

ASME B30.20-2010
(Revision of ASME B30.20-2006)

Below-the-Hook Lifting Devices

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

AN AMERICAN NATIONAL STANDARD



Three Park Avenue • New York, NY • 10016 USA

Copyright © 2010 by the American Society of Mechanical Engineers.
No reproduction may be made of this material without written consent of ASME.



INTENTIONALLY LEFT BLANK



ASME B30.20-2010
(Revision of ASME B30.20-2006)

Below-the-Hook Lifting Devices

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

AN AMERICAN NATIONAL STANDARD



Three Park Avenue • New York, NY • 10016 USA

Copyright © 2010 by the American Society of Mechanical Engineers.
No reproduction may be made of this material without written consent of ASME.



Date of Issuance: July 9, 2010

The next edition of this Standard is scheduled for publication in 2013. This Standard will become effective 1 year after the Date of Issuance. There will be no addenda issued to this edition.

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 the Standard.

ASME is the registered trademark of The American Society of Mechanical Engineers.

This code or standard was developed under procedures accredited as meeting the criteria for American National Standards. The Standards Committee that approved the code or standard was balanced to assure that individuals from competent and concerned interests have had an opportunity to participate. The proposed code or standard was made available for public review and comment that provided an opportunity for additional public input from industry, academia, regulatory agencies, and the public-at-large.

ASME does not “approve,” “rate,” or “endorse” any item, construction, proprietary device, or activity.

ASME does not take any position with respect to the validity of any patent rights asserted in connection with any items mentioned in this document, and does not undertake to insure anyone utilizing a standard against liability for infringement of any applicable letters patent, nor assume any such liability. Users of a code or standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, is entirely their own responsibility.

Participation by federal agency representative(s) or person(s) affiliated with industry is not to be interpreted as government or industry endorsement of this code or standard.

ASME accepts responsibility for only those interpretations of this document issued in accordance with the established ASME procedures and policies, which precludes the issuance of interpretations by individuals.

No part of this document may be reproduced in any form,
in an electronic retrieval system or otherwise,
without the prior written permission of the publisher.

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

Copyright © 2010 by
THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS
All rights reserved
Printed in U.S.A.



CONTENTS

Foreword	v
Committee Roster	vi
B30 Standard Introduction	viii
Summary of Changes	ix
Chapter 20-0 Scope, Definitions, and References	
Section 20-0.1 Scope of ASME B30.20	1
Section 20-0.2 Definitions — General	1
Section 20-0.3 Definitions for Chapter 20-1	1
Section 20-0.4 Definitions for Chapter 20-2	2
Section 20-0.5 Definitions for Chapter 20-3	8
Section 20-0.6 Definitions for Chapter 20-4	8
Section 20-0.7 Definitions for Chapter 20-5	10
Section 20-0.8 References to Other Codes and Standards	10
Chapter 20-1 Structural and Mechanical Lifting Devices	
Section 20-1.1 Scope	12
Section 20-1.2 Marking, Construction, and Installation	12
Section 20-1.3 Inspection, Testing, and Maintenance	13
Section 20-1.4 Operation	15
Section 20-1.5 Instruction Manuals	16
Chapter 20-2 Vacuum Lifting Devices	
Section 20-2.1 Scope	17
Section 20-2.2 Marking, Construction, and Installation	17
Section 20-2.3 Inspection, Testing, and Maintenance	18
Section 20-2.4 Operation	20
Section 20-2.5 Instruction Manuals	22
Chapter 20-3 Close Proximity Operated Lifting Magnets	
Section 20-3.1 Scope	23
Section 20-3.2 Marking, Construction, and Installation	23
Section 20-3.3 Inspection, Testing, and Maintenance	25
Section 20-3.4 Operation	27
Section 20-3.5 Instruction Manuals	28
Chapter 20-4 Remotely Operated Lifting Magnets	
Section 20-4.1 Scope	30
Section 20-4.2 Marking, Construction, and Installation	30
Section 20-4.3 Inspection, Testing, and Maintenance	31
Section 20-4.4 Operation	32
Section 20-4.5 Instruction Manuals	33
Chapter 20-5 Scrap and Material Handling Grapples	
Section 20-5.1 Scope	35
Section 20-5.2 Marking, Construction, and Installation	35
Section 20-5.3 Inspection, Testing, and Maintenance	35
Section 20-5.4 Operation	37
Section 20-5.5 Instruction Manuals	38
Figures	
20-0.3-1 Pressure-Gripping Lifters: Friction-Type Lifters	3
20-0.3-2 Grip Ratio	4



20-0.3-3	Pressure-Gripping Lifters: Indentation-Type Lifters	4
20-0.3-4	Manipulating Lifters	5
20-0.3-5	Load-Supporting Lifters	6
20-0.4-1	Vacuum Lifters	7
20-0.5-1	Magnetic Lifters	9
20-0.7-1	Scrap and Material-Handling Grapples	11
Table		
20-1.3.4-1	Minimum Inspection for Below-the-Hook Lifting Devices	14



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 ASME Committee on the Protection of Industrial Workers, was presented to the annual meeting of the 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 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 standards (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 the 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.

In this Volume of the Standard, maintenance has been made mandatory, definitions have been revised, and other changes have been made to improve clarity. This edition was approved by the B30 Committee and ANSI and was designated as an American National Standard on May 13, 2010.



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

P. S. Zorich, *Chair*
R. M. Parnell, *Vice Chair*
K. M. Hyam, *Secretary*

STANDARDS COMMITTEE PERSONNEL

N. E. Andrew, Thyssen Krupp Steel USA, LLC
W. T. Hargrove, *Alternate*, QINETIQ North America
R. E. Bluff IV, Gantry Constructors, Inc.
P. A. Boeckman, The Crosby Group
R. J. Bolen, *Consultant*, E. I. DuPont
G. B. Hetherston, *Alternate*, E. I. DuPont
A. D. Brown, Poms and Associates
M. E. Brunet, The Manitowoc Co.
T. A. Christensen, Alliance of American Insurers/Liberty Mutual Insurance
M. W. Mills, *Alternate*, Liberty Mutual Group
B. D. Closson, Craft Forensic Services, Inc.
T. L. Blanton, *Alternate*, NACB Group, Inc.
J. P. Colletti, John P. Colletti & Associates, Inc.
R. A. Dahlin, Walker Magnetics Group
K. M. Jankowski, *Alternate*, Walker Magnetics Group
L. D. DeMark, Equipment Training Solutions, LLC
D. W. Eckstine, Eckstine and Associates
H. G. Leidich, *Alternate*, Leidich Consulting Services
R. J. Edwards, Alliance Concrete Pumps
D. R. Remus, *Alternate*, Reed Manufacturing
E. D. Fidler, The Manitowoc Co.
N. C. Hargreaves, Terex Corp./Power Crane & Slinging Association
C. E. Imerman, *Alternate*, Link-Belt Construction Equipment Co.
J. J. Headley, Crane Institute of America
W. C. Dickinson, *Alternate*, Crane Industry Services, LLC
K. M. Hyam, The American Society of Mechanical Engineers
C. W. Ireland, National Oilwell Varco
A. J. Egging, *Alternate*, National Oilwell Varco
D. C. Jackson, Tulsa Wire Group
P. R. Juhren, Morrow Equipment Co., LLC
R. M. Kohner, Landmark Engineering Services
D. Duerr, *Alternate*, 2DM Associates, Inc.
C. E. Lucas, The Crosby Group
F. P. Mascare, *Alternate*, Bishop Lifting Products, Inc.
A. J. Lusi, International Union of Operating Engineers
E. K. Marburg, Columbus McKinnon Corp.
R. J. Burkey, *Alternate*, Columbus McKinnon Corp.
L. D. Means, Means Engineering and Consulting/Wire Rope Technical Board
D. M. Sleightholm, *Alternate*, Laidon American Corp.
K. J. Miller, Jacobs Engineering
P. E. Whitford, *Alternate*, Haag Engineering
G. L. Owens, *Consultant*
J. Sturm, Crane & Aerial Truck Service
R. M. Parnell, Wire Rope Rigging Consultants/Industrial Training International, Inc.
J. T. Perkins, Engineering Consultant
W. L. Osborn, *Alternate*, Ingersoll-Rand
J. E. Richardson, U.S. Department of the Navy
M. M. Jaxheimer, *Alternate*, Navy Crane Center
D. W. Ritchie, David Ritchie Consultant, LLC
J. D. Wiethorn, *Alternate*, Haag Engineering Co.
J. W. Rowland III, *Consultant*
J. C. Ryan, Boh Brothers Construction Co.
A. R. Ruud, *Alternate*, Atkinson Construction
D. Sayenga, The Cardon Management Group
J. A. Gilbert, *Alternate*, Associated Wire Rope Fabricators
D. W. Smith, Chicago Bridge and Iron Co.
S. K. Rammelsberg, *Alternate*, Chicago Bridge and Iron Co.
W. J. Smith, Jr., NBIS Claims and Risk Management, Inc.
R. G. Strain, Advanced Crane Technologies, LLC
P. D. Sweeney, General Dynamics/Electric Boat
A. R. Toth, Morris Material Handling
B. E. Weir, Jr., National Erectors Association/Norris Brothers Co., Inc.
J. R. Schober, *Alternate*, American Bridge Co.
R. C. Wild, U.S. Army Corps of Engineers
E. B. Stewart, *Alternate*, U.S. Army Corps of Engineers
D. N. Wolff, National Crane/Manitowoc Crane Group
A. L. Calta, *Alternate*, Manitowoc Crane Group
P. S. Zorich, RZP International Ltd.
H. W. Fair, *Alternate*, H. Fair Associates, Inc.

HONORARY MEMBERS

J. W. Downs, Jr., Downs Crane and Hoist Co.
J. J. Franks, *Consultant*
J. M. Klibert, Lift-All Co., Inc.
R. W. Parry, *Consultant*



B30.20 SUBCOMMITTEE PERSONNEL

R. A. Dahlin, *Chair*, Walker Magnetics Group
K. M. Jankowski, *Alternate*, Walker Magnetics Group
B. Baker, Young Corp.
G. A. Bond, Woods Power-Grip Co., Inc.
P. W. Boyd, The Boeing Co.
H. D. Bradley, *Honorary Member*, Consultant
R. M. Cutshall, Savannah River Nuclear Solutions
C. M. Robison, *Alternate*, Oak Ridge National Lab
J. W. Downs, Jr., Downs Crane and Hoist Co.
D. Duerr, 2DM Associates, Inc.

J. D. Edmundson, Morris Material Handling
T. Hayward, The Caldwell Group, Inc.
F. G. Heath, Heath & Associates
T. C. Mackey, WRPS Hanford
L. Radu, Mazzella Lifting Technologies
D. T. Rebbin, Bradley Lifting Corp.
C. D. Meads, *Alternate*, Bradley Lifting Corp.
B. E. Schaltenbrand, *Honorary Member*, Consulting Engineer
P. D. Sweeney, General Dynamics/Electric Boat
D. R. Verenski, Hunter Lift, Ltd.
T. J. Brookbank, *Alternate*, Hunter Lift, Ltd.



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

(10)

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, 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 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 Cranes
- B30.25 Scrap and Material Handlers
- B30.26 Rigging Hardware
- B30.27 Material Placement Systems
- B30.28 Balance Lifting Units¹
- B30.29 Self-Erect Fast Erect Tower Cranes¹

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.

¹ These volumes are 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. 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 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.