ASME B30.16-2003
(Revision of ASME B30.16-1998)

OVERHEAD HOISTS (UNDERHUNG)

AN AMERICAN NATIONAL STANDARD



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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 2006. 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 the 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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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 volumes (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 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 given 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 Committee and by ASME, was approved by ANSI and designated as an American National Standard on April 11, 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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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 and 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 B30.16-2003
SUMMARY OF CHANGES

Following approval by the ASME B30 Committee and ASME, and after public review, ASME B30.16-2003 was approved by the American National Standards Institute on April 11, 2003.

ASME B30.16-2003 includes editorial changes, revisions, and corrections introduced in ASME B30.16a-2001, as well as the following changes identified by a margin note, **(03)**.

Page	*Location*	*Change*
vii, viii	General	Revised
	Section I	Revised
3	Section 16-0.2	Definition of *minimum breaking strength* added
5	Section 16-0.3	Revised
6	16-1.1.4(c)	Revised
7	16-1.2.6(a)	Revised
	Footnote 1	Added
14	16-2.3.1(a)	Revised
15	16-2.4.1(a)(1)(d)	Revised
	16-2.4.2(b)	Revised

SPECIAL NOTE:

The interpretations to ASME B30.16 are included in this edition as a separate section for the user's convenience.

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OVERHEAD HOISTS (UNDERHUNG)

Chapter 16-0
Scope, Definitions, and References

SECTION 16-0.1: SCOPE OF B30.16

Volume B30.16 includes provisions that apply to the construction, installation, operation, inspection, and maintenance of hand chain-operated chain hoists and electric and air-powered chain and wire rope hoists used for, but not limited to, vertical lifting and lowering of freely suspended, unguided, loads which consist of equipment and materials. (See Figs. 1 through 7.)

Requirements for a hoist that is used for a special purpose, such as, but not limited to, tensioning a load, nonvertical lifting service, lifting a guided load, lifting personnel, or drawing both the load and the hoist up or down the load chain or rope when the hoist is attached to the load, are not included in this volume.

SECTION 16-0.2: DEFINITIONS

abnormal operating conditions: environmental conditions that are unfavorable, harmful, or detrimental to the operation of a hoist, such as excessively high or low ambient temperatures, exposure to 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.

block, load: the assembly of hook or shackle, swivel, bearing, sheaves, sprockets, pins, and frame suspended by the hoisting rope or load chain. This shall include any appurtenances reeved in the hoisting rope or load chain.

brake: a device, other than a motor, used for retarding or stopping motion by friction or power means.

brake, holding: a friction brake for a hoist that is automatically applied and prevents motion when power is off.

brake, mechanical load: an automatic type of friction brake used for controlling loads in a lowering direction. This unidirectional device requires torque from the motor or hand chain wheel to lower a load but does not impose any additional load on the motor or hand chain wheel when lifting a load.

braking, control: a method of controlling speed by removing energy from the moving body or by imparting energy in the opposite direction.

braking, countertorque (plugging): a method of control by which the power to the motor is reversed to develop torque in the direction opposite to the rotation of the motor.

braking, dynamic: a method of controlling speed by using the motor as a generator, with the energy being dissipated by resistance.

braking, eddy current: a method of controlling or reducing speed by means of an energy induction load brake.

braking, mechanical: a method of controlling or reducing speed by friction.

braking, pneumatic: a method of controlling or powering a drive or brake by means of a compressed gas.

braking, regenerative: a method of controlling speed in which the electrical energy generated by the motor is fed back into the power system.

chain, hand: the chain grasped by a person to apply force required for the lifting or lowering motion.

chain, load: the load-bearing chain in a hoist.

chain, roller: a series of alternately assembled roller links and pin links in which the pins articulate inside the bushings and the rollers are free to turn on the bushings. Pins and bushings are press fit in their respective link plates.

chain, welded link: a chain consisting of a series of interwoven links formed and welded.

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

drum: the cylindrical member around which rope is wound for lifting or lowering the load.

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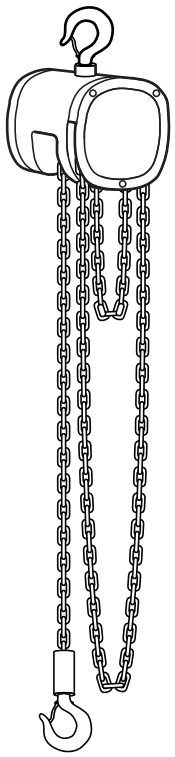


Fig. 1 Hand Chain-Operated Chain Hoist

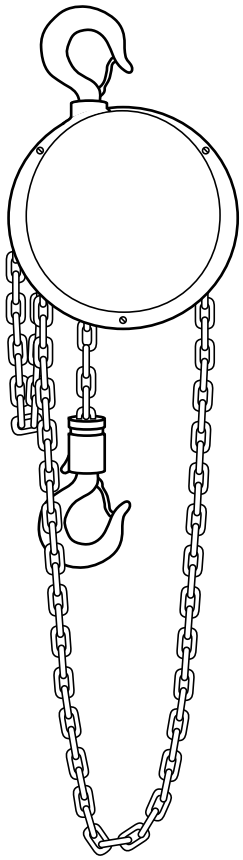


Fig. 2 Hand Chain-Operated Chain Hoist

equalizer: a device that compensates for unequal length or stretch of a rope or chain.

exposed: applies to hazardous objects not guarded or isolated (capable of being contacted inadvertently).

guide, chain: a means to guide the load chain at the load sprocket.

hazardous (classified) locations: locations where fire or explosion hazards may exist. Locations are classified depending on the properties of the flammable vapors, liquids or gases, or combustible dusts or fibers that may be present and the likelihood that a flammable or combustible concentration or quantity is present. Refer to ANSI/NFPA 70.

class 1 locations: locations in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures.

class 2 locations: locations that are hazardous because of the presence of combustible dust.

class 3 locations: locations that are hazardous because of the presence of easily ignitable fibers or flyings, but in which such fibers or flyings are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures.

hoist: a suspended machinery unit that is used for lifting or lowering a freely suspended (unguided) load.

lifting devices: devices that are not normally reeved onto the hoist rope or chain, such as hook-on buckets, magnets, grabs, and other supplemental devices used for ease of handling certain types of loads. The weight of these devices is to be considered part of the load to be lifted.

limit device: a device that is operated by some part or motion of a power-driven hoist to limit motion.

load: the total superimposed weight on the load block or hook.

load, rated: the maximum load for which a hoist is designated by the manufacturer or a qualified person.

load suspension parts: the load suspension parts of the hoist are the means of suspension (hook or lug), the structure or housing that supports the drum or load sprocket, the drum or load sprocket, the rope or load chain, the sheaves or sprockets, and the load block or hook.

lockout/tagout: the placement of a lock/tag on the energy-isolating device in accordance with an established procedure.

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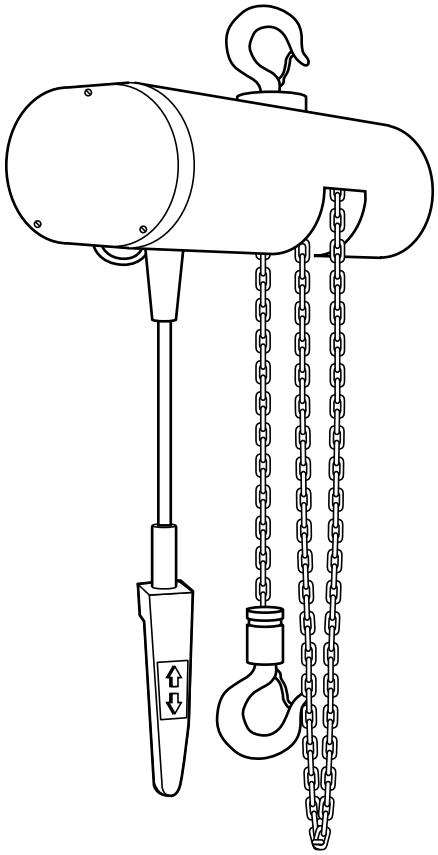


Fig. 3 Electric-Powered Chain Hoist

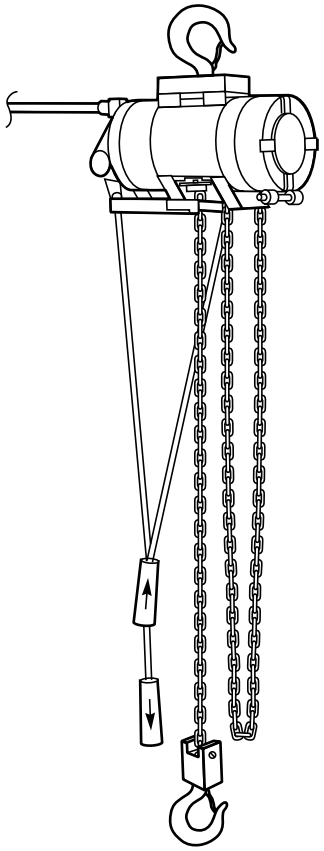


Fig. 4 Air-Powered Chain Hoist

(03) *minimum breaking strength:* specified value for wire rope which the actual (measured) breaking force meets or exceeds.

normal operating conditions: conditions during which a hoist is performing functions within the scope of the original design.

overload: any load greater than the rated load.

overtravel restraint: a device used to prevent the slack load chain from inadvertently being lowered out of the load sprocket.

parts (lines): number of lines of rope or chain supporting the load block or hook.

pawl: a device for holding the machinery against undesired rotation by engaging a ratchet.

pendant station: controls suspended from the hoist for operating the unit from the floor.

power transmission parts: the machinery components including the gears, shafts, clutches, couplings, bearings, motors, and brakes.

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

ratchet: a toothed member for engagement with the pawl.

reeving: a system in which a rope or chain travels around drums, sheaves, or sprockets.

rope: refers to wire-rope unless otherwise specified.

service, normal: service that involves operation with randomly distributed loads within the rated load limit, or uniform loads less than 65% of rated load for not more than 15% of the time for manually operated hoists, and 25% of the time for electric- or air-powered hoists.

service, heavy: service that involves operation within the rated load limit, which exceeds normal service.

service, severe: service that involves normal or heavy service with abnormal operating conditions.

shall: indicates that the rule is mandatory and must be followed.

sheave: a grooved wheel or pulley used with a rope or chain to change direction and point of application of a pulling force.

sheave, nonrunning: a sheave used to equalize tension in opposite parts of the rope or chain. Because of its slight

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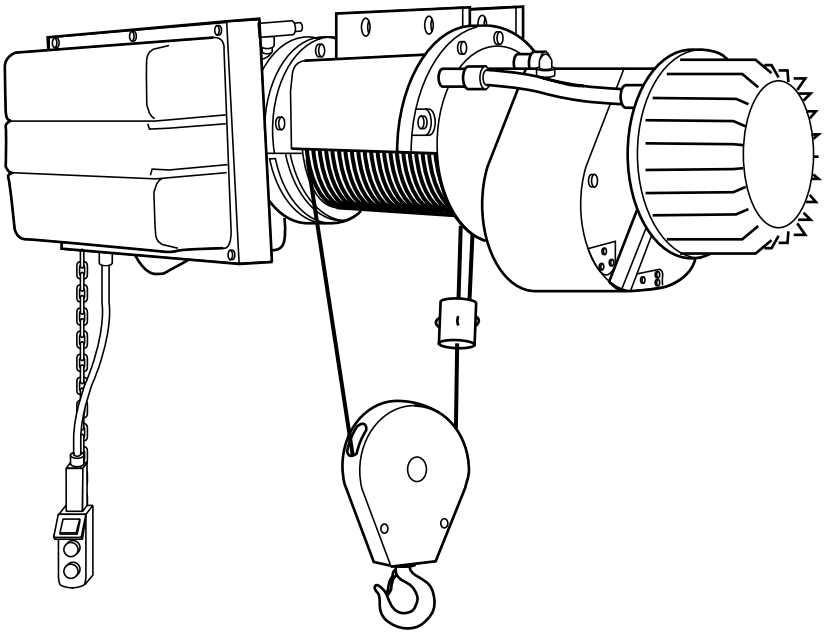


Fig. 5 Electric-Powered Wire Rope Hoist

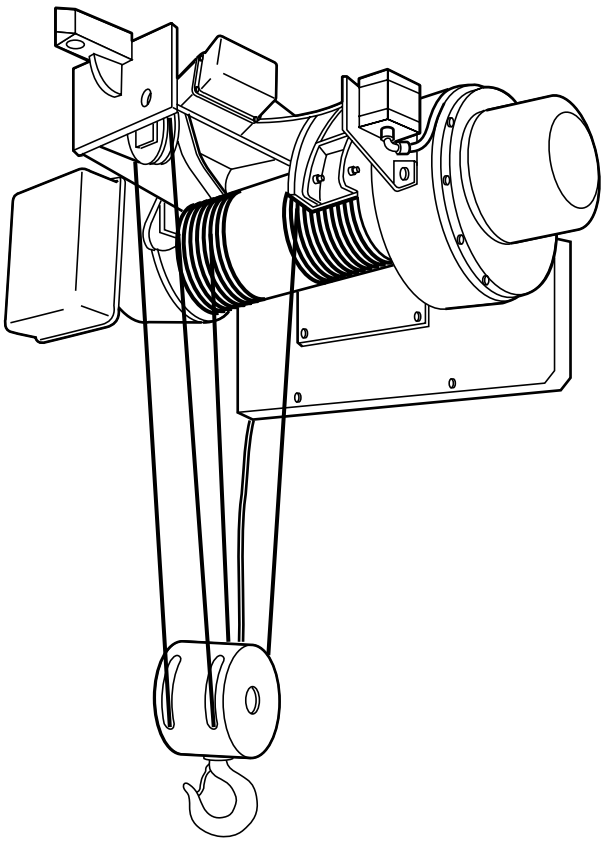


Fig. 6 Electric-Powered Wire Rope Hoist

movement, it is not termed a running sheave.

sheave, running: a sheave that rotates as the load block is lifted or lowered.

should: indicates that the rule is a recommendation, the advisability of which depends on the facts in each situation.

side pull: the component of the hoist pull acting horizontally when the hoist lines are not operated vertically.

slash (/): a slash (/) denotes and/or and indicates that two words are to be taken together or individually.

sprocket, idler: a freely rotating device that changes the direction of the load chain.

sprocket, load: a hoist component that transmits motion to the load chain. This component is sometimes called *load wheel*, *load sheave*, *pocket wheel*, or *chain wheel*.

stripper: a device that aids the load chain in leaving the load sprocket.

switch: a device for making, breaking, or changing the connections in an electric or pneumatic circuit (valve).

unattended: a condition in which the operator of a hoist is not at the operating control devices (pendant station or hand chain). If, however, the control devices are within an unobstructed distance of 26 ft (8.0 m) and within sight of the operator, the hoist should be considered attended.

wheel, hand chain: a wheel with formed pockets on its periphery to allow torque to be transmitted when a force is applied to the hand chain.

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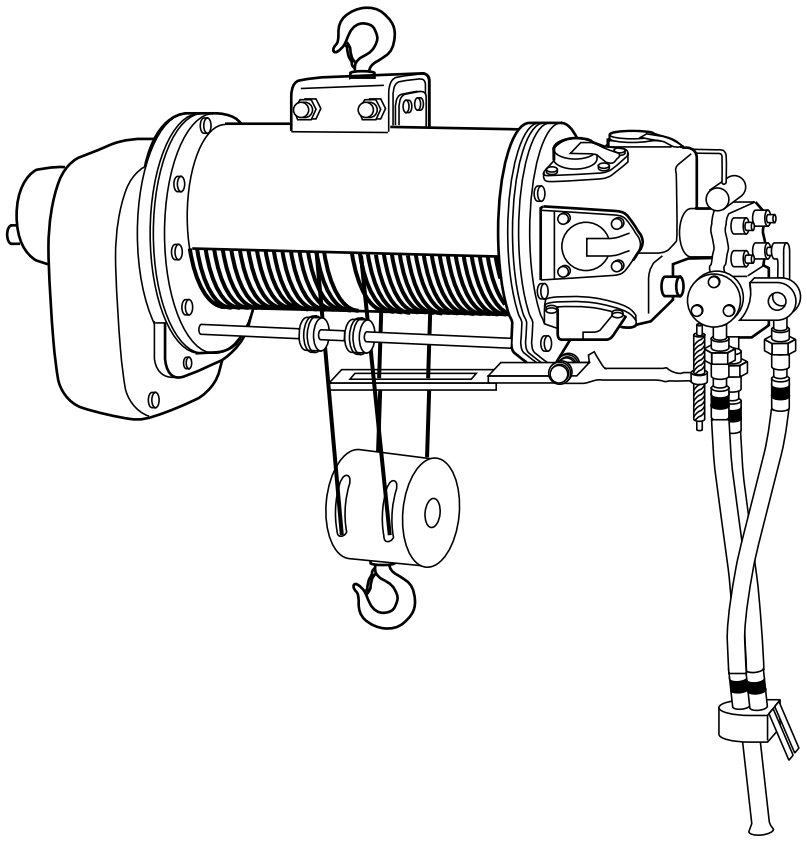


Fig. 7 Air-Powered Wire Rope Hoist

(03) SECTION 16-0.3: REFERENCES

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

ANSI/NEMA Standards Publication No. ICS6-1993, Industrial Control and Systems: Enclosures

ANSI Z535.4-1991, Product Safety Signs and Labels

Publisher: National Electrical Manufacturers Association (NEMA), 1300 North 17th Street, Rosslyn, VA 22209

ANSI/NFPA 70-2002, National Electrical Code

Publisher: National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02269-9101

ANSI Z241.2-1999, Safety Requirements for Melting and Pouring of Metals in the Metalcasting Industry

Publisher: American Foundry Society (AFS), 505 State Street, Des Plaines, IL 60016-8399

ANSI Z244.1-1982 (R1993), Safety Requirements for the Lockout/Tagout of Energy Sources

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

ASME B29.1M-1993 (R1999), Precision Power Transmission Roller Chains, Attachments, and Sprockets[1]

ASME B29.24M-1995, Roller Load Chains for Overhead Hoists[1]

ASME B30.9-1996, Slings[1]

ASME B30.10-1999, Hooks[1]

ASME B30.11-1998, Monorails and Underhung Cranes[1]

ASME B30.17-1998, Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)[1]

ASME HST-1-1999, Performance Standard for Electric Chain Hoists[1]

ASME HST-2-1999, Performance Standard for Hand Chain Manually Operated Chain Hoists[1]

ASME HST-4-1999, Performance Standard for Overhead Electric Wire Rope Hoists[1]

ASME HST-5-1999, Performance Standard for Air Chain Hoists[1]

ASME HST-6-1999, Performance Standard for Air Wire Rope Hoists[1]

Publisher: The American Society of Mechanical Engineers (ASME International), Three Park Avenue, New York, NY 10016-5990; Order Department: 22 Law Drive, Box 2900, Fairfield, NJ 07007-2900

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

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Chapter 16-1
Marking, Construction, and Installation

SECTION 16-1.1: MARKING

16-1.1.1 Rated Load

The rated load of the hoist shall be marked on the hoist or its load block and shall be legible from the ground or floor.

16-1.1.2 Controls

Each control actuator of an electric- or air-powered hoist shall be marked to indicate the direction of resultant motion.

16-1.1.3 Identification

The hoist shall be marked with manufacturer's identification information, on a plate or label attached to the hoist, or cast, forged, or stamped on the hoist, as follows:

(a) Hand Chain-Operated Hoist

(1) name of manufacturer

(2) manufacturer's model or serial number

(b) Electric-Powered Hoist

(1) name of manufacturer

(2) manufacturer's model or serial number

(3) voltage of AC or DC power supply and phase and frequency of AC power supply

(4) circuit ampacity

(c) Air-Powered Hoist

(1) name of manufacturer

(2) manufacturer's model and serial number

(3) rated air pressure

16-1.1.4 Warnings

(a) All hand chain-operated hoists shall have affixed to the hoist or load block, a label or labels displaying information concerning operating procedures. The label or labels shall be in compliance with ANSI Z535.4, and shall include cautionary language against

(1) lifting more than rated load

(2) operating hoist with twisted, kinked, or damaged chain

(3) operating damaged or malfunctioning hoist

(4) lifting people

(5) lifting loads over people

(6) operating hoist with other than manual power

(7) removing or obscuring label

(b) All electric-powered or air-powered hoists shall have affixed to the hoist, load block, or controls, a label or labels displaying information concerning operating procedures. The label or labels shall be in compliance with ANSI Z535.4, and shall include cautionary language against

(1) lifting more than rated load

(2) operating hoist when load is not centered under hoist

(3) operating hoist with twisted, kinked, or damaged chain or rope

(4) operating damaged or malfunctioning hoist

(5) lifting people

(6) lifting loads over people

(7) operating a rope hoist with a rope that is not properly seated in its groove

(8) removing or obscuring label

(c) A label shall be affixed on all electrical control enclosures. The label shall be in compliance with ANSI Z535.4, and shall include, but not be limited to, information such as: (03)

(1) "DISCONNECT POWER AND LOCKOUT/TAGOUT DISCONNECTING MEANS BEFORE REMOVING COVER OR SERVICING THIS EQUIPMENT"

(2) "DO NOT OPERATE WITHOUT COVER IN PLACE"

SECTION 16-1.2: CONSTRUCTION

16-1.2.1 Mechanical Design

(a) The hoist and appurtenances shall be designed to withstand all stresses imposed under normal operating conditions while handling loads within the rated load (capacity).

(b) Load suspension parts of hand chain-operated hoists shall be designed so that the static stress calculated for the rated load shall not exceed 25% of the average ultimate material strength.

(c) Load suspension parts of electric- or air-powered hoists shall be designed so that the static stress calculated for the rated load shall not exceed 20% of the average ultimate material strength.

(d) Power transmission parts shall be designed so that the dynamic stresses calculated for the rated load shall not exceed the endurance limits established by the manufacturer.

(e) Modifications to upgrade, rerate, or modernize hoist equipment shall be as authorized only by the original equipment manufacturer or a qualified person.

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(f) The hoist should be designed in accordance with applicable hoist design and performance standards. Refer to ASME HST-1, ASME HST-2, ASME HST-4, ASME HST-5, and ASME HST-6.

16-1.2.2 Electrical Design (Electric-Powered Hoists Only)

(a) Electrical construction shall comply with Article 610 of ANSI/NFPA 70.

(b) Unless otherwise specified, control enclosures shall be NEMA Type 1, general purpose for indoor application in accordance with ANSI/NEMA No. ICS6.

(c) Electrical equipment shall be so located or enclosed that live parts will not be exposed to inadvertent contact under normal operating conditions.

(d) Enclosures for resistors (if required) shall provide means for heat dissipation and shall be installed to minimize the accumulation of combustible matter. Provision shall be made to prevent broken resistor parts or molten metal from falling onto operator, other personnel, or combustible materials.

16-1.2.3 Controls (Electric- or Air-Powered Hoists Only)

(a) Controls, except in automatic cycling operation, shall return to the off position when released, and hook motion shall stop.

(b) Reversing contactor of electric-powered hoists shall be mechanically or electrically interlocked to prevent line-to-line faults.

(c) The voltage at pendant push-button station of electric-powered hoists shall not exceed 150 V for AC or 300 V for DC.

(d) A pendant station shall be supported in a manner that will protect the electrical conductors or air hoses against strain. Any pendant station that might present a hazard to the operator, if a ground fault occurs, shall be grounded.

16-1.2.4 Rope Sheaves (Electric- or Air-Powered Hoists Only)

(a) The grooves shall be free from surface conditions or damage that could cause accelerated wear or damage to the rope. The cross-sectional radius at the bottom of the groove should be such as to form a close-fitting saddle for the size of rope used. The sides of the groove shall be tapered outward and rounded at the rim to facilitate entrance of the rope into the groove. Flange rims shall run true about the axis of rotation.

(b) Sheaves shall be so mounted as to guard against rope jamming during normal operating conditions.

(c) All running sheave bearings, except permanently lubricated bearings, should be equipped with means for lubrication.

16-1.2.5 Rope Drum (Electric- or Air-Powered Hoists Only)

Rope drums shall be grooved except when the hoist is provided by the manufacturer for a special application. This requirement does not preclude the use of multiple layer spooling. The grooves shall be free from surface conditions or damage that could cause accelerated wear or damage to the rope. The cross-sectional radius at the bottom of the groove should form a close-fitting saddle for the size of rope used.

16-1.2.6 Ropes (Electric- or Air-Powered Hoists Only)

(a) The hoisting ropes shall be of a construction recommended for hoist service. The rated load divided by the number of parts (lines) of rope shall not exceed 20% of the minimum breaking strength[1] of the rope. When rope and rope core may be exposed to an environmental condition under which rope or core would be damaged, a rope and core having resistance to the conditions shall be used. (03)

(b) Socketing shall be done in a manner recommended by the rope of fitting manufacturer or a qualified person.

(c) The rope ends shall be attached to the hoist in a manner to prevent disengagement throughout rated hook travel. No less than two wraps of rope shall remain on each anchorage of the hoist drum when the hook is in its extreme low position unless a lower limit device is provided, in which case no less than one wrap shall remain on each anchorage of the hoist drum.

(d) Eye splices shall be made in a manner recommended by the rope or hoist manufacturer or a qualified person. Rope thimbles should be used in the eye.

(e) Wire-rope clips shall be drop-forged steel of the single saddle (U-bolt) or double saddle type clip. Malleable cast iron clips shall not be used. For spacing, number of clips, and torque values, refer to the clip manufacturer's recommendation. Wire-rope clips attached with U-bolts shall have the U-bolt over the dead end of the rope and the live rope resting in the clip saddle. Clips shall be tightened evenly to the recommended torque. After the initial load is applied to the rope, the clip nuts shall be retightened to the recommended torque to compensate for any decrease in rope diameter caused by the load. Rope clip nuts should be retightened periodically to compensate for any further decrease in rope diameter during usage.

(f) Swaged or compressed fittings shall be applied as recommended by the rope, hoist, or fitting manufacturer or a qualified person.

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

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[1] *Minimum breaking strength* formerly referred to as *nominal breaking strength.* (03)

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

16-1.2.7 Load Sprockets

(a) Load sprockets shall have pockets or teeth to allow engagement of the load chain.

(b) Load sprockets shall be guarded.

(c) Provision shall be made to guard against jamming of the load chain within the hoisting mechanism under normal operating conditions.

16-1.2.8 Load Chain

(a) Load chain may be either roller or welded link type. Chain shall be pitched (calibrated) so as to pass over all load sprockets without binding.

(b) Roller load chain shall comply with ASME B29.24M.

(c) The load chain shall be proof tested by the chain or hoist manufacturer with a load at least equivalent to $1\frac{1}{2}$ times the hoist's rated load divided by the number of chain parts supporting the load.

(d) If a load is supported by more than one part of load chain, the tension on the parts shall be equalized.

(e) Load chain properties do not conform to those shown in ASME B30.9 or ASME B29.1M.

16-1.2.9 Hooks

If hooks are of the swiveling type, they should rotate freely. Hooks shall be equipped with latches unless use of the latch creates a hazardous condition. When required, a latch shall be provided to bridge the throat opening of the hook and retain, under slack conditions, such items as, but not limited to, slings and chains. Refer to ASME B30.10.

16-1.2.10 Load Blocks

(a) Hand Chain-Operated Hoist. Means shall be provided to guard against load chain jamming in the load block under normal operating conditions.

(b) Electric- or Air-Powered Hoist. Load blocks shall be of the enclosed type, and means shall be provided to guard against rope or load chain jamming in the load block under normal operating conditions.

16-1.2.11 Brakes

(a) Hand Chain-Operated Hoist. Hand chain-operated hoist(s) shall be so designed that, when the actuating force is removed, it will automatically stop and hold any test load up to 125% of the rated load.

(b) Electric-Powered Hoist

(1) Under normal operating conditions with rated load and test conditions with test loads up to 125% of rated load, the braking system shall perform the following functions:

(a) stop and hold the load hook when controls are released

(b) limit the speed of load during lowering, with or without power, to a maximum speed of 120% of rated lowering speed for the load being handled

(c) stop and hold the load hook in the event of a complete power failure

(2) The braking system shall have thermal capacity for the frequency of operation required by the service.

(3) The braking system shall have provision for adjustments where necessary to compensate for wear.

(4) Electric-powered hoists that handle molten material shall be equipped with one of the following arrangements:

(a) Two holding brakes shall be provided, one of which is applied to a gear reducer shaft, plus control braking means. Each holding brake shall have a torque rating not less than 100% of rated load hoisting torque at the point where the brake is applied.

(b) One holding brake shall be provided if the hoisting unit has a mechanical load brake or a control braking means that provides controlled lowering of the load upon loss of power. The holding brake shall have a torque rating not less than 150% of rated load hoisting torque at the point where the brake is applied.

(c) Air-Powered Hoist

(1) Under normal operating conditions with rated load and test conditions with test loads up to 125% of rated load, the braking system shall perform the following functions:

(a) stop and hold the load hook when controls are released

(b) prevent an uncontrolled lowering of the load in the event of a loss of air pressure

(2) The braking system shall have thermal capacity for the frequency of operation required by the service.

(3) The braking system shall have provision for adjustments where necessary to compensate for wear.

16-1.2.12 Hand Chain (Hand Chain-Operated Hoists Only)

(a) The hand chain shall be of a shape and pitch to fit the hand chain wheel without binding or jamming under normal operating conditions.

(b) The hand chain shall be guarded to prevent disengagement from the hand chain wheel.

(c) The hand chain shall withstand, without permanent distortion, a force of three times the pull required to lift the rated load.

(d) Hand chain properties do not conform to those shown in ASME B30.9.

16-1.2.13 Overtravel Restraint (Hand Chain-Operated Hoists Only)

Before the load chain can be completely run out of the hoist, it shall be restrained in its fully extended

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position. The restraint shall be such that the unloaded hoist can withstand a lowering hand chain force equivalent to twice the pull required to lift the rated load or, with rated load on the hoist, a hand chain force equivalent to the pull required to lift the rated load.

16-1.2.14 Overtravel Protection (Electric- or Air-Powered Hoists Only)

The hoist shall be so designed and constructed that the load hook, either loaded or empty, shall not exceed the upper limit of travel. On wire-rope hoists, if a geared or other lift-limiting device that operates in relation to drum turns is used, an additional lift-limiting device that operates independently of drum rotations shall be provided.

16-1.2.15 Power Failure Protection (Electric- or Air-Powered Hoists Only)

Partial or complete interruption of the power supply (air or electric) during operation shall not result in uncontrollable motion of the load.

16-1.2.16 Lubrication

If lubrication is required, accessible means for lubrication should be provided.

16-1.2.17 Manual

The manufacturer shall furnish an instruction manual with each hoist. The manual shall include information on the following:

(a) installation
(b) operation
(c) inspection and testing
(d) lubrication, maintenance, and repair
(e) wiring diagram (electric powered only; may be supplied separately)

SECTION 16-1.3: INSTALLATION

16-1.3.1 Procedure

Procedures for installation recommended in the manual should be followed.

16-1.3.2 Support

The supporting structure, including trolleys, monorail, or crane, shall be designed to withstand the loads and forces imposed by the hoist for the rated load.

16-1.3.3 Location

(a) Hoists shall be installed in locations that will allow movement of the operator to stay clear of the load.

(b) When hoists are used in hazardous locations as defined by ANSI/NFPA 70, modifications to these rules or additional safety requirements may be necessary.

(c) When hoists are used to handle molten material, modifications to these rules or additional safety requirements may be necessary. Refer to ANSI Z241.2.

(d) When electric hoists are used in locations other than general indoor applications, control enclosures should be selected in accordance with ANSI/NEMA No. ICS6.

(e) Pendant controls of electric- or air-powered hoists should be located at a convenient level above the operating floor.

(f) An electric- or air-powered hoist shall not be installed where the load hook can be lowered beyond the rated hook travel under normal operating conditions unless the hoist is equipped with a lower limit device.

(g) Where the slack load chain hanging from the hoist may create a hazard to operations or personnel, a chain container recommended by the hoist manufacturer or qualified person should be used.

(h) When hoists are supported and used on cranes, trolleys, or monorails, modifications to these rules or additional safety requirements may be necessary. Refer to ASME B30.11 and ASME B30.17.

16-1.3.4 Power Connections

(a) Electric-powered hoists shall be connected in accordance with ANSI/NFPA 70.

(b) Air-powered hoists shall be connected to an air supply not exceeding the rated pressure at the hoist under normal operating conditions. To prevent excessive brake wear or heating, the air supply should be sufficient to operate the brake release mechanism, if provided.

16-1.3.5 Direction of Motion (Electric- or Air-Powered Hoists Only)

(a) Electric-Powered Hoists. Polyphase hoist motors shall be connected to the power supply lines in such a manner that the hook motion agrees with the control marking. Internal connections in the hoist or pendant station wiring shall not be changed to accomplish this. Phase reversal (motor reversal), if necessary, shall be accomplished by reversing the power leads to the hoist unit.

(b) Air-Powered Hoists. Air hoist motors shall be connected in such a manner that the hook motion agrees with the control marking.

16-1.3.6 Check Points

After installation, a check should be made as indicated in para. 16-2.1.2.

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Chapter 16-2
Inspection, Testing, and Maintenance

SECTION 16-2.1: INSPECTION

16-2.1.1 Inspection Classification

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

(b) Inspection procedures for hoists in regular service are divided into two general classifications based upon the intervals at which inspection should be performed. The intervals in turn are dependent upon the nature of the critical components of the hoist 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 person with records not required.

(a) normal service: monthly

(b) heavy service: weekly to monthly

(c) severe service: daily to weekly

(2) periodic inspection: visual inspection by a designated person who makes records of external conditions to provide the basis for a continuing evaluation. An external coded mark on the hoist is an acceptable identification in lieu of records.

(a) normal service: yearly

(b) heavy service: semi-annually

(c) severe service: quarterly

16-2.1.2 Frequent Inspection (See Also Tables 1 and 2)

(a) Frequent inspections shall be performed at intervals defined in para. 16-2.1.1(b)(1) and shall include observations during operation.

(b) A designated person shall determine whether conditions found during the inspection constitute a hazard and whether a more detailed inspection is required.

(c) The following items shall be inspected:

(1) operating mechanisms for proper operation, proper adjustment, and unusual sounds.

(2) hoist upper limit device of electric- or air-powered hoists, without a load on the hook at the beginning of each shift. Care shall be exercised. The load block shall be inched into its limit device or run in at slow speed on multi-speed or variable-speed hoists.

(3) hoist braking system for proper operation.

(4) lines, valves, and other parts of air systems for leakage.

(5) hooks in accordance with ASME B30.10, Frequent Inspection.

(6) hook latches, if used, for proper operation.

(7) hoist rope in accordance with para. 16-2.4.1(a).

(8) hoist load chain in accordance with para. 16-2.5.1 or 16-2.6.1.

(9) rope or load chain reeving for compliance with recommendations of the hoist manufacturer.

16-2.1.3 Periodic Inspection (See Also Tables 1 and 2)

(a) Periodic inspections shall be performed at intervals defined in para. 16-2.1.1(b)(2) and may be performed with the hoist at its normal location and do not require the hoist to be disassembled.

(b) Covers and other items normally supplied to allow inspection of components should be opened or removed.

(c) A designated person shall determine whether conditions found during inspection constitute a hazard and whether disassembly is required.

(d) The following items shall be inspected:

(1) the items listed in para. 16-2.1.2(c)

(2) fasteners for evidence of loosening

(3) load blocks, suspension housings, hand chain wheels, chain attachments, clevises, yokes, suspension bolts, shafts, gears, bearings, pins, rollers, and locking and clamping devices for evidence of wear, corrosion, cracks, and distortion

(4) hook-retaining nuts or collars, and pins, welds, or rivets used to secure the retaining members for evidence of damage

(5) load sprockets, idler sprockets, drums, and sheaves for evidence of damage and wear

(6) the brake mechanism on hand chain hoists for evidence of worn, glazed, or oil-contaminated friction disks; worn pawls, cams, or ratchets; corroded, stretched, or broken pawl springs

(7) the motor brake and load brake on electric- or air-powered hoists for evidence of wear

(8) electrical apparatus on electric-powered hoists for evidence of pitting or deterioration of controller contacts

(9) supporting structure or trolley, if used, for evidence of damage

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Table 1 Inspection for Hand Chain-Operated Hoists

Item	Normal Service		Heavy Service		Severe Service	
	Visual Monthly [Note (1)]	Record Yearly [Note (2)]	Visual Weekly [Note (1)]	Record Semiannually [Note (3)]	Visual Daily [Note (1)]	Record Quarterly [Note (3)]
Frequent Inspection (Refer to para. 16-2.1.2)						
All functional operating mechanisms for maladjustment and unusual sounds	X	...	X	...	X	...
Hoist braking system for proper operation	X	...	X	...	X	...
Hooks in accordance with ASME B30.10	X	...	X	...	X	...
Hook latch operation, if used	X	...	X	...	X	...
Load chain in accordance with para. 16-2.5.1 or 16-2.6.1	X	...	X	...	X	...
Load chain reeving for compliance with hoist manufacturer's recommendations	X	...	X	...	X	...
Periodic Inspection (Refer to para. 16-2.1.3)						
Requirements of frequent inspection	...	X	...	X	...	X
Evidence of loose bolts, nuts, or rivets	...	X	...	X	...	X
Evidence of worn, corroded, cracked, or distorted parts such as load blocks, suspension housing, hand chain wheels, chain attachments, clevises, yokes, suspension bolts, shafts, gears, bearings, pins, rollers, and locking and clamping devices	...	X	...	X	...	X
Evidence of damage to hook retaining nuts or collars and pins, and welds or rivets used to secure the retaining numbers	...	X	...	X	...	X
Evidence of damage or excessive wear of load sprockets, idler sprockets, or hand chain wheel	...	X	...	X	...	X
Evidence of worn, glazed, or oil-contaminated friction discs; worn pawls, cams or ratchet; corroded, stretched, or broken pawl springs in brake mechanism	...	X	...	X	...	X
Evidence of damage of supporting structure or trolley, if used	...	X	...	X	...	X
Label or labels required by para. 16-1.1.4 for legibility	...	X	...	X	...	X
End connections of load chain	...	X	...	X	...	X

NOTES:
(1) By operator or other designated person with records not required.
(2) Visual inspection by a designated person making records of conditions to provide the basis for a continuing evaluation.
(3) As in Note (2) unless conditions indicate that disassembly should be done to permit detailed inspection.

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Table 2 Inspection for Electric- or Air-Powered Hoists

Item	Normal Service		Heavy Service		Severe Service	
	Visual Monthly [Note (1)]	Record Yearly [Note (2)]	Visual Weekly [Note (1)]	Record Semiannually [Note (3)]	Visual Daily [Note (1)]	Record Quarterly [Note (3)]
Frequent Inspection (Refer to para. 16-2.1.2)						
All functional operating mechanisms for maladjustment and unusual sounds	X	...	X	...	X	...
Limit devices for operation	X	...	X	...	X	...
Hoist braking system for proper operation	X	...	X	...	X	...
Air lines, valves, and other parts for leakage	X	...	X	...	X	...
Hooks in accordance with ASME B30.10	X	...	X	...	X	...
Hook latch operation, if used	X	...	X	...	X	...
Hoist rope in accordance with para. 16-2.4.1(a)	X	...	X	...	X	...
Load chain in accordance with para. 16-2.5.1 or 16-2.6.1	X	...	X	...	X	...
Rope or load chain reeving for compliance with hoist manufacturer's recommendations	X	...	X	...	X	...
Periodic Inspection (Refer to para. 16-2.1.3)						
Requirements of frequent inspection	...	X	...	X	...	X
Hoist rope in accordance with para. 16-2.4.1(a)	...	X	...	X	...	X
Evidence of loose bolts, nuts, or rivets	...	X	...	X	...	X
Evidence of worn, corroded, cracked, or distorted parts such as load blocks, suspension housing, chain attachments, clevises, yokes, suspension bolts, shafts, gears, bearings, pins, rollers, and locking and clamping devices	...	X	...	X	...	X
Evidence of damage to hook retaining nuts or collars and pins, and welds or rivets used to secure the retaining numbers	...	X	...	X	...	X
Evidence of damage or excessive wear of load sprockets, idler sprockets, and drums or sheaves	...	X	...	X	...	X
Evidence of excessive wear on motor or load brake	...	X	...	X	...	X
Electrical apparatus for signs of pitting or any deterioration of visible controller contacts	...	X	...	X	...	X
Evidence of damage of supporting structure or trolley, if used	...	X	...	X	...	X
Function labels on pendant control stations for legibility	...	X	...	X	...	X
Label or labels required by para. 16-1.1.4 for legibility	...	X	...	X	...	X
End connections of rope or load chain	...	X	...	X	...	X

NOTES:
(1) By operator or other designated person with records not required.
(2) Visual inspection by a designated person making records of conditions to provide the basis for a continuing evaluation.
(3) As in Note (2) unless conditions indicate that disassembly should be done to permit detailed inspection.

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(10) label or labels required by para. 16-1.1.4 for legibility

(11) end connections of wire ropes or load chains for evidence of wear, corrosion, cracks, damage, and distortion

(12) hoist rope shall be inspected in accordance with para. 16-2.4.1(b)

(13) function labels on pendant control stations on electric- and air-powered hoists for legibility

(14) the hoist and hoist mounting for evidence of missing items

16-2.1.4 Hoists Not in Regular Service

(a) A hoist that is used infrequently, which has been idle for a period of 1 month or more, but less than 1 year, shall be inspected, before being placed in service, in accordance with the requirements listed in para. 16-2.1.2.

(b) A hoist that is used infrequently, which has been idle for a period of 1 year or more, shall be inspected before being placed in service, in accordance with the requirements listed in para. 16-2.1.3.

16-2.1.5 Inspection Records

(a) Dated inspection reports and records should be maintained at time intervals specified in para. 16-2.1.1(b)(2). Records should be stored where they are available to appointed persons.

(b) A long-range rope or chain inspection program should be established and should include records on examination of ropes or chains removed from service so a relationship can be established between visual observation and actual condition of the rope or chain.

SECTION 16-2.2: TESTING

16-2.2.1 Operational Tests

New hoists shall be tested by the hoist manufacturer to verify compliance with this volume as specified in para. 16-2.2.1(a) or 16-2.2.1(b). Altered or repaired hoists, or hoists that have not been used within the preceding 12 months, shall be tested by a designated person prior to the hoist being placed in service to verify compliance with this volume as specified in para. 16-2.2.1(a) or 16-2.2.1(b).

(a) Hand Chain-Operated Hoists

(1) Lifting and lowering functions shall be tested under no-load conditions (testing through complete rated lift length is not required).

(2) After testing under no-load conditions, a load of at least 50 lb (23 kg) times the number of load supporting parts of chain shall be applied to the hoist, and the hoist shall be tested to check proper load control.

(b) Electric-Powered or Air-Powered Hoists

(1) Lifting and lowering functions shall be tested under no-load conditions (testing through complete rated lift length is not required).

(2) Operation of brake(s) shall be tested under no-load conditions.

(3) Trip-setting of limit devices shall be determined by tests under no-load conditions. Tests shall be conducted first by hand, if practical, and then under slowest speed obtainable. Test with increasing speeds up to maximum speed. Actuating mechanisms shall be located so that they will trip the switches or limiting devices in sufficient time to stop motion without damage to any part of the hoisting arrangement. On hoists having adjustable trip-setting limit devices, care shall be exercised to achieve adjustment setting without the load block striking the hoist frame or without all the slack being taken out of the unloaded chain or less than one wrap of rope on the drum.

16-2.2.2 Load Test

(a) Hand Chain-Operated Hoists

(1) New hoists shall be load tested by the manufacturer as specified in para. 16-2.2.1(a)(1) with a test load of not less than 125% of the rated load, except that if load testing of the hoist cannot be performed by the manufacturer, the user shall be notified and the load test shall be accomplished at another location or job site, by or under the direction of a designated person prior to the hoist being placed in service.

(2) Hoists in which load-suspension parts have been altered, replaced, or repaired should be statically or dynamically load tested as determined by a qualified person. If a qualified person determines that a load test is required, the load test shall be performed.

(a) If a load test is conducted, the load test shall be conducted by or under the direction of a designated person as specifed below. Lifting and lowering functions shall be tested. (Testing through complete rated lift length is not required.)

(b) If the load test is conducted, the test load shall not be less than 100% of the rated load of the hoist or more than 125% of the rated load of the hoist unless otherwise recommended by the hoist manufacturer or a qualified person.

(c) If a load test is conducted, the person conducting the load test shall prepare a written report of the load sustained during the test and the operations performed during the test. Reports shall be placed on file.

(d) The replacement of load chain is specifically excluded from this load test; however, an operational test of the hoist should be made in accordance with para. 16-2.2.1(a)(2) prior to putting the hoist back in service.

(b) Electric-Powered or Air-Powered Hoists

(1) Complete new hoists shall be dynamically load tested by the manufacturer as specified in paras. 16-2.2.1(b)(1) and (2) with a test load of not less than 125% of the rated load, except that if testing of the hoist cannot be performed by the manufacturer, the user shall be

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notified and the load test shall be accomplished at another location or job site, by or under the direction of a designated person prior to the hoist being placed in service.

(2) Hoists in which load-suspension parts have been altered, replaced, or repaired should be statically or dynamically load tested as determined by a qualified person.

(a) If a load test is conducted, the load test shall be conducted by or under the direction of a designated person as specified below.

(1) Lifting and lowering functions shall be tested. (Testing through complete rated lift length is not required.)

(2) Operation of brake(s) shall be tested.

(b) If a load test is conducted, the test load shall not be less than 100% of the rated load of the hoist or more than 125% of the rated load of the hoist unless otherwise recommended by the hoist manufacturer or a qualified person.

(c) If a load test is conducted, the person conducting the load test shall prepare a written report of the load sustained during the test and the operations performed during the test. Reports shall be placed on file.

(d) The replacement of load chain or rope is specifically excluded from this load test; however, an operational test of the hoist should be made in accordance with paras. 16-2.2.1(b)(1) and (2) prior to putting the hoist back in service.

(c) Test anchorages or suspensions shall be approved by a qualified person.

SECTION 16-2.3: MAINTENANCE

16-2.3.1 Preventive Maintenance

(03) *(a)* A preventive maintenance program should be established. The program should be based on recommendations outlined in the hoist manufacturer's manual. If a qualified person determines it is appropriate, the program should also include that individual's additional recommendations based upon a review of the hoist application and operation. Dated records should be placed on file.

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

16-2.3.2 Maintenance Procedure (Refer to Hoist Manufacturer's Manual)

(a) Before adjustments and repairs are started on a hoist, the following precautions shall be taken as applicable.

(1) If a load is attached to the hoist, it shall be removed.

(2) If the hoist is electric- or air-powered, all controllers shall be placed in the off position.

(3) If the hoist is electric- or air-powered, a lockout/tagout procedure shall be performed (see Section 16-3.3).

(4) If the hoist is suspended from a trolley, provisions should be taken to prevent movement of the trolley.

(5) Warning signs and barriers shall be utilized on the floor beneath the hoist where overhead maintenance work creates a hazard.

(b) After adjustments and repairs have been completed and before restoring the hoist to normal operation

(1) guards shall be reinstalled

(2) safety devices shall be reactivated

(3) parts that have been replaced and loose material shall be removed

(4) maintenance equipment shall be removed, and

(5) warning signs and barriers, when used, shall be removed

(c) Warning signs and barriers, when used, shall be placed and removed only by designated persons.

16-2.3.3 Adjustments, Repairs, and Replacements

(a) Any condition disclosed by the inspections performed in accordance with the requirements of Section 16-2.1, that is determined to be a hazard to continued operation, shall be corrected by adjustment, repair, or replacement before continuing the use of the hoist.

(b) Adjustments, repairs, and replacements shall be performed by a designated person.

(c) Components shall be adjusted or repaired as needed. The following are examples:

(1) all operating mechanisms

(2) brakes and pawls

(3) limit devices of electric- or air-powered hoists

(4) control systems of electric- or air-powered hoists

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

(1) all excessively worn braking components such as friction disks, ratchets, pawls, and pawl springs.

(2) all critical parts, including load suspension components, that are cracked, broken, bent, or excessively worn.

(3) worn, corroded, or otherwise damaged load chain in accordance with para. 16-2.5.2 or para. 16-2.6.2.

(4) worn or otherwise damaged rope in accordance with para. 16-2.4.2.

(5) damaged or worn hooks as described under Maintenance in ASME B30.10. Repairs by welding or reshaping are not recommended.

(6) on electric-powered hoists, pitted or burned electrical contacts should be corrected only by replacement and in sets. Controller parts should be lubricated as recommended by the manufacturer.

(7) missing or illegible function labels on pendant control stations.

(8) missing or illegible warning labels.

(9) items that are determined to be missing.

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16-2.3.4 Lubrication

(a) All moving parts of the hoist for which lubrication is specified should be regularly lubricated. Lubricating method should be checked for delivery of lubricant. Care should be taken to follow recommendations outlined in the hoist manufacturer's manual as to points and frequency of lubrication, and quantity and types of lubricant to be used.

(b) Hoist machinery shall be stationary while lubricants are being applied except when lubricating load chain or rope unless equipped for automatic or remote lubrication.

SECTION 16-2.4: ROPE INSPECTION, REPLACEMENT, AND MAINTENANCE

16-2.4.1 Rope Inspection

(a) Frequent Inspection

(1) The operator or other designated person should visually inspect all ropes at the start of each shift. These visual observations should be concerned with discovering gross damage, such as listed below, which 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.

(03) *(d)* number, distribution, and type of visible broken wires. [See paras. 16-2.4.2(b)(1), (2), and (3) for further guidance.]

(2) When such damage is discovered, the rope shall either be removed from service or given an inspection as detailed in para. 16-2.4.1(b).

(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.

(2) Periodic inspections shall be performed by a designated person. This inspection shall cover the entire length of rope. The individual outer 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 determination shall be made as to whether further use of the rope would constitute a hazard:

(a) points listed in para. 16-2.4.1(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) Special care should 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) sections subject to reverse bends

(d) sections of rope that are normally hidden during visual inspection, such as parts passing over sheaves

16-2.4.2 Rope Replacement

(a) 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.

(b) Removal criteria for the rope replacement shall be as follows: (03)

(1) in running ropes, twelve randomly distributed broken wires in one rope lay or four broken wires in one strand in one rope lay, except as noted in para. 16-2.4.2(b)(2)

(2) in rotation-resistant ropes, two randomly distributed broken wires in six rope diameters or four randomly distributed broken wires in thirty rope diameters

(3) 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

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

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

(6) evidence of heat damage from any cause

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

Rope Diameter, in. (mm)	Maximum Allowable Reduction From Nominal Diameter, in. (mm)
Up to $\frac{5}{16}$ (8)	$\frac{1}{64}$ (0.4)
Over $\frac{5}{16}$ to $\frac{1}{2}$ (13)	$\frac{1}{32}$ (0.8)
Over $\frac{1}{2}$ to $\frac{3}{4}$ (19)	$\frac{3}{64}$ (1.2)
Over $\frac{3}{4}$ to $1\frac{1}{8}$ (29)	$\frac{1}{16}$ (1.6)
Over $1\frac{1}{8}$ to $1\frac{1}{2}$ (38)	$\frac{3}{32}$ (2.4)

(c) Broken wire removal criteria, in this volume,

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applies to wire ropes operating on steel sheaves and drums. The user shall contact the sheave, drum or hoist manufacturer, or qualified person, for broken wire removal criteria for wire ropes operating on sheaves and drums made of material other than steel.

(d) Attention shall be given to end connections. Upon development of two broken wires adjacent to a socketed end connection, the rope should be resocketed or replaced. Resocketing shall not be attempted if the resulting rope length will be insufficient for proper operation.

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

16-2.4.3 Rope Maintenance

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

(b) Rope shall be unreeled or uncoiled in a manner to avoid kinking of or inducing a twist in the rope.

(c) Before cutting rope, means shall be used to prevent unlaying of the strands.

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

(e) Rope should be maintained in a well-lubricated condition. Lubricant applied as part of a maintenance program shall be compatible with the original lubricant. Lubricant applied shall be of the type that does not hinder visual inspection. Those sections of rope that 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.

SECTION 16-2.5: WELDED LINK CHAIN INSPECTION, REPLACEMENT, AND MAINTENANCE

16-2.5.1 Welded Link Chain Inspection

(a) Test the hoist under load in lifting and lowering directions and observe the operation of the chain and sprockets. The chain should feed smoothly into and away from the sprockets.

(b) If the chain binds, jumps, or is noisy, first see that it is clean and properly lubricated. If the trouble persists, inspect the chain and mating parts for wear, distortion, or other damage.

(c) Examine visually for gouges, nicks, weld spatter, corrosion, and distorted links. Slacken the chain and move the adjacent links to one side to inspect for wear at the contact points. If wear is observed or if stretching is suspected, the chain should be measured as outlined in the hoist manufacturer's manual. If instructions are not available, proceed as follows:

(1) select an unworn, unstretched length of the chain (e.g., at the slack end)

(2) suspend the chain vertically under tension and, using a caliper-type gauge, measure the outside length of any convenient number of links approximately 12 in. (305 mm) to 24 in. (610 mm) overall

(3) measure the same number of links in the used sections and calculate the percentage increase in length

16-2.5.2 Welded Link Chain Replacement

(a) If the used chain exceeds the hoist manufacturer's recommended length (or in the absence of such recommendation, if the used chain for hand chain-operated hoists is $2\frac{1}{2}\%$ longer than the unused chain, or the used chain for powered hoists is $1\frac{1}{2}\%$ longer than the unused chain), replace the chain. Repairing of load chain by welding or any other means shall not be attempted by anyone other than the chain manufacturer.

(b) The existence of gouges, nicks, corrosion, weld spatter, or distorted links is sufficient reason to question chain safety and consider chain replacement. Safety in this respect depends largely upon the use of good judgment by a designated person in evaluating the degree of deficiency.

(c) Replacement chain shall be the same size, grade, and construction as the original chain furnished by the hoist manufacturer, unless otherwise recommended by the hoist manufacturer or a qualified person due to actual working conditions.

(d) Load chain links that pass over the hoist load sprocket on edge (alternate to those that lie flat in the pockets) shall be installed (if recommended by the hoist manufacturer) with the welds away from the center of the sprocket. This precaution is not required on idler sprockets that change the direction but not the tension in the chain.

(e) The chain shall be installed without any twist between the hoist and an anchored end on either the loaded side or slack side.

(f) When chain is replaced, disassemble and inspect the mating parts (sprockets, guides, stripper) for wear and replace if necessary.

(g) Discarded load chains shall not be used for slings.

16-2.5.3 Welded Link Chain Maintenance

(a) Load chains and hand chains should be kept clean and free from any coating or deposit that will build up and change their dimensions or reduce flexibility. The cleaning process shall not damage these chains, and any solution used in the cleaning process shall be acid-free.

(b) Load chains articulate slowly under high bearing pressures and should be lubricated as specified by the

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hoist manufacturer. Hand chains are lightly loaded and normally need no lubrication.

SECTION 16-2.6: ROLLER CHAIN INSPECTION, REPLACEMENT, AND MAINTENANCE

16-2.6.1 Roller Chain Inspection

(a) Test the hoist under load in lifting and lowering directions and observe the operation of the chain and sprockets. The chain should feed smoothly into and away from the sprockets.

(b) If the chain binds, jumps, or is noisy, first see that it is clean and properly lubricated. If the trouble persists, inspect the chain in accordance with paras. 16-2.6.1(c) and (d), and inspect mating parts for wear, distortion, or other damage.

(c) Roller chain should first be inspected while it is in the hoist. With the hoist suspended in normal position, apply a light load of approximately 50 lb (23 kg).

(1) Check chain for elongation as outlined in the hoist manufacturer's manual. In absence of specific instructions, the chain can be checked by determining the nominal pitch and measuring a 12 in. (305 mm) section of chain that normally travels over the chain sprocket. Using a caliper-type gauge, check the dimension from the edge of one chain pin to the corresponding edge of another pin for the number of pitches per foot. If elongation exceeds $\frac{1}{4}$ in. (6.3 mm) in 12 in. (305 mm), the chain shall be replaced. For example, a $\frac{3}{4}$ in. (19 mm) pitch chain should measure 12 in. (305 mm) over 16 pitches. Chain shall be rejected if measurement over 16 pitches exceeds $12\frac{1}{4}$ in. (311 mm).

(2) Check chain for twist. The chain shall be replaced if the twist in any 5 ft (1.52 m) section exceeds 15 deg.

(3) Check for side bow in plane perpendicular to plane of roller. A chain that has a side bow exceeding $\frac{1}{4}$ in. (6.3 mm) in any 5 ft (1.52 m) section shall be replaced.

(d) Additional inspection of the chain should be made by removing the chain from the hoist and cleaning it thoroughly in an acid-free solvent. A check should then be made for any of the following deficiencies:

(1) pins turned from their original position

(2) rollers that do not run freely with light finger pressure

(3) joints that cannot be flexed by easy hand pressure

(4) side plates that are spread open (a visual check of the pin head extension at the damaged area, as compared to the pin extension at the free end of the chain, can determine the amount of spread and the condition of the chain)

(5) corrosion, pitting, or discoloration of chain (generally indicative of serious impairment)

(6) gouges, nicks, or weld spatter

16-2.6.2 Roller Chain Replacement

(a) Roller chains shall be replaced if any of the conditions exist as stated in para. 16-2.6.1(c). Repairing the roller chain by welding or heating shall not be attempted.

(b) The existence of any of the conditions stated in para. 16-2.6.1(d) is reason to question chain safety and for a designated person to give consideration for replacement. Roller chains are subject to hidden wear and deterioration that must be considered.

(c) Replacement chain shall be the same size, grade, and construction as the original chain furnished by the hoist manufacturer unless otherwise recommended by the hoist manufacturer or qualified person due to actual working conditions.

(d) When chain is replaced, disassemble and inspect the mating parts (sprockets, guides, stripper) for wear and replace if necessary.

(e) When chain is replaced, it should be reeved as outlined in the hoist manufacturer's manual and should operate freely over all load and idler sprockets. All connecting links and chain end fastenings should be inspected and properly secured. The selection and installation of connecting links should be as outlined in the hoist manufacturer's manual or as determined by a qualified person.

(f) Discarded roller chains shall not be used for slings.

16-2.6.3 Roller Chain Maintenance

(a) Roller chains should be kept clean and free from rust. Excessively dirty chains should be soaked in a clean, acid-free solvent. Chains should be agitated to ensure that all joints are free from grit and foreign matter.

(b) Roller chains should be lubricated as outlined in the hoist manufacturer's manual. In absence of specific lubrication instructions, the chains should be lubricated with a good grade of automotive motor oil SAE grades 20 or 30. Never apply grease to the chain.

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Chapter 16-3
Operation

SECTION 16-3.1: HOISTING PRACTICES FOR OPERATORS

Operation of an overhead hoist involves more than pulling the hand chain of a hand chain-operated hoist or depressing the UP or DOWN control of a powered hoist. Refer to the Introduction to the B30 Standards, where it is emphasized that the use of overhead hoists is subject to certain hazards that cannot be met by mechanical means, but only by the exercise of intelligence, care, common sense, and experience in anticipating the motions that will occur as a result of operating the controls.

16-3.1.1 Before Operating Hoist

(a) The operator shall be familiar with all operating controls of the hoist, and be instructed in the operation(s) to be performed. Instructions shall include, as applicable, the warnings on the hoist, the hoisting practices listed in this Section, and the operation instructions portion of the hoist manufacturer's manual.

(b) If adjustments or repairs are necessary, or any defects are known, the operator shall report this promptly to a designated person.

(c) The operator shall not operate a hoist that bears an out-of-order sign.

(d) The operator shall not adjust or repair a hoist unless qualified to perform maintenance of hoist.

(e) The chain or rope shall not be used as a ground for welding.

(f) A welding electrode shall not be touched to the chain or rope.

(g) Hand chain-operated hoists shall only be operated with hand power, with no more than one operator per hand chain.

16-3.1.2 Applying the Load

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

(b) The load shall be attached to the load hook by suitable means.

(c) The sling or other device shall be properly seated in the base (bowl or saddle) of the hook. The hook latch shall not be allowed to support any part of the load.

(d) The load shall not be applied to the point of the hook.

(e) Before moving the load, the operator shall be sure chains or wire rope are not kinked or twisted or that multiple part chains or ropes are not twisted about each other.

(f) The hoist shall not be operated unless the rope or chain is seated properly on the drum, sheaves, or sprockets.

(g) Hoists shall not be operated unless the hoist unit is centered over the load, except when authorized by a qualified person who has determined that the components of the hoist and its mounting will not be overstressed. Should it be necessary to pick a load that is not centered under the hoist unit, precautions shall be taken to control the swing of the load when it is picked clear of its support.

(h) The operator shall not pick up a load in excess of the rated load appearing on the hoist or load block, except during properly authorized tests or properly authorized planned engineered lifts in accordance with para. 16-3.2.2. A hoist overload limiting device shall not be used to measure the maximum load to be lifted.

(i) Specific attention should be given to balancing of the load and hitching or slinging to prevent slipping of the load.

16-3.1.3 Moving the Load

(a) The operator shall not engage in any activity that will divert the operator's attention while operating the hoist.

(b) The operator shall respond to signals from a designated person only. However, the operator shall obey a stop signal at all times, no matter who gives it.

(c) The operator shall not lift or lower a load with the hoist until the operator and all other personnel are clear of the load.

(d) The operator shall make sure the load and hoist will clear all obstacles before moving or rotating the load.

(e) The operator shall inch powered hoists slowly into engagement with a load, but should avoid unnecessary inching and quick reversals of direction.

(f) A load shall not be lifted more than a few inches until it is well balanced in the sling or lifting device.

(g) Each time a load approaching rated capacity is handled, the operator shall check hoist brake action by lifting the load just clear of supports and continuing only after verifying that the brake system is operating properly.

(h) On rope hoists, the load shall not be lowered below the point where less than two wraps of rope remain on

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each anchorage of the hoist drum, unless a lower limit device is provided. In this case no less than one wrap may remain on each anchorage of the hoist drum.

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

(j) Personnel shall not be carried on the hook or the load.

(k) The operator shall avoid swinging the load or load hook when traveling the hoist.

(l) On trolley-mounted hoists, contact between trolleys or between trolleys and stops should be avoided.

(m) The operator shall not use the upper (or lower, if provided) limit device(s) as a normal means of stopping the hoist. These are emergency devices only.

16-3.1.4 Parking the Load

(a) The operator should not leave a suspended load unattended unless specific precautions have been instituted and are in place.

(b) The load block should be positioned above head level for storage when the hoist is not in use.

(c) Care shall be exercised when removing a sling from under a landed and blocked load.

16-3.1.5 Electric-Powered and Air-Powered Hoist Limit Devices (Switches)

(a) Prior to the initial use of any electric-powered or air-powered hoist during each shift, the operator shall verify operation of the upper-limit device under no-load conditions. If more than one upper-limit device is present, only the operation of the primary upper-limit device need be verified. Care shall be exercised; the block shall be inched into the limit device or run in at slow speed. If the device does not operate properly, the operator shall immediately notify the appointed person.

(b) The hoist limit device that controls the upper limit of travel of the load block shall not be used as an operating control in normal operation unless additional means are provided to prevent damage from overtravel.

SECTION 16-3.2: HANDLING THE LOAD

16-3.2.1 Load Weight

The hoist shall not be loaded in excess of its rated load except for test purposes as provided in para. 16-2.2.2 or for planned engineered lifts as provided in para. 16-3.2.2.

16-3.2.2 Planned Engineered Lifts

Lifts in excess of the rated load may be required from time to time on a limited basis for specific purposes such as new construction or major repairs. Every planned engineered lift exceeding the rated load shall be treated as a special and separate event.

Limitations and planned requirements shall be applicable as follows:

(a) Planned engineered lifts are only applicable to powered hoists having a load rating of 5 tons and above.

(b) When planned engineered lifts are made, the load shall not exceed 125% of the hoist load rating except as provided in para.16-3.2.2(d).

(c) Planned engineered lifts shall be limited to two occurrences on any hoist within any continuous 12-month period, except as provided in para. 16-3.2.2(d). If greater lift frequency is desired, consideration shall be given to rerating or replacing the hoist.

(d) The hoist manufacturer shall be consulted if the planned engineered lift exceeds 125% of rated load or if the frequency of planned engineered lifts exceeds two during a continuous 12-month period.

(e) Each planned engineered lift shall comply with the following requirements:

(1) A written review of the hoist service history shall be prepared, including reference to previous planned engineered lifts, structural repairs, and modifications of original design.

(2) The design of the structural, mechanical, electrical, pneumatic, and hydraulic components of the hoist shall be reviewed by means of applicable calculations for the load to be lifted and approved by the hoist manufacturer or a qualified person in accordance with accepted hoist design standards if the load to be lifted exceeds 125% of rated load or if the frequency of planned engineered lift exceeds two during a continuous 12-month period.

(3) The design of the hoist-supporting structure shall be reviewed and approved by a qualified person for conformance to applicable design criteria. The hoist support shall be inspected and any deterioration or damage shall be taken into consideration in design calculations for the load to be lifted.

(4) The hoist shall be inspected in accordance with para. 16-2.1.3 just prior to making the lift.

(5) The lift shall be made under controlled conditions under the direction of a designated person in accordance with a previously prepared lift plan. All persons in the area of the hoist shall be alerted that the lift is being made.

(6) The operator shall test the hoist at the planned engineered load by lifting the load a short distance and setting the brakes. The lift shall only be continued if the brake stops and holds the load. Any failure to hold the load shall be corrected before proceeding with the lift.

(7) The hoist shall be inspected in accordance with para. 16-2.1.3 after the lift is completed and prior to being used for the lifting of any other load.

(8) A record of the planned engineered lift, including calculations, inspections, and all distances moved, shall be placed on file for availability to appointed personnel.

(f) The rated load test specified in para. 16-2.2.2 is not applicable to planned engineered lift provisions.

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SECTION 16-3.3: HOIST LOCKOUT/TAGOUT

16-3.3.1 General

(a) A lockout/tagout policy and procedure shall be developed, documented, and implemented by the owner or user of electric- and air-powered overhead hoists.

(b) The lockout/tagout policy and procedure shall comply with the requirements of ANSI Z244.1.

16-3.3.2 Hoists Suspended From Cranes and Monorails

If the hoist is suspended from an overhead crane, gantry crane, underhung crane, or monorail, refer, as applicable, to ASME B30.2, ASME B30.11, or ASME B30.17 for additional information on lockout/tagout policies and procedures.

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ASME B30.16-2003 INTERPRETATIONS

Replies to Technical Inquiries
October 1998 through October 2002

FOREWORD

This publication includes all of the written replies issued between the indicated dates by the Secretary, speaking for the ASME B30 Standards Committee, Safety Standards for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings, to inquiries concerning interpretations of technical aspects of ASME B30.16, Overhead Hoists (Underhung).

These replies are taken verbatim from the original letters except for a few typographical corrections and some minor editorial corrections made for the purpose of improved clarity. In some few instances, a review of the interpretation revealed a need for corrections of a technical nature; in these cases, a corrected interpretation follows immediately after the original reply.

These interpretations were prepared in accordance with the accredited ASME procedures. ASME procedures provide for reconsideration of these interpretations when or if additional information is available that the inquirer believes might affect the interpretation. Further, persons aggrieved by this 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.

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Interpretation: 16-14

Subject: ASME B30.16c-1992

Date Issued: September 20, 1999

Question (1): With reference to paras. 16-2.1.3 and 16-2.1.2(c)(5), is a visual or NDE examination of the exposed parts (of the hook) sufficient to satisfy the inspection requirement or should the entire hook be required to have an examination?

Reply (1): No. A visual inspection or NDE of the exposed parts of the hook is not sufficient to satisfy the inspection requirement. Both paras. 16-2.1.3(d)(4) (B30.16) and 10-2.2.1.2(c)(4) (B30.10) require inspection of the hook attachment and securing means, including retaining nuts or collars, and pins, welds, or rivets in addition to the inspection of the exposed parts of the hook. However, please note that para. 10-2.2.1.1(b)(2) requires a *visual inspection* of *apparent external conditions*; para. 16-2.1.3(a) allows for a visual inspection with the hoist at its normal location and does not require the hoist to be disassembled; and para. 16-2.1.3(c) requires a determination as to whether a *visual inspection* of *external conditions* constitute a hazard and whether disassembly is required.

Question (2): With reference to Sections 10-2.2 (B30.10), 16-2.1 (B30.16), 21-1.2 (B30.21), 21-2.2, and 21-3.2, what recommendation is given by the standard to properly inspect the hook if the shank and swivel are riveted into an assembly that makes it impossible to examine the hook for cracks, distortion of the shank, or evidence of other distress?

Reply (2): There are at least eight recommendations given in B30 Standard in volumes B30.10, B30.16, and B30.21 to properly inspect the hook. The physical parts to be inspected have been identified in the replies to Questions (1), (2), and (3) and are included in paras. 10-2.2.1.2(c), 10-2.2.1.3(c), 16-2.1.2(c)(5), 16.2.1.3(d)(4), 21-1.2.2(c)(2), 21-1.2.3(d)(4), 21-2.2.2(c)(2), 21-2.2.3(d)(4), 21-3.2.2(c)(2), and 21-3.2.3(d)(4).

Other recommendations and requirements include:

(a) The intervals at which the inspections shall be made based on the kind of equipment in which they are used and the type of service in which the equipment is used: normal, heavy, or severe.

(b) The inspector shall be a person selected by the employer or the employer's representative as being competent to perform the inspection.

(c) Records of external conditions are required to provide a basis for a continuing evaluation.

(d) A requirement that a competent person shall determine whether conditions found during the inspection constitute a hazard and whether a more detailed inspection is required.

(e) The Periodic Inspection may be performed with the hoist in its normal location and does not require the hoist to be disassembled. (The hook and its securing means are a part of the hoist.)

(f) A requirement that a competent person shall determine whether conditions found during the inspection constitute a hazard and whether disassembly is required.

(g) Convenient aids to inspection such as Tables 1 and 2 found in B30.16, and Tables 1, 2, and 3 found in B30.21.

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Interpretation: 16-15

Subject: ASME B30.16c-1992

Date Issued: September 20, 1999

Question (1): With reference to paras. 16-2.1.3 and 16-2.1.2(c)(5), is a visual or NDE examination of the exposed parts (of the hook) sufficient to satisfy the inspection requirement or should the entire hook be required to have an examination?

Reply (1): No. A visual inspection or NDE of the exposed parts of the hook is not sufficient to satisfy the inspection requirement. Both paras. 16-2.1.3(d)(4) and 10-2.2.1.2(c)(4) require inspection of the hook attachment and securing means, including retaining nuts or collars, and pins, welds, or rivets in addition to the inspection of the exposed parts of the hook. However, please note that para. 10-2.2.1.1(b)(2) requires a visual inspection of apparent external conditions; para. 16-2.1.3(a) allows for a visual inspection with the hoist at its normal location and does not require the hoist to be disassembled; and para. 16-2.1.3(c) requires a determination as to whether a visual inspection of external *conditions* constitute a hazard and whether disassembly is required.

Question (2): With reference to paras. 21-1.2.3, 21-2.2.3, and 21-3.2.3, is a visual or NDE examination of the exposed parts (of the hook) sufficient to satisfy the inspection requirement, or should the entire hook be required to have an examination?

Reply (2): No. A visual inspection or NDE of the exposed parts of the hook is not sufficient to satisfy the inspection requirements. Paragraphs 21-1.2.3(d)(4), 21-2.2.3(d)(4), and 21-3.2.3.(d)(4) as well as para. 10-2.2.1.2(c)(4), which is also referenced, require inspection of the hook attachment and securing means, including hook retaining nuts or collars, and pins; welds or rivets in addition to the inspection of the exposed parts of the hook. However, please note that para. 10-2.2.1.1(b)(2) requires a visual inspection of apparent external conditions; paras. 21-1.2.3(a), 21-2.2.3(a), and 21-3.2.3(a) allow for a visual inspection with the hoist at its normal location and do not require the hoist to be disassembled; and paras. 21-1.2.3(c), 21-2.2.3(c), and 21-3.2.3(c) require a determination as to whether a visual inspection of external conditions constitute a hazard and whether disassembly is required.

Question (3): In reference to para. 10-2.2.1.2(c), does inspection of a hook that has areas covered by nonreadily removable assemblies comply if only the visible portions are inspected?

Reply (3): Inspection of only the visible portions (of the hook) does not comply with the requirements of para. 10-2.2.1.2(c)(4), which requires inspection of the hook attachment and securing means. See the replies to Questions (1) and (2).

Question (4): In reference to Section 10-2.2, is it the intent of the inspection to look at or nondestructively test all areas of the hook?

Reply (4): The intent of the inspection is to visually inspect all visible areas of the hook as well as to visually inspect the hook attachment or securing means. There is no requirement in the inspection section for a nondestructive test.

Question (5): With reference to Sections 10-2.2, 16-2.1, 21-1.2, 21-2.2, and 21-3.2, what recommendation is given by the standard to properly inspect the hook if the shank and swivel are riveted into an assembly that makes it impossible to examine the hook for cracks, distortion of the shank, or evidence of other distress?

Reply (5): There are at least eight recommendations given in the B30 Standard in volumes B30.10, B30.16, and B30.21 to properly inspect the hook. The physical parts to be inspected have been identified in the replies to Questions (1), (2), and (3) and are included in paras. 10-2.2.1.2(c), 10-2.2.1.3(c), 16-2.1.2(c)(5), 16-2.1.3(d)(4), 21-1.2.2(c)(2), 21-1.2.3(d)(4), 21-2.2.2(c)(2), 21-2.2.3(d)(4), 21-3.2.2(c)(2), and 21-3.2.3(d)(4).

Other recommendations and requirements include:

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(a) The intervals at which the inspections shall be made based on the kind of equipment in which they are used and the type of service in which the equipment is used: normal, heavy, or severe.

(b) The inspector shall be a person selected by the employer or the employer's representative as being competent to perform the inspection.

(c) Records of external conditions are required to provide a basis for a continuing evaluation.

(d) A requirement that a competent person shall determine whether conditions found during the inspection constitute a hazard and whether a more detailed inspection is required.

(e) The Periodic Inspection may be performed with the hoist in its normal location and does not require the hoist to be disassembled. (The hook and its securing means are a part of the hoist.)

(f) A requirement that a competent person shall determine whether conditions found during the inspection constitute a hazard and whether disassembly is required.

(g) Convenient aids to inspection such as Tables 1 and 2 found in B30.16, and Tables 1, 2, and 3 found in B30.21.

Interpretation: 16-16

Subject: ASME B30.16-1998

Date Issued: May 23, 2000

Question: The B30.16 volume defines *limit device* as "a device that is operated by some part or motion of a power-driven hoist to limit motion."

Paragraph 16-1.2.14, Overtravel Protection, states "The hoist shall be so designed and constructed that the load hook, either loaded or empty, shall not exceed the upper limit travel."

Paragraph 16-3.1.3(m), Moving the Load, states "The operator shall not use the upper (or lower, if provided) limit device(s) as a normal means of stopping the hoist. These are emergency devices only."

Is the use of load-limiting clutches as upper and/or lower limit devices in compliance with the B30.16 volume?

Reply: Yes, provided that the load-limiting clutch and other parts of the hoist that function as the limit device are designed by the manufacturer of the hoist for such operation and in accordance with para. 16-1.2.1(a) that states "The hoist and appurtenances shall be designed to withstand all stresses imposed under normal operating conditions while handling loads within the rated load (capacity)."

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Interpretation: 16-17

Subject: ASME B30.16-1998, Para. 16-1.2.14

Date Issued: January 19, 2001

Background: Paragraph 16-1.2.14 of ASME B30.16-1998 states the following: "The hoist shall be so designed and constructed that the load hook, either loaded or empty, shall not exceed the upper limit of travel. On wire-rope hoists, if a geared or other lift-limiting device that operates in relation to drum turns is used, an additional lift-limiting device that operates independently of drum rotations shall be provided."

Question (1): A number of wire rope hoists manufactured outside the United States employ a lift-limiting design that uses the wire rope guide, which follows the drum grooves, to actuate a travel-limiting device (switch) as the guide approaches the end of the drum. Is such a lift-limiting scheme considered to be in compliance with para. 16-1.2.14?

Reply (1): No. The second sentence of the paragraph states: "..., an additional lift-limiting device that operates independently of drum rotations shall be provided." A rope guide intended to prevent the overlapping of the rope on the drum of a wire rope hoist is dependent on drum rotation to perform its function. Refer also to Interpretation 2-45 published with the ASME B30.2b-1998.

Question (2): Can the intent of para. 16-1.2.14 be met by providing redundant travel-limiting devices in the form of multiple element gear-driven switches (i.e., four-position geared limit switches)?

Reply (2): No. The second sentence of the paragraph states: "..., an additional lift-limiting device that operates independently of drum rotations shall be provided." All elements of a multiple element gear-driven switch are dependent on drum rotation to perform their function.

Interpretation: 16-18

Subject: ASME B30.16-1998

Date Issued: January 28, 2002

Question: When utilizing a single monorail with multiple hoists and trolleys, and the load to be lifted is known to be less than or equal to the rated load of the monorail, can the individual or combined rated load of the hoists and trolleys be greater than the rated load of the monorail?

Reply: Yes.

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Interpretation: 16-19

Subject: ASME B30.16-1998

Date Issued: May 30, 2002

Question (1): What is meant by the word "uniform" in the definition of *normal service*?

Reply (1): "Uniform" refers to loads that are basically the same weight and that are less than 65% of the rated load limit of the hoist.

Question (2): What is meant by the phrase "of the time" in the definition of *normal service*?

Reply (2): "Of the time" refers to the total period of time being used to determine the 25% of the time that the hoist is operating; i.e., 15 min operating time over a period of 60 min.

Question (3): How does this apply to short-time usage?

Reply (3): The B30.16 volume does not address the subject of short-time usage except by the definition of *heavy service* that states "service that involves operation within a rated load limit, which exceeds normal service."

For a full discussion of service classifications for hoist performance that includes short-time usage, refer to the ASME HST series of standards that are referenced in the B30.16 volume.

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