

ASME B30.20-2006
(Revision of ASME B30.20-2003)

Below-the-Hook Lifting Devices

**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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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-handling 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
- B30.2 Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
- B30.3 Construction Tower Cranes
- B30.4 Portal, Tower, and Pedestal Cranes
- B30.5 Mobile and Locomotive Cranes
- B30.6 Derricks
- B30.7 Base Mounted Drum Hoists
- B30.8 Floating Cranes and Floating Derricks
- B30.9 Slings
- B30.10 Hooks
- B30.11 Monorails and Underhung Cranes
- B30.12 Handling Loads Suspended From Rotorcraft
- B30.13 Storage/Retrieval (S/R) Machines and Associated Equipment
- B30.14 Side Boom Tractors
- B30.15 Mobile Hydraulic Cranes (withdrawn 1982 — requirements found in latest revision of B30.5)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 Cranes¹
- B30.25 Scrap and Material Handlers
- B30.26 Rigging Hardware
- B30.27 Material Placement Systems
- B30.28 Balance Lifting Units¹

SECTION II: SCOPE EXCLUSIONS

The B30 Standard does not apply to track and automotive jacks, railway or automobile wrecking cranes, shipboard cranes, shipboard cargo-handling equipment, well-drilling derricks, skip hoists, mine hoists, truck body hoists, car or barge pullers, conveyors, excavating equipment, or equipment covered under the scope of the following standards: A10, A17, A90, A92, A120, B20, B56, and B77.

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.

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 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 customary units are to be regarded as the standard. The SI units are a direct (soft) conversion from the 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
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 Standards Committee.

SECTION IX: REQUESTS FOR INTERPRETATION

The B30 Standards Committee will render an interpretation of the provisions of the B30 Standard. Such requests should be directed to

Secretary, B30 Standards 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 Standards 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 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 20-1

Structural and Mechanical Lifting Devices

SECTION 20-1.1: SCOPE

Chapter 20-1 applies to the classification, marking, construction, installation, inspection, testing, maintenance, and operation of structural and mechanical lifting devices. Within Chapter 20-1, the structural and mechanical lifters/lifting devices are categorized as supporting lifters, indentation-type pressure-gripping lifters, and friction-type pressure-gripping lifters.

SECTION 20-1.2: MARKING, CONSTRUCTION, AND INSTALLATION

(06) 20-1.2.1 Marking

(a) *Rated Load.* The rated load of the lifting device shall be legibly marked on the main structure or on a tag attached to it where it is visible. If the lifting device is made up of several lifters, each detachable from the group, these lifters shall also be marked with their individual rated loads.

(b) *Identification.* All new structural and mechanical lifting devices shall be marked with, but not limited to, the following information:

- (1) manufacturer's name and address
- (2) serial number
- (3) lifter weight, if over 100 lb (45 kg)
- (4) cold current (amps) (when applicable)
- (5) rated voltage (when applicable)
- (6) rated load [as described in para. 20-1.2.1(a)]
- (7) ASME BTH-1 Design Category
- (8) ASME BTH-1 Service Class

(c) *Repaired or Modified Lifters.* All repaired or modified structural and mechanical lifters shall be provided with identification displaying, but not limited to, the following information:

- (1) name and address of the repairer or modifier
- (2) repairer's or modifier's unit identification
- (3) lifter weight (if altered)
- (4) cold current (amps) (if altered)
- (5) rated voltage (if altered)
- (6) rated load (if altered) [as described in para. 20-1.2.1(a)]
- (7) ASME BTH-1 Design Category (if altered)
- (8) ASME BTH-1 Service Class (if altered)

(d) *Product Safety Labels*

(1) Where size and shape of the lifter allow, all lifters shall have labels, affixed to them in a readable position, that include the appropriate signal word,

according to ANSI Z535.4-1998 (4.13), to bring the label to the attention of the operator. The label should include cautionary language to provide danger, warning, or caution notice to operators and others against

- (a) exceeding the rated load, or lifting loads not specified in the instruction manual
- (b) operating a damaged or malfunctioning unit, or a unit with missing parts
- (c) lifting people
- (d) lifting suspended loads over people
- (e) leaving suspended loads unattended
- (f) removing or obscuring warning labels
- (g) operating without having read and understood the operating manual
- (h) not staying clear of the suspended load
- (i) lifting loads higher than necessary
- (j) making alterations or modifications to lifter

(2) Where size or shape of the lifter prohibits the inclusion of all or any such markings, a label shall be affixed, referring user to consult manufacturer's instruction manual for product safety information.

20-1.2.2 Construction

The manufacturer shall verify that structural and mechanical lifting devices are designed by or under the direct supervision of a qualified person. The design shall be in accordance with ASME BTH-1 and shall consider the stresses resulting from the application of rated load plus the weight of the lifting device.

Structural and mechanical lifting devices shall be designed to ASME BTH-1 Design Category B (static strength criteria) and the proper Service Class (fatigue life criteria) selected for its number of load cycles, unless a qualified person representing the owner, purchaser, or user of the lifting device determines and can demonstrate that ASME BTH-1 Design Category A is appropriate.

Design Category A shall only be designated when the magnitude and variation of loads applied to the lifter are predicable and do not exceed the rated capacity, where the loading and environmental conditions are accurately defined, service is not severe, and the anticipated number of load cycles does not exceed Service Class 0.

(a) *Welding.* All welding shall be in accordance with ANSI/AWS D14.1 and ASME BTH-1.

(b) *Guards for Moving Parts.* Exposed moving parts, such as, but not limited to, gearing, projecting shafts,

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and chain drives, that constitute a hazard under normal operating conditions, should be guarded.

(c) *Electrical Equipment.* External power supply, electrical equipment, and wiring for below-the-hook lifters shall comply with ANSI/NFPA 70 and ASME BTH-1.

(d) *Modifications.* Structural and mechanical lifters may be modified or rerated, provided such modifications are analyzed and approved by the equipment manufacturer or a qualified person. A rerated lifter, or one whose components have been modified, shall conform to para. 20-1.2.2 and be tested according to para. 20-1.3.8. New rated load shall be displayed in accordance with para. 20-1.2.1.

20-1.2.3 Installation

(a) The lifter shall be installed in accordance with the manufacturer's instructions.

(b) The installer shall check for correct rotation of all motors.

SECTION 20-1.3: INSPECTION, TESTING, AND MAINTENANCE

20-1.3.1 Inspection Classification

(a) Initial Inspection

(1) New and reinstalled lifters shall be inspected by a designated person prior to initial use to verify compliance with applicable provisions of this Volume.

(2) Altered, repaired, or modified lifters shall be inspected by a designated person. The inspection may be limited to the provisions affected by the alteration, repair, or modification, as determined by a qualified person.

(b) *Inspection Intervals.* Inspection procedure for lifters in regular service is divided into three general classifications based upon the intervals at which inspection should be performed. The intervals, in turn, are dependent upon the critical components of the lifters and the degree of their exposure to wear, deterioration, or malfunction. The three general classifications are herein designated as *every lift*, *frequent*, and *periodic*, with respective intervals between inspections as defined below.

(1) *Every Lift Inspection.* Visual examination by the operator before and during each lift made by the lifter.

(2) *Frequent Inspection.* Visual examinations by the operator or other designated persons with records not required.

(a) Normal service — monthly

(b) Heavy service — weekly to monthly

(c) Severe service — daily to weekly

(d) Special or infrequent service — as recommended by a qualified person before and after each occurrence

(3) *Periodic Inspection.* Visual inspection by a qualified person making records of apparent external conditions to provide the basis for a continuing evaluation.

An external code mark on the lifter is an acceptable identification in lieu of records.

(a) Normal service for equipment in place — yearly

(b) Heavy service [as in (a) above, unless external conditions indicate that disassembly should be done to permit detailed inspection] — semiannually

(c) Severe service [as in (b) above] — quarterly

(d) Special or infrequent service — as recommended by a qualified person before the first such occurrence and as directed by the qualified person for any subsequent occurrences

20-1.3.2 Every Lift Inspection

Items such as the following shall be inspected by the operator before and/or during every lift for any indication of damage as specifically indicated, including observations during operation for any damage that might occur during the lift:

(a) surface of the load for debris

(b) condition and operation of the controls

(c) condition and operation of the indicators and meters when installed

20-1.3.3 Frequent Inspection (See Also Table 1)

Items such as the following shall be inspected for damage at intervals as defined in para. 20-1.3.1(b)(2), including observations during operation for any indications of damage that might appear between inspections. A qualified person shall determine whether any indications of damage constitute a hazard or will require more frequent inspection. For all lifters, inspect:

(a) structural members for deformation, cracks, or excessive wear on any part of the lifter

(b) loose or missing guards, fasteners, covers, stops, or nameplates

(c) all functional operating mechanisms and automatic hold-and-release mechanisms for misadjustments interfering with operation

20-1.3.4 Periodic Inspection (See Also Table 1)

Complete inspection of the lifter shall be performed at intervals as defined in para. 20-1.3.1(b)(3). Any deficiencies, such as listed below, shall be examined and determination made as to whether they constitute a hazard. These inspections shall include the requirements of para. 20-1.3.3 and, in addition, items such as the following:

(a) loose bolts or fasteners

(b) cracked or worn gears, pulleys, sheaves, sprockets, bearings, chains, and belts

(c) excessive wear of friction pads, linkages, and other mechanical parts

(d) excessive wear at hoist hooking points and load support clevises or pins

Table 1 Minimum Inspection for Below-the-Hook Lifting Devices

Item	Normal Service		Heavy Service		Severe Service	
	Visual, Monthly [Note (1)]	Record Yearly [Note (2)]	Visual, Weekly to Monthly [Note (1)]	Record Semiannually [Note (3)]	Visual, Daily to Weekly [Note (3)]	Record Quarterly [Note (3)]
Frequent inspection (refer to para. 20-1.3.3) — structural deformation, cracks, or excessive wear of any part of the lifter	X	...	X	...	X	...
Loose or missing guards, fasteners, covers, stops, or nameplates	X	...	X	...	X	...
All functional operating mechanisms and automatic hold and release mechanisms for misadjustments interfering with operation	X	...	X	...	X	...
Periodic inspection (refer to para. 20-1.3.4) — loose bolts or fasteners	...	X	...	X	...	X
Cracked or worn gears, pulleys, sheaves, sprockets, bearings, chains, and belts	...	X	...	X	...	X
Excessive wear of linkages and other mechanical parts	...	X	...	X	...	X
Excessive wear at hoist hooking points and load support clevises, or pins	...	X	...	X	...	X

NOTES:

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

20-1.3.5 Lifting Devices Not in Regular Use

A lifter that has been idle for a period of 1 month or more is to be given an inspection in accordance with para. 20-1.3.3 before being placed in service.

20-1.3.6 Inspection Records

Dated inspection reports shall be made on critical items such as those listed in para. 20-1.3.4. Records should be available to appointed personnel for each periodic inspection and when the lifter is either modified or repaired.

20-1.3.7 Repairs

Any indications of damage disclosed by the inspection requirements of Section 20-1.3 shall be corrected according to the procedures outlined in para. 20-1.3.9 before operation of the lifter is resumed.

20-1.3.8 Testing**20-1.3.8.1 Operational Tests**

(a) New and reinstalled lifting devices shall be tested by a qualified person, or a designated person under the direction of a qualified person, prior to initial use to verify compliance with applicable provisions of this Volume, including, but not limited to, the following:

(1) *Moving Parts.* Lifters with moving parts shall be tested to determine that the lifter operates in accordance with manufacturer's instructions.

(2) *Latches.* Lifters with manually operated or automatic latches shall be tested to determine that the latch operates in accordance with manufacturer's instructions.

(b) Altered, repaired, or modified lifters shall be tested by a qualified person, or a designated person under the direction of a qualified person. This test may be limited to the provisions affected by the alteration, repair, or modification, as determined by a qualified person with guidance from the manufacturer.

(c) All indicator lights, gages, horns, bells, alarms, pointers, and other warning devices shall be tested.

(d) Dated reports of all operational tests shall be filed.

20-1.3.8.2 Load Test

(a) Prior to initial use, all new, altered, modified, or repaired lifting devices should be tested and inspected. If performed, tests shall be done under the direction of a qualified person and a written report be furnished by such a person, confirming the load rating of the lifter. The load rating should not be more than 80% of the maximum load sustained during the test. Test loads shall not be more than 125% of the rated load unless otherwise recommended by the manufacturer. Test reports should be available.

(b) The load test, if made, shall consist of the following operations as a minimum requirement:

(1) Hoist the test load a sufficient distance to ensure the load is supported by the lifter, or apply the required load if the test is made using a testing machine.

(2) After the test load is released, visually inspect the lifter for deformation, cracks, or other defects.

(c) Tests of altered, repaired, or modified lifters may be limited to the provisions affected by the alteration, repair, or modification, as determined by a qualified person with guidance from the manufacturer.

20-1.3.9 Maintenance

(a) *Maintenance Program.* A maintenance program should be established and be based on recommendations made by the lifter manufacturer or a qualified person.

(b) Maintenance Procedure

(1) Before adjustments and repairs are started on a lifter, the following precautions shall be taken:

(a) All sources of power shall be disconnected, locked out, and tagged "Out of Service."

(b) A lifter removed from service for repair shall be tagged "Out of Service."

(2) Only qualified persons shall perform adjustments and tests when required.

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

(4) After adjustments and repairs have been made, the lifter shall not be returned to service until it has been inspected according to para. 20-1.3.4.

(5) Dated records of repairs and replacements should be made.

(6) *Adjustments and Repairs.* Any hazardous conditions disclosed by the inspection requirements of para. 20-1.3.1 shall be corrected before normal operation of the lifter is resumed. Adjustments and repairs shall be done under the direction of, or by, a qualified person.

SECTION 20-1.4: OPERATION**20-1.4.1 Operators**

Below-the-hook lifting devices shall be operated only by trained, designated persons.

20-1.4.2 Qualifications

Qualifications for operators of below-the-hook lifting devices are as follows:

(a) The operator shall be instructed in the use of the device by a designated person. Instructions should include, but not be limited to, the following:

(1) application of the lifter to the load and adjustments, if any, that adapt the lifter to various sizes or kinds of loads

(2) instructions in any special operations or precautions

(3) the manufacturer's suggested operating procedures

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(4) condition of the load itself required for operation of the lifter, such as, but not limited to, balance, surface cleanliness, flatness, bending, and load thickness

(5) storage of the lifter to protect it from damage

(6) not exceeding the rated load of the lifting device nor the capacity of the hoisting equipment by the combined weight of the load, the lifting device, and rigging

(7) the proper attachment of adapters to lifting device for special load handling

(b) The operator shall demonstrate the ability to operate the lifter as instructed before assuming responsibility for using the lifter.

20-1.4.3 Conduct of Lifting Device Operators

(a) The operator shall give attention to the operation of the lifts during a lifting sequence.

(b) When physically or otherwise unfit, an operator shall not engage in the operation of the equipment.

(c) Operators shall be responsible for those operations under their direct control. Whenever there is any doubt as to safety, the operator shall consult a designated person before handling the load.

(d) The operator shall respond only to instructions from designated persons. However, the operator shall obey a stop order at all times, no matter who gives it.

(e) The operation of the lifter shall be observed before use and during a shift. Any deficiency observed shall be carefully examined by a designated person. If the deficiency constitutes a hazard, the lifter shall be removed from service and tagged "Out of Service." Any indication of a hazardous condition shall be reported to a qualified person for evaluation.

(f) The operator shall be familiar with standard hand signals when applicable.

(g) The operator shall land any attached load and store the lifter before leaving the lifting device.

(h) All controls shall be tested by the operator before use during a shift. If any controls do not operate properly, they should be adjusted or repaired before operations are begun.

(i) The operator shall not ride, or allow others to ride, loads or the lifting device.

(j) The operator and other personnel shall stay clear of the load.

20-1.4.4 Lifting Device Operating Practices

(a) Lifting devices shall be operated only by the following qualified personnel:

(1) designated persons

(2) trainees under the direct supervision of a designated person

(3) maintenance and test personnel, when it is necessary in the performance of their duties

(4) inspectors (lifting devices)

(b) The lifting device shall not be loaded in excess of its rated load or handle any load for which it is not designed.

(c) The lifter shall be applied to the load in accordance with the instruction manual.

(d) Before lifting, the operator shall make sure that lifter ropes or chains are not kinked, and that multiple part lines are not twisted around each other.

(e) Care should be taken to make certain the load is correctly distributed for the lifter being used.

(f) The temperature of the load should not exceed the maximum allowable limits of the lifter.

(g) The lifter shall be brought over the load in such a manner as to minimize swinging.

(h) Care shall be taken that there is not sudden acceleration or deceleration of the load.

(i) Do not allow load or lifter to come into contact with any obstruction.

(j) The operator shall avoid carrying the load over people.

(k) The lifter shall not be used for side pulls or sliding the load unless specifically authorized by a qualified person.

(l) The operator shall not leave suspended loads unattended.

20-1.4.5 Miscellaneous Operating Practices

(a) An operator shall not use a lifting device that is tagged "Out of Service" or otherwise designated as nonfunctioning.

(b) "Out of Service" tags on lifting devices shall not be removed without the approval of the person placing them or an authorized person.

(c) The lifter, when not in use, should be stored at an assigned location.

(d) Caution should be taken that operating markings or tags shall not be removed or defaced. Missing or illegible markings or tags shall be replaced.

SECTION 20-1.5: INSTRUCTION MANUALS

The manufacturer shall provide operating instructions, and maintenance and parts information.