

ASME B30.14-2015
(Revision of ASME B30.14-2010)

Side Boom Tractors

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

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AN AMERICAN NATIONAL STANDARD



**The American Society of
Mechanical Engineers**

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The American Society of Mechanical Engineers

Two Park Avenue • New York, NY • 10016 USA

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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 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, 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.

B30.14 has been in existence since 1979. New editions were published in 1985, 1991, 1996, 2004, and 2010. This 2015 Edition contains technical and editorial revisions, including the addition of responsibilities of personnel, and requirements for personnel competence, and translations.

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 November 11, 2015.

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

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

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

(15)

B30 STANDARD INTRODUCTION

SECTION I: SCOPE

The ASME B30 Standard contains provisions that apply to the construction, installation, operation, inspection, testing, maintenance, and use of cranes and other lifting and material-movement related equipment. For the convenience of the reader, the Standard has been divided into separate volumes. Each volume has been written under the direction of the ASME B30 Standard Committee and has successfully completed a consensus approval process under the general auspices of the American National Standards Institute (ANSI).

As of the date of issuance of this Volume, the B30 Standard comprises the following volumes:

- B30.1 Jacks, Industrial Rollers, Air Casters, and Hydraulic Gantries
- B30.2 Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)
- B30.3 Tower Cranes
- B30.4 Portal and Pedestal Cranes
- B30.5 Mobile and Locomotive Cranes
- B30.6 Derricks
- B30.7 Winches
- B30.8 Floating Cranes and Floating Derricks
- B30.9 Slings
- B30.10 Hooks
- B30.11 Monorails and Underhung Cranes
- B30.12 Handling Loads Suspended From Rotorcraft
- B30.13 Storage/Retrieval (S/R) Machines and Associated Equipment
- B30.14 Side Boom Tractors
- B30.15 Mobile Hydraulic Cranes
(withdrawn 1982 — requirements found in latest revision of B30.5)
- B30.16 Overhead Hoists (Underhung)
- B30.17 Overhead and Gantry Cranes (Top Running Bridge, Single Girder, Underhung Hoist)
- B30.18 Stacker Cranes (Top or Under Running Bridge, Multiple Girder With Top or Under Running Trolley Hoist)
- B30.19 Cableways
- B30.20 Below-the-Hook Lifting Devices
- B30.21 Lever Hoists
- B30.22 Articulating Boom Cranes
- B30.23 Personnel Lifting Systems
- B30.24 Container Cranes
- B30.25 Scrap and Material Handlers
- B30.26 Rigging Hardware
- B30.27 Material Placement Systems
- B30.28 Balance Lifting Units
- B30.29 Self-Erecting Tower Cranes
- B30.30 Ropes¹

SECTION II: SCOPE EXCLUSIONS

Any exclusion of, or limitations applicable to the equipment, requirements, recommendations, or operations contained in this Standard are established in the affected volume's scope.

SECTION III: PURPOSE

The B30 Standard is intended to

- (a) prevent or minimize injury to workers, and otherwise provide for the protection of life, limb, and property by prescribing safety requirements
- (b) provide direction to manufacturers, owners, employers, users, and others concerned with, or responsible for, its application
- (c) guide governments and other regulatory bodies in the development, promulgation, and enforcement of appropriate safety directives

SECTION IV: USE BY REGULATORY AGENCIES

These volumes may be adopted in whole or in part for governmental or regulatory use. If adopted for governmental use, the references to other national codes and standards in the specific volumes may be changed to refer to the corresponding regulations of the governmental authorities.

SECTION V: EFFECTIVE DATE

- (a) *Effective Date.* The effective date of this Volume of the B30 Standard shall be 1 yr after its date of issuance.

¹ This volume is currently in the development process.

Construction, installation, inspection, testing, maintenance, and operation of equipment manufactured and facilities constructed after the effective date of this Volume shall conform to the mandatory requirements of this Volume.

(b) *Existing Installations.* Equipment manufactured and facilities constructed prior to the effective date of this Volume of the B30 Standard shall be subject to the inspection, testing, maintenance, and operation requirements of this Standard after the effective date.

It is not the intent of this Volume of the B30 Standard to require retrofitting of existing equipment. However, when an item is being modified, its performance requirements shall be reviewed relative to the requirements within the current volume. The need to meet the current requirements shall be evaluated by a qualified person selected by the owner (user). Recommended changes shall be made by the owner (user) within 1 yr.

SECTION VI: REQUIREMENTS AND RECOMMENDATIONS

Requirements of this Standard are characterized by use of the word *shall*. Recommendations of this Standard are characterized by the word *should*.

SECTION VII: USE OF MEASUREMENT UNITS

This Standard contains SI (metric) units as well as U.S. Customary units. The values stated in U.S. Customary units are to be regarded as the standard. The SI units are a direct (soft) conversion from the U.S. Customary units.

SECTION VIII: REQUESTS FOR REVISION

The B30 Standard Committee will consider requests for revision of any of the volumes within the B30 Standard. Such requests should be directed to

Secretary, B30 Standard Committee
ASME Codes and Standards
Two Park Avenue
New York, NY 10016-5990

Requests should be in the following format:

Volume: Cite the designation and title of the volume.
Edition: Cite the applicable edition of the volume.
Subject: Cite the applicable paragraph number(s) and the relevant heading(s).
Request: Indicate the suggested revision.
Rationale: State the rationale for the suggested revision.

Upon receipt by the Secretary, the request will be forwarded to the relevant B30 Subcommittee for consideration and action. Correspondence will be provided to

the requester defining the actions undertaken by the B30 Standard Committee.

SECTION IX: REQUESTS FOR INTERPRETATION

The B30 Standard Committee will render an interpretation of the provisions of the B30 Standard. Such requests should be directed to

Secretary, B30 Standard Committee
ASME Codes and Standards
Two Park Avenue
New York, NY 10016-5990

Requests should be in the following format:

Volume: Cite the designation and title of the volume.
Edition: Cite the applicable edition of the volume.
Subject: Cite the applicable paragraph number(s) and the relevant heading(s).
Question: Phrase the question as a request for an interpretation of a specific provision suitable for general understanding and use, not as a request for approval of a proprietary design or situation. Plans or drawings that explain the question may be submitted to clarify the question. However, they should not contain any proprietary names or information.

Upon receipt by the Secretary, the request will be forwarded to the relevant B30 Subcommittee for a draft response, which will then be subject to approval by the B30 Standard Committee prior to its formal issuance.

Interpretations to the B30 Standard will be published in the subsequent edition of the respective volume, and will be available online at <http://cstools.asme.org/>.

SECTION X: ADDITIONAL GUIDANCE

The equipment covered by the B30 Standard is subject to hazards that cannot be abated by mechanical means, but only by the exercise of intelligence, care, and common sense. It is therefore essential to have personnel involved in the use and operation of equipment who are competent, careful, physically and mentally qualified, and trained in the proper operation of the equipment and the handling of loads. Serious hazards include, but are not limited to, improper or inadequate maintenance, overloading, dropping or slipping of the load, obstructing the free passage of the load, and using equipment for a purpose for which it was not intended or designed.

The B30 Standard Committee fully realizes the importance of proper design factors, minimum or maximum dimensions, and other limiting criteria of wire rope or chain and their fastenings, sheaves, sprockets, drums, and similar equipment covered by the standard, all of

which are closely connected with safety. Sizes, strengths, and similar criteria are dependent on many different factors, often varying with the installation and uses. These factors depend on

- (a) the condition of the equipment or material
- (b) the loads
- (c) the acceleration or speed of the ropes, chains, sheaves, sprockets, or drums
- (d) the type of attachments

(e) the number, size, and arrangement of sheaves or other parts

(f) environmental conditions causing corrosion or wear

(g) many variables that must be considered in each individual case

The requirements and recommendations provided in the volumes must be interpreted accordingly, and judgment used in determining their application.

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ASME B30.14-2015

SUMMARY OF CHANGES

Following approval by the ASME B30 Committee and ASME, and after public review, ASME B30.14-2015 was approved by the American National Standards Institute on November 11, 2015.

ASME B30.14-2015 includes the following changes identified by (15).

<i>Page</i>	<i>Location</i>	<i>Change</i>
viii-x	B30 Standard Introduction	Updated
1, 2	Chapter 14-0	Chapter title revised
	Section 14-0.2	(1) Definitions of <i>appointed</i> , <i>authorized</i> , and <i>designated person</i> deleted (2) Definition of <i>operational aid</i> revised
3	Section 14-0.3	(1) Redesignated as 14-0.5 and revised (2) New Sections 14-0.3 and 14-0.4 added
4	14-1.1.1	(1) Subparagraph (a) in-text table revised (2) Subparagraphs (c) and (d) revised (3) Subparagraph (e) added
	14-1.1.3	Revised
	14-1.1.4	Subparagraphs (b) and (d) revised
5	Fig.14-1.1.4-1	Revised
	Section 14-1.2	(1) New subparagraph (a) added, old subparagraph (a) redesignated as (b) (2) Subparagraph (d) revised
	14-1.2.1	Subparagraph (b)(3) revised
6	14-1.3.1	Subparagraphs (c) and (d)(2) revised
	14-1.3.2	(1) Subparagraph (a)(2)(-b) revised (2) Subparagraph (c) deleted
7	14-1.5.1	Revised
	14-1.5.3	Subparagraph (c) revised
8	14-1.7.1	Subparagraphs (e) and (f) revised
	14-1.7.2	Subparagraph (b) revised
	14-1.7.4	Revised
	14-1.8.1	Subparagraph (b) revised
10	Section 14-2.1	General section added
	14-2.1.1	Revised
	14-2.1.2	Revised
	14-2.1.3	Revised

<i>Page</i>	<i>Location</i>	<i>Change</i>
11	14-2.1.5	Revised
	14-2.1.6	Revised
	14-2.2.1	Subparagraph (a)(5) deleted and subsequent subparagraph redesignated
	14-2.2.2	Subparagraph (b)(3) revised
	14-2.3.1	Subparagraph (a) revised
12, 13	Section 14-2.4	General section added
	14-2.4.1	Subparagraphs (a), (c), and (d) revised
	14-2.4.2	Subparagraphs (a), (b)(1), and (b)(6) revised
14–17	14-3.1.1	Revised
	14-3.1.2	Subparagraphs (b) and (c) revised
	14-3.1.3	Revised in its entirety
	14-3.2.1	Subparagraphs (b) and (c)(2) revised
	14-3.2.3	Subparagraphs (k) and (n) revised
18	14-3.2.5	Subparagraph (b) revised
	14-3.2.6	(1) Subparagraph (a) deleted (2) Former subparagraph (b) revised and redesignated as (a); former subparagraph (c) redesignated as (b)
19	14-3.3.3	Revised
	14-3.3.4	Revised
	Section 14-3.4	Revised to only include operating near electrical power lines
	14-3.4.1	Revised
	Section 14-3.5	Miscellaneous items moved from Section . 14-3.4 and revised
23	Fig. 14-3.4.1-1	Redesignated and revised
	Table 14-3.4.1-1	Redesignated and revised

SPECIAL NOTE:

The interpretations to ASME B30.14 are included in this edition as a separate section for the user's convenience.

SIDE BOOM TRACTORS

Chapter 14-0

(15)

Scope, Definitions, Translation, Personnel Competence, and References

SECTION 14-0.1: SCOPE OF B30.14

Volume B30.14 includes provisions that apply to the construction, installation, operation, inspection, testing, and maintenance of side boom tractors powered by an internal combustion engine used for pipe laying or lifting operations, utilizing a lifting boom, drum, wire rope, and/or hydraulic cylinders.

The requirements for a side boom tractor that is used for other than lifting operations such as when converted for excavating work, and a side boom tractor with a rated load of 1 ton or less, are not included in this Volume.

(15) SECTION 14-0.2: DEFINITIONS

accessory: a secondary part or assembly of parts that contributes to the effectiveness of a machine.

administrative or regulatory authority: governmental agency or the employer in the absence of governmental jurisdiction.

angled load: any load, other than freely suspended loads, which does not act upon the side boom tractor in a purely vertical manner.

approved: accepted as satisfactory by a duly constituted administrative or regulatory authority.

axle: the shaft or spindle with which or about which a wheel rotates. On side boom tractors and wheel-type tractors it refers to an assembly that includes the shaft, housing, and gearing from the shaft to the wheel, sprocket, or equivalent device.

boom: a member hinged to the side of the tractor with the outer end supported by a rope system or hydraulic cylinder(s).

boom hoist: a hoist drum and rope reeving system used to raise and lower the boom. The rope system may be all live reeving or a combination of live reeving and pendants. The boom may also be raised and lowered by a hydraulic cylinder(s).

boom stop: an automatic device used to limit the angle of the boom at the highest position.

brake: a device used for retarding or stopping motion by friction or power means.

clutch: a friction, electromagnetic, hydraulic, pneumatic, or positive mechanical device for engagement or disengagement of power.

counterweight: weight used to supplement the weight of the machine in providing stability for lifting loads.

drum: the cylindrical members around which ropes are wound.

dynamic loading: loads introduced into the machine or its components by forces in motion.

load: the external load, in pounds (kilograms) applied to the side boom tractor, including the weight of load-attaching equipment such as load blocks, shackles, and slings.

load block, lower: the assembly of hook or shackle, swivel, sheaves, pins, and frame suspended by the hoisting ropes.

load block, upper: the assembly of hook or shackle, swivel, sheaves, pins, and frame suspended from the boom point.

load capacity, maximum: the capacity for which the tractor is designed (refer to ISO 8813-1992).

load hoist: a hoist drum and rope reeving system used for lifting and lowering loads.

load monitoring and indicating system: any system with the capabilities to measure, advise the operator, and provide appropriate visual and audible warnings for

(a) weight of load being lifted

(b) the percentage of rated load being lifted

load movement: any movement of the load, vertically or horizontally, relative to either the ground or the side boom tractor.

load overhang, track-type tractor: the horizontal distance from the center of the load hook to the outer edge of the outer track rail on the boom side.

load overhang, wheel-type tractor: the horizontal distance from the center of the load hook measured perpendicular to the center line of the tires on the boom side.

load, rated: side boom tractor ratings in pounds (kilograms) established by the manufacturer in accordance with Section 14-1.1.

minimum breaking force: the minimum load at which a new and unused wire rope will break when loaded to destruction in direct tension.

operational aid: an accessory that provides information to facilitate operation of a side boom tractor or that takes control of particular functions without action of the operator when a limiting condition is sensed. Examples of such devices include, but are not limited to, the following:

- (a) anti-two-block device
- (b) rated capacity indicator
- (c) boom angle or load overhang indicator
- (d) load indicator or load monitoring and indication system
- (e) boom hoist disconnect device
- (f) machine level indicator

qualified person: a person who, by possession of a recognized degree in an applicable field, or certificate of professional standing, or who, by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter and work.

reeving: a rope system in which the rope travels around drums and sheaves.

rope: refers to wire rope unless otherwise specified.

service, heavy: service that involves operation within the rated load limit that exceeds normal service.

service, normal: distributed service that involves operation with randomly distributed loads within the rated load limit, or uniform loads less than 65% of rated load for not more than 25% of the time.

service, severe: service that involves normal or heavy service with abnormal operating conditions.

shall: if a provision is of a mandatory nature it is indicated by the use of the word *shall*.

should: if a provision is of an advisory nature, it is indicated by the use of the word *should* and is a recommendation to be considered, the advisability of which depends on the facts in each situation.

side boom tractor: a track-type (Fig. 14-0.2-1) or wheel-type tractor (Fig. 14-0.2-2) having a boom mounted on the side of the tractor, used for lifting, lowering, or transporting a load suspended on the load hook. The boom or hook can be lifted or lowered in a vertical direction only.

Fig. 14-0.2-1 Track-Type Side Boom Tractor

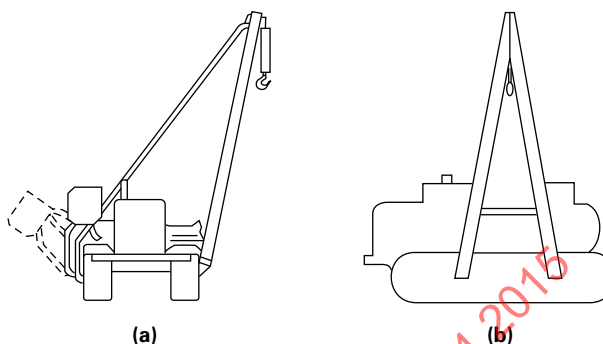
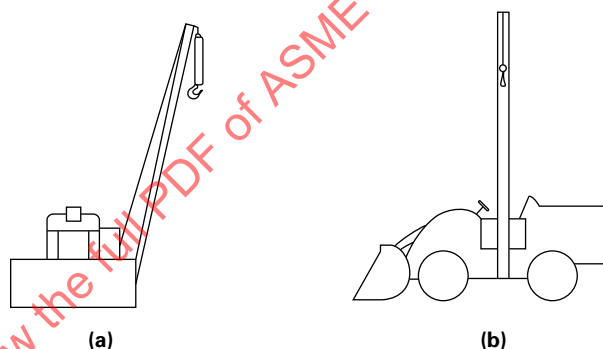


Fig. 14-0.2-2 Wheel-Type Side Boom Tractor



side loading: a load applied at an angle to the vertical plane of the boom.

stabilizers: extendable or fixed metal arms attached to the mounting base, that rest on supports at the outer ends.

standing rope (guy): a supporting rope that maintains a constant distance between the points of attachment to the two components connected by the rope.

structural competence: the ability of the machine and its components to withstand the stresses imposed by applied loads.

tackle: an assembly of ropes and sheaves arranged for lifting and pulling.

tipping condition, track-type tractor: the load on the hook at the given load overhang distance that will cause the track roller of the track opposite the boom side to lift $\frac{1}{4}$ in. (6.4 mm) from the rail.

tipping condition, wheel-type tractor: the load on the hook, in pounds (kilograms), at the given load overhang distance that will cause the wheel on the side opposite the boom to leave the ground $\frac{1}{16}$ in. (1.6 mm).

transit: the moving or transporting of a side boom tractor from one location to another.

travel: the function of the machine moving from one location to another, on a job site.

travel mechanism: the machinery involved in providing travel.

two-blocking: the condition in which the lower load block or hook assembly comes in contact with the upper block or boom point sheave assembly.

wheelbase: distance between centers of front and rear axles. For a multiple-axle assembly, the axle center for wheelbase measurement is taken as the midpoint of the assembly.

(15) SECTION 14-0.3: TRANSLATIONS OF SAFETY-RELATED INFORMATION AND CONTROL DESIGNATIONS

(a) Translation of non-English documentation into English

(1) The wording of written non-English safety information and manuals regarding use, inspection, and maintenance shall be translated into English using professional translation industry standards, which include, but are not limited to, the following:

(-a) translation of the complete paragraph message, instead of word by word

(-b) grammatical accuracy

(-c) respectfulness of the source document content without omitting or expanding the text

(-d) accurate translation of the terminology

(-e) reflection of the level of sophistication of the original document

(2) The finished translation shall be verified for compliance with (a)(1)(-a) through (a)(1)(-e) above by a qualified person having an understanding of the technical content of the subject matter.

(3) Pictograms used to identify controls shall be described in the manuals. The pictograms should comply with ISO 7000, or another recognized source, if previously defined. The text of the descriptions shall meet the criteria of (a)(1) and (a)(2) above.

(b) Any non-English documentation provided in addition to English shall be translated and reviewed in accordance with the requirements listed in (a)(1) and (a)(2) above.

SECTION 14-0.4: PERSONNEL COMPETENCE

(15)

Persons performing the functions identified in this Volume shall through education, training, experience, skill, and physical fitness, as necessary, be competent and capable to perform the functions as determined by the employer or employer's representative.

SECTION 14-0.5: REFERENCES

(15)

The following is a list of publications referenced in this Standard.

ANSI Z26.1-1990, Safety Code for Glazing Materials for Glazing Motor Vehicle Operating on Land Highways
Publisher: American National Standards Institute (ANSI), 25 West 43rd Street, New York, NY 10036 (www.ansi.org)

ASME B30.10-2010, Hooks

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

AWS D14.3-05, Specification for Welding Earthmoving and Construction Equipment¹

Publisher: American Welding Society (AWS), 8669 NW 36 Street, No. 130, Miami, FL 33166 (www.aws.org)

ISO 2867:2011, Earth-Moving Machinery — Access Systems

ISO 7000:2004, Graphical Symbols for Use on Equipment
ISO 8813:1992, Earth-Moving Machinery — Lift Capacity of Pipelayers and Wheeled Tractors or Loaders Equipped With Side Boom

ISO 13850:2006, Safety of Machinery — Emergency Stop — Principles for Design

Publisher: International Organization for Standardization (ISO) Central Secretariat, Chemin de Blandonnet 8, Case Postale 401, 1214 Vernier, Geneva, Switzerland (www.iso.org)

¹ Copies may also be obtained from the American National Standards Institute (ANSI), 25 West 43rd Street, New York, NY 10036. (www.ansi.org)

Chapter 14-1

Construction and Characteristics

SECTION 14-1.1: LOAD RATINGS

(15) 14-1.1.1 Load Ratings — Where Stability Governs Lifting Performance

Load ratings at the minimum load overhang may be based on structural competence rather than stability. Refer to para. 14-1.1.2.

(a) The margin of stability for determination of load ratings, with booms of stipulated lengths at stipulated load overhang for the various type of tractor mountings, is established by taking a percentage of the loads that will produce a condition of tipping. The load ratings shall not exceed the following percentages for side boom tractors, with the indicated types of mounting under conditions stipulated in (b) and (c) below.

Type of Machine	Rated Load (Percent of Maximum Load Capacity Based on ISO 8813 Test Procedure)
Track-type tractor	85%
Wheel-type tractor	65%

(b) The following stipulations shall govern the application of the values in (a) above for side boom tractors:

(1) Lift capacity from which ratings are determined shall be applied under static conditions only, i.e., without dynamic effect of lifting, lowering, traveling, or lateral movement.

(2) The weight of auxiliary handling devices, such as slings, shall be considered a part of the load.

(c) Stipulations governing the application of the values in (a) above for track-type side boom tractors and wheel-type side boom tractors shall be in accordance with tractor side boom testing procedure ISO 8813.

(d) The effectiveness of these preceding static stability factors will be influenced by such additional factors as freely suspended loads, wind or ground conditions, condition and inflation of rubber tires, boom lengths, operating speeds for existing conditions, and in general, careful and competent operation. All of these factors shall be taken into account by the operator.

(e) When lifting on slopes or unusual ground conditions (soft, rocky, or frozen), or where external restraints (e.g., winch tractors) are utilized for stability, the appropriate rated load capacity shall be determined by a qualified person.

14-1.1.2 Load Ratings — Where Structural Competence or Hydraulic Capacity Governs Lifting Performance

Load ratings are governed by the stability of the side boom tractor, i.e., the load required to tip the side boom tractor at a given load overhang. However, in some areas of the operating range, the ratings may be governed by factors other than stability, such as the conditions described below.

(a) Load ratings at some load overhangs are governed by structural competence or hydraulic capacity, and side boom tractor stability alone cannot be used as a basis of load rating.

(b) Manufacturer's recommendations shall not be exceeded.

14-1.1.3 Load Ratings — Where Dynamic Factors Govern Lifting Performance (15)

When dynamic operating conditions exist, appropriate reductions shall apply to the rated load capacity values. Refer to para. 14-3.2.4.

14-1.1.4 Load Rating Chart (15)

A load rating chart, based on Fig. 14-1.1.4-1, with legible letters and figures shall be provided with each side boom tractor and affixed in a location visible to the operator while seated at the control station. The data and information to be provided on these charts shall include, but not necessarily be limited to, the following:

(a) a range of manufacturer's recommended side boom tractor rated loads at stated static operating load overhang for permissible boom lengths and for all configurations and modifications, including, but not limited to, stabilizers or counterweight positioning.

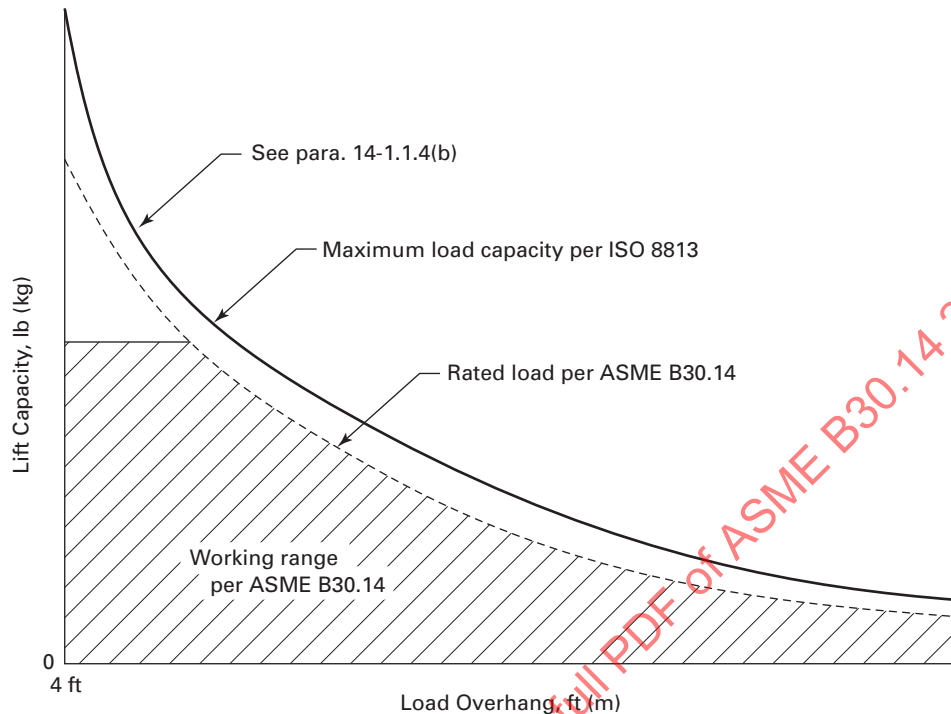
(b) the basis of ratings as found in para. 14-1.1.1, including the identification of ratings if based on structural limitations. Where ratings are limited by structural competence, hydraulic capacity, or rope design factors as shown in para. 14-1.6.1(a), such ratings shall be shown and emphasized on the rating charts and by listing the special provisions of para. 14-3.2.1(c).

(c) recommended parts of hoist reeving, size, and type of rope for various hook loads shall be shown on the rating chart and in the operating manual.

(d) a rating chart shall be prepared by a qualified person for all modifications, including boom length.

Fig. 14-1.1.4-1 Load Rating Chart

(15)

**(15) SECTION 14-1.2: OPERATIONAL AIDS**

(a) Side boom tractors shall have an operational aid that displays the following:

- (1) rated capacity
- (2) weight of the load on hook
- (3) load overhang
- (4) slope

(b) The instructions provided by the side boom tractor manufacturer or the device manufacturer, or both, shall describe the purpose of the device.

(c) The side boom tractor manufacturer or the device manufacturer, or both, shall provide recommendations for continued operation or shutdown of the side boom tractor if the operational aids are inoperative or malfunctioning. Without such recommendations, and without prohibitions, from the manufacturer against further operation, the operational constraints of para. 14-1.1.1(d) shall be observed.

(d) Operational aids shall include the capabilities and accuracies as described in this section. The load limits specified relate to the maximum rated load capacity of the side boom tractor as described in Section 14-1.1.

(1) All displays shall be visible from the operator's position.

(2) The devices shall be effective for operation in an ambient temperature of -40°F to $+140^{\circ}\text{F}$ (-40°C to $+60^{\circ}\text{C}$).

14-1.2.1 Motion and Performance Indicators

(15)

(a) *Rated Capacity Indicator.* The rated capacity indicator shall calculate and display the rated load capacity on level ground of the side boom tractor. The accuracy of the capacity indicating system shall be such that the indicated capacity is within the tolerance 100% (+0% and -5%) of the actual rated load capacity on level ground.

(b) *Load Indicator*

(1) The load indicator system shall measure and display the weight of the load being lifted.

(2) The load indicator shall indicate the portion (percentage) of rated load, on level ground.

(3) In out-of-level ground operation, the operational aid/device should provide the portion (percentage) of rated load for the applicable slope conditions.

(4) The accuracy of the load-indicator system shall be such that the indicated load is within the tolerance 100% (+5% and -0%) of the lifted load weight.

(c) *Load Overhang Indicator*

(1) The load overhang indicator shall indicate the overhang of the load.

(2) The accuracy of the load overhang indicator shall be such that when the rated capacity is applied, the load overhang indicated shall be within the tolerance of 100% (+5% and -0%) of the actual load overhang.

(d) *Slope Indicator.* The slope (level) indicator shall indicate the extent that the side boom tractor chassis is out-of-level. Accuracy of slope indication shall be within 2 deg of actual slope. Lateral and longitudinal slope should be indicated separately.

14-1.2.2 Machine Configuration and Capacity Setting

Provision should be made for a qualified person to modify the configuration information utilized in the rated load capacity calculations to accurately reflect changes from original (as manufactured) configuration. This capability shall not allow any increase from the original manufacturer's rated capacity, but may include, but not be limited to, changes in boom length (\pm), rigging (hooks and blocks) weight, and reductions in effective counterweight.

SECTION 14-1.3: BOOM HOIST AND LOAD HOIST MECHANISMS

(15) 14-1.3.1 Boom Hoist Mechanism

When using recommended boom hoist reeving or hydraulic cylinder system with maximum load capacity suspended, the boom hoist mechanism shall be capable of raising or lowering the boom, stopping boom motion, and holding it stationary without attention from the operator.

(a) The boom hoist mechanism shall be provided with a clutch or power engaging device permitting immediate starting or stopping of the boom motion. The boom hoist mechanism shall also be provided with a self-setting brake or hydraulic system, capable of supporting the maximum load capacity.

(b) Brakes and clutches shall be provided with adjustments where necessary to compensate for wear and to maintain adequate force in springs where used.

(c) The boom hoist mechanism shall be provided with a locking device or system to prevent inadvertent lowering of the boom.

(d) The boom hoist drum shall have sufficient rope capacity to operate the boom at all positions from horizontal to the highest angle utilizing recommended reeving and rope diameter.

(1) Not less than two full wraps of rope shall remain on the drum with boom point lowered to the level of the tractor supporting surface.

(2) The rope end shall be anchored by a clamp attached to the drum or by a wedge socket arrangement approved by the side boom tractor or rope manufacturer. The rope clamp shall be tightened evenly to the manufacturer's recommended torque.

(3) The drum flange shall extend a minimum of $\frac{1}{2}$ in. (13 mm) or one-half rope diameter, whichever is larger, over the top layer of rope at all times during operation.

(e) The drum diameter shall provide a first layer rope pitch diameter of not less than 10 times the nominal diameter of the rope used.

14-1.3.2 Load Hoist Mechanism

(15)

(a) *Load Hoist Drums.* The load hoist drum assemblies shall have power and operational characteristics to perform all load lifting and lowering functions required in side boom tractor service when operated under recommended conditions.

(1) Where brakes and clutches are used to control the motion of the load hoist drums, they shall be of size and thermal capacity to control maximum load capacity with minimum recommended reeving (when maximum load capacity is being lowered with near maximum boom length on operations involving long lowering distances, power controlled lowering usually is necessary to reduce demand on the load brake).

(2) Load hoist drums shall have rope capacity with recommended rope size and reeving to perform side boom tractor service as defined in Section 14-0.1, within the range of boom lengths, operating load overhang, and vertical lifts stipulated by the manufacturer.

(-a) Not less than two full wraps of rope shall remain on the drum when the hook is in its extreme low working position.

(-b) The rope end shall be anchored by a clamp attached to the drum or by a wedge socket arrangement approved by the side boom tractor or rope manufacturer. The rope clamp shall be tightened evenly to the manufacturer's recommended torque.

(-c) Drums shall be provided with a means to prevent rope from jumping off the drum.

(-d) The drum flange shall extend a minimum of $\frac{1}{2}$ in. (13 mm) or one-half rope diameter, whichever is larger, over the top layer of rope at all times during operation.

(3) Diameter of the load hoist drums shall provide a first layer rope pitch diameter of no less than 10 times the nominal diameter for the rope used.

(4) Positive means, controllable from the operator's station, shall be provided to prevent the drum from rotating in the lowering direction and be capable of holding the maximum load capacity without further attention from the operator.

(b) *Load Hoist Brakes.* When power operated brakes, having no continuous mechanical linkage between the actuating and braking means, are used for controlling loads, an automatic means shall be provided to prevent the load from falling in the event of loss of brake actuating power.

14-1.3.3 Adjustments

Brakes and clutches shall be provided with adjustments where necessary to compensate for lining wear.

SECTION 14-1.4: SIDE BOOM TRACTOR TRAVEL

14-1.4.1 Travel Controls

The controls for the travel function shall be located at the operator's station.

14-1.4.2 Travel Brakes and Locks

Brakes or other locking means shall be provided to hold the machine stationary within the limits of traction, during working cycles on level grade or while the machine is standing on maximum grade recommended for travel. Such brakes or locks shall be arranged to remain in engagement in event of loss of operating pressure.

SECTION 14-1.5: CONTROLS

(15) 14-1.5.1 Side Boom Tractor Operation

All controls used during normal side boom tractor operations shall be located within reach of the operator while seated at the operator's station, and controls shall be labeled as to function (direction).

14-1.5.2 Control Forces and Movement

For hoisting controls, the following shall be provided:

- (a) forces not greater than 35 lb (155 N) on hand levers
- (b) travel distance on hand levers not greater than 15 in. (380 mm) from neutral position on two-way levers and not greater than 24 in. (610 mm) on one-way levers

(15) 14-1.5.3 Power Plant Controls

Controls for operating the power plant shall be within reach of the operator and shall include the following means:

- (a) start and stop
- (b) control speed
- (c) emergency stop shall comply with ISO 13850
- (d) shifting selective transmission

14-1.5.4 Engine Clutch

All side boom tractors having mechanical draw works shall be provided with a means for disengaging power to the draw works. The control shall be within reach from the operator's station.

SECTION 14-1.6: ROPES AND REEVING ACCESSORIES

14-1.6.1 Rope Design Factors

(a) When supporting rated loads (including load suspensions), the design factor for live or running ropes that wind on drums or pass over sheaves shall be not less than 4.0.

(b) When supporting the maximum load capacity (including load suspensions) [refer to para. 14-1.1.4(b)],

the special provisions of para. 14-3.2.1(c) shall be followed.

(c) The design factors specified above shall be determined on the basis of the manufacturer's ratings, with approved reeving, published minimum breaking force of new ropes, and with load and boom stationary.

14-1.6.2 Ropes

(a) The hoist rope shall be of a construction recommended for side boom tractor service. Rotation resistant rope shall not be used.

(b) End terminations shall be done in the manner specified by the manufacturer of side boom tractor, the wire rope, or the fitting.

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

(d) Wherever exposed to temperatures at which fiber cores would be damaged, rope having an independent wire-rope or wire-stand core, or other temperature-damage resistant core shall be used.

14-1.6.3 Reeving Accessories

(a) Eye splices shall be made in accordance with manufacturer's recommendations and rope thimbles shall be used in the eye splices.

(b) 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.

(c) Swaged, poured, compressed, or wedge socket fittings shall be applied as recommended by the rope, side boom tractor, or fitting manufacturer.

14-1.6.4 Sheaves

(a) Sheave grooves shall be free from surface defects that could cause rope damage. The cross-sectional radius at the bottom of the groove should be such as to form a close-fitting saddle for the size of rope used. The sides of the groove shall be tapered outward and rounded at the rim to facilitate entrance of the rope into the groove. Flange rims shall run true about the axis of rotation.

(b) Sheaves carrying ropes that can be momentarily unloaded shall be provided with close-fittings guards or other suitable devices to guide the rope back into the groove when the load is applied again.

(c) Sheaves in the lower load block shall be equipped with close-fitting guards that will prevent ropes from becoming fouled when the block is lying on the ground with ropes loose.

(d) Means shall be provided to prevent chafing of the ropes.

(e) All sheave bearings shall be provided with means for lubrication. Permanently lubricated bearings are acceptable.

14-1.6.5 Sheave Sizes

(a) Boom hoisting sheaves shall have pitch diameters of not less than 10 times the nominal diameter of the rope used.

(b) Load hoisting sheaves shall have pitch diameters of not less than 10 times the nominal diameter of the rope used.

(c) Load block sheaves shall have pitch diameters of not less than 10 times the nominal diameter of the rope used.

SECTION 14-1.7: CABS

(15) 14-1.7.1 Construction

(a) Cabs, if provided, shall be constructed to enclose the operator's station to provide protection from the weather, and shall include all boom and tractor controls.

(b) Windows or openings shall be provided in the cab or operator's compartment on all four sides of the cab for maximum visibility.

(c) All cab glazing shall be safety glazing material as defined in ANSI Z26.1.

(d) Visibility on the boom side of the cab shall be such that the uppermost point of the boom is visible at all times.

(e) If an operator's station precludes a cab having doors on both sides, an alternate exit shall be provided that complies with ISO 2867.

(f) All cab doors, whether of sliding or swinging type, shall comply with ISO 2867 and shall be restrained from inadvertent opening or closing while traveling or operating the machine. The door adjacent to the operator, if the swinging type, should open outward and, if the sliding type, should slide rearward to open.

(g) A clear passageway shall be provided from the operator's station to an exit door on the operator's side.

(15) 14-1.7.2 Platforms

(a) Principal walking surfaces shall be of a skid resistant type.

(b) Outside platforms, if furnished, shall be provided with guardrails in accordance with ISO 2867. Where platforms are too narrow to use guardrails, handholds shall be provided at points above the platform.

14-1.7.3 Access

On all crawler and wheel-mounted side boom tractors, handholds and steps shall be provided, as needed, to facilitate entrance to and exit from the operator's cab.

14-1.7.4 Cab Roof

(15)

Where necessary for rigging or service requirements, a ladder or steps shall be provided to give access to a cab roof. The ladder, steps, and weight-supporting capability of the cab roof shall conform to the requirements of ISO 2867.

14-1.7.5 Noise Exposure

The noise level at the operator's station shall be a consideration in the manufacture of new tractors.

SECTION 14-1.8: GENERAL REQUIREMENTS

14-1.8.1 Booms

(15)

(a) Automatic means shall be provided to stop boom motion when the maximum permissible boom angle is reached.

(b) Booms shall meet the performance requirements of side boom tractor tests in ISO 8813.

14-1.8.2 Hoist Limiting

Two-block damage prevention devices or designs should be utilized, or hoist limiting devices should be provided, e.g., anti-two-block systems. Such systems or designs should prevent damage from either hook block or boom movement.

14-1.8.3 Exhaust Gases

Engine exhaust gases shall be piped to the outside of the cab and discharged in a direction away from the operator. All exhaust pipes shall be guarded or insulated in areas where contact by personnel is probable in the performance of normal duties.

14-1.8.4 Stabilizers (Wheel-Type Side Boom Tractors)

(a) Means shall be provided to hold all stabilizers in the retracted position while traveling and in the extended position when blocked for lifting. When stabilizers are used, all stabilizers shall be extended.

(b) Power-actuated jacks, where used, shall be provided with means to prevent loss of support under load.

(c) Each stabilizer shall be visible from its actuating location.

(d) Means shall be provided for fastening stabilizer floats to stabilizers when in use.

14-1.8.5 Welded Construction

All welding procedures and welding operator qualifications to be used on load sustaining members shall be in accordance with AWS D14.3-05. Where special steels

or other materials are required for appropriate repairs, the manufacturer shall provide welding guidance, procedures, or both.

14-1.8.6 Guards for Moving Parts

(a) Exposed moving parts (such as gears, set screws, projecting keys, chain, chain sprockets, and reciprocating or rotating parts) that might constitute a hazard under normal operating conditions shall be guarded.

(b) Guards shall be fastened.

(c) Each guard shall be capable of supporting without permanent distortion the weight of a 200 lb (90 kg) person unless the guard is located where it is not probable that a person will step on it.

14-1.8.7 Clutch and Brake Protection

Dry friction brakes and clutches shall be guarded against rain and other liquids such as oil and lubricants.

14-1.8.8 Lubricating Points

Lubricating points should be accessible without the necessity of removing guards.

14-1.8.9 Miscellaneous Equipment

tool box: a receptacle should be secured permanently to the side boom tractor for storing tools and lubricating equipment.

14-1.8.10 Hydraulic and Pneumatic Line Protection

Exposed lines subject to damage shall be protected insofar as it is practical.

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Chapter 14-2

Inspection, Testing, and Maintenance

(15) SECTION 14-2.1: INSPECTION — 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.

(15) 14-2.1.1 Inspection Classification

(a) *Initial Inspection.* Prior to initial use, all new, reinstalled, altered, or modified side boom tractors shall be inspected.

(b) Inspection procedure for side boom tractors in regular service is divided into two 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 side boom tractor and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications are herein designated as *frequent* and *periodic*, with respective intervals between inspections as defined below.

(1) *Frequent Inspection.* Visual examination with written 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 occurrence

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

(-a) normal service — annually

(-b) heavy service — semiannually

(-c) severe service — quarterly

(-d) special or infrequent service as recommended by a qualified person

(15) 14-2.1.2 Frequent Inspection

Items such as the following shall be inspected at intervals as defined in para. 14-2.1.1(b)(1) or as specifically indicated by the manufacturer:

(a) Operating mechanisms for proper operation, proper adjustment — daily, when in use. Electronic systems should be self-diagnosing. If they are self-diagnosing, they shall be capable of advising the operator of malfunction.

(b) Operational aids for malfunction — daily, when in use.

(c) Lines, tanks, valves, pumps, and other parts of air or hydraulic systems for leaks — daily, when in use.

(d) All hydraulic hoses, particularly those that flex in normal operation of tractor functions. — daily, when in use.

(e) Hydraulic system for proper oil level — daily, when in use.

(f) Hooks in accordance with ASME B30.10, hook latches, if used, for proper operation — daily, when in use.

(g) Hoist rope in accordance with para. 14-2.4.1(a).

(h) Rope reeving for compliance with tractor manufacturer's recommendations or instructions.

(i) Standing ropes (guys), including end connections, for wear [as defined in para. 14-2.4.2(b)], broken wires, stretch, kinking, or twisting.

(j) Electrical apparatus for proper operation and evidence of excessive deterioration, dirt, and moisture accumulation.

(k) Tires and wheels for condition and recommended inflation pressure.

Any deficiencies shall be evaluated by a qualified person and a determination made as to whether they constitute a hazard.

14-2.1.3 Periodic Inspection

(15)

Complete inspections of the side boom tractor shall be performed at intervals, as defined in para. 14-2.1.1(b)(2). These inspections shall include the requirements of para. 14-2.1.2 and items such as the following:

(a) deformed, cracked, or corroded members

(b) loose bolts or rivets

(c) cracked or worn sheaves and drums

(d) worn, cracked, or distorted parts such as pins, bearings, shafts, gears, rollers, and locking and clamping devices

(e) any significant inaccuracies of operational aids, as specified in Section 14-1.2

(f) excessive wear on brake system parts, linings, pawls, and ratchets

(g) gasoline, diesel, electric, or other power plants for improper performance or noncompliance with other applicable standards

(h) excessive wear of chain drive sprockets and excessive chain stretch

- (i) travel steering, braking, and locking devices, for malfunction
- (j) excessively worn or damaged tires or wheels

14-2.1.4 Side Boom Tractors Not in Regular Use

(a) A side boom tractor that has been idle for a period of 1 month or more, but less than 6 months, shall be inspected conforming with the requirements of paras. 14-2.1.2 and 14-2.4.1(a) before being placed in service.

(b) A side boom tractor that has been idle for a period of over 6 months shall be inspected by a designated person conforming with the requirements of paras. 14-2.1.3 and 14-2.4.1(c) before being placed in service.

(15) 14-2.1.5 Inspection Records

Dated inspection reports and records shall be made of periodic inspections on critical items in use such as brakes, hooks, and ropes. Dated records should be kept where readily available.

(15) 14-2.1.6 Operational Aids

(a) Prior to daily operation, operational aids shall be checked in accordance with the device/side boom tractor manufacturer's recommended procedures to determine if they are functioning properly. Electronic systems should be self diagnosing. If they are self diagnosing, they shall be capable of advising the operator of malfunction.

(b) Operational aids shall be inspected and tested by a designated person in accordance with the manufacturer's recommended procedures as part of the periodic inspection of para. 14-2.1.3.

(c) When operational aids are inoperative or malfunctioning, the side boom tractor and/or device manufacturer's recommendations for continued operation or shutdown of the side boom tractor shall be followed until the deficiencies are corrected. Without such recommendations and any prohibitions from the manufacturer against further operation, the designated person responsible for supervising the lifting operation shall establish procedures for conducting the lift.

SECTION 14-2.2: TESTING

(15) 14-2.2.1 Operational Testing

(a) Prior to initial use, all new, altered, or modified side boom tractors shall be tested by a designated person to verify compliance with this Volume including the following functions:

- (1) lifting and lowering
- (2) boom up and down
- (3) limit devices, such as boom stops should be tested by raising the boom slowly until the boom stop prevents further raising of the boom

- (4) travel mechanism
- (5) operational aids

(b) Prior to initial use, a repaired side boom tractor shall be tested. Testing may be limited to the function(s) affected by the repair.

14-2.2.2 Rated Load Test

(15)

(a) Prior to initial use

(1) all new side boom tractors shall be tested and all altered or modified side boom tractors shall be tested and inspected by or under the direction of a qualified person. A written test report shall be prepared by the qualified person and placed on file. Test loads shall not exceed 110% of the manufacturer's rated load and shall not exceed tipping load at any selected working load overhang.

(2) the need for testing of repaired side boom tractors shall be determined by a qualified person. When a rated load test is required, testing shall be in accordance with (a)(1) above.

(b) Rated load test shall consist of the following operations as a minimum requirement:

(1) hoist the test load to ensure that the load is supported by the side boom tractor and held by the hoist brake(s)

(2) boom the side boom tractor up and down within the working load overhang

(3) travel with the test load a distance sufficient to prove the ability of the side boom tractor to support the test load

(c) No side boom tractor shall be rerated in excess of the original load ratings unless such rating changes are approved by the side boom tractor manufacturer. If information is not available from the original manufacturer, the recommendations of a qualified person shall be followed.

SECTION 14-2.3: MAINTENANCE

14-2.3.1 Preventive Maintenance

(15)

(a) A preventive maintenance program shall be established and should be based on the recommendation by the side boom tractor manufacturer or a qualified person. Dated records should be maintained.

(b) Replacement parts shall be at least equal to the original manufacturer's specifications. It is recommended that replacement parts be obtained from the original equipment manufacturer.

14-2.3.2 Maintenance Procedure

(a) Before adjustments and repairs are started on a side boom tractor, the following precautions shall be taken as applicable:

- (1) side boom tractor placed where it will cause the least interference with other equipment or operations in the area

(2) all controls at the manufacturer's recommended position

(3) starting means rendered inoperative, except when required for repairs

(4) hydraulic oil pressure relieved from all hydraulic circuits before loosening or removing hydraulic components

(5) power plant stopped or disconnected at take-off

(6) boom lowered to the ground, if possible, or otherwise secured against dropping

(7) lower load block lowered to the ground, if possible, or otherwise secured against dropping

(b) "Warning" or "Out of Order" signs shall be placed on the side boom tractor controls.

(c) After adjustments and repairs have been made, the side boom tractor shall not be returned to service until all guards have been reinstalled, safety devices reactivated, maintenance equipment and "Warning" or "Out of Order" signs are removed, and equipment function checks are complete.

14-2.3.3 Adjustments and Repairs

(a) Any hazardous conditions, disclosed by the inspection requirements of Section 14-2.1, shall be corrected before normal operation of the side boom tractor is resumed. Adjustments and repairs shall be done only by designated personnel.

(b) Adjustments shall be maintained to assure correct functioning of components. The following are examples:

- (1) all functional operating mechanisms
- (2) limit devices
- (3) control systems
- (4) braking systems
- (5) operational aids

(c) Repairs or replacements shall be made as needed. The following are examples:

(1) side boom tractor hooks showing defects described in para. 14-2.1.2(f) and ASME B30.10 shall be taken out of service. Repairs by welding or reshaping are not recommended. Repairs shall be done under supervision by a qualified person and the hook shall be tested to the load requirement of para. 14-2.2.1 before further use.

(2) load attachment chains and rope slings having any of the conditions described in para. 14-2.1.2.

(3) all critical parts that are cracked, broken, bent, or excessively worn.

(d) If repairs of load sustaining members are made by welding, identification of materials shall be made and appropriate welding procedure shall be followed in compliance with original manufacturer's recommendations. If information is not available from the original manufacturer, the recommendations of a qualified person shall be followed.

14-2.3.4 Lubrication

(a) A lubrication chart should be available on the side boom tractor.

(b) All moving parts of the side boom tractor for which lubrication is specified, including rope and chain, should be regularly lubricated. Lubricating systems should be checked for proper delivery of lubricant. Care should be taken to follow recommendations of the manufacturer as to points and frequency of lubrication, maintenance of lubricant levels, and types of lubricant to be used. If the manufacturer cannot supply this information a qualified person should be consulted.

(c) Machinery shall be stationary while lubricants are being applied and protection provided as called for in paras. 14-2.3.2(a)(2) through (5), unless equipped for automatic lubrication.

SECTION 14-2.4: ROPE INSPECTION, REPLACEMENT, AND MAINTENANCE — GENERAL

(15)

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.

14-2.4.1 Rope Inspection

(15)

(a) All running ropes in continuous service shall be visually inspected once each working day. This inspection shall consist of observation of all rope in service during the day's operation. An inspection of all ropes shall be made at least monthly and a dated report of rope condition kept on file. Sections of rope that are normally hidden during visual and maintenance inspection, such as parts passing over sheaves, should be given close inspection as these are points most likely to fail. 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:

(1) reduction of rope diameter below nominal diameter due to loss of core support, internal or external corrosion, or wear of outside wires

(2) a number of broken outside wires and the degree of distribution or concentration of such broken wires

(3) worn outside wires

(4) corroded or broken wires at end connections

(5) corroded, cracked, bent, worn, or improperly applied end connections

(6) kinking, crushing, cutting, or unstranding

(b) Heavy wear or broken wires may occur in sections in contact with equalizer sheaves or other sheaves where rope travel is limited, or with saddles. Care shall be taken to inspect ropes at these locations.

(c) All rope that has been idle for a period of 1 month or more due to shutdown or storage of a side boom tractor on which it is installed shall be given a thorough inspection before it is placed in service. This inspection shall be for all types of deterioration. A dated report of the rope condition shall be filed.

(d) Any new poured socket or swaged socket assembly used as a standing rope (guy) shall be proof tested to the side boom tractor or fitting manufacturer's recommendation, but in no case greater than 50% of the component wire rope, structural strand, or fitting(s) minimum breaking force.

(15) 14-2.4.2 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 prior to the equipment being used by the next work shift.

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

(1) broken wires — in running ropes, six randomly distributed broken wires in six rope diameters or three broken wires in one strand in six rope diameters.

(2) one outer wire broken at the point of contact 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. Additional inspection of this section is required.

(3) independent wire rope core (IWRC) or strand core protrusion between the outer strands.

(4) kinking, crushing, birdcaging, or any other damage resulting in distortion of the rope structure

(5) evidence of heat damage

(6) reduction of rope diameter due to loss of core support, or internal or external corrosion.

(7) reduction from nominal diameter of more than 5%.

(8) deviation shall be allowed from the removal criteria listed in paras. 14-2.4.2(b)(1) through (7) only with the written approval of the manufacturer of the specific wire rope to which the deviation is applicable.

(c) Broken wire removal criteria cited in this Volume apply to wire rope operating on multilayer drums regardless of sheave material.

(d) In order to establish data as a basis of judging the proper time for replacement, a continuing inspection record should be maintained. This record shall cover points of deterioration listed in para. 14-2.4.1.

(e) Replacement rope shall be the same size, grade, and construction as the original rope furnished by the manufacturer, unless otherwise recommended by a rope manufacturer or a qualified person due to actual working condition requirements.

(f) Discarded rope should not be used for slings.

14-2.4.3 Rope Maintenance

(a) Rope should be stored to prevent damage or deterioration.

(b) Unreeling or uncoiling of rope shall be done as recommended by the rope manufacturer(s) or a qualified person and with care to avoid kinking or inducing a twist.

(c) Before cutting a rope, means shall be used to prevent unlaying of the strands.

(d) During installation, care should be observed 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 and the rope manufacturer should be consulted. 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.

(f) When an operating rope shows greater wear at well-defined localized areas than on the remainder of the rope, rope life can be extended (in cases where a reduced rope length is adequate) by cutting off a section at the worn end, and thus shifting the wear to different areas of the rope.

Chapter 14-3 Operation

SECTION 14-3.1: OPERATOR QUALIFICATIONS AND OPERATING PRACTICES

(15) 14-3.1.1 Operators

(a) Side boom tractors shall be operated only by the following personnel:

(1) qualified operators who meet the requirements of para. 14-3.1.2.

(2) trainees under the supervision of a designated person. The number of trainees permitted to be supervised by a single designated person, the physical location of the designated person while supervising, and the type of communication required between the designated person and the trainee shall be determined by a qualified person.

(3) maintenance, inspection, and test personnel, when it is necessary in the performance of their duties and they are qualified to do so. Operation by these persons shall be limited to those side boom tractor functions necessary to verify equipment function, perform maintenance on the side boom tractor, or verify the performance of the side boom tractor after maintenance.

(b) No one, other than personnel specified in (a) above, shall enter the operator station, with the exception of supervisors, whose duties require them to do so, and then only in the performance of their duties and with the knowledge of the operator or other designated person.

(15) 14-3.1.2 Operator Qualifications

Operators shall successfully meet the qualifications for the specific type of operating system for the side boom tractor they are operating.

(a) Operators and operator trainees shall meet the following physical requirements unless it can be shown that failure to meet the qualifications will not affect the operation of the side boom tractor. In such cases, the following specialized clinical or medical judgments and tests may be required:

(1) vision of at least 20/30 Snellen in one eye, and 20/50 in the other, with or without corrective lenses.

(2) ability to distinguish red, green, and yellow, regardless of position of colors, if color differentiation is required for operation.

(3) normal depth perception, field of vision, and no tendencies to dizziness.

(4) adequate hearing to meet operational demands, with or without hearing aid.

(5) sufficient strength, endurance, agility, coordination, manual dexterity, and speed of reaction to meet the operational demands.

(6) no evidence of having physical defects, being subject to seizures, or emotional instability that could render a hazard to the operator or others, or, that in the opinion of the examiner, could interfere with the operator performance. If evidence of this nature is found, it may be sufficient cause for disqualification. Specialized medical tests may be required to determine these conditions.

(b) A negative result on a substance abuse test. The level of testing shall be determined by the standard practice for the industry where the side boom tractor is employed and the test results shall be confirmed by a recognized laboratory service.

(c) Operator requirements shall include, but not be limited to, the following:

(1) satisfactory completion of a written examination covering the operational characteristics, controls, emergency control skills, and side boom tractor lifting operations appropriate for the side boom tractor type and model being operated. Emergency control skills shall include response to fire, power line contact, loss of stability, and issues with multiple side boom tractor lifting operations.

(2) demonstrated ability to read, write, and comprehend the manufacturer's manual and load chart.

(3) satisfactory completion of a combination written and oral test on load/capacity chart usage for the type of side boom tractor that qualification is being sought.

(4) satisfactory completion of an operational test demonstrating proficiency in performing lifting, lowering, booming, and traveling functions with and without a load. Testing shall also include proficiency in prestart and poststart inspection by appropriate written, oral, or practical methods for the type of side boom tractor to be operated.

14-3.1.3 Responsibilities

(15)

While the organizational structure of various projects may differ, the following roles are described here for purposes of delineating responsibilities. All responsibilities listed below shall be assigned in the work site organization. (A single individual may perform one or more of these roles.)

(a) *Side Boom Tractor Owner.* The side boom tractor owner has custodial control of a side boom tractor by virtue of lease or ownership.

(b) *Side Boom Tractor User.* The side boom tractor user arranges the side boom tractor's presence on a work site and controls its use there.

(c) *Site Supervisor.* The site supervisor exercises supervisory control over the work site on which a side boom tractor is being used and over the work that is being performed on that site.

(d) *Lift Director.* The lift director directly oversees the work being performed by a side boom tractor and the associated rigging crew.

(e) *Side Boom Tractor Operator.* The side boom tractor operator directly controls the side boom tractor's functions.

14-3.1.3.1 Responsibilities of the Side Boom Tractor Owner and Side Boom Tractor User. In some situations the owner and the user may be the same entity and is therefore accountable for all of the following responsibilities. In other cases, the user may lease or rent a side boom tractor from the owner without supervisory, operational, maintenance, support personnel, or services from the owner. In these situations, paras. 14-3.1.3.1.1 and 14-3.1.3.1.2 shall apply.

14-3.1.3.1.1 Side Boom Tractor Owner. The side boom tractor owner's responsibilities shall include the following:

(a) providing a side boom tractor that meets the requirements of Chapters 14-1 and 14-2 as well as specific job requirements defined by the user

(b) providing a side boom tractor and all necessary components, specified by the manufacturer, that meet the user's requested configuration and capacity

(c) providing all applicable load rating chart(s) and diagrams

(d) providing additional technical information pertaining to the side boom tractor, necessary for side boom tractor operation, when requested by the side boom tractor user

(e) providing field assembly, disassembly, operation, maintenance information, and warning decals and placards installed as prescribed by the side boom tractor manufacturer

(f) establishing an inspection, testing, and maintenance program in accordance with Chapter 14-2 and informing the side boom tractor user of the requirements of this program

(g) using personnel that meet the requirements for a designated person as defined in para. 14-0.4 for the purposes of inspection, maintenance, repair, transport, assembly, and disassembly

14-3.1.3.1.2 Side Boom Tractor User. The side boom tractor user's responsibilities shall include the following:

(a) complying with the requirements of this Volume, manufacturer's requirements, and those regulations applicable at the work site

(b) using supervisors for side boom tractor activities that meet the requirements for a qualified person

(c) ensuring that the side boom tractor is in proper operating condition prior to initial use at the work site by

(1) verifying that the side boom tractor owner has provided documentation that the side boom tractor meets the requirements of para. 14-2.1.5

(2) verifying that a frequent inspection has been performed as defined in para. 14-2.1.2

(d) verifying that the side boom tractor has the necessary lifting capacity to perform the proposed lifting operations in the planned configuration

(e) using side boom tractor operators that meet the requirements of paras. 14-3.1.1 and 14-3.1.2 and are qualified to perform the tasks that will be required with the side boom tractor they are assigned to operate

(f) ensuring the assigned operator(s) has been notified of adjustments or repairs that have not yet been completed, prior to commencing side boom tractor operations

(g) using personnel that meet the requirements for a designated person as defined in Section 14-0.4 for the purposes of inspection, maintenance, repair, transport, assembly, and disassembly

(h) ensuring that all personnel involved in maintenance, repair, transport, assembly, disassembly, and inspection are aware of their responsibilities, assigned duties, and the associated hazards

(i) ensuring that the inspection, testing, and maintenance programs specified by the side boom tractor owner are followed

14-3.1.3.2 Responsibilities of Site Supervisor and Lift Director. In some situations, the site supervisor and the lift director may be the same person.

14-3.1.3.2.1 Site Supervisor. The site supervisor's responsibilities shall include the following:

(a) ensuring that the side boom tractor meets the requirements of Chapter 14-2 prior to initial site usage.

(b) determining if additional regulations are applicable to side boom tractor operations.

(c) ensuring that a qualified person is designated as the lift director.

(d) ensuring that side boom tractor operations are coordinated with other work site activities that will be affected by or will affect lift operations.

(e) ensuring that the area for the side boom tractor is adequately prepared. The preparation includes, but is not limited to, the following:

(1) access roads for the side boom tractor and associated equipment

(2) sufficient room to assemble and disassemble the side boom tractor

(3) an operating area that is suitable for the side boom tractor with respect to levelness, surface conditions, support capability, proximity to power lines, excavations, slopes, underground utilities, subsurface construction, and obstructions to side boom tractor operation

(4) traffic control as necessary to restrict unauthorized access to the side boom tractor's working area

(f) ensuring that work involving the assembly and disassembly of a side boom tractor is supervised by a qualified person.

(g) ensuring that side boom tractor operators meet the requirements of para. 14-3.1.2.

(h) ensuring that conditions that may adversely affect side boom tractor operations are addressed. Such conditions include, but are not limited to, the following:

- (1) poor soil conditions
- (2) wind velocity or gusting winds
- (3) heavy rain
- (4) fog
- (5) extreme cold
- (6) artificial lighting

(i) allowing side boom tractor operation near electric power lines only when the requirements of para. 14-3.4.1 have been met.

(j) permitting special lifting operations only when equipment and procedures required by this Volume, the side boom tractor manufacturer, or a qualified person are employed. Such operations include, but are not limited to, the following:

- (1) multiple unit lifts
- (2) pick-and-carry operations (movement with load)

(k) ensuring that work performed by the rigging crew is supervised by a qualified person.

(l) ensuring that side boom tractor maintenance is performed by a designated person.

14-3.1.3.2.2 Lift Director. The lift director's responsibilities shall include the following:

(a) being present at the work site during lifting operations.

(b) stopping side boom tractor operations if alerted to an unsafe condition affecting those operations.

(c) ensuring that the preparation of the area needed to support side boom tractor operations has been completed before side boom tractor operations commence.

(d) ensuring necessary traffic controls are in place to restrict unauthorized access to the side boom tractor's work area.

(e) ensuring that personnel involved in side boom tractor operations understand their responsibilities, assigned duties, and the associated hazards.

(f) addressing safety concerns raised by the operator or other personnel and being responsible if he decides to overrule those concerns and directs side boom tractor

operations to continue. (In all cases, the manufacturer's criteria for safe operation and the requirements of this Volume shall be adhered to.)

(g) appointing the signalperson(s) and conveying that information to the side boom tractor operator.

(h) ensuring that signalperson(s) appointed meet the requirements of Section 14-3.3.

(i) allowing side boom tractor operation near electric power lines only when the requirements of para. 14-3.4 and any additional requirements determined by the site supervisor have been met.

(j) ensuring precautions are implemented when hazards associated with special lifting operations are present. Such operations include, but are not limited to, the following:

- (1) multiple unit lifts
- (2) pick-and-carry operations (movement with load)
- (3) side boom tractor operating on barges

(k) informing the side boom tractor operator of the weight of loads to be lifted, as well as the lifting, moving, and placing locations for these loads.

(l) obtaining the side boom tractor operator's verification that this weight does not exceed the side boom's rated capacity.

(m) ensuring that a side boom tractor's load rigging is performed by designated personnel as defined in Section 14-0.4.

(n) ensuring that the load is properly rigged and balanced before it is lifted more than a few inches.

14-3.1.3.3 Responsibilities of Side Boom Tractor Operators.

The operator shall be responsible for the following listed items. The operator shall not be responsible for hazards or conditions that are not under his direct control and that adversely affect the lift operations. Whenever the operator has doubt as to the safety of side boom tractor operations, the operator shall stop the side boom tractor's functions in a controlled manner. Lift operations shall resume only after safety concerns have been addressed or the continuation of side boom tractor operations is directed by the lift director.

The operator's responsibilities shall include the following:

(a) reviewing the requirements for the side boom tractor with the lift director before operations.

(b) knowing what types of site conditions could adversely affect the operation of the side boom tractor and consulting with the lift director concerning the possible presence of those conditions.

(c) understanding and applying the information contained in the side boom tractor manufacturer's operating manual.

(d) understanding the side boom tractor's functions and limitations as well as its particular operating characteristics.

(e) using the side boom tractor's load rating chart(s) and diagrams and applying all notes and warnings related to the charts to confirm the correct side boom tractor configuration to suit the load, site, and lift conditions. Be fully trained on, and competent in the use of, any load monitoring system the side boom tractor may be equipped with.

(f) refusing to operate the side boom tractor when any portion of the load or side boom tractor would enter the prohibited zone of energized power lines except as defined in para. 14-3.4.1(d).

(g) performing a daily inspection as specified in paras. 14-2.1.2 and 14-2.4.1.

(h) promptly reporting the need for any adjustments or repairs.

(i) following applicable lock out/tag out procedures.

(j) not operating the side boom tractor when physically or mentally unfit.

(k) ensuring that all controls are in the off or neutral position and that all personnel are in the clear before energizing the side boom tractor or starting the engine.

(l) not engaging in any practice that will divert his attention while actually operating the side boom tractor controls.

(m) testing the side boom tractor function controls that will be used and operating the side boom tractor only if those function controls respond properly.

(n) operating the side boom tractor's functions, under normal operating conditions, in a smooth and controlled manner.

(o) knowing and following the procedures specified by the manufacturer or approved by a qualified person, for assembly, disassembly, setting up, and reeving the side boom tractor.

(p) knowing how to travel with a load on the side boom tractor.

(q) observing each outrigger during extension, setting, and retraction or using a signalperson to observe each outrigger during extension, setting, or retraction.

(r) ensuring that the load and rigging weight(s) have been provided.

(s) calculating or determining the net capacity for all configurations that will be used and verifying, using the load rating chart(s), that the side boom tractor has sufficient net capacity for the proposed lift.

(t) considering all factors known that might affect the side boom tractor capacity and informing the lift director of the need to make appropriate adjustments.

(u) knowing the standard and special signals as specified in Section 14-3.3 and responding to such signals from the person who is directing the lift or an appointed signalperson. (When a signalperson is not required as part of the lift operation, the operator is then responsible for the movement of the side boom tractor. However, the operator shall obey a stop signal at all times, no matter who gives it.)

(v) understanding basic load rigging procedures. See paras. 14-3.1.3.2.2(m) and (n) for responsibility of rigging the load and ensuring that the load is rigged properly.

(w) if power fails during operations

(1) setting all brakes and locking devices

(2) moving all clutches or other power controls to the off or neutral position

(3) landing any load suspended below the hook under brake control if practical

(x) before leaving the side boom tractor unattended

(1) landing any load suspended below the hook, unless the requirements of para.14-3.2.5(b) are met

(2) disengaging the master clutch

(3) setting travel, boom brakes, and other locking devices

(4) putting controls in the off or neutral position

(5) stopping the engine, unless the requirements of para.14-3.2.5(b) are met

(y) The operator shall not allow anyone to be transported on the side boom tractor unless approved seating is provided.

(z) Side boom tractors shall not be used for personnel lifting, on the load, on the hook, or in platforms, under any condition.

SECTION 14-3.2: HANDLING THE LOAD

14-3.2.1 Weight of Load

(15)

(a) No side boom tractor shall be loaded beyond the maximum load capacity, except for test purposes as provided in Section 14-2.2.

(b) When loads that are limited by structural competence or hydraulic capacity rather than by stability are to be handled, the person responsible for the job shall ascertain that the weight of the load has been determined within +10% before it is lifted.

(c) When the load lifted results in design factors of less than 4.0 for running ropes or 3.5 for standing ropes, the following requirements shall be met:

(1) An inspection prior to and following the lift reveals no deficiencies of the rope, per Section 14-2.4.

(2) The maximum load capacity of the side boom tractor is not exceeded.

(3) The load can be and is handled in such manner and at such speeds as to minimize dynamic effects.

(4) The lift and inspections are made under controlled conditions and under the direction of a qualified person.

14-3.2.2 Attaching the Load

(a) The hoist rope shall not be wrapped around the load.

(b) The load shall be attached to the hook by means of slings or other devices.

(15) 14-3.2.3 Moving the Load

(a) The individual directing the lift shall see that the load is secured and balanced in the sling or lifting device before it is lifted more than a few inches.

(b) Before starting to lift, the individual directing the lift shall note the following conditions:

(1) Hoist rope shall not be kinked.

(2) Multiple-part lines shall not be twisted around each other.

(3) The hook shall be brought over the load in such a manner as to prevent swinging.

(4) If there is a slack rope condition, it should be determined that the rope is properly seated on the drum and in the sheaves.

(5) Confirm all personnel are clear of the load and lifting equipment, or have acknowledged awareness of the intended movement.

(c) During lifting, care should be taken that

(1) there is no sudden acceleration or deceleration of the moving load

(2) the load does not contact any obstructions

(d) Side loading of booms should be limited to freely suspended loads.

(e) The operator shall not lift, lower, or travel while anyone is on the load or hook, except when the hook is attached to landed pipe placed in trench.

(f) Ensure all personnel are clear of the load and lifting equipment.

(g) The operator shall avoid carrying loads over people.

(h) The operator shall test the load and boom brakes each time a load approaching the rated load is handled.

(i) If equipped by the manufacturer, stabilizers shall be used when the load to be handled at that particular load overhang exceeds the rated load without stabilizers, as specified by the manufacturer. Where floats are used, they shall be attached to the stabilizers. Wood blocks used to support stabilizers shall be

(1) strong enough to prevent crushing, bending, or shear failure

(2) of such thickness, width, and length as to completely support the float, transmit the load to the supporting surface, and prevent shifting, toppling, or excessive settlement under load

(3) used only under the outer bearing surface of the extended stabilizer beam

(j) Neither the load nor the boom shall be lowered below the point where less than two full wraps of rope remain on their respective drums.

(k) When two or more side boom tractors are used to lift one load, one person shall be designated to be responsible for the operation. He shall analyze the operation and instruct all personnel involved in the proper positioning, rigging of the load, and the movements to be made.

(l) In transit, the following additional precaution shall be exercised: the empty hook shall be lashed or otherwise restrained so that it cannot swing freely.

(m) Before traveling a side boom tractor with load, a qualified person shall be responsible for determining and controlling safety. Decisions such as position of load, boom location, ground support, travel route, and speed of movement shall be in accord with that person's determinations.

(n) When a side boom tractor is to be operated at a fixed load overhang, the bottom hoist pawl or other positive locking device shall be engaged.

14-3.2.4 Load Ratings — Where Dynamic Factors Determine Lifting Capacity

When dynamic operating conditions involving travel or lateral movement, multiple unit lifts, or when load hoisting/lowering speeds may cause shock loading, the rated load capacity shall be determined by a qualified person.

14-3.2.5 Holding the Load**(15)**

(a) The operator shall not leave the controls while the load is suspended.

(b) As an exception to para. 14-3.2.5(a), under such circumstances where a load is to be held suspended for a period of time exceeding normal lifting operations, the operator may leave the controls, provided prior to that time the requirements for restraining the boom and load have been established and agreed upon by the operator and lift director.

(c) No person should be permitted to stand or pass under a suspended load.

14-3.2.6 Assisted Lifts**(15)**

(a) When side boom tractors are used to lift loads with the aid of other equipment, one person shall be designated to be responsible for the operation. That person shall evaluate the operation, instruct all personnel in the proper positioning of the equipment, rigging of the load, any connections between the machines, and all movements to be performed.

(b) Decisions such as the necessity to reduce side boom tractor lift capacity ratings, load position, boom and hook locations, ground support, and speed of movement shall be in accordance with this evaluation and in compliance with all manufacturer's recommendations.

SECTION 14-3.3: SIGNALS**14-3.3.1 Standard Signals**

Standard signals to the operator shall be in accordance with the standards prescribed in para. 14-3.3.2 unless voice communication equipment (telephone, radio, or equivalent) is utilized. Signals shall be discernible or audible at all times. No response shall be made unless signals are understood.

14-3.3.2 Hand Signals

Hand signals shall be in accordance with Fig. 14-3.3.2-1 and shall be posted conspicuously.

(15) 14-3.3.3 Voice Signals

Prior to beginning lifting operations using voice signals, the signals shall be discussed and agreed upon by the lift director, the side boom tractor operator, and the signalperson.

(a) Telephones, radios, or equivalent, if used, shall be tested before lifting operations begin.

(b) Prior to commencing a lift, the operator and signalperson shall contact and identify each other.

(c) All directions given to the side boom tractor operator by the signalperson shall be given from the operator's direction perspective (e.g., turn right).

(d) Each series of voice signals shall contain three elements stated in the following order:

- (1) function and direction
- (2) distance and/or speed
- (3) function stop

(15) 14-3.3.4 Special Signals

For operations not covered by para. 14-3.3.2 or for special conditions that occur from time to time, additions to or modifications of the standard signals may be required. In such cases these special signals shall be agreed on in advance by the operator, the signalperson, and other personnel directly assisting with the load handling activities. The special signals should not be in conflict with standard signals.

14-3.3.5 Instructions

If it is desired to give instructions to the operator, other than provided by the established signal system, the side boom tractor motions shall be stopped.

(15) SECTION 14-3.4: OPERATING NEAR ELECTRIC POWER LINES**(15) 14-3.4.1 Operating Near Electric Power Lines**

(a) Side boom tractors shall be operated so that no part of the side boom tractor or load enters into the Danger Zone shown in Fig. 14-3.4.1-1.

NOTE: The Danger Zone may be entered if

- (a) the electrical distribution and transmission lines have been de-energized and visibly grounded at the point of work
- (b) insulating barriers (not a part of nor an attachment to the side boom tractor) have been erected to prevent physical contact with the lines

(1) For lines rated 50 kV or below, minimum clearance between the lines and any part of the side boom tractor or load (including handling appendages) shall be 10 ft (3.0 m). For higher voltages, see Table 14-3.4.1-1.

(2) Caution shall be exercised when working near overhead lines because they can move horizontally or

vertically due to wind, moving the Danger Zone to new positions.

(3) In transit with no load and boom lowered, the clearance shall be as specified in Table 14-3.4.1-1.

(4) A qualified signalperson shall be assigned to observe the clearance and give warning before approaching the limits specified in Table 14-3.4.1-1.

(b) Before the commencement of operations near electrical lines, the site supervisor responsible for the job shall notify the owners of the lines or their designated representative, providing them with all pertinent information and requesting their cooperation.

(c) Any overhead wire shall be considered to be an energized line unless and until the person owning such line or the electrical utility authorities verify that it is not an energized line.

(d) Exceptions to this procedure, if approved by the owner of the electrical lines, may be granted by the administrative or regulatory authority if the alternate procedure provides sufficient protection and is set forth in writing.

(e) If cage-type boom guards, insulating links, or proximity warning devices are used on side boom tractors, such devices shall not be a substitute for the requirements of (a) above even if such devices are required by law or regulation. Limitations of such devices shall be understood by operating personnel and tested in the manner prescribed by the manufacturer of the device.

(f) Durable signs shall be installed at the operator's station and on the outside of the side boom tractor, warning that electrocution or serious bodily injury may occur unless a minimum clearance of 10 ft (3.0 m) for 50 kV is maintained between the side boom tractor or the load being handled and energized power lines. Greater clearances are required because of higher voltage as stated in (a)(1) above. Signs shall be revised but not removed when local jurisdiction requires greater clearances.

(g) When local jurisdictions require greater clearances than those stated in (a)(1) above, the signs shall be revised but not removed.

SECTION 14-3.5: MISCELLANEOUS**(15)****14-3.5.1 Counterweight**

Counterweights shall be used in accordance with the manufacturer's specifications. Additional counterweight shall not be installed unless approved by the side boom tractor manufacturer or a qualified person.

14-3.5.2 Refueling

(a) When refueling with a small portable container, it shall be a safety-type can equipped with automatic closing cap and flame arrester.

(b) Gasoline powered machines shall not be refueled with the engine running.

(c) Smoking or open flames shall be prohibited in the refueling area.

14-3.5.3 Fire Extinguishers

(a) An appropriate capacity for portable fire extinguisher, with a minimum extinguisher rating of 10 BC, shall be installed in the cab or at the machinery housing.

(b) Operating and maintenance personnel shall be familiar with the use and care of the fire extinguisher provided.

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