

**ASME B30.2-2016**  
(Revision of ASME B30.2-2011)

# Overhead and Gantry Cranes

(Top Running Bridge, Single or  
Multiple Girder, Top Running  
Trolley Hoist)

**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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Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: May 30, 2017

The next edition of this Standard is scheduled for publication in 2021. This Standard will become effective 1 year after the Date of Issuance.

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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). 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 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 (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 addressing just jacks. Both documents were reaffirmed in 1952 and widely accepted as safety standards.

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 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, USASI 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.

New editions were published in 1967, 1983, 1990, 1996, 2001, and 2005. In the 2011 edition, Chapter 2-3 was revised and Maintenance moved to a new Chapter 2-4. This 2016 edition contains revisions throughout all chapters to be more consistent with other B30 volumes.

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 December 21, 2016.

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

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

## B30 STANDARD INTRODUCTION

(16)

### 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 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<sup>1</sup>

### 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 year after its date of issuance.

<sup>1</sup> 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 year.

## **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/Interpretation/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/SearchInterpretation.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 B30.2-2016 SUMMARY OF CHANGES

Following approval by the ASME B30 Committee and ASME, and after public review, ASME B30.2-2016 was approved by the American National Standards Institute on December 21, 2016.

ASME B30.2-2016 includes editorial changes, revisions, and corrections, as well as the following changes identified by a margin note, (16).

<i>Page</i>	<i>Location</i>	<i>Change</i>
ix–xi	B30 Standard Introduction	Revised in its entirety
1–4	Chapter 2-0	Title revised
	Section 2-0.2	(1) Definitions of <i>administrative or regulatory authority, appointed, authorized, boom (of gantry cranes), boom (of overhead cranes), cab, normal; designated person, man trolley, and slash (/)</i> deleted (2) Under definition of <i>hazardous (classified) locations</i> , definitions for <i>class I, class II, and class III</i> deleted (3) Definitions of <i>accessory, operational aid, and rated speed</i> added (4) Definitions of <i>shall</i> and <i>should</i> revised
5, 6	Section 2-0.3	Revised
	Section 2-0.4	Added
7	2-1.1.5	Subparagraph (d) added
	2-1.1.6	Added
8	2-1.3.1	Subparagraphs (c) and (g) revised
	2-1.4.2	Title and paragraph revised
11	2-1.9.2	Subparagraph (b)(3) revised
	2-1.12.1	(1) Subparagraph (b) revised (2) New subparagraph (c) added (3) Subsequent subparagraphs redesignated
12	2-1.12.3	Subparagraph (a)(1) revised
	2-1.12.4	Subparagraph (a)(1) revised
	2-1.13.1	Subparagraph (f) added

<i>Page</i>	<i>Location</i>	<i>Change</i>
13	2-1.13.3	(1) Subparagraphs (a) and (d) revised (2) Subparagraph (e) deleted (3) Subparagraphs (f), (g), and (h) renumbered as (e), (f), and (g); newly renumbered (f) and (g) revised (4) New subparagraph (h) added (5) New subparagraphs (l) through (p) added and old subparagraph (l) redesignated as (q)
	2-1.13.4	(1) Subparagraph (c) revised (2) Subparagraph (d) added
14	Figs. 2-1.13.3-1 and 2-1.13.3-2	Titles revised
16	2-1.13.5	(1) Title revised (2) Subparagraphs (a), (b), and (c) revised (3) Subparagraphs (c)(1) through (c)(3) deleted. Subparagraphs (d) and (e) moved to new Section 2-1.13.6
	2-1.13.6	New Section added
	2-1.13.7	Renumbered from 2-1.13.6, revised and new subparagraph (b) added
	2-1.13.8	Renumbered from 2-1.13.7 and new subparagraph (e) added
	2-1.13.9	Renumbered from 2-1.13.8 and title revised
17	2-1.14.3	Subparagraph (a) revised
	2-1.15.1	Subparagraph (b) revised
	2-1.15.2	Subparagraph (b) revised
18	Section 2-1.17	Added
19, 20	2-2.1.1	Subparagraph (d) revised
	2-2.1.3	Subparagraph (b)(2) revised
	2-2.1.5	(1) Subparagraphs (c)(9) and (10) revised (2) Subparagraph (c)(15) added
	2-2.2.1	Revised
21	2-2.3.1	(1) Subparagraph (b)(5) revised (2) Subparagraph (b)(7) added
23, 24	2-3.3.3	Subparagraph (e) added
	2-3.3.4	(1) Subparagraphs (b)(4) and redesignated (c)(28) revised (2) Subparagraph (c)(17) added and subsequent paragraphs renumbered

<i>Page</i>	<i>Location</i>	<i>Change</i>
25, 26	2-3.3.5	Added
	Section 2-3.4	Subparagraph (e)(8) revised
	Section 2-3.5	Subparagraph (a) revised
29, 30	2-4.3.1	Subparagraph (f) added

# OVERHEAD AND GANTRY CRANES

## (TOP RUNNING BRIDGE, SINGLE OR MULTIPLE GIRDER, TOP RUNNING TROLLEY HOIST)

### Chapter 2-0

## Scope, Definitions, References, and Personnel Competence

(16)

#### SECTION 2-0.1: SCOPE OF B30.2

Volume B30.2 includes provisions that apply to the construction, installation, operation, inspection, and maintenance of hand-operated and power-driven overhead and gantry cranes that have a top-running single-girder or multiple-girder bridge, with one or more top-running trolley hoists used for vertical lifting and lowering of freely suspended, unguided loads consisting of equipment and materials (see Figs. 2-0.2-1 through 2-0.2-5). The requirements included in this Volume also apply to cranes having the same fundamental characteristics such as cantilever gantry cranes, semi-gantry cranes, and wall cranes.

Requirements for a crane used for a special purpose such as, but not limited to, non-vertical lifting service, lifting a guided load, or lifting personnel are not included in this Volume.

#### (16) SECTION 2-0.2: DEFINITIONS

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

*accessory:* a secondary part or assembly of parts that contributes to the overall function and usefulness of a crane.

*auxiliary hoist:* supplemental hoisting unit usually of lower load rating and higher speed than the main hoist.

*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 to the brake 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 to lower a load but does not impose any additional load on the motor when lifting a load.

*braking means:* a method or device used for stopping/holding motion by friction or power.

*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 controlling speed by reversing the motor line voltage polarity or phase sequence to develop torque in the direction opposite 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 electrical induction load brake.

*braking, emergency:* a method of decelerating a drive when power is not available. The braking effort may be established as a result of action by the operator, or automatically when power to the drive is interrupted.

*braking, hydraulic:* a method of controlling or reducing speed by means of displacement of a liquid.

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

*braking, pneumatic:* a method of controlling or reducing speed by means of 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.

*braking, service:* a method to decelerate crane motion during normal operation.

*bridge*: that part of a crane consisting of one or more girders, trucks, end ties, footwalks, and drive mechanism, which carries the trolley or trolleys.

*bridge travel*: the crane movement in a direction parallel to the crane runway.

*bumper (buffer)*: a device for reducing impact when a moving crane or trolley reaches the end of its permitted travel, or when two moving cranes or trolleys come into contact. This device may be attached to the bridge, trolley, or runway stop.

*cab*: the operator's compartment on a crane.

*cab, skeleton*: operator's compartment used for occasional cab operation of a normally floor- or remote-operated crane.

*cantilever frame*: a structural member that supports the trolley of a wall crane.

*clearance*: distance from any part of the crane to the nearest obstruction.

*collectors, current*: contacting devices for collecting current from runway or bridge conductors.

*conductors, bridge*: the electrical conductors located along the bridge structure of a crane that transmit control signals and power to the trolley(s).

*conductors, runway (main)*: the electrical conductors located along a crane runway that transmit control signals and power to the crane.

*controller*: a device, or group of devices, that serves to govern, in a predetermined manner, the power delivered directly to the apparatus to which it is connected.

*controller, manual*: a controller having all of its basic functions performed by devices that are operated by hand.

*controller, spring-return*: a controller that, when released, will return automatically to a neutral (off) position.

*control panel*: an assembly of components (magnetic, static, hydraulic, pneumatic, etc.) that governs the flow of power to or from a motor or other equipment in response to signals from a master switch, push-button station, remote control, automatic program control, or other similar device.

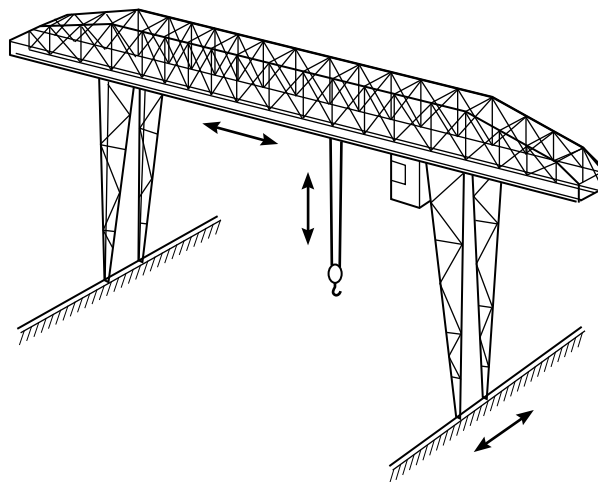
*crane*: a machine for lifting and lowering a load and moving it horizontally, with the hoisting mechanism being an integral part of the machine.

*crane, automatic*: a crane which, when activated, operates through a preset cycle or cycles.

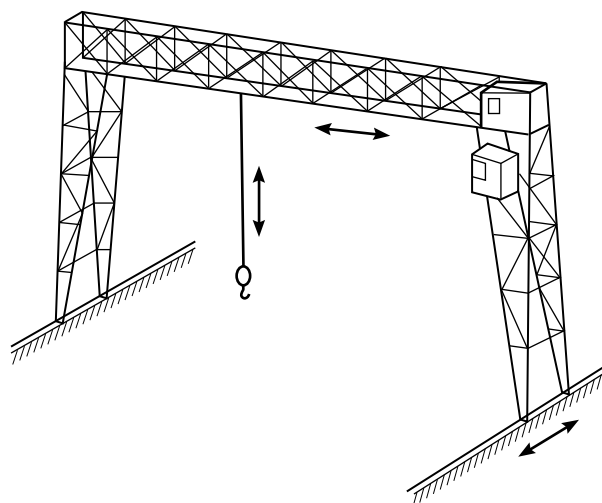
*crane, cab-operated*: a crane whose movements are controlled by an operator through the use of controllers located in a cab that is attached to the crane.

*crane, cantilever gantry*: a gantry or semigantry crane in which the bridge girders or trusses extend transversely beyond the crane runway on one or both sides (see Fig. 2-0.2-1).

**Fig. 2-0.2-1 Cantilever Gantry Crane**



**Fig. 2-0.2-2 Gantry Crane**



*crane, floor-operated*: a crane whose movements are controlled by an operator through the use of controllers contained in a pendant station suspended from the crane.

*crane, gantry*: a crane similar to an overhead crane except that the bridge for carrying the trolley or trolleys is rigidly supported on two or more legs running on fixed rails or other runway (see Fig. 2-0.2-2).

*crane, molten-material-handling*: an overhead crane used for transporting or pouring molten material.

*crane, manually operated*: a crane whose hoist mechanism is driven by pulling an endless chain, or whose travel mechanism is driven in the same manner or by manually moving the load or hook.

*crane, outdoor*: an overhead or gantry crane that operates outdoors and for which provisions are not available for