ASME B30.16-2017
(Revision of ASME B30.16-2012)

Overhead Underhung and Stationary Hoists

Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

ASME B30.16-2017
(Revision of ASME B30.16-2012)

Overhead Underhung and Stationary Hoists

Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers
Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: August 31, 2017

The next edition of this Standard is scheduled for publication in 2022. This Standard will become effective 1 year after the Date of Issuance.

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://cstools.asme.org/ as they are issued.

Errata to codes and standards may be posted on the ASME Web site under the Committee Pages to provide corrections to incorrectly published items, or to correct typographical or grammatical errors in codes and standards. Such errata shall be used on the date posted.

The Committee Pages can be found at http://cstools.asme.org/. There is an option available to automatically receive an e-mail notification when errata are posted to a particular code or standard. This option can be found on the appropriate Committee Page after selecting "Errata" in the "Publication Information" section.

The American Society of Mechanical Engineers
Two Park Avenue, New York, NY 10016-5990

CONTENTS

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 (ANSI). 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 at the annual meeting of ASME.

Meetings and discussions regarding safety on cranes, derricks, and hoists were held from 192 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 (AESC) [later changed to American Standards Association (ASA), then to the United States of America Standards Institute (USASI), and finally to ANSI], 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, AESC 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. Commencing June 1, 1927, and using the eight-page code published by ASME in 1916 as a basis, the Sectional Committee developed the Safety Code for Cranes, Derricks, and Hoists. The early drafts of this safety code included requirements for jacks, but, due to inputs and comments on those drafts, the Sectional Committee decided in 1938 to make the requirements for jacks a separate code. In January 1943, ASA B30.2-1943 was published addressing a multitude of equipment types, and in August 1943, ASA B30.1-1943 was published just addressing jacks. Both documents were reaffirmed in 1952 and widely accepted as safety standards.

Due to changes in design, advancements in techniques, and general interest of labor and industry in safety, the Sectional Committee, under the joint sponsorship of ASME and the Bureau of Yards and Docks (now the Naval Facilities Engineering Command), was reorganized on January 31, 1962, with 39 members representing 27 national organizations. The new committee changed the format of ASA B30.2-1943 so that the multitude of equipment types it addressed could be published in separate volumes that could completely cover the construction, installation, inspection, testing, maintenance, and operation of each type of equipment that was included in the scope of ASA B30.2. This format change resulted in the initial publication of B30.3, B30.5, B30.6, B30.11, and B30.16 being designated as revisions of B30.2 with the remainder of the B30 volumes being published as totally new volumes. ASA changed its name to USASI in 1966 and to ANSI in 1969, which resulted in B30 volumes from 1943 to 1968 being designated as either ASA B30, USAS B30, or ANSI B30 depending on their date of publication.

In 1982, the Committee was reorganized as an Accredited Organization Committee, operating under procedures developed by ASME and accredited by ANSI. 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 IX of the Introduction, before rendering decisions on disputed points.

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.

The first edition of B30.16 was published in 1973. New editions were published in 1981, 1987, 1993, 1998, 2003, 2007, and 2012. The 2012 edition of this Standard included a major revision to Chapter 16-2 and the addition of Chapter 16-4. The sections on maintenance of hoist components in Chapter 16-2 were moved to Chapter 16-4, along with other updates to the Standard. In this 2017 edition, revisions were made to reflect current technology and terminology. This revision now addresses overhead underhung and stationary hoists and includes new information regarding personnel competence, inclusion of hoist duty service classification on labels of powered hoists, requirements for presentation of technical and safety-related information, pitch diameter requirements for sheaves and drums, a referenced standard for supporting structures, general inspection requirements, and responsibilities for riggers and signalpersons.

This Volume of the Standard, which was approved by the B30 Committee and ASME, was approved by ANSI and designated an American National Standard on July 28, 2017.

ASME B30 COMMITTEE
Safety Standard 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.)

STANDARDS COMMITTEE OFFICERS

B. D. Closson, *Chair*
T. L. Blanton, *Vice Chair*
K. M. Hyam, *Secretary*

STANDARDS COMMITTEE PERSONNEL

N. E. Andrew, LTS Cranes Mechanical
M. Eggenberger, *Alternate,* Berry Contracting, Inc.
T. L. Blanton, NACB Group, Inc.
P. A. Boeckman, The Crosby Group
E. E. Lutter, *Alternate,* The Crosby Group, Inc.
P. W. Boyd, The Boeing Co.
B. B. Bacon, *Alternate,* Tennessee Valley Authority
B. D. Closson, Craft Forensic Services
J. A. Danielson, The Boeing Co.
B. M. Casey, *Alternate,* General Dynamics Electric Boat
D. R. Decker, Becket, LLC
L. S. Olver, *Alternate,* Kolo Holdings, Inc.
L. D. Demark, Equipment Training Solutions, LLC
D. F. Jordan, *Alternate,* American International Crane Bureau
D. W. Eckstine, Eckstine & Associates, Inc.
G. J. Brent, *Alternate,* NCCCO
R. J. Edwards, NBIS
A. J. Egging, National Oilwell Varco
R. Stanoch, *Alternate,* IPS Cranes
E. D. Fidler, Grove U.S., LLC
G. D. Miller, *Alternate,* Manitowoc Cranes
J. A. Gilbert, Associated Wire Rope Fabricators
J. L. Gordon, Acco Material Handling Solutions, Inc.
N. C. Hargreaves, Consultant
G. B. Hetherston, Consultant
R. J. Bolen, *Alternate,* Consultant
K. M. Hyam, The American Society of Mechanical Engineers
M. M. Jaxtheimer, Navy Crane Center
S. R. Gridley, *Alternate,* Navy Crane Center
P. R. Juhren, Morrow Equipment Co., LLC
C. H. Smith, *Alternate,* Morrow Equipment Co., LLC
R. M. Kipper, Landmark Engineering Services
D. D[illegible], *Alternate,* 2DM Associates, Inc.
A. J. Lusi, Jr., LuMark Consulting, LLP
K. J. Shinn, *Alternate,* K. J. Shinn, Inc.
E. L. Marburg, Columbus McKinnon Corp.
J. R. Burkey, *Alternate,* Columbus McKinnon Corp.
L. D. Means, Means Engineering & Consulting
D. A. Henninger, *Alternate,* Bridon America
M. W. Mills, Liberty Mutual Insurance
D. M. Gordon, *Alternate,* Liberty Mutual Insurance
D. L. Morgan, Critical Lift Consultants, LLC
T. C. Mackey, *Alternate,* WRPS Hanford
W. E. Osborn, Ingersoll Rand
S. Snider, *Alternate,* Ingersoll Rand
R. M. Parnell, Industrial Training International, Inc.
W. C. Dickinson, *Alternate,* Crane Industry Services, LLC
J. T. Perkins, First Solar Electric
J. R. Strobel, *Alternate,* American Bridge Co.
B. A. Pickett, Systems Engineering and Forensic Services
J. A. Pingrim, Manitowoc Cranes
S. K. Rammelsberg, CB&I
J. W. Randall, *Alternate,* CB&I
J. E. Richardson, U.S. Department of the Navy
K. Kennedy, *Alternate,* Navy Crane Center
D. W. Ritchie, Dave Ritchie Consultant, LLC
L. Shapiro, *Alternate,* Howard I. Shapiro & Associates
J. W. Rowland III, Consultant
D. A. Moore, *Alternate,* Unified Engineering
J. C. Ryan, Boh Bros. Construction Co.
A. R. Ruud, *Alternate,* Atkinson Construction
D. W. Smith, STI Group
C. Warren, *Alternate,* Webber, LLC
W. J. Smith, Jr., NBIS
J. Schoppert, *Alternate,* NBIS
R. S. Stemp, Lampson International, LLC
M. P. Zerba, *Alternate,* Lampson International, LLC
R. G. Strain, Advanced Crane Technologies, LLC
J. Sturm, Sturm Corp.
P. D. Sweeney, Riverside Engineering, LLC
S. R. Fletcher, *Alternate,* Cowles, Murphy, Glover, & Associates
E. P. Vliet, Turner Industries Group, LLC
J. D. Wiethorn, Haag Engineering Co.
M. Gardiner, *Alternate,* Haag Engineering Co.
R. C. Wild, CJ Drilling, Inc.
J. Dudley, *Alternate,* The Walsh Group
D. N. Wolff, National Crane/Manitowoc Cranes
S. D. Wood, Terex Corp.
J. Lindsay, *Alternate,* Link-Belt Construction Equipment

HONORARY MEMBERS

J. W. Downs, Jr., Downs Crane & Hoist Co.
J. L. Franks, Consultant
C. W. Ireland, Consultant
J. M. Klibert, Lift-All Co., Inc.
R. W. Parry, Consultant

B30.16 SUBCOMMITTEE PERSONNEL

E. K. Marburg, *Chair,* Columbus McKinnon Corp.
J. R. Burkey, Columbus McKinnon Corp.
B. M. Casey, General Dynamics Electric Boat
J. A. Danielson, The Boeing Co.
J. L. Gordon, Acco Material Handling Solutions, Inc.
J. B. Greenwood, Navy Crane Center
C. M. Hess, Harrington Hoists, Inc.
P. S. Hughes, MAGNA Lifting
M. M. Jaxtheimer, Navy Crane Center
H. G. Leidich, Leidich Consulting Services, Inc.
L. D. Means, Means Engineering & Consulting
S. Snider, Ingersoll Rand
J. Sturm, Sturm Corp.

B30 REGULATORY AUTHORITY COUNCIL

C. Shelhamer, *Chair,* New York City Department of Buildings
A. O. Omran, *Alternate,* New York City Department of Buildings
K. M. Hyam, *Secretary,* The American Society of Mechanical Engineers
L. G. Campion, Department of Labor/OSHA
R. Feidt, Stephenson Equipment, Inc.
C. Harris, City of Chicago — Department of Buildings
R. D. Jackson, U.S. Department of Labor
J. L. Lankford, State of Nevada (OSHA)
D. E. Latham, State of Maryland DLLR
K. L. Powell, *Alternate,* Maryland Department of Labor, MOSH
A. Lundeen, State of Washington, Department of Labor and Industries
J. Mendoza, North Carolina Department of Labor, Division of Occupational Safety
M. J. Nelmida, State of California, Occupational Safety and Health Standards Board
G. E. Pushies, Michigan OSHA
C. L. Stribling, Jr., Kentucky Labor Cabinet
T. Taylor, Minnesota Department of Labor & Industry

B30 INTEREST REVIEW GROUP

O. Akinboboye, Ropetech Engineering Services
D. Beltran, Gunnebo Johnson Corp.
J. D. Cannon, U.S. Army Corps of Engineers
B. Dobbs, LEEA
M. J. Eggenberger, Berry Contracting, Inc.
A. Gomes Rocha, Belgo Bekaert Arames
H. A. Hashem, Saudi Aramco
J. Hui, Si Pai Lou, School of Civil Engineering
C. Lan, Department of Industry — BSEE
A. C. Mattoli, Prowinch, LLC
J. P. Mihlbauer, All Ship & Cargo Surveys, Ltd.
L. S. Olver, Kolo Holdings, Inc.
G. L. Owens, Consultant
D. R. Remus, Reed Manufacturing
C.-C. Tsaur, Institute of Occupational Safety and Health

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

(17)

B30 STANDARD INTRODUCTION

SECTION I: SCOPE

The ASME B30 Standard contains provisions that apply to the construction, installation, operation, inspection, testing, maintenance, and use of cranes and other lifting and material-movement related equipment. For the convenience of the reader, the Standard has been divided into separate volumes. Each volume has been written under the direction of the ASME B30 Standard Committee and has successfully completed a consensus approval process under the general auspices of the American National Standards Institute (ANSI).

As of the date of issuance of this Volume, the B30 Standard comprises the following volumes:

B30.1 Jacks, Industrial Rollers, Air Casters, and Hydraulic Gantries
B30.2 Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
B30.3 Tower Cranes
B30.4 Portal and Pedestal Cranes
B30.5 Mobile and Locomotive Cranes
B30.6 Derricks
B30.7 Winches
B30.8 Floating Cranes and Floating Derricks
B30.9 Slings
B30.10 Hooks
B30.11 Monorails and Underhung Cranes[1]
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 (withdrawn 1982 — requirements found in latest revision of B30.5)
B30.16 Overhead Underhung and Stationary Hoists
B30.17 Cranes and Monorails (With Underhung Trolley or Bridge)
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 Lever Hoists
B30.22 Articulating Boom Cranes
B30.23 Personnel Lifting Systems
B30.24 Container Cranes
B30.25 Scrap and Material Handlers
B30.26 Rigging Hardware
B30.27 Material Placement Systems
B30.28 Balance Lifting Units
B30.29 Self-Erecting Tower Cranes
B30.30 Ropes[2]

SECTION II: SCOPE EXCLUSIONS

Any exclusion of, or limitations applicable to the equipment, requirements, recommendations, or operations contained in this Standard are established in the affected volume's scope.

SECTION III: PURPOSE

The B30 Standard is intended to

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

(b) provide direction to manufacturers, owners, employers, users, 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 IV: USE BY REGULATORY AGENCIES

These volumes may be adopted in whole or in part for governmental or regulatory use. If 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.

SECTION V: EFFECTIVE DATE

(a) Effective Date. The effective date of this Volume of the B30 Standard shall be 1 yr after its date of issuance.

[1] This Volume is consolidated into B30.17 and will be withdrawn.

[2] This Volume is currently in the development process.

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.

(b) Existing Installations. Equipment manufactured and facilities constructed prior to the effective date of this Volume of the B30 Standard shall be subject to the inspection, testing, maintenance, and operation requirements of this Standard after the effective date.

It is not the intent of this Volume of the B30 Standard to require retrofitting of existing equipment. However, when an item is being modified, its performance requirements shall be reviewed relative to the requirements within the current volume. The need to meet the current requirements shall be evaluated by a qualified person selected by the owner (user). Recommended changes shall be made by the owner (user) within 1 yr.

SECTION VI: REQUIREMENTS AND RECOMMENDATIONS

Requirements of this Standard are characterized by use of the word *shall*. Recommendations of this Standard are characterized by the word *should*.

SECTION VII: USE OF MEASUREMENT UNITS

This Standard contains SI (metric) units as well as U.S. Customary units. The values stated in U.S. Customary units are to be regarded as the standard. The SI units are a direct (soft) conversion from the U.S. Customary units.

SECTION VIII: REQUESTS FOR REVISION

The B30 Standard Committee will consider requests for revision of any of the volumes within the B30 Standard. Such requests should be directed to

Secretary, B30 Standard Committee
ASME Codes and Standards
Two Park Avenue
New York, NY 10016-5990

Requests should be in the following format:

Volume:	Cite the designation and title of the volume.
Edition:	Cite the applicable edition of the volume.
Subject:	Cite the applicable paragraph number(s) and the relevant heading(s).
Request:	Indicate the suggested revision.
Rationale:	State the rationale for the suggested revision.

Upon receipt by the Secretary, the request will be forwarded to the relevant B30 Subcommittee for consideration and action. Correspondence will be provided to the requester defining the actions undertaken by the B30 Standard Committee.

SECTION IX: REQUESTS FOR INTERPRETATION

The B30 Standard Committee will render an interpretation of the provisions of the B30 Standard. An Interpretation Submittal Form is available on ASME's website at http://cstools.asme.org/InterpretationForm.cfm.

Phrase the question as a request for an interpretation of a specific provision suitable for general understanding and use, not as a request for approval of a proprietary design or situation. Plans or drawings that explain the question may be submitted to clarify the question. However, they should not contain any proprietary names or information. Read carefully the note addressing the types of requests that the B30 Standard Committee can and cannot consider.

Upon submittal, the request will be forwarded to the relevant B30 Subcommittee for a draft response, which will then be subject to approval by the B30 Standard Committee prior to its formal issuance. The B30 Standard Committee may rewrite the question for the sake of clarity.

Interpretations to the B30 Standard will be available online at https://cstools.asme.org/Interpretation/StandardInterpretation.cfm.

SECTION X: ADDITIONAL GUIDANCE

The equipment covered by the B30 Standard is subject to hazards that cannot be abated 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 proper operation of the equipment and the handling of loads. Serious hazards include, but are not limited to, improper or inadequate maintenance, overloading, dropping or slipping of the load, obstructing the free passage of the load, and using equipment for a purpose for which it was not intended or designed.

The B30 Standard Committee fully realizes the importance of proper design factors, minimum or maximum dimensions, and other limiting criteria 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 are dependent on many different factors, often varying with the installation and uses. These factors depend on

(a) the condition of the equipment or material

(b) the loads

(c) the acceleration or speed of the ropes, chains, sheaves, sprockets, or drums

(d) the type of attachments

(e) the number, size, and arrangement of sheaves or other parts

(f) environmental conditions causing corrosion or wear

(g) many variables that must be considered in each individual case

The requirements and recommendations provided in the volumes must be interpreted accordingly, and judgment used in determining their application.

ASME B30.16-2017
SUMMARY OF CHANGES

Following approval by the ASME B30 Standard Committee and ASME, and after public review, ASME B30.16-2017 was approved by the American National Standards Institute on July 28, 2017.

ASME B30.16-2017 includes the following changes identified by a margin note, **(17)**. In addition, the title of the Standard was revised.

Page	*Location*	*Change*
xiii–x	B30 Standard Introduction	Revised
1–10	Chapter 16-0	Revised in its entirety
11–14	16-1.1.3	Subparagraphs (b)(5) and (c)(4) added
	16-1.1.5	Added
	Section 16-1.2	Revised in its entirety
15	16-1.3.2	Final sentence added
	16-1.3.3	Subparagraph (h) revised
16–20	Section 16-2.1	Revised in its entirety
	16-2.2.1	Subparagraph (b)(3) revised
22–27	Chapter 16-3	Revised in its entirety
29, 30	16-4.3.3	Subparagraphs (b)(5) and (c)(5) revised
	16-4.4.1	Subparagraph (c) revised

INTENTIONALLY LEFT BLANK

OVERHEAD UNDERHUNG AND STATIONARY HOISTS

Chapter 16-0
Scope, Definitions, Personnel Competence, and References

(17)

SECTION 16-0.1: SCOPE OF B30.16

Volume B30.16 includes provisions that apply to the construction, installation, operation, inspection, testing, and maintenance of overhead underhung and stationary hoists, including hand-chain-operated, electric-powered, and air-powered chain and wire rope hoists used for, but not limited to, vertical lifting and lowering of freely suspended, unguided loads that consist of equipment and materials (see Figs. 16-0.1-1 through 16-0.1-6).

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 the equipment, such as excessively high or low ambient temperatures, exposure to weather, corrosive fumes, dust-laden or moisture-laden atmospheres, and hazardous locations.

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 means of friction or power.

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. This may also be used as a holding brake if designed as such by the manufacturer.

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 in resistors.

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, 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.

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

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

exposed: applies to hazardous objects not guarded or isolated and 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 (see ANSI/NFPA 70).

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

hoist, stationary: a base or deck-, ceiling-, or wall-mounted hoist used for vertical lifting and lowering of freely suspended, unguided loads (see Fig. 16-0.1-6).

hoist, underhung: trolley hoists or hoists suspended from trolleys traveling on the lower flanges of beams or similar hoists that are hook- or lug-suspended.

hoist operator, dedicated: an employee whose job is normally confined solely to the operation of the equipment.

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 limits equipment motion or takes control of particular functions without action of the operator when a limiting condition is reached.

load, rated (capacity): the maximum load designated by the manufacturer for which the equipment is designed and built.

load, working: the external load applied to the equipment, including the weight of load-attaching equipment, such as shackles and slings.

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.

minimum breaking force: the minimum load at which a new and unused wire rope will break when loaded to destruction in direct tension.

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

operator, nondedicated: an employee who uses the equipment as a tool to assist in the performance of his/her regular job.

original language(s): language(s) used by the manufacturer to develop and verify product instructions and manual(s).

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 that engages a ratchet to prevent rotation.

pendant station: controls suspended from the equipment 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 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, heavy: service that involves operation within the rated load limit that exceeds normal service.

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

shall: a word indicating a requirement.

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

sheave, equalizer: a sheave used to equalize tension in opposite parts of the rope or chain. Because of its slight movement, it is not termed a running sheave.

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

should: a word indicating a recommendation.

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

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).

transmitter: the device used for remote control that is not electrically connected to the hoist.

unattended: a condition in which the operator is not at the operating control devices. If, however, the control devices are within sight of the operator, the equipment 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.

SECTION 16-0.3: PERSONNEL COMPETENCE

Persons performing the functions identified in this Volume shall meet the applicable qualifying criteria stated in this Volume and shall, through education, training, experience, skill, and physical fitness, as necessary, be competent and capable to perform the functions as determined by the employer or employer's representative.

SECTION 16-0.4: REFERENCES

The following is a list of standards and specifications referenced in this Standard.

AA ADM-1-2015, Aluminum Design Manual

Publisher: Aluminum Association, Inc. (AA), 1400 Crystal Drive, Suite 430, Arlington, VA 22202 (http://www.aluminum.org)

AISC/ASD Manual of Steel Construction, 14th Edition, 2011

AISC/LRFD Manual of Steel Construction, 2nd Edition, 2nd Revision, 1998

Publisher: American Institute of Steel Construction (AISC), 130 East Randolph Street, Suite 2000, Chicago, IL 60601 (http://www.aisc.org)

ANSI ECMA 15-2010, Specifications for Cable-less Controls for Electric Overhead Traveling Cranes

Publisher: Monorail Manufacturers Association, Inc. (MMA), 8720 Red Oak Boulevard, Charlotte, NC 28217 (http://www.mhia.org/industrygroups/mma)

ANSI/NEMA Standards Publication No. ICS 6-1993, Industrial Control and Systems: Enclosures[1]

ANSI Z535.4-2007, Product Safety Signs and Labels[1]

Publisher: National Electrical Manufacturers Association (NEMA), 1300 North 17th Street, Suite 900, Arlington, VA 22209 (http://www.nema.org)

ANSI/NFPA 70-2011, National Electrical Code[1]

Publisher: National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471 (http://www.nfpa.org)

ASME B29.24-2002, Roller Load Chains for Overhead Hoists (R2009)

ASME B30.9-2014, Slings

ASME B30.10-2014, Hooks

ASME B30.11-2010, Monorails and Underhung Cranes

ASME B30.17-2015, Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)

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

ASME HST-2–1999, Performance Standard for Hand Chain Manually Operated Chain Hoists

ASME HST-4–1999, Performance Standard for Overhead Electric Wire Rope Hoists

ASME HST-5–1999, Performance Standard for Air Chain Hoists

ASME HST-6–1999, Performance Standard for Air Wire Rope Hoists

Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (http://www.asme.org)

ASSE Z244.1-2003 (R2008), Safety Requirements for the Lockout/Tagout of Energy Sources[1]

Publisher: The American Society of Safety Engineers (ASSE), 520 N. Northwest Hwy, Park Ridge, IL 60068 (http://www.asse.org)

ASTM E2349-2009, Standard Practice for Safety Requirements in Metal Casting Operations: Sand Preparation, Molding, and Core Making; Melting and Pouring; and Cleaning and Finishing[1]

Publisher: American Society for Testing and Materials (ASTM International), 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959 (http://www.astm.org)

ISO 7000-2012, Graphical symbols for use on equipment — Registered symbols

ISO 7296-1991, Cranes — Graphical symbols — Parts 1–3

Publisher: International Organization for Standardization (ISO), Central Secretariat, Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland (http://www.iso.org)

[1] May also be obtained from American National Standards Institute (ANSI), 25 West 43rd Street, New York, NY 10036 (http://www.ansi.org)