Below-the-Hook Lifting Devices
January 2021 Draft Revisions

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FOREWORD

This American National Standard, Safety Standard for Cable ways, Cranes, Derrick, 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 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 (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, Derrick, 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, advance 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.

B30.20, Below-the-Hook Lifting Devices, was first published in 1985; new editions were published in 1993, 1999, 2003, and 2006. In the 2010 edition, maintenance was made mandatory, definitions were revised and other changes were made to improve clarity. The 2013 revision added requirements for personnel competence, operating controls marking and inspection, translation of non-English documentation into English, and updates to the definition of Duty Cycle to align with revisions made to BTH-1. In addition, responsibilities for Owners and Operators are defined for each piece of equipment. The 2018 edition adds Chapter 6 on Clamps, revisions to product safety labeling, addition of rated load marking requirements for remotely operated magnets, expanded and clarified magnet testing requirements, revision to the
permanent magnet rating factor, revisions to align with recent changes to BTH-1, and updates to the operating practices sections to align with revisions to the standards applicable to the equipment used with BTH lifters. This 2021 edition improved clarity and readability of inspection requirements, added removal criteria and contains revisions to load test.

This Volume of the Standard, which was approved by the B30 Committee and by ASME, was approved by ANSI and designated as an American National Standard on TBD.
CHAPTER 20-1
STRUCTURAL AND MECHANICAL LIFTING DEVICES

SECTION 20-1.3: INSPECTION, TESTING, AND MAINTENANCE

20-1.3.1 Inspection Classification

General. All inspections shall be performed by a designated person. 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.

Inspection of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other special devices shall comply with the inspection requirements in the applicable volume.

(a) Initial Inspection

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

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

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

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

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

(-a) Normal service — monthly

(-b) Heavy service — weekly to monthly

(-c) Severe service — daily to weekly

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

(3) Periodic Inspection. Documented visual inspection making records of apparent external conditions to provide the basis for a continuing evaluation. An external code mark on the lifter is an acceptable identification in lieu of records.

(-a) Normal service for equipment in place — yearly

(-b) Heavy service — semiannually

(-c) Severe service — quarterly

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

20-1.3.2 Every Lift Inspection
Items such as the following Structural and Mechanical Lifting Devices shall be inspected by the operator before and/or during every lift for any deficiencies indication of damage as specifically indicated, including observations during operation for any deficiencies damage that might occur during the lift:
(a) surface of the load for debris
(b) condition and operation of the controls
(c) condition and operation of the indicators and meters when installed

20-1.3.3 Frequent Inspection (See Also Table 20-1.3.3-1)
Lifting devices shall be inspected for damage at intervals as defined in para. 20-1.3.1(b)(2), including observations during operation for any indications of deficiencies damage that might appear between inspections. Items such as the following shall be inspected for damage at intervals as defined in para. 20-1.3.1(b)(2), including observations during operation for any indications of damage that might appear between inspections. Conditions such as those listed in para. 20-1.3.7, or any other condition that may constitute a hazard, shall cause the lifter to be removed from service. A qualified person shall determine whether any deficiency indications of damage constitute a hazard, requires a repair, requires disassembly for further inspection, or will require more frequent inspection. The lifter shall not be returned to service until approved by a qualified person. For all lifters, inspect:
(a) structural members for deformation, cracks, or excessive wear on any part of the lifter
(b) loose or missing guards, fasteners, covers, stops, or nameplates
(c) all functional operating mechanisms and automatic hold-and-release mechanisms for misadjustments interfering with operation
(d) missing or illegible operating control markings

20-1.3.4 Periodic Inspection (See Also Table 20-1.3.3-1)
Complete inspection of the lifting devices shall be performed at intervals as defined in para. 20-1.3.1(b)(3). Any deficiencies, such as listed below, shall be examined and determination made as to whether they constitute a hazard. Conditions such as those listed in para. 20-1.3.7, or any other condition that may constitute a hazard, shall cause the lifter to be removed from service. A qualified person shall determine whether any deficiency indications of damage constitute a hazard, requires repair, requires disassembly for further inspection, or will require more frequent inspection. The lifter shall not be returned to service until approved by a qualified person. The inspection shall be based on the manufacturer's instructions, or para. 20-1.3.7, or the recommendations of a qualified person. These inspections shall include the requirements of para. 20-1.3.3 and, in addition, items such as the following:
(a) loose bolts or fasteners
(b) cracked or worn gears, pulleys, sheaves, sprockets, bearings, drive-chains, and belts
(c) excessive wear of friction pads, linkages, and other mechanical parts
(d) excessive wear at hoist hooking points and load support clevises or pins
(e) missing or illegible product safety labels required by para. 20-1.2.1(d)

20-1.3.5 Lifting Devices Not in Regular Use
A lifter that has been idle for a period of 1 month to 1 yr shall be inspected in accordance with para. 20-1.3.3 before being placed in service. A lifter that has been idle for a period of 1 yr or more shall be inspected in accordance with para. 20-1.3.4 before being returned to service.

20-1.3.6 Inspection Records
Dated inspection reports shall be made on critical items such as those listed in para. 20-1.3.4. Records should be available for each periodic inspection and when the lifter is either altered or repaired.
20-1.3.7 Removal Criteria

A structural and mechanical lifting device shall be removed from service if any conditions (if applicable) such as the following are present (limits established by the manufacturer or qualified person) and would result in unsafe performance. A structural and mechanical lifting device shall only be returned to service when approved by a qualified person:

(a) deformation, cracks, or wear
(b) loose or missing guards, fasteners, covers, stops, or nameplates
(c) excessive pitting or corrosion
(d) excessive nicks or gouges
(e) indications of heat damage
(f) unauthorized welding or modifications
(g) unauthorized replacement components
(h) improper assembly or function
(i) impaired, seized, or bound moving parts
(j) supporting surfaces
(k) contamination
(l) excessive surface wear
(m) lack of integrity of the supporting surface material
(n) lack of bond between supporting surface material and metal backing
(k) damaged, distorted, or worn threads including foreign material on the threads
(l) missing, damaged, or unreadable gauges if so equipped
(m) missing or illegible operating control markings or product safety labels
(n) other conditions, including visible damage, that cause doubt as to continued safe use

20-1.3.8 Repairs

Damage Deficiencies disclosed by the inspection requirements of Section 20-1.3 shall be corrected according to the procedures outlined in para. 20-1.3.109 before operation of the lifter is resumed, unless a qualified person determines the damage deficiency does not constitute a hazard. Repairs of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other special devices shall comply with repair requirements in the applicable volumes or standards.

20-1.3.9 Testing

20-1.3.9.1 Operational Tests

20-1.3.9.2 Load Test

(a) Prior to initial use, all new, altered, or repaired lifting devices should be tested and inspected. If performed, tests shall be done under the direction of the manufacturer or a qualified person and a written report be furnished by such a person, confirming the load rating of the lifter. The load rating should not be more than 80% of the maximum load sustained during the test. Test loads shall not be more than 125% +5%/-0% of the rated load unless otherwise recommended by the manufacturer or a qualified person. Test reports should be available.

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

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

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

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

20-1.3.10 Maintenance
CHAPTER 20-2 VACUUM LIFTING DEVICES

SECTION 20-2.3: INSPECTION, TESTING, AND MAINTENANCE

20-2.3.1 Inspection Classification

General. All inspections shall be performed by a designated person. 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.

Inspection of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other special devices shall comply with the inspection requirements in the applicable volume.

(a) Initial Inspection

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

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

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

(1) Every Lift Inspection. Visual examination by the operator before and during each lift made by the vacuum lifting device.

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

(-a) Normal service — monthly
(-b) Heavy service — weekly to monthly
(-c) Severe service — daily to weekly
(-d) Special or infrequent service — as recommended by a qualified person before and after each lift

(3) Periodic Inspection. Documented visual inspection making records of apparent external conditions to provide the basis for a continuing evaluation. An external coded mark on the vacuum lifting device is an acceptable identification in lieu of records.

(-a) Normal service for equipment in place — yearly
(-b) Heavy service — semiannually
(-c) Severe service — quarterly
(-d) Special or infrequent service — as recommended by a qualified person before the first lift and as directed by the qualified person for any subsequent lifts

20-2.3.2 Every Lift Inspection

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

(a) surface of the load for debris
(b) seal of the vacuum pad for debris
(c) condition and operation of the controls
(d) condition and operation of the indicators, meters, and pumps when installed

20-2.3.3 Frequent Inspection
Items such as the following vacuum lifters shall be inspected for damage at intervals as defined in para. 20-2.3.1(b)(2), including observations during operation for any indications of deficiencies, damage that might appear between inspections. Conditions such as those listed in para 20-2.3.7, or any other condition that may constitute a hazard, shall cause the vacuum lifter to be removed from service. A qualified person shall determine whether any deficiency indications of damage constitute a hazard, requires repair, requires disassembly for further inspection, or will require more frequent inspection. The lifter shall not be returned to service until approved by a qualified person. For all vacuum lifters, inspect:

(a) structural members for deformation, cracks, and excessive wear on any part of the lifter.
(b) the vacuum generator for output.
(c) all vacuum pad seal rings for cuts, tears, excessive wear, and presence of foreign particles.
(d) all vacuum lines and vacuum line connections for leakage, cuts, kinks, and collapsed areas of hoses.
(e) the vacuum reservoir for leaks and visual damage.
(f) the entire vacuum system, including indicator lights, gages, horns, bells, pointers or other warning devices, and vacuum level indicators, by attaching a nonporous, clean surface to the vacuum pad or pads and then stopping the vacuum source. The vacuum level in the system shall not decrease by more than the manufacturer's specified rate.
(g) missing or illegible operating control markings.

20-2.3.4 Periodic Inspection
Complete inspections of the vacuum lifting device shall be performed at intervals as defined in para. 20-2.3.1(b)(3). Any deficiencies, such as listed below, shall be examined, and determination made as to whether they constitute a hazard. Conditions such as those listed in para. 20-2.3.7, or any other condition that may constitute a hazard, shall cause the vacuum lifter to be removed from service. A qualified person shall determine whether any deficiency indications of damage constitute a hazard, requires repair, requires disassembly for further inspection, or will require more frequent inspection. The vacuum lifter shall not be returned to service until approved by a qualified person. The inspection shall be based on the manufacturer’s instructions, or para. 20-2.3.7, or the recommendations of a qualified person. These inspections shall include the requirements of para. 20-2.3.3 and, in addition, items such as the following:

(a) external evidence of
   — (1) looseness
   — (2) wear
   — (3) deformation
   — (4) cracking
   — (5) corrosion
(b) external evidence of damage to
   — (1) supporting structure
   — (2) motors
   — (3) controls
   — (4) other auxiliary components
(c) missing or illegible product safety labels required by para. 20-2.2.1(d)

20-2.3.5 Vacuum Lifters Not in Regular Use
A vacuum lifter that has been idle for a period of 1 month to 1 yr shall be inspected in accordance with para. 20-2.3.3 before being placed in service. A vacuum lifter that has been idle for a period of 1 yr or more shall be inspected in accordance with para. 20-2.3.4 before being returned to service.
20-2.3.6 Inspection Records
Dated inspection reports shall be made on critical items such as those listed in para. 20-2.3.4. Records should be available for each periodic inspection and when the vacuum lifter is either altered or repaired.

20-2.3.7 Removal Criteria
A vacuum lifter shall be removed from service if conditions (if applicable) such as the following are present (limits established by the manufacturer or qualified person) and shall only be returned to service when approved by a qualified person:

- (a) deformation, cracks, or wear
- (b) loose or missing guards, fasteners, covers, stops, or nameplates
- (c) excessive pitting or corrosion
- (d) excessive nicks or gouges
- (e) indications of heat damage,
- (f) unauthorized welding or modifications
- (g) unauthorized replacement components
- (h) improper assembly or function
- (i) impaired, seized, or bound moving parts
- (j) vacuum leaks greater than manufacturer specification (see 20-2.3.9.1 (c))
- (k) vacuum pads
  - (i) contamination
  - (ii) excessive surface wear
  - (iii) lack of integrity of the seal material
  - (iv) reduced coefficient of friction
- (l) damaged or distorted pins
- (m) vacuum hoses and fittings
  - (i) loose or disconnected hoses
  - (ii) kinked, collapsed, or damaged hoses
  - (iii) dirty or missing filters
- (n) deformed, broken or missing component(s)
- (o) missing or illegible operation control markings or product safety labels
- (p) other conditions, including visible damage, that cause doubt as to continued safe use
- (q) inability to achieve designated minimum vacuum level
- (r) incorrect operation or function of any controls, indicators or warning devices

20-2.3.87 Repairs
Damage Deficiencies disclosed by the inspection requirements of Section 20-2.3 shall be corrected according to the procedures outlined in para. 20-2.3.109 before operation of the vacuum lifter is resumed, unless a qualified person determines the damage deficiency does not constitute a hazard.

Repairs of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other special devices shall comply with repair requirements in the applicable volumes or standards.

20-2.3.98 Testing
20-2.3.98.1 Operational Tests
(a) New and reinstalled lifting devices shall be tested by, or under the direction of the manufacturer or a qualified person prior to initial use to verify compliance with applicable provisions of this Volume, including, but not limited to, the following:

1. moving parts
2. latches
3. stops
4. limit switches
5. control devices
(6) vacuum pad seals
(7) vacuum lines
(b) Altered or repaired lifting devices shall be tested by a qualified person, or a designated person under the direction of the manufacturer or a qualified person. This test may be limited to the components affected by the alteration or repair, as determined by a qualified person with guidance from the manufacturer.
(c) The seals and connections shall be tested for leaks by attaching a smooth, nonporous, clean material to the vacuum pad or pads and then stopping the vacuum source. Vacuum level in the system shall not decrease by more than the manufacturer’s specified rate.
(d) All indicator lights, gages, horns, bells, pointers, and other warning devices and vacuum level indicators shall be tested by the same method as in para. 20-2.3.98.2 below.
(e) Dated reports of all operational tests shall be filed.

20-2.3.98.2 Load Test
(a) Prior to initial use, all new, altered, or repaired vacuum lifting devices shall be load tested and inspected by a qualified person, or a designated person under the direction of the manufacturer or a qualified person. A written report shall be prepared by the qualified person and placed on file, confirming the load rating of the vacuum lifting device. The load rating should not be more than 80% of the maximum load sustained during the test. Test loads shall not be more than 125% +5%/-0% of the rated load of the system, unless otherwise recommended by the manufacturer or a qualified person.
(b) Altered or repaired vacuum lifting devices shall be tested by, or under the direction of, a qualified person. This test may be limited to the components affected by the alteration or repair, as determined by a qualified person with guidance from the manufacturer.
(c) The load test shall consist of one of the following procedures:
   (1) Actual Load Test
      (-a) Attach pads to the designated test load.
      (-b) Raise the test load a minimum distance to ensure the load is supported by the vacuum lifting device.
      (-c) Hold the load for 2 min.
      (-d) Lower the load for release.
   (2) Simulated Load Test. Using a test fixture, apply forces to all load-bearing components, either individually or in assemblies, equivalent to the force encountered by the components if they were supporting a load that was 125% of the rated load.
(d) After the test, the vacuum lifting device shall be visually inspected. Any condition that constitutes a hazard shall be corrected before the lifting device is placed in service. If the correction affects the structure, then the lifter shall be retested.

20-2.3.109 Maintenance
CHAPTER 20-3 CLOSE PROXIMITY OPERATED LIFTING MAGNETS

SECTION 20-3.3: INSPECTION, TESTING, AND MAINTENANCE

20-3.3.1 Inspection Classification

General. All inspections shall be performed by a designated person. 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.

Inspection of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other special devices shall comply with the inspection requirements in the applicable volume.

(a) Initial Inspection

(1) New and reinstalled lifting magnets shall be inspected prior to initial use to verify compliance with applicable provisions of this Volume.

(2) Altered or repaired lifting magnets shall be inspected. The inspection may be limited to the components affected by the alteration or repair, as determined by a qualified person.

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

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

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

(-a) Normal service — monthly
(-b) Heavy service — weekly to monthly
(-c) Severe service — daily to weekly
(-d) Special or infrequent service — as recommended by a qualified person before and after each lift

(3) Periodic Inspection. Documented visual inspection making records of apparent external conditions to provide the basis for a continuing evaluation.

(-a) Normal service for equipment in place — yearly
(-b) Heavy service for equipment in place — quarterly
(-c) Severe service — monthly
(-d) Special or infrequent service — as recommended by a qualified person before the first lift and as directed by the qualified person for any subsequent lifts

20-3.3.2 Every Lift Inspection

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

(a) lifting magnet face and surface of the load for foreign materials and smoothness
(b) condition and operation of the control handle of a manually controlled permanent magnet
(c) condition and operation of indicators and meters when installed

20-3.3.3 Frequent Inspection

Items such as the following lifting magnets shall be inspected for damage at intervals as defined in para. 20-3.3.1(b)(2), including observations during operation for any indications of deficiencies damage that might appear between inspections. Conditions such as those listed in para 20-3.3.7, or any other
condition that may constitute a hazard, shall cause the magnet lifter to be removed from service. A qualified person shall determine whether any deficiency indications of damage constitutes a hazard, requires repair, requires disassembly for inspection, or will require more frequent inspection. The lifter shall not be returned to service until approved by a qualified person. For all lifting magnets, inspect (a) structural and suspension members for deformation, cracks, or excessive wear on any part of the lifting magnet (b) lifting magnet face for foreign materials and smoothness (c) condition of lifting bail or sling suspension (d) condition and operation of control handle (e) condition and operation of indicators and meters, where applicable (f) for all lifting magnets, except manually controlled permanent magnets, inspect all electrical conductors that are visible without disassembly for loose connections, continuity, corrosion, and damage to insulation (g) for battery operated electromagnets, inspect for proper level of battery electrolyte and for corrosion of either the battery posts or connectors (h) cracked housings, welds, and loose bolts (i) labels and markings (j) missing or illegible operating control markings

20-3.3.4 Periodic Inspection
Complete inspections of lifting magnets shall be performed and recorded at intervals as defined in para. 20-3.3.1(b)(3). Conditions such as those listed in para. 20-3.3.7, or any other condition that may constitute a hazard, shall cause the magnet lifter to be removed from service. A qualified person shall determine whether any deficiency indications of damage constitutes a hazard, requires repair, requires disassembly for further inspection, or will require more frequent inspection. The magnet lifter shall not be returned to service until approved by a qualified person. The inspection shall be based on the manufacturer’s instructions, or para. 20-3.3.7, or the recommendations of a qualified person. Any deficiencies, such as those listed below, shall be examined by a qualified person and determination made as to whether they constitute a hazard. These inspections shall include the requirements of para. 20-3.2.2 and, in addition, items such as the following: (a) All members, fasteners, locks, switches, warning labels, and lifting parts shall be inspected for deformation, wear, and corrosion. (b) All electrical components described in paras. 20-3.2.2(b) through 20-3.2.2(f), including meters, indicators, or alarms, shall be tested for proper operation and condition. (c) The lifting magnet coil shall be tested for ohmic and ground readings and compared to manufacturer’s standards. (d) missing or illegible product safety labels required by para. 20-3.2.1(d).

20-3.3.5 Lifting Magnets Not in Regular Use
A lifting magnet that has been idle for a period of 1 month to 1 yr shall be inspected in accordance with para. 20-3.3.3 before being placed in service. A lifting magnet that has been idle for a period of 1 yr or more shall be inspected in accordance with para. 20-3.3.4 before being returned to service.

20-3.3.6 Inspection Records
Dated inspection reports shall be made on critical items, such as those listed in para. 20-3.3.4. Records should be available for each periodic inspection and when the lifting magnet is either altered or repaired.
### 20-3.3.7 Removal Criteria

A lifting magnet shall be removed from service if conditions (if applicable) such as the following are present (limits established by the manufacturer or qualified person) and shall only be returned to service when approved by a qualified person:

- (a) deformation, cracks, or wear
- (b) loose or missing guards, fasteners, covers, stops, or nameplates
- (c) excessive pitting or corrosion
- (d) excessive nicks or gouges
- (e) indications of heat damage
- (f) unauthorized welding or modifications
- (g) unauthorized replacement components
- (h) improper assembly or function
- (i) Lifting surfaces:
  - (i) excessive surface wear
  - (ii) nicks, gouges, or any parts impeding the lifting surface from full contact with the load
- (j) Lifting surfaces:
  - (i) foreign material
- (k) On/Off Handle operation
  - (i) impeded movement/rotation of the handle
- (l) damaged, distorted, or worn threads including foreign material on the threads
- (m) impaired, seized, or bound bail movement
- (n) deformed, broken or missing spring(s)
- (o) missing or illegible operating control markings or product safety labels
- (p) loose connections, loss of continuity, corrosion, or damage to insulation of electrical conductors
- (q) improper level of battery electrolyte or corrosion of either the battery posts or connectors
- (r) other conditions, including visible damage, that cause doubt as to continued safe use

### 20-3.3.8 Repairs

Damage Deficiencies disclosed by the inspection requirements of Section 20-3.3 shall be corrected according to the procedures outlined in para. 20-3.3.109 before operation of the lifting magnet is resumed, unless a qualified person determines the deficiency damage does not constitute a hazard. Repairs of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other special devices shall comply with repair requirements in the applicable volumes or standards.

### 20-3.3.9 Testing

#### 20-3.3.9.1 Operational Tests

#### 20-3.3.9.2 Load Test

Prior to initial use, all new, altered, or repaired lifting magnets shall be tested by, or under the direction of the manufacturer or a qualified person. The rated load of all lifting components associated with the magnet shall exceed the maximum breakaway force of the magnet to avoid overload, or the components shall not be included in the test. The test results shall be recorded confirming the load rating of the lifting magnet.

1. **Breakaway Force Test**

2. **Design Factor Test.** Close proximity operated lifting magnets should have an annual magnetic design factor test to verify the magnet meets para. 20-3.3.9.2 (a)(1)(a) or para. 20-3.3.9.2 (a)(1)(b). This test should be performed to the actual breakaway point of the magnet or may be performed at the calculated minimum breakaway force. The rated load of all components associated with the (magnetic) design factor test shall exceed the maximum breakaway load of the magnet to avoid overload or the lifting hardware shall be removed. Caution should be exercised during the test. The test shall be performed under the direction of a qualified person.

### 20-3.3.10 Maintenance
CHAPTER 20-4 REMOTELY OPERATED LIFTING MAGNETS

SECTION 20-4.3: INSPECTION, TESTING, AND MAINTENANCE

20-4.3.1 Inspection Classification

General. All inspections shall be performed by a designated person. 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. Inspection of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other special devices shall comply with the inspection requirements in the applicable volume.

(a) Initial Inspection

(1) New and reinstalled lifting magnets shall be inspected prior to initial use to verify compliance with applicable provisions of this Volume.

(2) Altered or repaired lifting magnets shall be inspected. The inspection may be limited to the components affected by the alteration or repair, as determined by a qualified person.

(b) Inspection Intervals. Inspection procedures for lifting magnets in regular service are divided into two general classifications, based upon the intervals at which the inspections shall be performed. The intervals, in turn, are dependent upon the nature of the critical components of the lifting magnet and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are designated as frequent and periodic, with respective intervals between inspections as defined below.

(1) Frequent Inspection. Visual examination by the operator or other designated persons with records not required.

(-a) Normal service — monthly
(-b) Heavy service — weekly to monthly
(-c) Severe service — daily to weekly
(-d) Special or infrequent service — as recommended by a qualified person before and after each lift

(2) Periodic Inspection. Documented visual inspection making records of apparent external conditions to provide the basis for a continuing evaluation.

(-a) Normal service for equipment in place — yearly
(-b) Heavy service for equipment in place — quarterly
(-c) Severe service — monthly
(-d) Special or infrequent service — as recommended by a qualified person before the first lift and as directed by the qualified person for any subsequent lifts

20-4.3.2 Frequent Inspection

Items such as the following Lifting magnets shall be inspected for damage at intervals as defined in para. 20-4.3.1(b)(1), including observations during operation for any deficiency indications of damage that might appear between inspections. Conditions such as those listed in para 20-4.3.6, or any other condition that may constitute a hazard, shall cause the magnet lifter to be removed from service. A qualified person shall determine whether any deficiency indications of damage constitute a hazard, requires a repair, requires disassembly for inspection, or will require more frequent inspection. The lifter shall not be returned to service until approved by a qualified person. For all lifting magnets, inspect:

(a) structural and suspension members for deformation, cracks, or excessive wear on any part of the lifting magnet
(b) lifting magnet face for foreign materials and smoothness, if applicable
(c) all electrical conductors that are visible without disassembly
(d) cracked housings, welds, and loose bolts
(e) missing or illegible operating control markings
(f) for battery operated electromagnets, inspect for proper level of battery electrolyte and for corrosion of either the battery posts or connectors

20-4.3.3 Periodic Inspection
Complete inspections of lifting magnets shall be performed and recorded at intervals as defined in para. 20-4.3.1(b)(2). Any deficiencies, such as those listed below, shall be examined by a qualified person and determination made as to whether they constitute a hazard. Conditions such as those listed in 20-4.3.6, or any other condition that may constitute a hazard, shall cause the magnet lifter to be removed from service. A qualified person shall determine whether any deficiency indications of damage constituted a hazard, requires repair, requires disassembly for further inspection, or will require more frequent inspection. The magnet lifter shall not be returned to service until approved by a qualified person. These inspections shall include the requirements of para. 20-4.3.2 and, in addition, items such as the following:
(a) All members, fasteners, and lifting parts shall be inspected for deformation, wear, and corrosion.
(b) All electrical components described in para. 20-4.2.2, including meters, indicators, or alarms, shall be tested for proper operation and condition.
(c) The lifting magnet coil shall be tested for ohmic and ground readings, and compared to manufacturer’s standards.
(d) Missing or illegible product safety labels required by para. 20-4.2.1(d).

20-4.3.4 Lifting Magnets Not in Regular Use
A lifting magnet that has been idle for a period of 1 month to 1 yr shall be inspected in accordance with para. 20-4.3.2 before being placed in service. A lifting magnet that has been idle for a period of 1 yr or more shall be inspected in accordance with para. 20-4.3.3 before being returned to service.

20-4.3.5 Inspection Records
Dated inspection reports shall be made on critical items, such as those listed in para. 20-4.3.3. Records should be available for each periodic inspection and when the lifting magnet is either altered or repaired.

20-4.3.6 Removal Criteria
A lifting magnet shall be removed from service if conditions (if applicable) such as the following are present (limits established by the manufacturer or qualified person) and shall only be returned to service when approved by a qualified person:
(a) deformation, cracks, or wear
(b) loose or missing guards, fasteners, covers, stops, or nameplates
(c) excessive pitting or corrosion
(d) excessive nicks or gouges
(e) indications of heat damage,
(f) unauthorized welding or modifications
(g) unauthorized replacement components
(h) improper assembly or function
(i) impaired, seized, or bound moving parts
(j) Lifting surfaces:
   (i) excessive surface wear
   (ii) broken, chipped, or damaged
   (iii) foreign material
(k) damaged or distorted pins
(l) damaged, distorted, or worn threads including foreign material on the threads
(m) magnet exhibits electrical characteristics outside manufacturer recommendations
(n) cable or wiring shows signs of wear or damage
(o) plugs and connectors show signs of wear or damage
(p) missing, damaged, or unreadable gauges if so equipped
(q) missing or illegible operating control markings or product safety labels
(r) improper level of battery electrolyte or corrosion of either the battery posts or connectors
(s) other conditions, including visible damage, that cause doubt as to continued safe use

20-4.3.76 Repairs

Damage Deficiencies disclosed by the inspection requirements of Section 20-4.3 shall be corrected according to the procedures outlined in para. 20-4.3.98 before operation of the lifting magnet is resumed, unless a qualified person determines the damage deficiency does not constitute a hazard. Repairs of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other special devices shall comply with repair requirements in the applicable volumes or standards.

20-4.3.87 Testing

20-4.3.87.1 Operational Tests

20-4.3.87.2 Load Test

(a) Prior to initial use, all new, altered, or repaired lifting magnets shall be tested by a qualified person, or a designated person under the direction of the manufacturer or a qualified person. The rated load for all components associated with the magnet shall meet the maximum breakaway force of the magnet to avoid overload or the components shall not be included in the test. The test results shall be recorded confirming the load rating of the lifting magnet.

(1) Breakaway Force Test

(2) Design Factor Test. Remote operated lifting magnets should have an annual magnetic design factor test to verify the magnet meets (a)(1)(-a) or (a)(1)(-b). This test should be performed to the actual breakaway point of the magnet or may be performed at the calculated minimum breakaway force. The rated load of lifting hardware associated with the magnetic design factor test shall exceed the maximum breakaway load of the magnet to avoid overload or the lifting hardware shall be removed. Caution should be applied during the test. The test shall be performed under the direction of a qualified person.

20-4.3.98 Maintenance
CHAPTER 20-5 SCRAP AND MATERIAL-HANDLING GRAPPLES

SECTION 20-5.3: INSPECTION, TESTING, AND MAINTENANCE

20-5.3.1 Inspection Classification

General. All inspections shall be performed by a designated person. 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.

Inspection of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other special devices shall comply with the inspection requirements in the applicable volume.

(a) Initial Inspection

(1) New and reinstalled grapples shall be inspected prior to initial use to verify compliance with applicable provisions of this Volume.

(2) Altered or repaired grapples shall be inspected. The inspection may be limited to the components affected by the alteration or repair, as determined by a qualified person.

(b) Inspection Intervals. Inspection procedures for grapples in regular service are divided into two general classifications, based upon the intervals at which the inspections shall be performed. The intervals, in turn, are dependent upon the nature of the critical components of the grapple and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are designated as frequent and periodic, with respective intervals between inspections as defined below.

(1) Frequent Inspection. Visual examination by the operator or other designated persons with records not required.

(-a) Normal service — monthly

(-b) Heavy service — weekly to monthly

(-c) Severe service — daily to weekly

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

(2) Periodic Inspection. Documented visual inspection making records of apparent external conditions to provide the basis for a continuing evaluation.

(-a) Normal service for equipment in place — yearly

(-b) Heavy service for equipment in place — quarterly

(-c) Severe service for equipment in place — monthly

(-d) Special or infrequent service — as recommended by a qualified person before the first lift and as directed by the qualified person for any subsequent lifts

20-5.3.2 Frequent Inspection

Items such as the following grapples shall be inspected for damage at intervals as defined in para. 20-5.3.1(b)(1), including observations during operation for any indications of deficiencies damage that might appear between inspections. Conditions such as those listed in para 20-5.3.7, or any other condition that may constitute a hazard, shall cause the grapple to be removed from service. A qualified person shall determine whether any deficiency indications of damage constitute a hazard, requires a repair, requires disassembly for further inspection, or will require more frequent inspection. The grapple shall not be returned to service until approved by a qualified person. For all grapples,

inspect

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

(b) pins and bushings

(c) hydraulic lines

(d) hydraulic cylinders

(e) loose bolts

(f) for combination magnet/grapples, inspect the lifting magnet per para. 20-4.3.2
(g) for electrohydraulic grapples, inspect all electrical conductors that are visible without disassembly
(h) missing or illegible operating control markings

20-5.3.3 Periodic Inspection
Complete inspections of grapples shall be performed and recorded at intervals as defined in para. 20-5.3.1 (b)(2). Any deficiencies, such as those listed below, shall be examined by a qualified person and determination made as to whether they constitute a hazard. Conditions such as those listed in para. 20-5.3.7, or any other condition that may constitute a hazard, shall cause the grapple to be removed from service. A qualified person shall determine whether any deficiency indications of damage constitute a hazard, requires repair, requires disassembly for further inspection, or will require more frequent inspection. The grapple shall not be returned to service until approved by a qualified person. The inspection shall be based on the manufacturer’s instructions, or para. 20-5.3.7, or the recommendations of a qualified person. These inspections shall include the requirements of para. 20-5.3.2 and, in addition, items such as the following:
(a) all members, fasteners, and lifting parts shall be inspected for deformation, wear, and corrosion
(b) hydraulic hose, fittings, and tubing inspection
- (1) evidence of leakage at the surface of flexible hose or its junction with metal couplings
- (2) blistering or abnormal deformation of the outer covering of the hydraulic hose
- (3) leakage at threaded or clamped joints that cannot be eliminated by normal tightening or recommended procedures
- (4) evidence of excessive abrasion or scrubbing on the outer surface of a hose, rigid tube, or fitting
(c) hydraulic motors
- (1) loose bolts or fasteners
- (2) leaks at joints between sections
- (3) shaft seal leaks
- (4) unusual noises or vibration
- (5) loss of operating speed
- (6) excessive heating of the fluid
- (7) loss of pressure
(d) hydraulic cylinders
- (1) drifting caused by fluid leaking across the piston seals
- (2) rod seal leakage
- (3) leaks at welded joints
- (4) scored, nicked, or dented cylinder rods
- (5) dented case (barrel)
- (6) loose or deformed rod eyes or connecting joints
(e) for combination magnet/grapples, inspect the magnet per para. 20-4.3.3
(f) for electrohydraulic grapples, all electrical components, including meters, indicators, and alarms, shall be tested for proper operation and condition

20-5.3.4 Grapples Not in Regular Use
A grapple that has been idle for a period of 1 month to 1 yr shall be inspected in accordance with para. 20-5.3.2 before being placed in service. A grapple that has been idle for a period of 1 yr or more shall be inspected in accordance with para. 20-5.3.3 before being returned to service.

20-5.3.5 Inspection Records
Dated inspection reports shall be made on critical items such as those listed in para. 20-5.3.3. Records should be available for each periodic inspection and when the grapple is either altered or repaired.
20-5.3.6 Repairs

Damage Deficiencies disclosed by the inspection requirements of Section 20-5.3 shall be corrected according to the procedures outlined in para. 20-5.3.8 before normal operation of the grapple is resumed, unless a qualified person determines the damage deficiency does not constitute a hazard. Repairs of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other special devices shall comply with repair requirements in the applicable volumes or standards.

20-5.3.7 Removal Criteria

A grapple shall be removed from service if conditions (if applicable) such as the following are present (limits established by the manufacturer or qualified person) and shall only be returned to service when approved by a qualified person:

(a) deformation, cracks, or wear
(b) loose or missing guards, fasteners, covers, stops, or nameplates
(c) excessive pitting or corrosion
(d) excessive nicks or gouges
(e) indications of heat damage,
(f) unauthorized welding or modifications
(g) unauthorized replacement components
(h) improper assembly or function
(i) impaired, seized, or bound moving parts
(j) incorrect operation or function of any controls, indicators or warning devices
(k) damaged or leaking hydraulic cylinders, hoses or other components
(l) damaged magnet, see 20-4.3.6
(m) damaged connecting link
(n) missing or illegible operating control markings or product safety labels
(o) other conditions, including visible damage, that cause doubt as to continued safe use

20-5.3.87 Testing

20-5.3.98 Maintenance
CHAPTER 20-6 CLAMPS

SECTION 20-6.3: INSPECTION, TESTING, AND MAINTENANCE

20-6.3.1 Inspection Classification

General. All inspections shall be performed by a designated person. 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.

Inspection of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other devices shall comply with the inspection requirements in the applicable volume.

(a) Initial Inspection

(1) New and reinstalled clamps shall be inspected prior to initial use to verify compliance with applicable provisions of this Volume.

(2) Altered or repaired clamps shall be inspected. The inspection may be limited to those components affected by the alteration or repair, as determined by a qualified person.

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

(1) Every Lift Inspection. Visual examination before and during each use of the clamp.

(2) Frequent Inspection. Visual examinations with records not required.

(-a) Normal service — monthly
(-b) Heavy service — weekly to monthly
(-c) Severe service — daily to weekly
(-d) Special or infrequent service — as recommended by a qualified person before and after each lift

(3) Periodic Inspection. Documented visual inspection making records of apparent external conditions to provide the basis for a continuing evaluation. An external code mark on the clamp is an acceptable identification in lieu of records.

(-a) Normal service — yearly
(-b) Heavy service — semiannually
(-c) Severe service — quarterly
(-d) Special or infrequent service — as recommended by a qualified person before the first such lift and as directed by the qualified person for any subsequent lifts

20-6.3.2 Every Lift Inspection

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

(a) clamp load contact surface condition
(b) engagement
(c) obvious clamp damage

20-6.3.3 Frequent Inspection

Clamps shall be inspected for damage at intervals as defined in para. 20-6.3.1(b)(2), including observations during operation for any indications of damage that might appear between inspections. A qualified person shall determine whether any indications of damage constitute a hazard or will require more frequent inspection. Conditions such as those listed in para. 20-6.3.7, or any other condition that may constitute a hazard, shall cause the clamp to be removed from service. Clamps shall not be...
20-6.3.4 Periodic Inspection
Documented Complete inspection of the clamp shall be performed at intervals as defined in para. 20-6.3.1(b)(3), including observations during operation for any indications of damage. If external conditions indicate disassembly shall be performed for a detailed inspection. Conditions such as those listed in para. 20-6.3.7, or any other condition that may result in a hazard, shall cause the clamp to be removed from service. Clamps shall not be returned to service until approved by a qualified person. A qualified person shall determine whether any deficiency indications of damage constitute a hazard, requires repair, requires disassembly for further inspection, or will require more frequent inspection. Clamps shall not be returned to service until approved by a qualified person. The inspection and documentation shall be based on the manufacturer’s instructions or the recommendations of a qualified person.

20-6.3.5 Clamps Not in Regular Use
A clamp that has been idle for a period of 1 month to 1 yr shall be inspected in accordance with para. 20-6.3.3 before being placed in service. A clamp that has been idle for a period of 1 yr or more shall be inspected in accordance with para. 20-6.3.4 before being returned to service.

20-6.3.6 Inspection Records
Dated inspection reports shall be made on critical items such as those listed in para. 20-6.3.7. Records should be available for each periodic inspection and when the clamp is either altered or repaired.

20-6.3.7 Removal Criteria
A clamp shall be removed from service if conditions (if applicable) such as the following are present (limits established by the manufacturer or qualified person) and shall only be returned to service when approved by a qualified person:

(a) deformation, cracks, or wear
(b) loose or missing guards, fasteners, covers, stops, or nameplates
(c) excessive pitting or corrosion
(d) excessive nicks or gouges
(e) indications of heat damage, including weld spatter or arc strikes
(f) evidence of unauthorized welding or modification
(g) unauthorized replacement components
(h) improper assembly or function
(i) impaired, seized, or bound cam, linkage, bail movement, or locking lever moving parts
(j) gripping teeth
   (1) severely worn
   (2) broken, chipped, or damaged
   (3) clogged with foreign material
(k) gripping surfaces
   (1) contamination
   (2) excessive surface wear
   (3) lack of integrity of the gripping material
   (4) lack of bond between gripping material and metal backing
20-6.3.8 Repairs

Damage Deficiencies disclosed by the inspection requirements of Section 20-6.3 shall be corrected according to the procedures outlined in para. 20-6.3.10 before operation of the clamp is resumed, unless a qualified person determines the deficiency damage does not constitute a hazard. Repairs of slings (ASME B30.9), hooks (ASME B30.10), rigging hardware (ASME B30.26), or other devices shall comply with repair requirements in the applicable volumes or standards.
Record#: 20-355  
Standard: B30.20 - Below-the-Hook Lifting Devices  
Subject: Revision of paragraph 20-6.3.9.2 Load Test  
Date: November 2020

Chapter 20-6
Clamps

SECTION 20-6.3: INSPECTION, TESTING, AND MAINTENANCE

20-6.3.9 Testing
20-6.3.9.1 Operational Tests
20-6.3.9.2 Load Test

(a) Prior to initial use, all new, altered, or repaired clamps should be tested and inspected. If performed, tests shall be done by a qualified person, or a designated person under the direction of the manufacturer or a qualified person and a written report be furnished, confirming the load rating of the clamp. The load rating should not be more than 80% of the maximum load sustained during the test. Test loads shall not be more than 125% ±5%/-0% of the rated load unless otherwise recommended by the manufacturer or a qualified person. Test reports should be available.