ASME BTH-1–2008
(Revision of ASME BTH-1–2005)

Design of Below-the-Hook Lifting Devices

AN AMERICAN NATIONAL STANDARD

The American Society of Mechanical Engineers

ASME
SETTING THE STANDARD

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Date of Issuance: January 9, 2009

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FOREWORD

There have been many formal requests for interpretation of the limited structural design criteria stated within ASME B30.20, Below-the-Hook Lifting Devices, a safety standard. As a consequence, industry has for quite some time expressed a need for a comprehensive design standard for below-the hook lifting devices that would complement the safety requirements of ASME B30.20. All editions of ASME B30.20 included structural design criteria oriented toward the industrial manufacturing community requiring a minimum design factor of three, based on the yield strength of the material; recent editions also included design criteria for the fatigue failure mode. However, members of the construction community expressed the need for design criteria more suitable to their operating conditions, including a lower design factor, and the necessity to address other failure modes such as fracture, shear and buckling, and design topics, such as impact and fasteners.

A Design Task Group was created in 1997 to begin work on a design standard as a companion document to ASME B30.20. The ASME BTH Standards Committee on the Design of Below-the-Hook Lifting Devices was formed out of the Design Task Group and held its organizational meeting on December 5, 1999.

ASME BTH-1–2005, Design of Below-the-Hook Lifting Devices, contained five chapters: Scope and Definitions, Lifter Classifications, Structural Design, Mechanical Design, and Electrical Components. This Standard, intended for general industry and construction, sets forth two design categories for lifters based on the magnitude and duration of loading; and operating and environmental conditions. The two design categories provide different design factors for determining allowable static stress limits. Five Service Classes, based on load cycles, are provided. The Service Class establishes allowable stress range values for lifter structural members and design parameters for mechanical components. ASME BTH-1–2005 was approved by the American National Standards Institute on October 18, 2005.

A nonmandatory Commentary, which immediately follows applicable paragraphs, is included to provide background for the Standard's provisions. Users are encouraged to consult it.

This edition of ASME BTH-1 incorporates editorial revisions and two new mechanical design sections for grip ratio and vacuum lifting device design. ASME BTH-1–2008 was approved by the American National Standards Institute on September 17, 2008.

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ASME BTH STANDARDS COMMITTEE
Design of Below-the-Hook Lifting Devices

(The following is the roster of the Committee at the time of approval of this Standard.)

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General. ASME Standards are developed and maintained with the intent to represent the consensus of concerned interests. As such, users of this Standard may interact with the Committee by requesting interpretations, proposing revisions, and attending Committee meetings. Correspondence should be addressed to:

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

Proposing Revisions. Revisions are made periodically to the Standard to incorporate changes that appear necessary or desirable, as demonstrated by the experience gained from the application of the Standard. Approved revisions will be published periodically.

The Committee welcomes proposals for revisions to this Standard. Such proposals should be as specific as possible, citing the paragraph number(s), the proposed wording, and a detailed description of the reasons for the proposal, including any pertinent documentation.

Interpretations. Upon request, the BTH Committee will render an interpretation of any requirement of the Standard. Interpretations can only be rendered in response to a written request sent to the Secretary of the BTH Standards Committee.

The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his/her request in the following format:

Subject:	Cite the applicable paragraph number(s) and the topic of the inquiry.
Edition:	Cite the applicable edition of the Standard for which the interpretation is being requested.
Question:	Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings that are necessary to explain the question; however, they should not contain proprietary names or information.

Requests that are not in this format may be rewritten in the appropriate format by the Committee prior to being answered, which may inadvertently change the intent of the original request.

ASME procedures provide for reconsideration of any interpretation when or if additional information that might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME Committee or Subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.

Attending Committee Meetings. The BTH Standards Committee regularly holds meetings, which are open to the public. Persons wishing to attend any meeting should contact the Secretary of the BTH Standards Committee.

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ASME BTH-1–2008
SUMMARY OF CHANGES

Following approval by the ASME BTH Standards Committee and ASME, and after public review, ASME BTH-1–2008 was approved by the American National Standards Institute on September 17, 2008.

ASME BTH-1–2008 includes editorial changes, revisions, and corrections identified by a margi note, **(08)**.

Page	*Location*	*Change*
5	1-5.3	Revised in its entirety
6, 7	Commentary to 1-6	Reference to AISE updated to AIST
	1-6.1	a, C_r, D_p, and ϕ added
8	1-6.2	Revised
9–11	Commentary to 1-7	Revised
19	3-2.3.2	Second paragraph revised
24, 25	3-3.3.1	Revised
	Fig. C3-3	Revised
26	3-3.3.5	First paragraph deleted and Commentary revised
40	Commentary to 4-1.1	Reference to AISE updated to AIST
47, 48	4-9	Added
	4-10	Added
49	Commentary to 5-2.5	Reference to AISE updated to AIST
50	5-3.2	Revised
	5-3.3	Revised
	5-3.5	Revised
	5-3.7	Revised
51	5-4.3	Last sentence revised
	5-4.4	Title and last sentence revised
52	5-7.1	Title revised

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DESIGN OF BELOW-THE-HOOK LIFTING DEVICES

Chapter 1
Scope and Definitions

1-1 PURPOSE

This Standard sets forth design criteria for ASME B30.20 below-the-hook lifting devices. This Standard serves as a guide to designers, manufacturers, purchasers, and users of below-the-hook lifting devices.

Commentary: This Standard has been developed in response to the need to provide clarification of the intent of ASME B30.20 with respect to the structural design of below-the-hook lifting devices. Since the original publication of ASME B30.20 in 1986, users have requested interpretations of the construction (structural design) requirements stated therein. The level of detail required to provide adequate answers to the questions submitted extends beyond that which can be covered by interpretations of a B30 safety standard.

1-2 SCOPE

This Standard provides minimum structural and mechanical design and electrical component selection criteria for ASME B30.20 below-the-hook lifting devices.

The provisions in this Standard apply to the design or modification of below-the-hook lifting devices. Compliance with requirements and criteria that may be unique to specialized industries and environments is outside of the scope of this Standard.

Lifting devices designed to this Standard shall comply with ASME B30.20, Below-the-Hook Lifting Devices. ASME B30.20 includes provisions that apply to the marking, construction, installation, inspection, testing, maintenance, and operation of below-the-hook lifting devices.

Commentary: ASME BTH-1 addresses only design requirements. As such, this Standard should be used in conjunction with ASME B30.20, which addresses safety requirements. ASME BTH-1 does not replace ASME B30.20. The design criteria set forth are minimum requirements that may be increased at the discretion of the lifting device manufacturer or a qualified person.

1-3 NEW AND EXISTING DEVICES

The effective date of this Standard shall be one year after its date of issuance. Lifting devices manufactured after the effective date shall conform to the requirements of this Standard.

When a lifter is being modified, its design shall be reviewed relative to this Standard, and the need to meet this Standard shall be evaluated by the manufacturer or a qualified person.

Commentary: It is not the intent of this Standard to require retrofitting of existing lifting devices.

1-4 GENERAL REQUIREMENTS

1-4.1 Design Responsibility

Lifting devices shall be designed by, or under the direct supervision of, a qualified person.

Commentary: Although always implied, this provision now explicitly states that the design of below-the-hook lifting devices is the responsibility of a qualified person. This requirement has been established in recognition of the impact that the performance of a lifting device has on workplace safety, the complexity of the design process, and the level of knowledge and training required to competently design lifting devices.

1-4.2 Units of Measure

A dual unit format is used. Values are given in U.S. Customary units as the primary units followed by the International System of Units (SI) in parentheses as the secondary units. The values stated in U.S. Customary units are to be regarded as the standard. The SI units in the text have been directly (softly) converted from U.S. Customary units.

Commentary: The requirements of this Standard are presented wherever possible in a manner that is dimensionally independent, thus allowing application of these requirements using either U.S. Customary units

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