

**ASME B30.30-2019**

# Ropes

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

**AN AMERICAN NATIONAL STANDARD**



**ASME B30.30-2019**

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**AN AMERICAN NATIONAL STANDARD**



**The American Society of  
Mechanical Engineers**

Two Park Avenue • New York, NY • 10016 USA

Date of Issuance: March 4, 2019

The next edition of this Standard is scheduled for publication in 2024. 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 The 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 (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, the 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 was organized on 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 only 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 B30.3, B30.5, B30.6, B30.11, and B30.16 being initially published 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 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 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.

This first edition of B30.30, which was approved by the B30 Committee and ASME, was approved by ANSI and designated an American National Standard on January 29, 2019.

# ASME B30 COMMITTEE

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

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# 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 Standards 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 (withdrawn 2018 — requirements found in latest revision of B30.17)
- 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
- B30.31 Self-Propelled, Towed, or Remote-Controlled Hydraulic Platform Transporters<sup>1</sup>
- B30.32 Unmanned Aircraft Systems (UAS) Used in Inspection, Testing, Maintenance, and Lifting Operations<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.

<sup>1</sup>This volume is currently in the development process.

## 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. The effective date of any Volume of the B30 Standard that adopts and references this Volume shall be in accordance with the effective-date provisions of that 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 Standards Committee will consider requests for revision of any of the volumes within the B30 Standard. Such requests should be directed to

Secretary, B30 Standards 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 Standards Committee.

## SECTION IX: REQUESTS FOR INTERPRETATION

The B30 Standards 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 Standards 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 Standards Committee prior to its formal issuance. The B30 Standards 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 Standards 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.

# Chapter 30-0

## Scope, Definitions, Personnel Competence, Translations, and References

### SECTION 30-0.1: SCOPE OF ASME B30.30

Volume B30.30 includes provisions that apply to the construction, selection, installation, attachment, testing, inspection, maintenance, repair, use, and replacement of wire rope, hybrid rope, and synthetic fiber rope and rope-lifting components used in conjunction with equipment addressed in the volumes of the ASME B30 Standard. These provisions apply to a particular volume when B30.30 is referenced and as specified in that volume.

### SECTION 30-0.2: DEFINITIONS

*aramid fiber*: a manufactured, high modulus fiber made from a long-chain synthetic aromatic polyamide in which at least 85% of the amide linkages join two aromatic rings.

*birdcage*: a rope condition that results in deformation with the outer strands being displaced away from the rope axis. It is usually the result of shock loading or localized twisting in a rope (see [Figure 30-0.2-1](#)).

*braid*: a rope or textile structure formed by intertwining strands.

*double braid*: a rope constructed from an inner hollow braided rope (core) surrounded by another hollow braided rope (cover) (also known as braid-on-braid or two-in-one braid).

*single braid*: rope structure consisting of multiple strands that may be intertwined in a plain or twill pattern.

*crown break*: a wire break located on the outside of the rope that occurs above the strand-to-strand contact points with both ends visible (see [Figure 30-0.2-2](#)).

*D/d ratio*: the ratio of the pitch diameter of the sheave or drum,  $D$ , to the nominal rope diameter,  $d$  (see [Figure 30-0.2-3](#)).

*denier*: a mass-per-unit-length measure equal to the weight in grams of 9000 m of the material. Denier is a direct numbering system in which the lower numbers represent the finer sizes and the higher numbers the coarser sizes.

*design factor*: the minimum breaking force of the rope in a rope system divided by the maximum static tension in the rope.

*dogleg, minor*: a bend or deformation exhibiting no associated strand distortion and that cannot be observed while the rope is under tension.

*dogleg, severe*: a permanent, localized, irreparable bend or deformation in a wire rope that restricts the natural adjustment of the rope's components during operation due to strand distortion. It is caused by improper use or handling and results in an indeterminate loss of strength in the rope (see [Figure 30-0.2-4](#)).

*fiber core*: a wire rope center component consisting of man-made or natural (vegetable) materials whose purpose is to support the outer strands of the wire rope and is not included as one of the load-bearing components of the wire rope when calculating the minimum breaking force.

*fleet angle*: the angle between the rope's position on a drum or sheave and the line drawn perpendicular to the axis of the drum or sheave through the center of the nearest fixed sheave (see [Figure 30-0.2-5](#)).

*groove corrugation*: a repetitive pattern in the groove of a sheave or drum caused by wear at the contact point with each rope strand that may cause rope wear and distortion.

*guy*: a fixed length of strand or rope for stabilizing or maintaining a structure in a fixed position or a constant distance between the two components connected by the rope.

*heavy rope service*: service that involves operating at 85% to 100% of rope rated load or in excess of ten lift cycles per hour as a regular specified procedure.

*high modulus polyethylene (HMPE)*: a polyolefin fiber produced by gel spinning or solid-state extrusion of an ultra-high-molecular-weight polyethylene (UHMWPE) feedstock to produce extremely high tenacity [also known as extended-chain polyethylene (ECPE) or high-performance polyethylene (HPPE)].

*hours of rope operation*: the actual or estimated operating time of the rope.

*hybrid rope*: a wire rope consisting of both synthetic and steel components. The synthetic components are included as load-bearing components of the rope when calculating its minimum breaking force.