ASME B30.9-2006
(Revision of ASME B30.9-2003)

Slings

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

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

ASME B30.9-2006

(Revision of ASME B30.9-2003)

Slings

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

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

Three Park Avenue • New York, NY 10016

Date of Issuance: May 4, 2007

The next edition of this Standard is scheduled for publication in 2010. 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.

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

CONTENTS

Figures

Tables

(06)

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 (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 on November 4, 1926, with 57 members representing 29 national organizations. The Safety Code for Cranes, Derricks, and Hoists, ASA B30.2-1943, was created from the eight-page document referred to in the first paragraph. This document was reaffirmed in 1952 and widely accepted as a safety standard.

Due to changes in design, advancement in techniques, and general interest of labor and industry in safety, the Sectional Committee, under the joint sponsorship of ASME and the Naval Facilities Engineering Command, U.S. Department of the Navy, was reorganized as an American National Standards Committee on January 31, 1962, with 39 members representing 27 national organizations.

The format of the previous code was changed so that separate volumes (each complete as to construction and installation; inspection, testing, and maintenance; and operation) would cover the different types of equipment included in the scope of B30.

In 1982, the Committee was reorganized as an Accredited Organization Committee, operating under procedures developed by ASME and accredited by the American National Standards Institute.

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, 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.

Following approval by the Standards Committee and the ASME Board, ASME B30.9-2006, Slings was approved as an American National Standard by ANSI on November 13, 2006.

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*
B. D. Closson, *Vice Chair*
J. D. Wendler, *Secretary*

STANDARDS COMMITTEE PERSONNEL

N. E. Andrew, Northrop Grumman Ship Systems
W. T. Hargrove, *Alternate,* Mantech International Corp.
R. E. Bluff IV, Gantry Constructors, Inc.
R. J. Bolen, Consultant
G. B. Hetherston, *Alternate,* E. I. DuPont
A. D. Brown, A. D. Brown, Inc.
M. E. Brunet, Manitowoc Crane Group
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
J. W. Downs, Jr., *Alternate,* Downs Crane and Hoist Co.
L. D. DeMark, International Union of Operating Engineers
A. J. Lusi, *Alternate,* International Union of Operating Engineers
D. W. Eckstine, Eckstine and Associates
R. J. Edwards, Schwing America
D. R. Remus, *Alternate,* Reed Manufacturing
J. L. Gordon, Acco Chain and Lifting Products
N. C. Hargreaves, Terex Corp./Power Crane & Shovel Association
E. D. Fidler, *Alternate,* Grove Worldwide
J. J. Headley, Crane Institute of America
C. W. Ireland, National Oilwell
A. J. Egging, *Alternate,* National Oilwell
L. S. Johnson, Fluor Construction Technology
E. P. Vliet, *Alternate,* Turner Industries
R. M. Kohner, Landmark Engineering Services
H. I. Shapiro, *Alternate,* Specialized Carriers and Rigging Association/Howard I. Shapiro & Associates
C. E. Lucas, The Crosby Group
P. A. Boeckman, *Alternate,* The Crosby Group
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,* Bridon American Corp.
K. J. Miller, Jacobs Engineering
D. W. Smith, *Alternate,* Chicago Bridge and Iron Co.
G. L. Owens, Granite Construction, Inc.
R. M. Parnell, Wire Rope Rigging Consultants/Industrial Training International
P. D. Sweeney, *Alternate,* General Dynamics, Electric Boat
J. V. Perkins, Ingersoll-Rand
H. G. Leidich, *Alternate,* Ingersoll-Rand
J. E. Richardson, U.S. Department of the Navy
D. W. Ritchie, St. Paul Companies
W. P. Rollins, Manitowoc Crane Group
J. W. Rowland III, Consultant
J. C. Ryan, Boh Bros. Construction Co.
A. R. Ruud, *Alternate,* Atkinson Construction
D. Sayenga, Associated Wire Rope Fabricators
J. A. Gilbert, *Alternate,* Associated Wire Rope Fabricators
G. W. Shields, Caterpillar, Inc.
W. J. Smith, Jr., Nations Builders Insurance Services
R. G. Strain, Advanced Automation Associates, Inc.
J. B. Hamill, *Alternate,* Advanced Automation Associates, Inc.
A. R. Toth, Morris Material Handling
B. E. Weir, Jr., National Erectors Association/Norris Brothers Co., Inc.
J. D. Wendler, The American Society of Mechanical Engineers
R. C. Wild, U.S. Army Corps of Engineers
D. N. Wolff, National Crane Corp.
A. L. Calta, *Alternate,* National Crane Corp.
P. S. Zorich, RZP International Ltd.
H. W. Fair, *Alternate,* H. Fair Associates, Inc.

HONORARY MEMBERS

J. M. Klibert, Lift-All Co., Inc.
R. W. Parry, Consultant

B30.9 SUBCOMMITTEE PERSONNEL

L. D. Means, *Chair,* Means Engineering and Consulting/Wire Rope Technical Board
N. E. Andrew, Northrop Grumman Ship Systems
D. J. Bishop, Bishop Lifting Products
T. L. Blanton, NACB Group
P. A. Boeckman, The Crosby Group
D. R. Decker, Navy Crane Center
C. Domino, Naval Weapons Station
M. J. Gelskey, Lift-It Manufacturing
J. A. Gilbert, Associated Wire Rope Fabricators
M. A. Kowalick, Liftex
C. E. Lucas, The Crosby Group
M. G. Neuzil, Six Flags
R. M. Parnell, Wire Rope Rigging Consultants/Industrial Training International
D. A. Richards, Southwest Ocean Services
D. Sayenga, Associated Wire Rope Fabricators
B. D. Todd, Campbell Chain
J. P. van Niekerk, Columbus McKinnon Corp.

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

B30 STANDARD INTRODUCTION

(07)

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 (NOTE: B30.15-1973 has been withdrawn. The revision of B30.15 is included in the latest edition of B30.5.)
B30.16 Overhead Hoists (Underhung)
B30.17 Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)
B30.18 Stacker Cranes (Top or Under Running Bridge, Multiple Girder With Top or Under Running Trolley Hoist)
B30.19 Cableways
B30.20 Below-the-Hook Lifting Devices
B30.21 Manually Lever Operated Hoists
B30.22 Articulating Boom Cranes
B30.23 Personnel Lifting Systems
B30.24 Container Cranes*
B30.25 Scrap and Material Handlers
B30.26 Rigging Hardware
B30.27 Material Placement Systems
B30.28 Balance Lifting Units*

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.

* 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

The 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

The 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.

ASME B30.9-2006
SUMMARY OF CHANGES

Following approval by the ASME B30 Committee and ASME, and after public review, ASME B30.9-2006 was approved by the American National Standards Institute on November 13, 2006.

ASME B30.9-2006 includes editorial changes, revisions, and corrections identified by a margin note, **(06)**.

Page	*Location*	*Change*
vi	Foreword	Updated
ix–xi	Introduction	Revised
1–3	Section 9-0.1	Revised
	Section 9-0.2	(1) Definitions of *D/d ratio*, *fabric thickness (metal mesh)*, and *strength (wire rope and structural strand)* revised (2) Definition of *horizontal angle* added
	Section 9-0.3	Revised
4	Section 9-1.0	Revised
	9-1.2.2	Subparagraph (d) revised and subpara. (e) added
	9-1.2.3	Revised
	9-1.3.2	Subparagraph (b) redesignated as (c) and new subpara. (b) added
	9-1.5.2	Second line revised
5	Fig. 1	Revised
6	Table 1	Revised
	Table 2	Revised
7	Table 3	Added
	Table 4	Added
8	9-1.5.5	Revised
	9-1.7.1	Subparagraph (e) revised and subpara. (g) added
	9-1.8.2	Revised
9	Table 5	Column heads revised
	9-1.9.3	Editorially revised
	9-1.9.4	Subparagraph (k) redesignated as (l) and new subpara. (k) added
10	9-1.10.4	Subparagraphs (d) and (j) revised
11	Section 9-2.0	Revised
	9-2.2.1	Revised

Page	*Location*	*Change*
	9-2.2.2	Subparagraph (b) revised and subpara. (d) added
	9-2.2.3	Editorially revised
	9-2.3.1(a)(1)	Revised
12	Fig. 4	Revised
14	9-2.7.1(d)	Added
	9-2.8.2	Revised
	9-2.9.3	Editorially revised
15	9-2.9.4	Subparagraph (i) redesignated as (j) and new subpara. (i) added
16	9-2.10.4	Subparagraphs (d) and (j) revised
25	Table 15	Title editorially revised
26	Section 9-3.0	Revised
	9-3.2.4	Revised
	9-3.3.2	Editorially revised
29	9-3.7.1	Subparagraphs (d) and (e) added
	9-3.8.2	Revised
	9-3.9.3	Editorially revised
30	9-3.10.1(d)	Editorially revised
	9-3.10.4	Subparagraphs (d) and (m) revised
31	Section 9-4.0	Revised
	9-4.2.1	Revised
	9-4.2.3	Subparagraphs (g) and (h) revised and subpara. (i) added
	9-4.2.4	Revised
32	9-4.3.1(f)	Revised
35	9-4.7.1(e)	Added
38	9-4.8.1	Revised
	9-4.8.2	Revised
	9-4.8.3	Revised
	9-4.9.3	Editorially revised
39	9-4.9.4	Subparagraph (l) redesignated as (n) and new subparas. (l) and (m) added
40	9-4.10.4	Subparagraphs (d) and (f) revised
41	Section 9-5.0	Revised
	9-5.2.2	Revised
	9-5.2.4	Subparagraph (d) revised and subpara. (e) added
	9-5.2.5	Revised

Page	*Location*	*Change*
44	Table 22	(1) Values for 8-in., 10-in., and 12-in. vertical basket revised (2) General Note (a) revised
45	Table 23	(1) Values for 8-in., 10-in., and 12-in. vertical basket revised (2) General Note (a) revised
46	9-5.7.1(e)	Added
	9-5.8.2	Revised
	9-5.8.3	Added
47	9-5.9.3	Editorially revised
	9-5.9.4	Subparagraph (k) redesignated as (l) and new subpara. (k) added
48	9-5.10.4	Subparagraphs (d), (j), and (q) revised
49	Section 9-6.0	Revised
	9-6.2.4	Subparagraph (d) revised and subpara. (e) added
	9-6.2.5	Editorially revised
51	9-6.7.1(f)	Added
	9-6.8.2	Revised
52	9-6.9.3(c)	Editorially revised
	9-6.9.4	Revised
53	9-6.10.4	Subparagraphs (c) and (i) revised

SPECIAL NOTE:

The interpretations to ASME B30.9 are included in this edition as a separate section for the user's convenience.

SLINGS

Chapter 9-0
Scope, Definitions, and References

(06) SECTION 9-0.1: SCOPE OF ASME B30.9

Volume B30.9 includes provisions that apply to the fabrication, attachment, use, inspection, and maintenance of slings used for lifting purposes, used in conjunction with equipment described in other volumes of the B30 Standard, except as restricted in B30.12 and B30.23. Slings fabricated from alloy steel chain, wire rope, metal mesh, synthetic fiber rope, synthetic webbing, and synthetic fiber yarns in a protective cover(s) are addressed. Slings fabricated from other materials or constructions other than those detailed in this Volume shall be used only in accordance with the recommendations of the sling manufacturer or a qualified person.

(06) SECTION 9-0.2: DEFINITIONS

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

abrasion: the mechanical wearing of a surface resulting from frictional contact with other materials or objects.

angle of choke: angle formed in a sling body as it passes through the choking eye or fittings.

angle of loading: the acute angle between horizontal and the leg of the rigging, often referred to as horizontal angle.

assembly: a synonym for sling. See *sling.*

authorized: approved by a duly constituted administrative or regulatory authority.

body (sling): that part of a sling between the eyes, end fittings, or loop eyes.

braided wire rope: a rope formed by plaiting component wire ropes.

braided wire rope sling: a sling made from braided rope.

bridle sling: a sling composed of multiple legs with the top ends gathered in a fitting that goes over the lifting hook.

cable-laid rope: a cable composed of six wire ropes laid as strands around a wire rope core.

cable-laid rope sling, mechanical joint: a wire rope sling made from a cable-laid wire rope with eyes fabricated by swaging one of more metal sleeves over the rope junction.

component: see *fitting.*

cross rod: a wire used to join spirals of metal mesh to form the complete fabric.

D/d ratio: the ratio between the curvature taken by the sling, *D*, and the diameter of the component rope, *d*.

design factor: ratio between nominal or minimum breaking strength and rated load of the sling.

designated person: selected or assigned by the employer or employer's representative as being competent to perform specific duties.

end fitting: terminal hardware on the end of a sling. See *sling*.

endless and grommet wire rope slings

cable-laid endless sling, mechanical joint: a wire rope sling made endless from one continuous length of cable laid rope with the ends joined by one or more metallic fittings.

cable-laid grommet, hand-tucked: an endless wire rope sling made from one continuous length of rope formed to make a body composed of six ropes around a rope core. The rope ends are tucked into the body, thus forming the core. No sleeves are used.

strand-laid endless sling, mechanical joint: a wire rope sling from one continuous length of wire rope with the ends joined by one or more metallic fittings.

strand-laid grommet, hand-tucked: an endless wire rope sling made from one continuous length of strand formed to make a six-strand rope with a strand core. The strand ends are hand tucked into the body. No sleeves are used.

eye opening: the opening in the end of a sling for the attachment of the hook, shackle, or other lifting device or the load itself.