Overhead Underhung and Stationary Hoists
September 2021 Draft Revisions
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 an 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, 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 organized 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 just addressing 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 the initial publication of B30.3, B30.5, B30.6, B30.11, and B30.16 being designated 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 either 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 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.

The first edition of B30.16 was published in 1973. New editions were published in 1981, 1987, 1993, 1998, 2003, 2007, and 2012. The 2012 edition of this Standard included a major revision to Chapter 16-2 and the addition of Chapter 16-4. The sections on maintenance of hoist components in Chapter 16-2 were moved to Chapter 16-4, along with other updates to the Standard. In this 2017 edition, revisions were made to reflect current technology and terminology. The 2017 revision addressed overhead underhung and stationary hoists and included new information regarding personnel competence, inclusion of hoist duty service classification on labels of powered hoists, requirements for presentation of technical and safety-related information, pitch diameter requirements for sheaves and drums, a referenced standard for supporting structures, general inspection requirements, and responsibilities for riggers and signalpersons. This revision includes references to B30.30, updates in sections pertaining to inspections, overtravel protection, translation language, load test, land added the angle of loading definition.

This Volume of the Standard, which was approved by the B30 Committee and ASME, was approved by ANSI and designated an American National Standard on TBD.
Records included in this draft.

<table>
<thead>
<tr>
<th>Ballot</th>
<th>Record</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-2037RC1</td>
<td>20-1531</td>
<td>Add the Angle of Loading</td>
</tr>
<tr>
<td>20-2038</td>
<td>20-1532</td>
<td>Revisions to 16-2.2.2 Load Test</td>
</tr>
<tr>
<td>20-2039</td>
<td>20-1533</td>
<td>Revise Translation Verbiage</td>
</tr>
<tr>
<td>20-3547RC1</td>
<td>20-2605</td>
<td>B30.16 Changes to Section 16-1.2.14</td>
</tr>
<tr>
<td>21-1070</td>
<td>21-732</td>
<td>Update the references</td>
</tr>
<tr>
<td>21-1071</td>
<td>21-733</td>
<td>Inspection Reorg and B30.30 Incorporation.</td>
</tr>
<tr>
<td>21-2017</td>
<td>21-1490</td>
<td>B30.16 Revise Item 16-1.2.17 (e)</td>
</tr>
</tbody>
</table>
Proposal to Add the Angle of Loading to the 2022 Revision to ASME B30.16 Ballot 20-2037 Updated 1-7-21 for recirculation.

Note that changes since the first ballot are highlighted in yellow.

Angle of Loading:

Add Definition: **Angle of Loading: The angle between a hoist rope or load chain and the vertical axis**

(See Figure 16-0.1-7)

**Figure 16-0.1-7 Angle of Loading**

16-1.2.1 Mechanical Design

(a) The hoist and appurtenances shall be designed to withstand all stresses imposed under normal operating conditions while handling loads within the rated load.

(b) Load suspension parts, except for roller load chain, of hand-chain-operated hoists shall be designed so that the static stress calculated for the rated load shall not exceed 25% of the minimum tensile strength. The maximum encountered angle of loading, (See Figure 16-0.1.7) under normal operating conditions, shall be considered in determining the maximum load. Roller load chain shall be designed so that the static stress calculated for the rated load shall not exceed 25% of the minimum tensile strength as stated in ASME B29.24.

(c) Load suspension parts, except for roller load chain, of electric-powered or air-powered hoists shall be designed so that the static stress calculated for the rated load shall not exceed 20% of the minimum tensile strength. The maximum encountered angle of loading, (See Figure 16-0.1.7) under normal operating conditions, shall be considered in determining the maximum load. Roller load chain shall be designed so that the static stress calculated for the rated load shall not exceed 20% of the minimum tensile strength as stated in ASME B29.24.

16-1.2.6 Ropes (Electric- or Air-Powered Hoists Only)

(a) The hoisting ropes shall be of a construction recommended for hoist service. The rated load divided by the number of parts (lines) of rope shall not exceed 20% of the minimum breaking force of the rope. When rope and rope core may be exposed to an environmental condition under which rope or core would be damaged, a rope and core having resistance to the conditions shall be used. The maximum encountered angle of loading, (See Figure 16-0.1.7) under normal operating conditions, shall be considered in determining the maximum load on the rope and this maximum load shall not exceed 20% of the minimum breaking force of the rope.
Proposal to Revise the Load Test Requirement Verbiage for the 2022 Revision of ASME B30.16
Approved by SC on May 7, 2020

Load Test Requirement After Replacing Rope or Chain:

16-2.2.2 Load Test

(a) Hand-Chain-Operated Hoists

(1) New hoists shall be load tested by the manufacturer using the method specified in para. 16-2.2.1(a)(1) with a test load of not less than 125% of the rated load. If load testing of the hoist cannot be performed by the manufacturer, the user shall be notified and the load test shall be accomplished at another location or job site, by or under the direction of a designated person, prior to the hoist being placed in service.

(2) Hoists in which load-suspension parts have been altered, replaced, or repaired should be statically or dynamically load tested as determined by a qualified person. If a qualified person determines that a load test is required, the load test shall be performed.

(-a) If a load test is conducted, the load test shall be conducted by or under the direction of a designated person. Lifting and lowering functions shall be tested. (Testing through complete rated lift length is not required.)

(-b) If the load test is conducted, the test load shall not be less than 100% of the rated load of the hoist or more than 125% of the rated load of the hoist unless otherwise recommended by the hoist manufacturer or a qualified person.

(-c) If a load test is conducted, the person conducting the load test shall prepare a written report of the load sustained during the test and the operations performed during the test. Reports shall be placed on file.

(-d) The replacement of load chain is specifically excluded from this load test; if a qualified person determines the replacement chain is acceptable suitable for the intended use. However, an operational test of the hoist shall be made in accordance with para. 16-2.2.1(a)(2) prior to putting the hoist back in service.

(b) Electric-Powered or Air-Powered Hoists

(1) Complete new hoists shall be dynamically load tested by the manufacturer using the method specified in paras. 16-2.2.1(b)(1) and (b)(2) with a test load of not less than 125% of the rated load. If testing of the hoist cannot be performed by the manufacturer, the user shall be notified and the load test shall be accomplished at another location or job site, by or under the direction of a designated person, prior to the hoist being placed in service.

(2) Hoists in which load-suspension parts have been altered, replaced, or repaired should be statically or dynamically load tested as determined by a qualified person.

(-a) If a load test is conducted, the load test shall be conducted by or under the direction of a designated person.

(-1) Lifting and lowering functions shall be tested. (Testing through complete rated lift length is not required.)

(-2) Operation of brake(s) shall be tested.

(-b) If a load test is conducted, the test load shall not be less than 100% of the rated load of the hoist or more than 125% of the rated load of the hoist unless otherwise recommended by the hoist manufacturer or a qualified person.
(c) If a load test is conducted, the person conducting the load test shall prepare a written report of the load sustained during the test and the operations performed during the test. Reports shall be placed on file.

(d) The replacement of load chain or rope is specifically excluded from this load test; if a qualified person determines the replacement chain or rope is acceptable suitable for the intended use. However, an operational test of the hoist shall be made in accordance with paras. 16-2.1(b)(1), (b)(2), and (b)(3) prior to putting the hoist back in service.
Proposal to Revise Translation Verbiage for the 2022 Revision to ASME B30.16 Approved by SC on May 7, 2020

Translation language:

16-1.1.5 Technical and Safety-Related Information

The manufacturer shall provide instructions [manual(s)] for the operation, inspection, testing, maintenance, assembly, and disassembly of the hoist equipment.

(a) The instructions shall be provided in a language specified by the purchaser at the time of the initial sale by the manufacturer.

(b) Pictograms used to identify controls shall be described in the instructions. The pictograms should comply with ISO 7000, ISO 7296, or another recognized source, if previously defined.

(c) Translations of the original language instructions (if the manufacturer no longer exists, translation of the instructions with the machine is acceptable) shall meet professional translation industry standards, which include, but are not limited to, the following: if the manufacturer no longer exists, or if the language required is not available from the manufacturer, translation of the instructions with the machine hoist is acceptable. Translations of the original language instructions shall meet professional translation industry standards, which include, but are not limited to, the following:

   (1) translating the complete paragraph message, instead of word by word
   (2) ensuring grammatical accuracy
   (3) preserving the source document content with-out omitting or expanding the text
   (4) translating the terminology accurately
   (5) reflecting the level of sophistication of the original document

(d) The finished translation shall be verified for compliance with (c)(1) through (c)(5) by a qualified person having an understanding of the technical content of the subject matter.

(e) The entities responsible for the operation use, inspection, testing, maintenance, assembly and disassembly of the hoist shall have the technical and safety-related information available in a language that their employees can read and understand. If the information is not available in a language understood by their employees, the entities shall obtain a translation of the original manufacturer’s technical and safety related information from the manufacturer or from a translation service provider. The translation(s) shall meet the requirements of Section 16-1.1.5 (c) and (d).
16-1.2.14 Overtravel Protection (Electric or Air Powered Hoists Only)

(a) **Rope Hoists**: The hoist shall be so designed and constructed that the load hook, either loaded or empty, shall not exceed the upper limit of travel. If a geared or other lift-limiting device that operates in relation to drum turns is used, an additional lift-limiting device that operates independently of drum rotations shall be provided. The activation point of all lift-limiting devices shall be located to allow the braking system to safely stop motion at maximum operating speed being used for maximum stopping distance of the motion being stopped at maximum speed for the braking system being used.

(b) **Chain Hoists**: The hoist shall be so designed and constructed that it will prevent the load chain from being completely run out of the hoist, and that the load hook, either loaded or empty, shall not exceed the upper or lower limit of travel and will also prevent the load chain from being completely run out of the hoist. The activation point of all limit devices shall be located to allow the braking system to safely stop motion at maximum operating speed being used for maximum stopping distance of the motion being stopped at maximum speed for the braking system being used. If installed, the Overtravel protection components shall be designed by the manufacturer according to the requirements of para. 16-1.2.1(a). The use of a travel-limiting clutch as overtravel protection is permitted. If a travel-limiting clutch is used, the hoist shall be equipped with a chain end restraint capable of withstanding a load on the chain equal to the load on the chain at full hoist capacity plus the load on the chain required to activate the travel limiting clutch.
B30.16 OVERHEAD HOISTS (UNDERHUNG)

Chapter 16-0  Scope, Definitions, and References

SECTION 16-0.4: REFERENCES

The following is a list of standards and specifications referenced in this Standard.

Publisher: Aluminum Association, Inc. (AA), 1400 Crystal Drive, Suite 430, Arlington, VA 22202 (http://www.aluminum.org)

Publisher: American Institute of Steel Construction (AISC), 130 East Randolph Street, Suite 2000, Chicago, IL 60601 (http://www.aisc.org)

ANSI/ECMA 15-2010 ECMA 15-2018, Specifications for Cable-less Controls for Electric Overhead Traveling Cranes
Publisher: Monorail Manufacturers Association, Inc. (MMA), 8720 Red Oak Boulevard, Charlotte, NC 28217 (http://www.mhia.org/industrygroups/mma)

ANSI Z535.4-2007 Z535.4-2011, Product Safety Signs and Labels
Publisher: National Electrical Manufacturers Association (NEMA), 1300 North 17th Street, Suite 900, Arlington, VA 22209 (http://www.nema.org)

ANSI/NFPA 70-2011 70-2020, National Electrical Code
Publisher: National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471 (http://www.nfpa.org)

ASME B29.24-2002 B29.24-2016, Roller Load Chains for Overhead Hoists (R2009)
ASME B30.9-2014 B30.9-2018, Slings
ASME B30.10-2014 B30.10-2019, Hooks
ASME B30.11-2010, Monorails and Underhung Cranes
ASME B30.17-2015, Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)

ASME B30.20-2018, Below the Hook Lifting Devices
ASME B30.26-2020, Rigging Hardware


ASME HST-4-1999 HST-4-2016, Performance Standard for Overhead Electric Wire Rope Hoists
ASME HST-5-1999 HST-5-2020, Performance Standard for Air Chain Hoists
ASME HST-6-1999 HST-6-2020, Performance Standard for Air Wire Rope Hoists
Chapter 16-1  Marking, Construction, and Installation

16-1.3.2 Support

The supporting structure, including trolleys, monorail, or crane, shall be designed to withstand the loads and forces imposed by the hoist for the rated load. The supporting structure should conform to the design parameters as specified in the applicable AISC Manual of Steel Construction Specification for Structural Steel Buildings, Aluminum Design Manual, or applicable design manual or standard for the material used.
SECTION 16-0.2: DEFINITIONS

**rope:** refers to wire rope unless otherwise specified. refers to wire rope or synthetic rope per ASME B30.30.

SECTION 16-0.4: REFERENCES

The following is a list of standards and specifications referenced in this Standard.

ASME B30.30-2019, Ropes
Publisher: The American Society of Mechanical Engineers (ASME), Two Park Avenue, New York, NY 10016-5990 (http://www.asme.org)

Chapter 16-1 Marking, Construction, and Installation

SECTION 16-1.2: CONSTRUCTION

16-1.2.6 Ropes (Electric- or Air-Powered Hoists Only)

*(a)* The hoisting ropes shall be of a construction recommended for hoist service. For further guidance on rope selection, see ASME B30.30 Sections 30-1.3.1.4 for wire rope or 30-2.3.2.4 for synthetic rope. The rated load divided by the number of parts (lines) of rope shall not exceed 20% of the minimum breaking force of the rope. The maximum angle of loading, (See Figure 16-0.1.7) under normal operating conditions, shall be considered in determining the maximum load on the rope and this maximum load shall not exceed 20% of the minimum breaking force of the rope.

*(b)* Socketing shall be done in a manner recommended by the rope or fitting manufacturer or a qualified person.

*(c)* The rope ends shall be attached to the hoist in a manner to prevent disengagement throughout rated hook travel. No less than two wraps of rope shall remain on each anchorage of the hoist drum when the hook is in its extreme low position unless a lower-limit device is provided, in which case no less than one wrap shall remain on each anchorage of the hoist drum.

*(d)* Eye splices shall be made in a manner recommended by the rope or hoist manufacturer or a qualified person. Rope thimbles should be used in the eye.

*(e)* Wire rope clips shall be drop-forged steel of the single-saddle type (U-bolt) or double-saddle type clip. Malleable cast iron clips shall not be used. For spacing, number of clips, and torque values, refer to the clip manufacturer’s recommendation. Wire rope clips attached with U-bolts shall have the U-bolt over the dead end of the rope and the live rope resting in the clip saddle. Clips shall be tightened evenly to the recommended torque. After the initial load is applied to the rope, the clip nuts shall be retightened to the recommended torque to compensate
for any decrease in rope diameter caused by the load. Rope clip nuts should be retightened periodically to compensate for any further decrease in rope diameter during usage.

(f) Swaged or compressed fittings shall be applied as recommended by the rope, hoist, or fitting manufacturer or a qualified person.

(b) For environmental considerations, see ASME B30.30 Sections 30-1.6 for wire rope or 30-2.6 for synthetic rope.

(c) End terminations shall be in accordance with ASME B30.30 Sections 30-1.7.4 for wire rope or 30-2.7.4 for synthetic rope.

(g) If a load is supported by more than one part of rope, the tension on the parts shall be equalized.

(h) Wherever rope is exposed to ambient temperatures in excess of 180°F (82°C), rope having an independent wire rope or wire strand core or other temperature damage-resistant core shall be used.

16-1.2.17 Manual

The manufacturer shall furnish an instruction manual with each hoist. The manual shall include information on the following:

(a) installation

(b) operation

(c) inspection and testing (including travel limit clutches when used as limit devices)

(d) lubrication, maintenance, and repair

(e) wiring diagram (electric powered only; may be supplied separately)

(f) wire rope information (wire rope hoists only) may be supplied separately

(1) nominal rope diameter

(2) rope classification (e.g., 6X19, 6X36, 8X19, 8X36, 19X19, 35X7)

(3) ASTM A1023 rotation resistance Category 1, 2, or 3 (if applicable)

(4) rope core (e.g., IWRC, fiber core)

(5) lay direction and lay type (e.g., RRL, RLL, LAL, sZ, zZ)

(6) minimum breaking force

(g) synthetic rope information (synthetic rope hoists only) may be supplied separately

(1) nominal rope diameter

(2) rope construction (e.g., 12-strand single braid, 6-strand cable laid, etc.)

(3) material type of load bearing yarns

(4) operating temperature range

(5) minimum breaking force and test method (e.g., ISO, Cordage Institute)

Chapter 16-2 Inspection and Testing

SECTION 16-2.1: INSPECTION

16-2.1.1 General

(a) All inspections shall be performed by a designated person in accordance with the manufacturer’s recommendations and requirements of this Volume. Any deficiencies identified shall be examined and a determination made by a qualified person as to whether they constitute a hazard and, if so, what additional steps need to be taken to address the hazard whether disassembly or a more detailed inspection is required. Any condition disclosed by these
inspections that is determined to be a hazard to continued operation shall be corrected before continuing the use of the equipment.

(b) **Inspection Frequency.** The intervals shall be determined by a qualified person based on intended operating conditions and their effects on critical hoist components. There are five types of inspections required, each directed toward a different set of circumstances. They are the following:

1. **Initial Inspection**
2. **Preoperation Inspection**
3. **Frequent Inspection**
4. **Periodic Inspection**
5. **Inspection of Hoists Not in Regular Use**

(c) In addition, the inspection shall be based on the recommendations in the equipment manufacturer’s manual and, when appropriate, recommendations by a qualified person based upon review of the equipment application and operation.

**16-2.1.2 Initial Inspection—Classification**

(a) **Initial Inspection.** Prior to initial use, all new, altered, or modified hoists shall be inspected to verify compliance with the applicable provisions of this Volume.

(b) **Other Inspections.** Inspection procedures for hoists in regular service are divided into three general classifications based upon the intervals at which inspections should be performed. The intervals in turn are dependent upon the nature of the critical components of the hoist and the degree of their exposure to wear, deterioration, or malfunction. The three general classifications are herein designated as preoperation, frequent, and periodic, with respective intervals between inspections as follows:

1. **Preoperation Inspection:** visual inspection with records not required, performed before the first use of each shift.
2. **Frequent Inspection:** visual examinations with records not required.
   - (a) normal service—monthly
   - (b) heavy service—weekly
   - (c) severe service—daily
3. **Periodic Inspection:** visual inspection with records of external conditions to provide the basis for a continuing evaluation. An external coded mark on the hoist is an acceptable identification in lieu of records.
   - (a) normal service—yearly
   - (b) heavy service—semiannually
   - (c) severe service—quarterly

(a) An initial inspection is a visual and audible examination of the hoist.

(b) New, reinstalled, altered, repaired, or modified hoists as defined in the scope of this volume shall be inspected prior to initial use to verify compliance with the applicable provisions of Chapter 16-1 of this Volume.

(c) Inspection of altered, repaired, or modified hoists may be limited to the parts of the hoist affected by the alteration, repair, or modification as determined by a qualified person.

(d) Adjustments, repairs, or replacements necessary to satisfy the requirements of this Section shall be made in accordance with para. 16-4.3.4 prior to initial use.
(e) Dated and signed records of initial inspections shall be made.

**16-2.1.3 Preoperation Inspection**

(a) The preoperation inspection shall be performed at intervals defined in para. 16-2.1.2(b)(1). A preoperation inspection is a visual and audible operational examination of the hoist, and shall be conducted before the hoist is first used during each shift. When the handling of a suspended load is transferred from operator to operator at shift change, this inspection shall be performed when that lift is completed.

(b) Records of preoperational inspections are not required.

(c) As a minimum, the following items shall be inspected:

1. Operating mechanisms for proper operation, proper adjustment, and unusual sounds.
2. Hoist limit device(s) of electric- or air-powered hoists without a load on the hook. The load block shall be inched into its limit device or run in at slow speed on multispeed or variable-speed hoists. When travel-limiting clutches are used as limit devices, follow the methods for inspecting the travel-limiting clutch in the manual provided with the hoist.
3. Hooks for gross damage, which may be an immediate hazard.
4. Hook latches, if used, for proper operation.
5. Hoist rope for gross damage, which may be an immediate hazard.
6. Load chain for gross damage, which may be an immediate hazard.

**16-2.1.4 Frequent Inspection (See Also Tables 16-2.1.4-1 and 16-2.1.4-2)**

(a) Frequent inspections shall be performed at intervals defined in para. 16-2.1.2(b)(2) and shall include observations during operation. A frequent inspection is a visual and audible examination of the hoist.

(b) Records of frequent inspections are not required.

(c) Frequent inspections shall be performed at intervals depending on the use of the hoist, as follows:

1. Normal service – monthly
2. Heavy service – weekly
3. Severe service – daily

(d) As a minimum, the following items shall be inspected:

1. Operating mechanisms for proper operation, proper adjustment, and unusual sounds.
2. Hoist limit device(s) of electric- or air-powered hoists without a load on the hook. The load block shall be inched into its limit device or run in at slow speed on multispeed or variable-speed hoists. When travel-limiting clutches are used as limit devices, follow the methods for inspecting the travel-limiting clutch in the manual provided with the hoist.
3. Hoist braking system for proper operation.
4. Lines, valves, and other parts of air systems for leakage.
5. Hooks, in accordance with ASME B30.10.
6. Hook latches, if used, for proper operation.
7. Hoist rope for gross damage, which may be an immediate hazard, such as the following:
   
   - (a) Distortion of the rope such as kinking, crushing, unstranding, birdcaging, main strand displacement, or core protrusion
   - (b) General corrosion
   - (c) Broken or cut strands
   - (d) Number, distribution, and type of visible broken wires [see paras. 16-4.4.1(b)(1) through (b)(4)]
OVERHEAD HOISTS (UNDERHUNG) ASME B30.16 – 202X

(7) hoist rope per ASME B30.30 Sections 30-1.8.1(b) for wire rope or 30-2.8.1(b) for synthetic rope.

(8) load chain for gross damage, which may be an immediate hazard, such as the following:
   (-a) Examine visually for gouges, nicks, weld spatter, corrosion, and distorted links.
   (-b) Observe operation of the chain and sprockets with a load to remove chain slack, in lifting and lowering directions. The chain should feed smoothly into and away from the sprockets.

(9) rope or load chain reeving for compliance with recommendations of the hoist manufacturer.

(e) Adjustments, repairs, or replacements shall be made, as necessary, in accordance with para. 16-4.3.4.

16-2.1.5 Periodic Inspection (See Also Tables 16-2.1.4-1 and 16-2.1.4-2)

(a) Periodic inspections shall be performed at intervals defined in para. 16-2.1.2(b)(3) A periodic inspection is a visual and audible examination of the hoist and may be performed with the hoist at its normal location. Periodic inspections do not require the hoist to be disassembled.

(b) Dated and signed records of periodic inspections shall be maintained to provide the basis for continuing evaluation. An external coded mark on the hoist is an acceptable identification in lieu of records.

(b)(c) Covers and other items supplied to allow inspection of components shall be opened or removed.

(d) Periodic inspections shall be performed at intervals depending on the use of the hoist as follows:

(1) normal service – yearly
(2) heavy service – semiannually
(3) severe service – quarterly
(e)(e) As a minimum, The-the following items shall be inspected:

(1) the items listed in para. 16-2.1.4(b) 16-2.1.4(d).
(2) fasteners for evidence of loosening.
(3) load blocks, suspension housings, hand chain wheels, chain attachments, clevises, yokes, suspension bolts, shafts, gears, bearings, pins, rollers, and locking and clamping devices for evidence of wear, corrosion, cracks, and distortion.
(4) hook-retaining nuts or collars, and pins, welds, or rivets used to secure the retaining members for evidence of damage.
(5) load sprockets, idler sprockets, drums, and sheaves for evidence of damage and wear.
(6) the brake mechanism on hand chain hoists for evidence of worn, glazed, or oil-contaminated friction disks; worn pawls, cams, or ratchets; and corroded, stretched, or broken pawl springs.
(7) the motor brake and load brake on electric- or air-powered hoists for evidence of wear.
(8) electrical apparatus on electric-powered hoists for evidence of pitting or deterioration of controller contacts.
(9) supporting structure or trolley, if used, for evidence of damage.
(10) label or labels required by para. 16-1.1.4 for legibility.
(11) hoist rope over its entire length. The individual outer wires in the strands of the rope shall be visible to the inspecting person during the inspection. Any deterioration resulting in appreciable loss of original strength, such as the following, shall be noted and determination made as to whether further use of the rope would constitute a hazard:

- (a) points listed in para. 16.2.1.4(b)(7) 16.2.1.4(d)(7)
- (b) reduction of rope diameter due to loss of core support or internal or external corrosion
- (c) reduction of nominal diameter of more than 5%
- (d) severely corroded or broken wires at end connections
- (e) severely corroded, cracked, bent, worn, or improperly applied end connections

(12) sections of rope subject to rapid deterioration, such as the following:

- (a) rope in contact with saddles, equalizer sheaves, or other sheaves where rope travel is limited
- (b) rope at or near terminal ends where corroded or broken wires may protrude
- (c) rope subject to reverse bending
- (d) rope normally hidden during visual inspection, such as parts passing over sheaves

(11) hoist rope per ASME B30.30 Sections 30-1.8.1(c) for wire rope or 30-2.8.1(c) for synthetic rope.

(13) welded link chain for gouges, nicks, weld spatter corrosion, and distorted links. Slacken the chain and move the adjacent links to one side to inspect for wear at the contact points. If wear is observed or if stretching is suspected, the chain should be measured as outlined in the hoist manufacturer’s manual. If instructions are not available, proceed as follows:

- (a) select an unworn, unstretched length of the chain (e.g., at the slack end)
- (b) suspend the chain vertically under tension and, using a caliper-type gauge, measure the outside length of any convenient number of links approximately 12 in. (305 mm) to 24 in. (610 mm) in overall length
- (c) measure the same number of links in the used sections and calculate the percentage increase in length

(14) roller chain, which should first be inspected while it is in the hoist. With the hoist suspended in normal position, a light load of approximately 50 lb (23 kg) shall be applied.

- (a) Chain shall be inspected for elongation as outlined by the hoist manufacturer. In absence of specific instructions, the chain should be inspected by determining the nominal pitch and measuring a 12-in. (305-mm) section of chain that normally travels over the chain sprocket. The dimension from the edge of one chain pin to the corresponding edge of another pin shall be measured using a caliper-type gauge for the number of pitches per foot. If elongation exceeds ¼ in. (6.3 mm) in 12 in. (305 mm), the chain shall be replaced. For example, A ¾ in. (19-mm) pitch chain should measure 12 in. (305 mm) over 16 pitches. Chain shall be rejected if measurement over 16 pitches exceeds 12¼ in. (311 mm).
- (b) Chain shall be inspected for twist. The chain shall be replaced if the twist in any 5-ft (1.52-m) section exceeds 15 deg.
- (c) The chain shall be inspected for side bow in plane perpendicular to plane of roller. A chain that has a side bow exceeding ¼ in. (6.3 mm) in any 5-ft (1.52-m) section shall be replaced.

(15) Additional inspection of the roller chain should be made by removing the chain from the hoist and cleaning it thoroughly in an acid-free solvent. A check should then be made for any of the following deficiencies:

- (a) pins turned from their original position
OVERHEAD HOISTS (UNDERHUNG)  
- (b) rollers that do not run freely with light finger pressure  
- (c) joints that cannot be flexed by easy hand pressure  
- (d) side plates that are spread open (a visual check of the pin head extension at the damaged area, as compared to the pin extension at the free end of the chain, can determine the amount of spread and the condition of the chain)  
- (e) corrosion, pitting, or discoloration of chain (generally indicative of serious impairment)  
- (f) gouges, nicks, or weld spatter  
- (15) function labels on pendant control stations on electric- and air-powered hoists for legibility.  
- (16) the hoist and hoist mounting for evidence of missing items.  
- (f) Adjustments, repairs, or replacements shall be made, as necessary, in accordance with para. 16-4.3.4.

16-2.1.7 Inspection Records  
- (a) Dated inspection reports and records should be maintained at time intervals specified in para. 16-2.1.2(b)(3). Records should be stored where they are available to appointed persons.  
- (b) A long-range rope or chain inspection program should be established and should include records on examination of ropes or chains removed from service so a relationship can be established between visual observation and actual condition of the rope or chain.

### Table 16-2.1.4-2 Inspection for Electric- or Air-Operated Hoists

<table>
<thead>
<tr>
<th>Item</th>
<th>Normal Service</th>
<th>Heavy Service</th>
<th>Severe Service</th>
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<tbody>
<tr>
<td></td>
<td>Record Yearly</td>
<td>Record Semiannually</td>
<td>Record Quarterly</td>
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<td>[Note (1)]</td>
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<td>[Note (1)]</td>
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<td></td>
<td>[Note (2)]</td>
<td>[Note (3)]</td>
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</table>

**Frequent Inspection** (Refer to para. 16-2.1.4)

<table>
<thead>
<tr>
<th>Item</th>
<th>Normal Service</th>
<th>Heavy Service</th>
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<tr>
<td></td>
<td>[Note (2)]</td>
<td>[Note (3)]</td>
<td>[Note (3)]</td>
</tr>
</tbody>
</table>

- All functional operating mechanisms for maladjustment and unusual sounds  
- Limit devices for operation  
- Hoist braking system for proper operation  
- Air lines, valves, and other parts for leakage  
- Hooks in accordance with ASME B30.10  
- Hook latch operation, if used  
- Hoist rope in accordance with para. 16-2.1.4(b)(7) ASME B30.30 Sections 30-1.8.1(b) for wire rope or Section 30-2.8.1(b) for synthetic rope  
- Load chain in accordance with para. 16-2.1.4(b)(8)  
- Rope or load chain reeving for compliance with hoist manufacturer’s recommendations  
- Requirements of frequent inspection

**Periodic Inspection** (Refer to para. 16-2.1.5)

- X . . . X . . . X . . .
| Hoist rope in accordance with paras. 16-2.1.5(c)(11) and (12) | ... | X | ... | X | ... | X |
| Load chain in accordance with paras. 16-2.1.5(c)(13), (14), and (15) | ... | X | ... | X | ... | X |
| Evidence of loose bolts, nuts, or rivets | ... | X | ... | X | ... | X |
| Evidence of worn, corroded, cracked, or distorted parts such as load blocks, suspension housing, chain attachments, clevises, yokes, suspension bolts, shafts, gears, bearings, pins, rollers, and locking and clamping devices | ... | X | ... | X | ... | X |
| Evidence of damage to hook retaining nuts or collars and pins, and welds or rivets used to secure the retaining members | ... | X | ... | X | ... | X |
| Evidence of damage or excessive wear of load sprockets, idler sprockets, and drums or sheaves | ... | X | ... | X | ... | X |
| Evidence of excessive wear on motor or load brake | ... | X | ... | X | ... | X |
| Electrical apparatus for signs of pitting or any deterioration of visible controller contacts | ... | X | ... | X | ... | X |
| Evidence of damage of supporting structure or trolley, if used | ... | X | ... | X | ... | X |
| Function labels on pendant control stations for legibility | ... | X | ... | X | ... | X |
| Label or labels required by para. 16-1.1.4 for legibility | ... | X | ... | X | ... | X |
| End connections of rope or load chain for wear, cracks, corrosion, or distortion | ... | X | ... | X | ... | X |

NOTES:
(1) Records not required.
(2) Visual inspection with records of conditions to provide the basis for a continuing evaluation.
(3) As in Note (2) unless conditions indicate that disassembly should be done to permit detailed inspection.

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**Chapter 16-4 Maintenance Training and Maintenance**

**16-4.2.4 Responsibilities of Maintenance Persons**

Responsibilities of hoist maintenance persons shall include, but not be limited to:

(a) reading the applicable equipment safety standard referenced and the instructions outlined in the manuals(s) provided for the equipment by the equipment manufacturer.

(b) not attempting to repair electrical apparatus or make other major repairs on the equipment unless specific authorization has been received and the power is locked out/tagged out.

(c) lowering the load block to the ground or otherwise securing the load block before attempting any repairs or adjustments on the lifting equipment that would allow the load block to lower.

(d) using replacement parts that are at least equal to the original manufacturer’s specifications.

(e) becoming familiar with load chain and wire-rope replacement criteria.

(f) installing wire rope clips correctly. Refer to the manufacturer’s manual provided with the equipment.

(g) not using the wire rope, load chain, or hook as a ground for welding.

(h) not touching a live electrode to the wire rope, load chain, or hook.
OVERHEAD HOISTS (UNDERHUNG) ASME B30.16 – 202X

(i) not attempting to repair a damaged wire-rope or load chain.
(j) not removing or obscuring the safety labels, plates, or tags furnished on the lifting equipment.
(k) replacing safety labels, plates, or tags when they are obscured or illegible.
(l) replacing all protective covers and guards before returning the hoist to normal operation.
(m) lubricating the wire rope or load chain as recommended by the hoist, wire rope, or chain manufacturer.

SECTION 16-4.3 EQUIPMENT MAINTENANCE

16-4.3.4 Adjustments, Repairs, and Replacements

(a) Any condition disclosed by the inspections performed in accordance with the requirements of Section 16-2.1 that is determined by a qualified person to be a hazard to continued operation shall be corrected by adjustment, repair, or replacement before continuing the use of the hoist.

(b) Adjustments, repairs, and replacements shall be performed by a designated person.

(c) Adjustments, repairs, or replacements shall be made to the following on an as-needed basis:

(1) all operating mechanisms.
(2) all excessively worn braking components, such as friction disks, ratchets, pawls, and pawl springs.
(3) all critical parts, including load suspension components, that are cracked, broken, bent, or excessively worn.
(4) control systems of electric- and air-powered hoists.
(5) worn, corroded, or otherwise damaged load chain in accordance with Section 16-4.5 or Section 16-4.6.
(6) worn or otherwise damaged rope in accordance with Section 16-4.4.
(7) damaged or worn hooks as described in ASME B30.10. Repairs by welding or reshaping are not recommended.
(8) pitted or burned electrical contacts on electric powered hoists. These should be corrected only by replacement and in sets. Controller parts should be lubricated as recommended by the manufacturer.
(9) missing or illegible function labels on pendant control stations.
(10) missing or illegible product safety labels.
(11) items that are determined to be missing.

(d) Dated records should be placed on file.

SECTION 16-4.4: ROPE REPLACEMENT AND MAINTENANCE

16-4.4.1 Rope Replacement

(a) No precise rules can be given for determination of the exact time for rope replacement since many variable factors are involved. Once a rope reaches any one of the specified removal criteria, it may be allowed to operate to the end of the work shift, based on the judgment of a
qualified person. The rope shall be replaced after that work shift, at the end of the day, or at the latest time prior to the equipment being used by the next work shift.

(b) Removal criteria for the rope replacement shall be as follows:

(1) in running ropes, six randomly distributed broken wires in six rope diameters, or three broken wires in one strand in six rope diameters, except as noted in (b)(2)
(2) in rotation-resistant ropes, two randomly distributed broken wires in six rope diameters, or four randomly distributed broken wires in thirty rope diameters
(3) one outer wire broken at the contact point with the core of the rope that has worked its way out of the rope structure and protrudes or loops out from the rope structure
(4) kinking, crushing, birdcaging, or any other damage resulting in distortion of the rope structure
(5) evidence of heat damage from any cause
(6) reduction of rope diameter due to loss of core support or internal or external corrosion
(7) reductions from nominal diameter greater than 5%

Deviation shall be allowed from the removal criteria in (b)(1) through (b)(7) only with written approval of the hoist manufacturer, rope manufacturer, or a qualified person.

(e) Broken wire removal criteria, cited in this Volume, apply to wire rope operating on steel and cast iron sheaves and drums and wire rope operating on multilayer drums regardless of sheave material. When drum spooling is single layer, synthetic sheaves or sheaves with synthetic linings should not be used because there are no broken wire removal criteria for this configuration, and internal wire breaks may occur in large numbers before any breaks or signs of substantial wear are visible on the outside wires of the rope.

(d) Attention shall be given to end connections. Upon development of two broken wires adjacent to a socketed end connection, the rope should be resocketed or replaced. Resocketing shall not be attempted if the resulting rope length will be insufficient for proper operation.

(a) For rope replacement criteria see ASME B30.30 Sections 30-1.8.2 for wire rope or 30-2.8.2 for synthetic rope.

(b) Replacement rope and connections shall have a strength rating at least as great as the original rope and connections furnished by the hoist manufacturer. Any deviation from the original size, grade, or construction shall be specified by a rope manufacturer, the hoist manufacturer, or a qualified person.

16-4.4.2 Rope Maintenance, Storage and Installation

(a) Rope should be stored to prevent damage or deterioration.
(b) Rope shall be unreeled or uncoiled in a manner to avoid kinking or inducing a twist in the rope.
(c) Before cutting rope, means shall be used to prevent unlaying of the strands.
(d) During installation, care should be taken to avoid dragging the rope in dirt or around objects that will scrape, nick, crush, or induce sharp bends.
(e) Rope should be maintained in a well-lubricated condition. Lubricant applied as part of a maintenance program shall be compatible with the original lubricant. Lubricant applied shall be of the type that does not hinder visual inspection. Those sections of rope that are located over sheaves or otherwise hidden during inspection and maintenance procedures require special attention when lubricating rope. The object of rope lubrication is to reduce internal friction and to prevent corrosion.

(a) Hoist rope should be maintained in accordance with ASME B30.30 Section 30-1.5.3 for wire rope or 30-2.5.3 for synthetic rope or information from the manufacturer.
(b) Hoist rope should be stored and installed in accordance with ASME B30.30 Sections 30-1.5.1 for wire rope or 30-2.5.1 for synthetic rope or information from the manufacturer.
Record # 21-1490

Standard: B30.16 Overhead Hoists (Underhung)

Subject: B30.16 Revise Item 16-1.2.17 (e)

Date: July 2021

OVERHEAD HOISTS (UNDERHUNG) ASME B30.16 – 202X

SECTION 16-1.2.17 Manual

(e) wiring diagram (electric powered only) may be supplied separately}