintenance program should be established and based upon the derrick manufacturer's or a qualified person's recommendation. Dated records should be kept where readily available to appointed personnel.

(b) Replacement parts shall be at least equal to the original parts.

6-2.3.2 Maintenance Procedure

(a) Before adjustments and repairs are started, the following precautions shall be taken:

(1) the derrick to be repaired shall be arranged to cause the least interference with other equipment and operations in the area

(2) all hoist drum dogs shall be engaged

(3) if electric hoist is used, the main or emergency switch shall be locked in the open position

(4) warning or out-of-order signs shall be placed on the derrick and hoist

(5) the repairs of booms of derricks shall be made either when the booms are lowered and supported or tied off

(6) a communication system shall be set up between the hoist operator and the appointed person in charge of derrick operations before any work on the equipment is started

(7) welding repairs shall be approved by an appointed person

(b) After adjustments and repairs have been made, the derrick shall not be returned to service until all guards have been reinstalled, safety devices reactivated, and maintenance equipment removed.

6-2.3.3 Adjustments and Repairs

(a) Any hazardous conditions disclosed by the inspection and requirements of Section 6-2.1 shall be corrected before operation of the derrick is resumed. Adjustments and repairs shall be done only by designated personnel.

(b) Adjustments shall be maintained to assure correct functioning of components such as the following:

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(1) all functioning operating mechanisms
(2) tie-downs or anchorages
(3) signal system
(4) brakes and clutches
(5) power plants
(6) guys
(7) limit devices, if provided

(c) Repairs or replacements shall be made as needed. The following are examples.

(1) Hooks showing defects described in para. 6-2.1.2(f) shall be discarded. Repairs by welding or reshaping are not recommended.

(2) All critical parts that are cracked, broken, bent, or excessively worn.

(3) Pitted or burned electrical contacts should be corrected only by replacement and in sets. Controller parts should be lubricated only as recommended by the manufacturer.

(d) All replacement and repaired parts shall have at least the original design factor.

6-2.3.4 Lubrication

(a) All moving parts of the derrick and hoist for which lubrication is specified, including rope and chain, should be regularly lubricated. Lubricating systems should be checked for proper delivery of lubricant. Care should be taken to follow manufacturer's recommendations as to points and frequency of lubrication, maintenance of lubricant levels, and types of lubricant to be used.

(b) Machinery shall be stationary while lubricants are being applied and protection provided as called for in paras. 6-2.3.2(a)(1) through (a)(3), unless equipped for automatic or remote lubrication.

SECTION 6-2.4: ROPE INSPECTION, REPLACEMENT, AND MAINTENANCE

6-2.4.1 Inspection

(a) Frequent Inspection

(1) All running ropes in continuous service should be visually inspected once each working day. A visual inspection shall consist of observation of all rope that can be expected to be in use during the day's operations. These visual observations should be concerned with discovering damage such as listed below that may be an immediate hazard:

(a) distortion of the rope such as kinking, crushing, unstranding, birdcaging, main strand displacement, or core protrusion.

(b) general corrosion.

(c) broken or cut strands.

(d) number, distribution, and type of visible broken wires [see para. 6-2.4.1(c) for further guidance]. When such damage is discovered, the rope shall be either removed from service or given an inspection as detailed in para. 6-2.4.1(b).

(2) Care shall be taken when inspecting sections of rapid deterioration such as flange points, crossover points, and repetitive pickup points on drums.

(b) Periodic Inspection

(1) The inspection frequency shall be determined by a qualified person and shall be based on such factors as expected rope life, as determined by experience on the particular installation or similar installations; severity of environment; percentage of capacity lifts; frequency rates of operation; and exposure to shock loads. Inspections need not be at equal calendar intervals and should be more frequent as the rope approaches the end of its useful life. This inspection shall be made at least annually.

(2) Periodic inspections shall be performed by an appointed or authorized person. This inspection shall cover the entire length of rope. The individual wires in the strands of the rope shall be visible to this person during the inspection. Any deterioration resulting in appreciable loss of original strength, such as described below, shall be noted, and a determination shall be made as to whether further use of the rope would constitute a hazard:

(a) points listed in para. 6-2.4.1(a)

(b) reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires

(c) severely corroded or broken wires at end connections

(d) severely corroded, cracked, bent, worn, or improperly applied end connections

(3) Care shall be taken when inspecting sections of rapid deterioration such as the following:

(a) sections in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited

(b) sections of the rope at or near terminal ends where corroded or broken wires may protrude

(c) Rope Replacement

(1) No precise rules can be given for determination of the exact time for rope replacement, since many variable factors are involved. Once a rope reaches any one of the specified removal criteria, it may be allowed to operate to the end of the work shift, based on the judgment of a qualified person. The rope shall be replaced after that work shift, at the end of the day, or at the latest time prior to the equipment being used by the next work shift.

(2) Removal criteria for rope replacement shall be as follows:

(a) in running ropes other than rotation resistant ropes, six randomly distributed broken wires in one lay or three broken wires in one strand in one lay — consult rope manufacturer for broken wire criteria for rotation resistant rope

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(b) one outer wire broken at the contact point with the core of the rope which has worked its way out of the rope structure and protrudes or loops out from the rope structure

(c) wear of one-third the original diameter of the outside individual wires

(d) kinking, crushing, birdcaging, or any other damage resulting in distortion of the rope structure

(e) evidence of heat damage from any cause

(f) reductions from nominal diameter greater than those shown below

Rope Diameter, in. (mm)	Maximum Allowable Reduction From Nominal Diameter, in. (mm)
Up to 5/16 (8)	1/64 (0.4)
3/8 (9.5) to 1/2 (13)	1/32 (0.8)
9/16 (14.5) to 3/4 (19)	3/64 (1.2)
7/8 (22) to 1 1/8 (29)	1/16 (1.6)
1 1/4 (32) to 1 1/2 (38)	3/32 (2.4)

(g) in standing ropes, more than two broken wires in one lay in sections beyond end connections, or more than one broken wire at an end connection

(3) Broken wire removal criteria cited in this volume apply to wire rope operating on steel sheaves and drums. The user shall contact the sheave, drum, or derrick manufacturer, or a qualified person, for broken wire removal criteria for wire ropes operating on sheaves and drums made of material other than steel.

(4) Replacement rope shall have a strength rating at least as great as the original rope furnished by the derrick manufacturer. Any deviation from the original size, grade, or construction shall be specified by a rope manufacturer, the derrick manufacturer, or a qualified person.

(d) Ropes Not in Regular Use. All rope which has been idle for a period of 1 month or more due to shutdown or storage of the derrick on which it is installed shall be given an inspection in accordance with para. 6-2.4.1(b) before it is placed in service. This inspection shall be for all types of deterioration and shall be performed by an appointed or authorized person whose approval shall be required for further use of the rope.

(e) Inspection Records

(1) Frequent inspection — no records required.

(2) Periodic inspection — in order to establish data as a basis for judging the proper time for replacement, a dated report of rope condition at each periodic inspection shall be kept on file. This report shall cover points of deterioration listed in para. 6-2.4.1(b)(2).

(f) A long-range inspection program should be established and include records on examination of ropes removed from service so that a relationship can be established between visual observation and actual condition of the internal structure.

6-2.4.2 Rope Maintenance

(a) Rope shall be stored to prevent damage or deterioration.

(b) Unreeling or uncoiling of rope shall be performed as recommended by the rope manufacturer, with care taken to avoid kinking or inducing a twist.

(c) Before cutting a rope, seizings shall be placed on each side of the location where the rope is to be cut to prevent unlaying of the strands. On preformed rope, one seizing on each side of the cut is required. On non-preformed ropes of 7/8 in. (22 mm) diameter or smaller, two seizings on each side of the cut are required; for non-preformed rope of 1 in. (25 mm) diameter and larger, three seizings on each side of the cut are required.

(d) During installation, care shall be exercised to avoid dragging the rope in dirt or around objects that will scrape, nick, crush, or induce sharp bends in it.

(e) Rope should be maintained in a well-lubricated condition. It is important that lubricant applied as part of a maintenance program shall be compatible with the original lubricant, and to this end the rope manufacturer should be consulted; lubricant applied shall be the type which does not hinder visual inspection. Those sections of rope which are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when lubricating rope. The object of rope lubrication is to reduce internal friction and to prevent corrosion. Periodic field lubrication is particularly important for rotation resistant rope.

(f) When an operating rope shows greater wear at well-defined localized areas than on the remainder of the rope, rope life can be extended, in cases where a reduced rope length is adequate, by cutting off a section at one end, thus shifting the wear to different areas of the rope.

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Chapter 6-3
Operation

SECTION 6-3.1: QUALIFICATIONS FOR AND CONDUCT OF DIRECTOR AND OPERATING PRACTICES

6-3.1.1 Operation of Derricks

Derrick operations shall be supervised by a designated person.

6-3.1.2 Qualifications for Directors

(a) The director shall be required by the employer to pass a written or oral examination and a practical operating examination, unless able to furnish satisfactory evidence of qualifications and experience. Qualifications shall be limited to the specific type of operations for which the director was examined.

(b) The director shall meet the following physical qualifications:

(1) vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without corrective lenses

(2) ability to distinguish color, regardless of the position of colors, if color differentiation is required for operation

(3) adequate hearing, with or without hearing aid, for the specific operation

6-3.1.3 Practices of Designated Individuals Directing Operations

(a) The designated individual shall not engage in any practice which will divert his attention while actually engaged in directing derrick operations.

(b) When physically or mentally unfit, the designated individual shall not direct operations but shall ask to be relieved.

(c) The designated individual shall give signals only to the derrick hoist operator, or an appointed signal person.

(d) The designated individual shall direct the operation of equipment. Whenever there is any doubt as to safety, he shall refuse to authorize operations until safety has been assured.

(e) Before permitting equipment to be left unattended, the individual in charge of derrick operations shall direct disposition of all loads and make certain that equipment is secured in accordance with para. 6-3.2.3(e).

(f) If power fails during operations, the person in charge of derrick operation shall investigate and take necessary action before operation is resumed.

SECTION 6-3.2: OPERATOR QUALIFICATIONS AND OPERATING PRACTICES

6-3.2.1 Operators

Derricks and derrick hoists shall be operated only by the following qualified personnel:

(a) designated persons

(b) trainees under the direct supervision of a designated person

(c) maintenance and test personnel, when it is necessary in the performance of their duties

6-3.2.2 Qualifications for Operators

(a) Operators shall be required by the employer to pass a written or oral examination and a practical operating examination, unless able to furnish satisfactory evidence of qualifications and experience. Qualifications shall be limited to the specific type of equipment for which the operator is examined.

(b) Operators and operator trainees shall meet the following physical qualifications:

(1) vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without corrective lenses

(2) ability to distinguish color, regardless of the position of colors, if color differentiation is required for operation

(3) adequate hearing, with or without hearing aid, for the specific operation

(4) sufficient strength, endurance, agility, coordination, and speed of reaction to meet the demands of equipment operation

(c) Evidence of physical limitations or emotional instability which could be a hazard to the operator or others, or which in the opinion of the examiner could interfere with the operator's safe performance, may be cause for disqualification. In such cases, specialized clinical or medical judgements and tests may be required.

(d) Evidence that an operator is subject to seizures or loss of physical control shall be reason for disqualification. Specialized medical tests may be required to determine these conditions.

(e) Operators and operator trainees should have normal depth perception, field of vision, reaction time, manual dexterity, coordination, and no tendencies to dizziness or similar undesirable characteristics.

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6-3.2.3 Conduct of Operators

(a) The operator shall not engage in any practice which will divert his attention while actually engaged in operating the derrick hoist.

(b) When physically or mentally unfit, an operator shall not engage in the operation of the derrick hoist.

(c) The operator shall respond to signals only from the person who is directing the lift, or an appointed signal person. However, the operator shall obey a stop signal at all times, no matter who gives it.

(d) Each operator shall be responsible for those operations under the operator's direct control. Whenever there is any doubt as to safety, the operator shall consult with the director before handling a load.

(e) The operator shall not leave the equipment unattended until notified by the director that it is safe to do so. Before leaving, the operator should

(1) land any attached load

(2) disengage clutches

(3) put the handles of controls in the OFF position

(4) open main switch or stop the engine

(5) engage manual locking devices in the absence of automatic holding equipment

(f) If there is a warning sign on the switch or engine starting controls, the derrick hoist operator shall not close the switch or start operations until the sign has been removed by an appointed person.

(g) Before closing the switch or starting the hoist engine, the derrick hoist operator shall see to it that all controls are in the OFF position and all personnel are in the clear.

(h) If power fails during operations, the derrick hoist operator shall

(1) lower load to ground, if possible

(2) set all brakes or locking devices

(3) move all clutch or other power controls to the OFF position

(4) communicate with the director

(i) The operator shall be familiar with the equipment and its proper care. If adjustments or repairs are necessary, or any defects are known, the operator shall report them to the director and also notify the next operator of the defects when changing shifts.

(j) All controls shall be tested by the operator before beginning a new shift. If any controls do not operate properly, they shall be adjusted or repaired before operations begin.

SECTION 6-3.3: HANDLING THE LOAD

6-3.3.1 Size of Load

(a) No derrick shall be loaded beyond the rated load for the particular derrick configuration.

(b) When loads approach the maximum rating of the derrick, the person responsible for the job shall ascertain that the weight of the load has been determined within ±10% before it is lifted.

(c) When rotation resistant ropes are used with an operating design factor less than 5, but in no case less than 3.5, the special provisions that follow shall apply.

(1) For each such lifting assignment:

(a) an appointed person shall direct each lift;

(b) a qualified person shall ascertain that the rope is in satisfactory condition [see paras. 6-2.4.1(a)(1)(a) through (a)(1)(d)] both before and after lifting; but more than 1 broken wire in any one lay shall be reason to consider not using the rope for such lifts;

(c) operations shall be conducted in such a manner and at such speeds as to reduce dynamic effects.

(2) Each lift under these provisions shall be recorded in the derrick inspection record, and such prior uses shall be considered before permitting another such lift.

(3) These provisions are not intended to permit duty cycle or repetitive lifts to be made with operating design factors less than 5.

6-3.3.2 Attaching the Load

(a) The hoist rope shall not be wrapped around the load.

(b) The load shall be attached to the hook by means of slings or other devices of sufficient capacities.

6-3.3.3 Moving the Load

(a) The person directing the lift shall see that the load is well secured and properly balanced in the sling or lifting device before it is lifted more than a few inches.

(b) Before starting the lift, note the following conditions:

(1) hoist rope shall not be kinked

(2) multiple part lines shall not be twisted around each other

(3) the hook shall be brought over the load in such a manner as to prevent swinging

(4) if there is a slack rope condition, it should be determined that the rope is properly seated on the drum and in the sheaves

(c) During lifting, care shall be taken that

(1) there is no sudden acceleration or deceleration of the moving load

(2) the load does not contact any obstructions

(d) A derrick shall not be used for side loading except when specifically authorized by a qualified person who has determined that the various structural components will not be overstressed.

(e) The operator should avoid carrying loads over people.

(f) The operator shall test the brakes each time a load approaching the rated load is handled by lifting it a few inches and applying the brakes.

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(g) Neither the load nor boom shall be lowered below the point where less than two full wraps of rope remain on their respective drums.

(h) When rotating a derrick, sudden starts and stops shall be avoided. Rotational speed shall be such that the load does not swing out beyond the radius at which it can be controlled. A tag or restraint line should also be used.

(i) Boom and hoisting rope systems shall not be twisted.

(j) The operator shall not hoist, lower, or swing while anyone is on the load or hook.

6-3.3.4 Personnel Lifting

This Standard recognizes that derricks are designed and intended for handling materials. They do not meet personnel lift or elevator requirements. Therefore, no derrick function shall be performed while a person is on the hook, load, manlift platform, boom, or other personnel lifting device attached to the derrick load line or boom unless each of the specific, special requirements which follow are met.

(a) The following special procedures shall be followed when personnel are to be lifted.

(1) The person on the job site specifically responsible for the overall work function to be performed shall determine that there is no practical alternate way to perform the needed work and authorize its usage.

(2) For each instance of such lifting, the person responsible for the task shall attest to the need for the operation by issuing a statement (describing the operation and its time frame) itemizing that each of the following requirements have been met. The statement, after being approved by the authorizer, shall be retained at the job site.

(3) Before use for lifting people, the derrick shall be inspected in accordance with the requirements of paras. 6-2.1.2 and 6-2.4.1(a).

(4) The lift shall be made under controlled conditions and under the direction of an appointed signal person.

(5) A meeting attended by the derrick operator, signal person, person(s) to be lifted, and the person responsible for the task to be performed shall be held to plan and review procedures to be followed, including procedures for entering and leaving the manlift platform and the points at which persons will enter and leave the platform.

(6) The operator and signal person shall conduct a test lift with an empty manlift platform.

(7) Communication between the derrick operator, signal person, and person(s) being lifted shall be maintained.

(8) Warning or limiting devices shall be installed to prevent two-blocking, unless audible communication has been provided and one of the persons being lifted has been specifically assigned the task of warning of the approach of a two-block condition.

(9) The derrick shall be operated so that downward motion will be power controlled lowering (no freefall).

(10) When welding is done by an employee on the platform, the electrode holders shall be protected from contact with metal components of the platform.

(11) Persons on the platform shall wear safety belts with lanyards attached, preferably above the hook or shackle.

(12) The operator shall remain at the controls when the platform is suspended.

(13) When lifting or lowering platforms, the operator shall control the speed, and it shall not exceed 100 ft/min (0.51 m/s).

(14) Derricks shall not travel while personnel are on the platform.

(15) The employees being lifted, moved, or positioned shall remain in continuous sight or in communication with the operator or signal person.

(16) The total weight of the lifted load (including personnel) shall not exceed 50% of the derrick rating.

(b) A platform which is designed and constructed in accordance with the following shall be used.

(1) The platform shall be designed by a qualified person.

(2) The platform shall be limited to a capacity of 6 persons.

(3) The platform and attaching devices shall have a minimum design factor of 5.

(4) The platform shall have a plate specifying the weight of the empty platform, the maximum number of persons, and the weight for which the platform is rated.

(5) The platform shall have standard railing as defined in ANSI A1264.1.

(6) The sides of the platform shall be enclosed from floor to midrail.

(7) If access doors are installed, they shall open only to the interior of the platform. Access doors shall be equipped with a device to restrain the door from inadvertently opening.

(8) The platform shall have overhead protection when there is an overhead hazard.

(9) The platform shall be easily identifiable by high-visibility color or marking.

(10) The platform shall be attached by means such as, but not limited to, a shackle, hook (latched or moused), or wedge and socket attachment. A wedge and socket attachment shall have a clip on the free end of the load line (see Fig. 9).

(11) The suspension system shall minimize inclination of the platform due to the movement of personnel on the platform.

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6-3.3.5 Holding the Load

(a) The operator shall not leave the controls while the load is suspended unless the precautions in the exceptions as listed in paras. 6-3.3.5(b) through (d) have been taken.

(b) People should not be permitted to stand or pass under a load on the hook.

(c) If the load must remain suspended for any considerable length of time, a dog, a pawl and ratchet, or other equivalent means, rather than the brake alone, shall be used to hold the load.

(d) As an exception to para. 6-3.3.5(a), under such circumstances where a load is to be held suspended for a period of time exceeding normal lifting operations, the operator may leave his position at the controls, provided, prior to that time, the appointed individual and operator have established the requirements for dogging the hoist and providing notices, barricades, or whatever other precautions may be necessary.

6-3.3.6 Use of Winch Heads

(a) Ropes shall not be handled on a winch head without the knowledge of the operator.

(b) While a winch head is being used, the operator shall be within reach of the power unit control lever.

6-3.3.7 Securing Boom

Dogs, pawls, or other positive holding mechanisms on the hoist shall be engaged. When not in use, the derrick boom shall be either

(a) laid down

(b) secured to a stationary member, as nearly under the head as possible, by attachment of a sling to the load block

(c) lifted to a vertical position and secured to the mast for guy derricks

(d) secured against stiffleg for stiffleg derrick

SECTION 6-3.4: SIGNALS

6-3.4.1 Standard Signals

Standard signals to the operator shall be in accordance with the standard prescribed in paras. 6-3.4.2 and 6-3.4.3, unless voice communication equipment (telephone, radio, or equivalent) is utilized. Signals shall be discernible or audible at all times. No response shall be made unless signals are clearly understood.

6-3.4.2 Hand Signals

Hand signals shall be in accordance with Fig. 10 and shall be posted conspicuously.

6-3.4.3 Bell or Light Signals

Bells of different tones shall be used for boom, load, runner (whip), and swinger. Where electrically activated, both bell and light signal systems shall have safety lights of a different color lit to indicate that the signal system is effective. The signals shall be as follows:

(a) When operating, one bell or light means *stop*.

(b) When stopped, one bell or light means *lift*; two bells or lights means *lower*.

(c) When temporarily stopped, three or four bells or lights alternately on the boom and load mean *dog it off* or *stopping for some time*.

(d) When dogged off, before starting, ring three or four bells or light three or four lights alternately on the boom and load, meaning *get ready to start work again*.

6-3.4.4 Special Signals

Some special operations may require additions to, or modifications of, the basic signals standardized herein. In all such cases, these special signals should be agreed upon, thoroughly understood by the director, signal person, and the operator, and should not be in conflict with the standard signals.

6-3.4.5 Instructions

If it is desired to give instructions to the operator other than those provided for in the standard signal system, the derrick motions shall be stopped.

SECTION 6-3.5: MISCELLANEOUS

6-3.5.1 Fire Extinguishers

(a) A portable fire extinguisher, with a basic minimum extinguisher rating of 10 BC, shall be installed in the cab or at the machinery housing.

(b) Operating and maintenance personnel shall be familiar with the use and care of the fire extinguishers provided.

6-3.5.2 Refueling

(a) When refueling with a portable container, it shall be of a safety-type can equipped with an automatic closing cap and flame arrester.

(b) The machine shall not be refueled with the engine running.

(c) Smoking or open flames shall be prohibited in the refueling area.

6-3.5.3 Operating Near Electric Power Lines

(a) Derricks shall be operated so that no part of the derrick or load enters into the danger zone shown in Fig. 11.

EXCEPTIONS:

(1) The danger zone may be entered if the electrical distribution and transmission lines have been de-energized and visibly grounded at the point of work; or

(2) The danger zone may be entered if insulating barriers (not a part of or an attachment to the derrick) have been erected to prevent physical contact with the lines.

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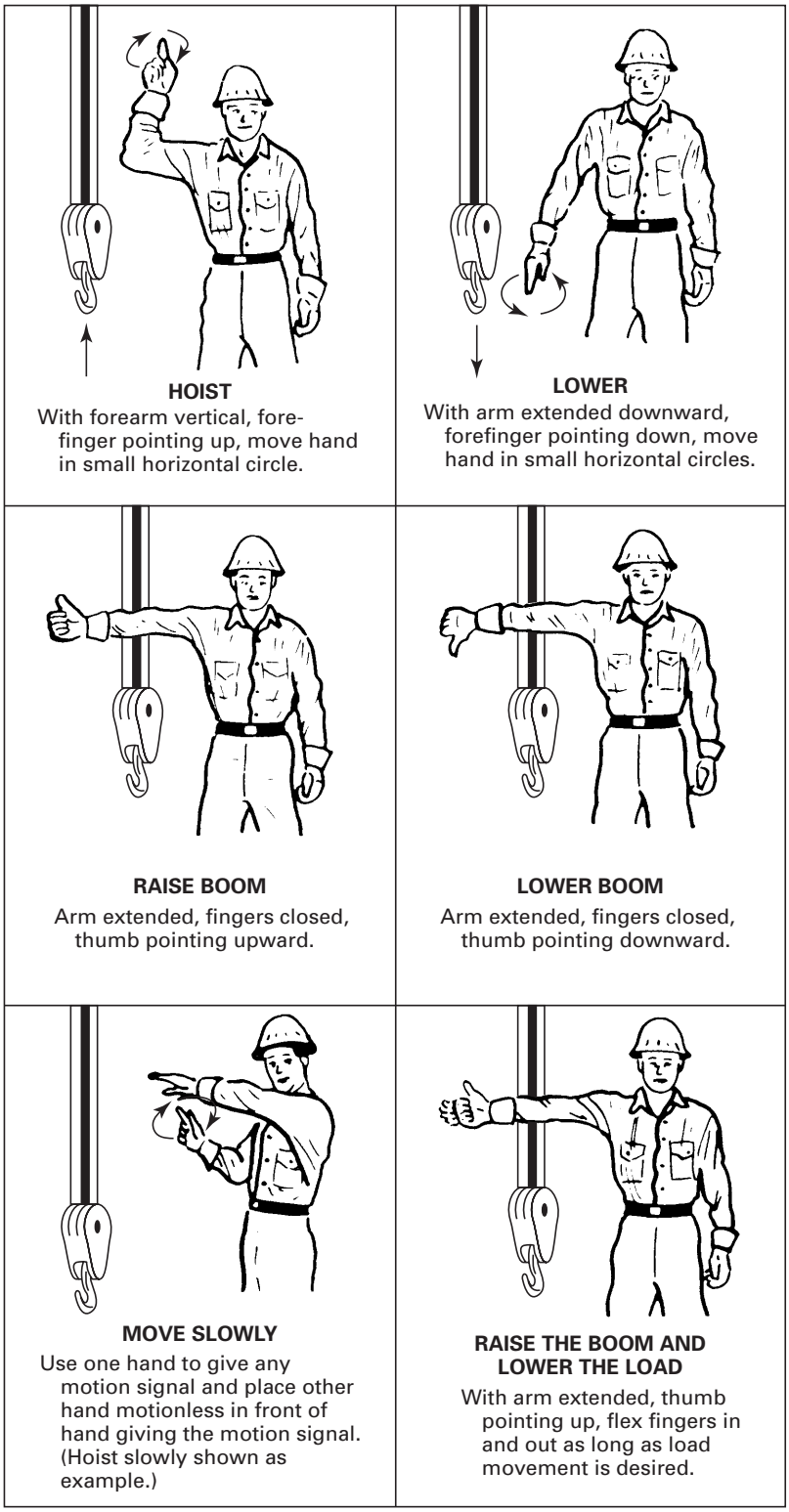


Fig. 10 Standard Hand Signals for Controlling Derricks

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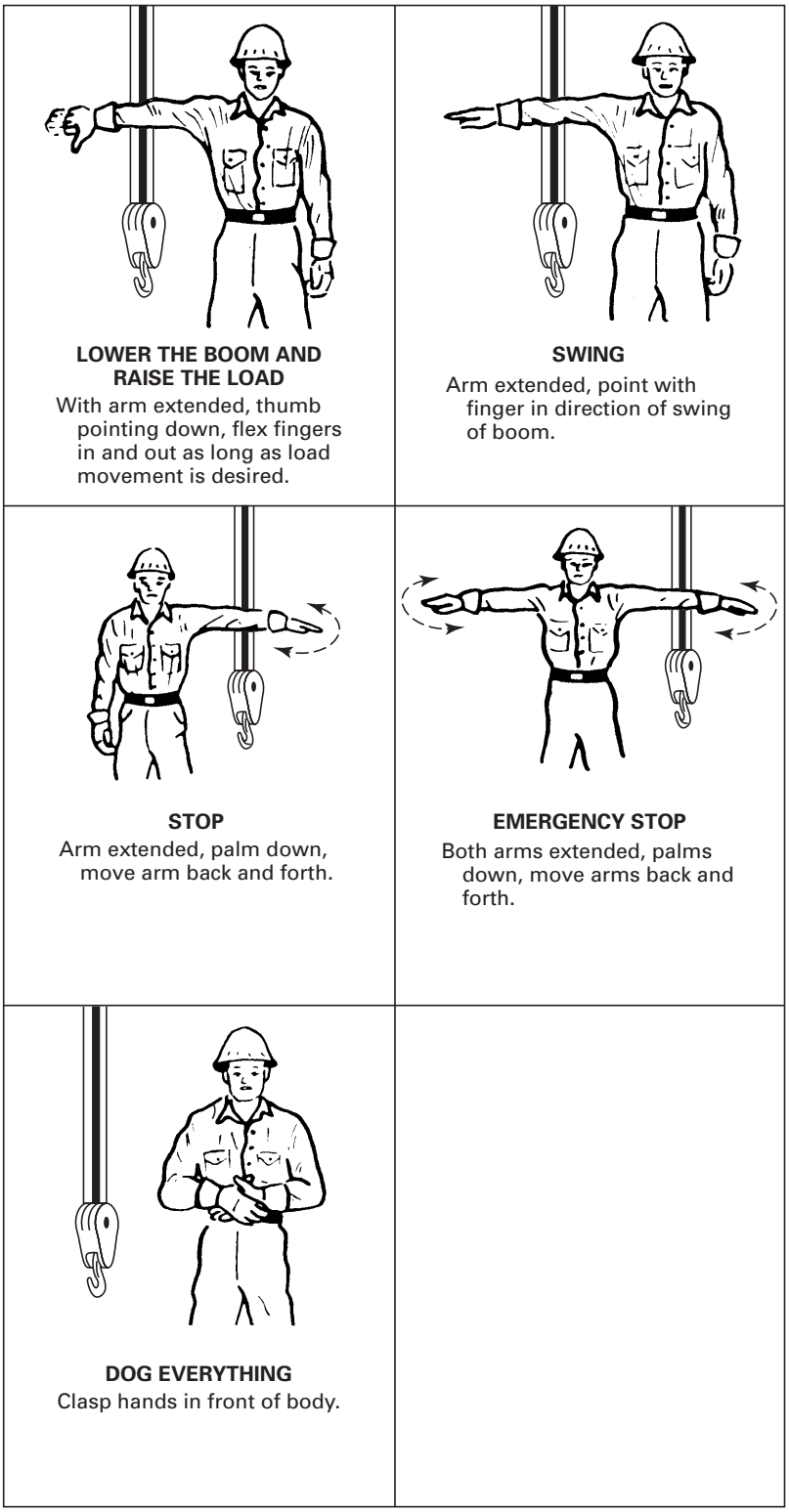
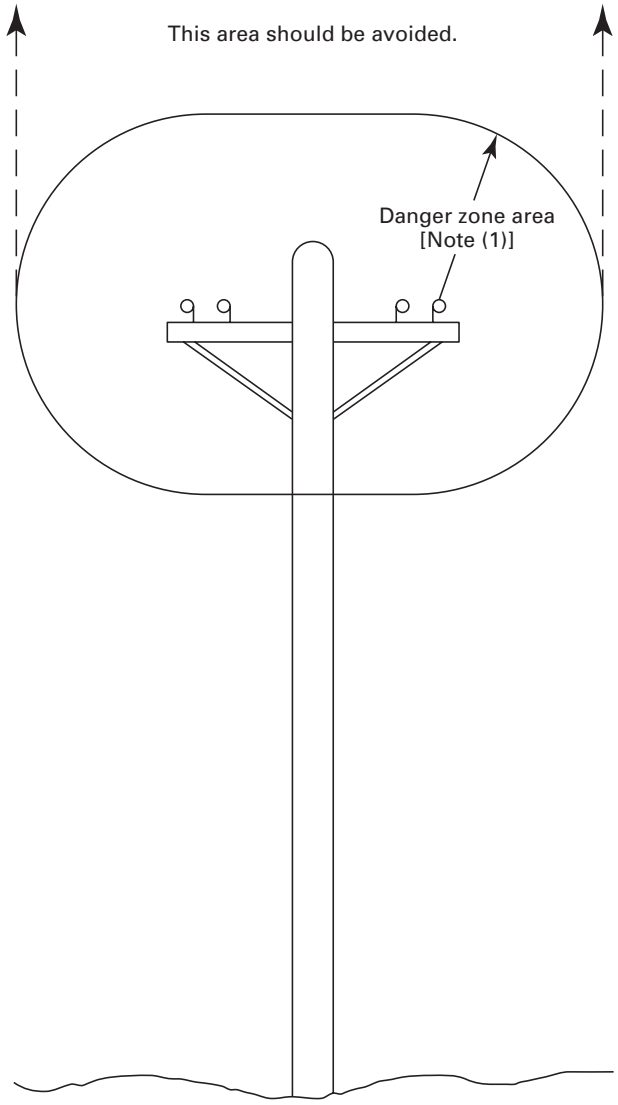


Fig. 10 Standard Hand Signals for Controlling Derricks (Cont'd)

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NOTE:
(1) For minimum radial distance of danger zone, see para. 6-3.5.3.

Fig. 11 Danger Zone for Derricks and Lifted Loads Operating Near Electrical Transmission Lines

(1) For lines rated 50 kV or below, minimum clearance between the lines and any part of the derrick or load shall be 10 ft (3.0 m).

(2) For lines rated over 50 kV, minimum clearance between the lines and any part of the derrick or load shall be 10 ft (3.0 m) plus 0.4 in. (10.2 mm) for each 1 kV over 50 kV, or use twice the length of the line insulator, but never less than 10 ft (3.0 m) (see Table 1).

(3) Caution shall be exercised when working near overhead lines because they can move horizontally or vertically due to wind, moving the danger zone to new positions.

(4) In transit with no load and boom lowered, the clearance shall be a minimum of 4 ft (1.2 m) (see Table 1).

(5) A qualified signal person shall be assigned to observe the clearance and give warning before approaching the above limits.

(b) If cage-type boom guards, insulating links, or proximity warning devices are used on derricks, such devices shall not be considered a substitute for the requirements of para. 6-3.5.3(a), even if such devices are required by law or regulation. Limitations of such devices shall be understood by the operating personnel and tested in the manner prescribed by the manufacturer of the device.

(c) Before the commencement of operations near electrical lines, the person responsible for the job shall notify

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the owners of the lines or their authorized representatives, providing them with all pertinent information and requesting their cooperation.

(d) Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities verify that it is not an energized line.

(e) Exceptions to this procedure, if approved by the owner of the electrical lines, may be granted by the administrative or regulatory authority if the alternate procedure provides protection and is set forth in writing.

(f) Durable signs shall be installed at the operator's station and on the outside of the derrick, warning that electrocution or serious bodily injury may occur unless a minimum clearance of 10 ft (3.0 m) is maintained between the derrick or the load being handled and energized power lines. Greater clearances are required because of higher voltage as stated in para. 6-3.5.3(a)(2). These signs shall be revised but not removed when local jurisdiction requires greater clearances.

Table 1 Required Clearance for Normal Voltage in Operation Near High Voltage Power Lines

Normal Voltage, kV (Phase to Phase)	Minimum Required Clearance ft	(m)
When Operating Near High Voltage Power Lines		
Up to 50	10	(3.05)
Over 50 to 200	15	(4.57)
Over 200 to 350	20	(6.10)
Over 350 to 500	25	(7.62)
Over 500 to 750	35	(10.67)
Over 750 to 1 000	45	(13.72)
While in Transit With No Lead and Boom or Mast Lowered		
Up to 0.75	4	(1.22)
Over 0.75 to 50	6	(1.83)
Over 50 to 345	10	(3.05)
Over 345 to 750	16	(4.88)
Over 750 to 1 000	20	(6.10)

6-3.5.4 Cab or Operating Enclosure

(a) Necessary clothing and personal belongings shall be stored in such a manner as not to interfere with access or operation.

(b) Tools, oil cans, waste, extra fuses, and other necessary articles shall be stored in the tool box and shall not be permitted to lie loose in or about the cab operating enclosure.

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ASME B30.6-2003 INTERPRETATIONS

Replies to Technical Inquiries
September 2000 through October 2002

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