ASME B30.16-2012
(Revision of ASME B30.16-2007)

# Overhead Hoists (Underhung)

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

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers



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

Date of Issuance: December 7, 2012

The next edition of this Standard is scheduled for publication in 2017. 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, and will also be published within the next edition of this Standard.

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
Three Park Avenue, New York, NY 10016-5990



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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 (ANSI, 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 American Society of Mechanical Engineers (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 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 (ASA), 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) will 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 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 B30 Standard 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 2012 edition of this Standard includes 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 have been moved to Chapter 16-4, along with other updates to the Standard. This Volume of the Standard, which was approved by the B30 Standards Committee and by ASME, was approved by ANSI and designated as an American National Standard on September 5, 2012.

# 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.)

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

# B30 STANDARD INTRODUCTION (12)

## 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
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 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
B30.25 Scrap and Material Handlers
B30.26 Rigging Hardware
B30.27 Material Placement Systems
B30.28 Balance Lifting Units
B30.29 Self-Erect Tower Cranes[1]
B30.30 Ropes[1]

## 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] These volumes are 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
Three 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. Such requests should be directed to

Secretary, B30 Standard Committee
ASME Codes and Standards
Three 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). |
| Question: | 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. |

Upon receipt by the Secretary, 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.

Interpretations to the B30 Standard will be published in the subsequent edition of the respective volume, and will be available online at http://cstools.asme.org/.

## 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 B30.16-2012
# SUMMARY OF CHANGES

Following approval by the ASME B30 Committee and ASME, and after public review, ASME B30.16-2012 was approved by the American National Standards Institute on September 5, 2012.

ASME B30.16-2012 includes revisions that are identified by a margin note, **(12)**. The following is a summary of the latest revisions and changes.

| *Page* | *Location* | *Change* |
|---|---|---|
| vii–ix | Introduction | Revised |
| 6 | Section 16-0.2 | Definitions of *hoist operator, dedicated*; *hoist operator, nondedicated*; *minimum breaking force*; *sheave*; and *sheave, equalizer* revised |
| 7 | Section 16-0.3 | Revised |
| 8 | 16-1.1.2 | Subparagraph (b) revised |
| | 16-1.1.3 | Subparagraph (b)(4) added |
| | 16-1.1.4 | Title revised |
| | 16-1.2.1 | Subparagraphs (b) and (c) revised |
| 9 | 16-1.2.6 | (1) Subparagraph (a) revised<br>(2) Footnote 1 revised |
| 10 | 16-1.2.8 | Subparagraph (e) revised |
| | 16-1.2.11 | Subparagraphs (b)(1)(b), (b)(4), and (c)(1)(b) revised |
| 11 | 16-1.2.14 | Revised |
| | 16-1.2.17 | Subparagraph (c) revised |
| | 16-1.3.3 | Reference in subparagraph (c) revised |
| 13, 16–18 | Chapter 16-2 | Revised in its entirety |
| 19–23 | Chapter 16-3 | Revised in its entirety |
| 24–27 | Chapter 16-4 | Added |

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

# 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, testing, 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 that consist of equipment and materials. (See Figs. 16-0.1-1 through 16-0.1-5.)

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.

## (12) 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.