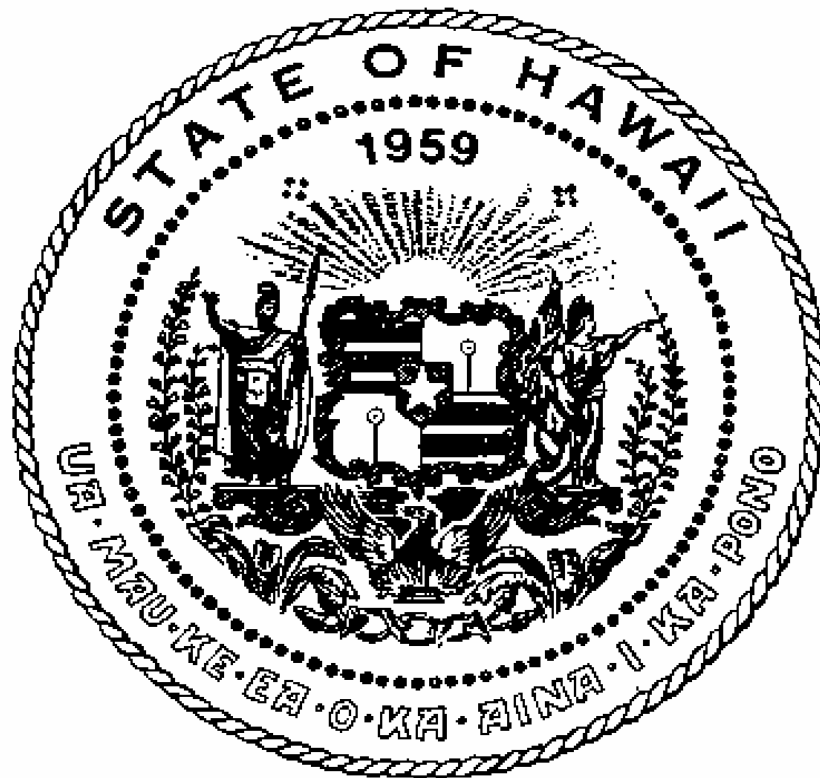


# OCCUPATIONAL SAFETY AND HEALTH STANDARDS



## PART 7 Longshoring

HAWAII ADMINISTRATIVE RULES

TITLE 12

DEPARTMENT OF LABOR AND INDUSTRIAL RELATIONS

SUBTITLE 8

DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

PART 7

OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR LONGSHORING

Chapter 12-190 Longshoring

This unofficial copy varies from the administrative rules format in that all sections follow directly after the previous section; small letters designating subsections are in bold type; page numbers have been added to the bottom center of each page; headers do not include the section number, only the title and chapter number; and sections that incorporate federal (Department of Labor, Occupational Safety and Health Administration) standards through reference include the federal standard. These variations facilitate changes to and use of the HIOSH rules and standards. This is an official copy in all other respects.

## HAWAII ADMINISTRATIVE RULES

## TITLE 12

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## DIVISION OF OCCUPATIONAL SAFETY AND HEALTH

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## SAFETY AND HEALTH REGULATIONS FOR LONGSHORING

## CHAPTER 190

## LONGSHORING

§12-190-1 Incorporation of federal standard

**§12-190-1 Incorporation of federal standard.** Title 29, Code of Federal Regulations. Part 1918 entitled "Safety and Health Regulations for Longshoring", published by the Office of the Federal Register, National Archives and Records Administration, on July 9, 1974; and the amendments published on July 22, 1977; August 24, 1987; February 9, 1994; July 19, 1994; December 22, 1994; February 13, 1996; July 25, 1997; December 1, 1998; August 27, 1999; November 12, 1999; June 30, 2000; February 28, 2006; and November 15, 2007, are made part of this chapter. [Eff 03/23/01; am; 12/21/06; am 5/02/08] (Auth: HRS §396-4) (Imp: HRS §396-4)

**§1918.1 Scope and application.**

- (a) The regulations of this part apply to longshoring operations and related employments aboard vessels. All cargo transfer accomplished with the use of shore-based material handling devices is covered by part §1917 of this chapter.
- (b) Part §1910 of this chapter does not apply to longshoring except for the following provisions:
- (1) Access to employee exposure and medical records. Subpart Z, §1910.1020;
  - (2) Commercial diving operations. Subpart T;
  - (3) Electrical. Subpart S when shore-based electrical installations provide power for use aboard vessels;
  - (4) Hazard communication. Subpart Z, §1910.1200;
  - (5) Ionizing radiation. Subpart Z, §1910.1096;
  - (6) Noise. Subpart G, §1910.95;
  - (7) Nonionizing radiation. Subpart G, §1910.97;

**Note to paragraph (b)(7):** Exposures to nonionizing radiation emissions from commercial vessel radar transmitters are considered hazardous under the following situations:

- (a) Where the radar is transmitting, the scanner is stationary, and the exposure distance is 19 feet (5.79 m) or less; or
  - (b) where the radar is transmitting, the scanner is rotating, and the exposure distance is 5 feet (1.52 m.) or less.
- (8) Respiratory protection. Subpart I, §1910.134;
  - (9) Toxic and hazardous substances. Subpart Z applies to marine cargo handling activities except for the following:

- (i) When a substance or cargo is contained within a sealed, intact means of packaging or containment complying with Department of Transportation or International Maritime Organization requirements;<sup>(1)</sup>
  - (ii) Bloodborne pathogens, §1910.1030;
  - (iii) Carbon monoxide, §1910.1000 (See §1918.94(a)); and
  - (iv) Hydrogen sulfide, §1910.1000 (See §1918.94(f)); and
  - (v) Hexavalent chromium §1910.1026 (See §1915.1026)
- (10) Powered industrial truck operator training, Subpart N, §1910.178(l).

**Note to Paragraph (b)(10):** The Compliance dates of December 1, 1999 set forth in 29 CFR 1910.178(l)(7) are stayed until March 1, 2000 for Longshoring.

Footnote <sup>(1)</sup> The International Maritime Organization publishes the International Maritime Dangerous Goods Code to aid compliance with the international legal requirements of the International Convention for the Safety of Life at Sea, 1960.

(c) Section 1915.1026 applies to any occupational exposures to hexavalent chromium in workplaces covered by this part.

### §1918.2 Definitions.

**Barge** means an unpowered, flatbottomed, shallow draft vessel including river barges, scows, carfloats, and lighters. It does not include ship shaped or deep draft barges.

**Bulling** means the horizontal dragging of cargo across a surface with none of the weight of the cargo supported by the fall.

**Danger zone** means any place in or about a machine or piece of equipment where an employee may be struck by or caught between moving parts, caught between moving and stationary objects or parts of the machine, caught between the material and a moving part of the machine, burned by hot surfaces or exposed to electric shock. Examples of danger zones are nip and shear points, shear lines, drive mechanisms, and areas underneath counterweights.

**Designated person** means a person who possesses specialized abilities in a specific area and is assigned by the employer to do a specific task in that area.

**Dockboards** (car and bridge plates) mean devices for spanning short distances between, for example, two barges, that is not higher than four feet (1.22m) above the water or next lower level.

**Employee** means any longshore worker or other person engaged in longshoring operations or related employments other than the master, ship's officers, crew of the vessel, or any person engaged by the master to load or unload any vessel of less than 18 net tons.

**Employer** means a person that employs employees in longshoring operations or related employments, as defined in this section.

**Enclosed space** means an interior space in or on a vessel that may contain or accumulate a hazardous atmosphere due to inadequate natural ventilation. Examples of enclosed spaces are holds, deep tanks and refrigerated compartments.

**Fall hazard** means the following situations:

- (1) Whenever employees are working within three feet (.91 m) of the unprotected edge of a work surface that is 8 feet or more (2.44 m) above the adjoining surface and twelve inches (.3 m) or more, horizontally, from the adjacent surface; or
- (2) Whenever weather conditions may impair the vision or sound footing of employees working on top of containers.

**Fumigant** is a substance or mixture of substances, used to kill pests or prevent infestation, that is a gas or is rapidly or progressively transformed to the gaseous state, although some nongaseous or particulate matter may remain and be dispersed in the treatment space.

**Gangway** means any ramp-like or stair-like means of access provided to enable personnel to board or leave a vessel, including accommodation ladders, gangplanks and brows.

**Hatch beam or strongback** mean a portable transverse or longitudinal beam placed across a hatchway that acts as a bearer to support the hatch covers.

**Hazardous cargo, materials, substance or atmosphere** means:

- (1) Any substance listed in 29 CFR part §1910, subpart Z;

- (2) Any material in the Hazardous Materials Table and Hazardous Materials Communications Regulations of the Department of Transportation, 49 CFR part 172;
- (3) Any article not properly described by a name in the Hazardous Materials Table and Hazardous Materials Communication Regulations of the Department of Transportation, 49 CFR part 172, but which is properly classified under the definitions of those categories of dangerous articles given in 49 CFR part 173; or
- (4) Any atmosphere with an oxygen content of less than 19.5 percent or greater than 23 percent.

**Intermodal container** means a reusable cargo container of a rigid construction and rectangular configuration; fitted with devices permitting its ready handling, particularly its transfer from one mode of transport to another; so designed to be readily filled and emptied; intended to contain one or more articles of cargo or bulk commodities for transportation by water and one or more other transport modes. The term includes completely enclosed units, open top units, fractional height units, units incorporating liquid or gas tanks and other variations fitting into the container system. It does not include cylinders, drums, crates, cases, cartons, packages, sacks, unitized loads or any other form of packaging.

**Longshoring operations** means the loading, unloading, moving or handling of cargo, ship's stores, gear, or any other materials, into, in, on, or out of any vessel.

**Mississippi River System** includes the Mississippi River from the head of navigation to its mouth, and navigable tributaries including the Illinois Waterway, Missouri River, Ohio River, Tennessee River, Allegheny River, Cumberland River, Green River, Kanawha River, Monongahela River, and such others to which barge operations extend.

**Public vessel** means a vessel owned and operated by a government and not regularly employed in merchant service.

**Ramp** means other flat surface devices for passage between levels and across openings not covered under the term dockboards.

**Related employments** means any employments performed incidental to or in conjunction with longshoring operations, including, but not restricted to, securing cargo, rigging, and employment as a porter, clerk, checker, or security officer.

**River towboat** means a shallow draft, low freeboard, self-propelled vessel designed to tow river barges by pushing ahead. It does not include other towing vessels.

**Ro-Ro operations** are those cargo handling and related operations, such as lashing, that occur on Ro-Ro vessels, which are vessels whose cargo is driven on or off the vessel by way of ramps and moved within the vessel by way of ramps and/or elevators.

**Small trimming hatch** means a small hatch or opening, pierced in the between deck or other intermediate deck of a vessel, and intended for the trimming of dry bulk cargoes. It does not refer to the large hatchways through which cargo is normally handled.

**Vessel** includes every description of watercraft or other artificial contrivance used or capable of being used for transportation on water, including special purpose floating structures not primarily designed for or used for transportation on water.

**Vessel's cargo handling gear** includes that gear that is a permanent part of the vessel's equipment and used for the handling of cargo other than bulk liquids. The term covers all stationary or mobile cargo handling appliances used on board ship for suspending, raising or lowering loads or moving them from one position to another while suspended or supported. This includes, but is not limited to, cargo elevators, forklifts, and other powered industrial equipment. It does not include gear used only for handling or holding hoses, handling ship's stores or handling the gangway, or boom conveyor belt systems for the self-unloading of bulk cargo vessels.

### §1918.3 Incorporation by reference.

- (a) (1) Standards of agencies of the U.S. Government, and organizations which are not agencies of the U.S. Government which are incorporated by reference in this part, have the same force and effect as other standards in this part. Only the mandatory provisions (i.e. provisions containing the word "shall" or other mandatory language) of standards incorporated by reference are adopted as standards under the Occupational Safety and Health Act.

- (2) Any changes in the standards incorporated by reference in this part and an official historic file of such changes are available for inspection at the national office of the Occupational Safety and Health Administration, U.S. Department of Labor, Washington, DC 20210.
  - (3) The materials listed in paragraph (b) of this section are incorporated by reference in the corresponding sections noted as they exist on the date of the approval, and a notice of any change in these materials will be published in the Federal Register. These incorporations by reference (IBRs) were approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51.
  - (4) Copies of the following standards that are issued by the respective private standards organizations may be obtained from the issuing organizations. The materials are available for purchase at the corresponding addresses of the private standards organizations noted in paragraph (b) of this section. In addition, all are available for inspection at the Office of the Federal Register, 800 North Capitol Street, NW., suite 700, Washington DC, and through the OSHA Docket Office, room N2625, U.S. Department of Labor, 200 Constitution Ave., Washington, DC 20210, or any of OSHA's regional offices.
- (b) The following material is available for purchase from the American National Standards Institute (ANSI), 11 West 42nd St., New York, NY 10036:
- (1) ANSI A14.1-1990, Safety Requirements for Portable Wood Ladders; IBR approved for §1918.24(g)(1).
  - (2) ANSI A14.2-1990, Safety Requirements for Portable Metal Ladders; IBR approved for §1918.24(g)(2).
  - (3) ANSI A14.5-1992, Safety Requirements for Portable Reinforced Plastic Ladders; IBR approved for §1918.24(g)(3).
  - (4) ANSI Z-87.1-1989, Practice for Occupational and Educational Eye and Face Protection; IBR approved for §1918.101(a)(1).
  - (5) ANSI Z-89.1-1986, Personnel Protection-Protective Headwear for Industrial Workers-Requirements; IBR approved for §1918.103(b).
  - (6) ANSI Z-41-1991, American National Standard for Personal Protection-Protective Footwear; IBR approved for §1918.104(b).

**§1918.4 OMB control numbers under the Paperwork Reduction Act.**

The following list identifies the 29 CFR citations for sections or paragraphs in this part that contain a collection of information requirement approved by the Office of Management and Budget (OMB). The list also provides the control number assigned by OMB to each approved requirement; control number 1218-0196 expires on May 31, 2002 and control number 1218-0003 expires on July 31, 2001. The list follows:

29 CFR citation	OMB control No.
1918.22(g)	1218-0196
1918.24(i)(1)	1218-0196
1918.61(b)(2)	1218-0196
1918.61(c)	1218-0196
1918.61(f)(1)	1218-0003
1918.61(f)(2)	1218-0003
1918.61(g)	1218-0003
1918.61(h)	1218-0003
1918.61(i)	1218-0003
1918.62(b)(1)	1218-0196
1918.62(b)(5)	1218-0196
1918.62(c)(1)	1218-0196
1918.62(d)(1)	1218-0196
1918.62(g)(3)	1218-0196
1918.62(g)(4)	1218-0196

1918.62(h)(1)	1218-0196
1918.62(h)(3)(ii)	1218-0196
1918.62(h)(4)	1218-0196
1918.64(k)(1)	1218-0196
1918.64(k)(2)	1218-0196
1918.65(b)(1)	1218-0196
1918.66(a)(2)	1218-0196
1918.66(a)(8)	1218-0196
1918.66(a)(9)	1218-0196
1918.66(a)(11)	1218-0196
1918.66(a)(15)	1218-0196
1918.66(d)(2)	1218-0196
1918.66(d)(4)	1218-0196
1918.66(f)(1)(v)	1218-0196
1918.85(a)	1218-0196
1918.85(b)(4)(ii)	1218-0196
1918.85(k)(13)	1218-0196
1918.86(b)	1218-0196
1918.86(e)	1218-0196
1918.86(g)	1218-0196
1918.86(h)	1218-0196
1918.93(b)	1218-0196
1918.93(d)(4)	1218-0196
1918.94(c)	1218-0196
1918.96(e)(2)	1218-0196
1918.97(d)(7)	1218-0196
1918.100(a)	1218-0196
1918.100(e)(3)	1218-0196

**§1918.11 Gear certification (See also §1918.2, definition of “Vessel’s cargo handling gear” and §1918.51).**

- (a) The employer shall not use the vessel's cargo handling gear until it has been ascertained that the vessel has a current and valid cargo gear register and certificates that in form and content are in accordance with the recommendations of the International Labor Office, as set forth in Appendix I of this part, and as provided by International Labor Organization Convention No. 152, and that shows that the cargo gear has been tested, examined and heat treated by or under the supervision of persons or organizations defined as competent to make register entries and issue certificates pursuant to paragraphs (b) and (c) of this section.
- (1) Annual thorough examinations under ILO 152 are required after July 27, 1998.
  - (2) Testing under ILO 152 is required after July 16, 2001.
  - (3) In the interim period(s), prior to the effective dates noted in paragraph (a) (1) and (2), vessels with cargo gear and a cargo gear register according to ILO 32 are deemed to meet the requirements of this paragraph (a).
- (b) Public vessels and vessels holding a valid Certificate of Inspection issued by the U.S. Coast Guard pursuant to 46 CFR Part 91 are deemed to meet the requirements of paragraph (a) of this section.
- (c) With respect to U.S. vessels not holding a valid Certificate of Inspection issued by the U.S. Coast Guard, entries in the registers and the issuance of certificates required by paragraph (a) of this section shall be made only by competent persons currently accredited by the U.S. Department of Labor (OSHA) for full function vessels or loose gear and wire rope testing, as appropriate, as provided in part 1919 of this chapter.
- (d) With respect to vessels under foreign registries, persons or organizations competent to make entries in the registers and issue the certificates required by paragraph (a) of this section shall be:
- (1) Those acceptable as such to any foreign nation;

- (2) Those acceptable to the Commandant of the U.S. Coast Guard; or
- (3) Those currently accredited by the U.S. Department of Labor (OSHA), for full function vessels or loose gear and wire rope testing, as appropriate and as provided in part 1919 of this chapter.

**§1918.21 General requirements.**

The employer shall not permit employees to board or leave any vessel, except a barge or river towboat, until all of the applicable requirements of this subpart have been met.

- (a) If possible, the vessel's means of access shall be located so that suspended loads do not pass over it. In any event, suspended loads shall not be passed over the means of access while employees or others are on it.
- (b) When the upper end of the means of access rests on or is flush with the top of the bulwark, substantial steps, properly secured, trimmed and equipped with at least one substantial handrail, 33 inches (.84 m) in height, shall be provided between the top of the bulwark and the deck.
- (c) The means of access shall be illuminated for its full length in accordance with §1918.92.<sup>(2)</sup>

Footnote<sup>(2)</sup> §1918.92 requires, along with other requirements, an average light intensity of five foot-candles (54 lux).

**§1918.22 Gangways.**

- (a) Whenever practicable, a gangway of not less than 20 inches (.51 m) in width, of adequate strength, maintained in safe repair and safely secured shall be used. If a gangway is not practicable, a straight ladder meeting the requirements of §1918.24 that extends at least 36 inches (.91 m) above the upper landing surface and is secured against shifting or slipping shall be provided. When conditions are such that neither a gangway nor straight ladder can be used, a Jacob's ladder meeting the requirements of §1918.23 may be used.
- (b) Each side of the gangway, and the turntable, if used, shall have a hand rail with a minimum height of 33 inches (.84 m) measured perpendicularly from rail to walking surfaces at the stanchion, with a midrail. Rails shall be of wood, pipe, chain, wire, rope or materials of equivalent strength and shall be kept taut always. Portable stanchions supporting railings shall be supported or secured to prevent accidental dislodgement.
- (c) The gangway shall be kept properly trimmed.
- (d) When a fixed flat tread accommodation ladder is used, and the angle is low enough to require employees to walk on the edge of the treads, cleated duckboards shall be laid over and secured to the ladder.
- (e) When the gangway overhangs the water so that there is danger of employees falling between the ship and the dock, a net or suitable protection shall be provided to prevent employees from receiving serious injury from falls to a lower level.
- (f) If the foot of a gangway is more than one foot (.30 m) away from the edge of the apron, the space between them shall be bridged by a firm walkway equipped with a hand rail with a minimum height of approximately 33 inches (.84 m) with midrails on both sides.
- (g) Gangways shall be kept clear of supporting bridles and other obstructions, to provide unobstructed passage. If, because of design, the gangway bridle cannot be moved to provide unobstructed passage, then the hazard shall be properly marked to alert employees of the danger.
- (h) Obstructions shall not be laid on or across the gangway.
- (i) Handrails and walking surfaces of gangways shall be maintained in a safe condition to prevent employees from slipping or falling.
- (j) Gangways on vessels inspected and certificated by the U.S. Coast Guard are deemed to meet the requirements of this section.

**§1918.23 Jacob's ladders.**

- (a) Jacob's ladders shall be of the double rung or flat tread type. They shall be well maintained and properly secured.
- (b) A Jacob's ladder shall either hang without slack from its lashings or be pulled up entirely.
- (c) When a Jacob's ladder is used as the means of access to a barge being worked, spacers (bumpers) shall be hung between the vessel, barge, or other structure to which the barge is tied alongside, or other equally effective means shall be provided to prevent damage to the bottom rungs of the ladder.
- (d) When a Jacob's ladder is being used so that there is a danger of an employee falling or being crushed between the vessel, barge, or other structure (pier), suitable protection shall be provided.

**§1918.24 Fixed and portable ladders.**

- (a) There shall be at least one safe and accessible ladder for each gang working in a single hatch. An effective means of gaining a handhold shall be provided at or near the head of each vertical fixed ladder. No more than two ladders are required in any hatch regardless of the number of gangs present.
- (b) When any fixed ladder is visibly unsafe (or known to be unsafe), the employer shall identify such ladder and prohibit its use by employees.
- (c) Where portable straight ladders are used, they shall be of sufficient length to extend three feet (.91 m) above the upper landing surface, and be positively secured or held against shifting or slipping. When conditions are such that a straight ladder cannot be used, Jacob's ladders meeting the requirements of §1918.23 may be used.
- (d) For vessels built after July 16, 2001, when six inches (15.24 cm) or more clearance does not exist behind the rungs of a fixed ladder, the ladder shall be deemed "unsafe" for the purposes of this section. Alternate means of access (for example, a portable ladder) must be used.
- (e)
  - (1) Where access to or from a stowed deckload or other cargo is needed and no other safe means is available, ladders or steps of adequate strength shall be furnished and positively secured or held against shifting or slipping while in use. Steps formed by the cargo itself are acceptable when the employer demonstrates that the nature of the cargo and the type of stowage provides equivalent safe access.
  - (2) Where portable straight ladders are used they shall be of sufficient length to extend at least three feet (.91 m) above the upper landing surface.
- (f) The following standards for existing manufactured portable ladders must be met:
  - (1) Rungs of manufactured portable ladders obtained before January 21, 1998 shall be capable of supporting a 200-pound (890 N) load without deformation.
  - (2) Rungs shall be evenly spaced from nine to sixteen and one-half inches (22.9 to 41.9 cm), center to center.
  - (3) Rungs shall be continuous members between rails. Each rung of a double-rung ladder (two side rails and a center rail) shall extend the full width of the ladder.
  - (4) Width between side rails at the base of the ladder shall be at least 12 inches (30.48 cm) for ladders 10 feet (3.05 m) or less in overall length, and shall increase at least one-fourth inch (0.64 cm) for each additional two feet (0.61 m) of ladder length.
- (g) Portable manufactured ladders obtained after January 21, 1998 shall bear identification showing that they meet the appropriate ladder construction requirements of the following standards:
  - (1) ANSI A14.1-1990, Safety Requirements for Portable Wood Ladders;
  - (2) ANSI A14.2-1990, Safety Requirements for Portable Metal Ladders;
  - (3) ANSI A14.5-1992, Safety Requirements for Portable Reinforced Plastic Ladders.
- (h) Job-made ladders shall:
  - (1) Have a uniform distance between rungs of at least 12 inches (30.48cm) center to center;
  - (2) Be capable of supporting a 250-pound (1,112 N) load without deformation; and
  - (3) Have a minimum width between side rails of 12 inches (30.48 cm) for ladders 10 feet (3.05 m) or less in height. Width between rails shall increase at least one-fourth inch (0.64 cm) for each additional two feet (0.61 m) of ladder length.
- (i) The employer shall:

- (1) Maintain portable ladders in safe condition. Ladders with the following defects shall not be used, and shall either be tagged as unusable if kept on board, or shall be removed from the vessel:
    - (i) Broken, split or missing rungs, cleats or steps;
    - (ii) Broken or split side rails;
    - (iii) Missing or loose bolts, rivets or fastenings;
    - (iv) Defective ropes; or
    - (v) Any other structural defect.
  - (2) Ladders shall be inspected for defects before each day's use, and after any occurrence, such as a fall, which could damage the ladder.
- (j)** Ladders shall be used in the following manner:
- (1) Ladders shall be securely positioned on a level and firm base.
  - (2) Ladders shall be fitted with slip-resistant bases and/or be positively secured or held in place to prevent slipping or shifting while in use.
  - (3) Except for combination ladders, self-supporting ladders shall not be used as single straight ladders.
  - (4) Unless intended for cantilever operation, non-self-supporting ladders shall not be used to climb above the top support point.
  - (5) Ladders shall not be used:
    - (i) As guys, braces or skids; or
    - (ii) As platforms, runways or scaffolds.
  - (6) Metal and wire-reinforced ladders (even with wooden side rails) shall not be used when employees on the ladder might contact energized electrical conductors.
  - (7) Individual sections from different multi-sectional ladders or two or more single straight ladders shall not be tied or fastened together to achieve additional length.
  - (8) Single rail ladders (i.e. made by fastening rungs or devices across a single rail) shall not be used.

**§1918.25 Bridge plates and ramps (See also §1918.86).**

- (a)** Bridge and car plates (dockboards). Bridge and car plates used afloat shall be well maintained and shall:
  - (1) Be strong enough to support the loads imposed on them;
  - (2) Be secured or equipped with devices to prevent their dislodgement;
  - (3) Be equipped with hand holds or other effective means to permit safe handling; and
  - (4) Be designed, constructed, and maintained to prevent vehicles from running off the edge.<sup>(3)</sup>
- (b)** Portable ramps. Portable ramps used afloat shall be well maintained and shall:
  - (1) Be strong enough to support the loads imposed on them;
  - (2) Be equipped with a railing meeting the requirements of §1918.21(b), if the slope is more than 20 degrees to the horizontal or if employees could fall more than four feet (1.22 m);
  - (3) Be equipped with a slip resistant surface;
  - (4) Be properly secured; and
  - (5) Be designed, constructed, and maintained to prevent vehicles from running off the edge.<sup>(4)</sup>

Footnote <sup>(3)</sup> When the gap to be bridged is greater than 36 inches (.91m), an acceptable means of preventing vehicles from running off the edge is a minimum side board height of two and three-quarter inches.

Footnote <sup>(4)</sup> When the gap to be bridged is greater than 36 inches (.91m), an acceptable means of preventing vehicles from running off the edge is a minimum side board height of two and three-quarter inches.

**§1918.26 Access to barges and river towboats.**

- (a) With the exception of §1918.25(b)(2), ramps used solely for vehicle access to or between barges shall meet the requirements of §1918.25.
- (b) When employees cannot step safely to or from the wharf and a float, barge, or river towboat, either a ramp meeting the requirements of paragraph (a) of this section or a safe walkway meeting the requirements of §1918.22(f) shall be provided. When a ramp or walkway cannot be used, a straight ladder meeting the requirements of §1918.24 and extending at least three feet (.91 m) above the upper landing surface and adequately secured or held against shifting or slipping shall be provided. When neither a walkway nor a straight ladder can be used, a Jacob's ladder meeting the requirements of §1918.23 shall be provided. Exception: For barges operating on the Mississippi River System, where the employer shows that these requirements cannot reasonably be met due to local conditions, other safe means of access shall be provided.
- (c) When a barge or raft is being worked alongside a larger vessel, a Jacob's ladder meeting the requirements of §1918.23 shall be provided for each gang working alongside unless other safe means of access is provided. However, no more than two Jacob's ladders are required for any single barge or raft being worked.
- (d) When longshoring operations are in progress on barges, the barges shall be securely made fast to the vessel, wharf, or dolphins.

**§1918.31 Hatch coverings.**

- (a) No cargo, dunnage, or other material shall be loaded or unloaded by means requiring the services of employees at any partially opened intermediate deck unless either the hatch at that deck is sufficiently covered or an adequate landing area suitable for the prevailing conditions exists. In no event shall such work be done unless the working area available for such employees extends for a distance of 10 feet (3.05 m) or more fore and aft and athwartships.
- (b) Cargo shall not be landed on or handled over a covered hatch or between-decks unless all hatch beams are in place under the hatch covers.
- (c) Missing, broken, or poorly fitting hatch covers that would not protect employees shall be reported at once to the officer in charge of the vessel. Pending replacement or repairs by the vessel, work shall not be performed in the section containing the unsafe covers or in adjacent sections unless the flooring is made safe.
- (d) Hatch covers and hatch beams not of uniform size shall be placed only in the hatch, deck, and section in which they fit properly.
- (e) Small trimming hatches in intermediate decks shall be securely covered or guarded while work is going on in the hatch in which they are found, unless they are actually in use.

**§1918.32 Stowed cargo and temporary landing surfaces.**

- (a) Temporary surfaces on which loads are to be landed shall be of sufficient size and strength to permit employees to work safely.
- (b) When the edge of a hatch section or of stowed cargo may constitute a fall hazard to an employee, the edge shall be guarded by a vertical safety net, or other means providing equal protection, to prevent an employee from falling. When the employer can demonstrate that vertical nets or other equally effective means of guarding cannot be used due to the type of cargo, cargo stowage, or other circumstances, a trapeze net shall be rigged at the top edge of the elevation or other means shall be taken to prevent injury if an employee falls. Safety nets shall be maintained in good condition and be of adequate strength for the purpose intended.
- (c) When two gangs are working in the same hatch on different levels, a vertical safety net shall be rigged and securely fastened to prevent employees or cargo from falling. Safety nets shall be maintained in good condition and be of adequate strength for the purpose intended.

**§1918.33 Deck loads.**

- (a) Employees shall not be permitted to pass over or around deck loads unless there is a safe route of passage.
- (b) Employees giving signals to crane operators shall not be permitted to walk over deck loads from rail to coaming unless there is a safe route of passage. If it is necessary to stand or walk at the outboard or inboard edge of the deck load having less than 24 inches (.61 m) of bulwark, rail, coaming, or other protection, those employees shall be provided with protection against falling from the deck load.

**§1918.34 Other decks.**

- (a) Cargo shall not be worked on decks that were not designed to support the load being worked.
- (b) Grated decks shall be properly placed, supported, maintained and designed to support employees.

**§1918.35 Open hatches.**

Open weather deck hatches around which employees must work that are not protected to a height of 24 inches (.61 m) by coamings shall be guarded by taut lines or barricades at a height of 36 to 42 inches (.91 to 1.07 m) above the deck, except on the side on which cargo is being worked. Any portable stanchions or uprights used shall be supported or secured to prevent accidental dislodgement.

**§1918.36 Weather deck rails.**

Removable weather deck rails shall be kept in place except when cargo operations require them to be removed, in which case they shall be replaced as soon as such cargo operations are completed.

**§1918.37 Barges.**

- (a) Walking shall be prohibited along the sides of covered lighters or barges with coamings or cargo more than five feet (1.52 m) high unless a three-foot (.91 m) clear walkway or a grab rail or taut handline is provided.
- (b) Walking or working shall be prohibited on the decks of barges to be loaded unless the walking or working surfaces have been determined by visual inspection to be structurally sound and maintained properly. If, while discharging a barge, an unsound deck surface is discovered, work shall be discontinued and shall not be resumed until means have been taken to ensure a safe work surface.

**§1918.41 Coaming clearances.**

- (a) Weather decks. If a deck load (such as lumber or other smooth sided deck cargo) more than five feet (1.52 m) high is stowed within three feet (.91 m) of the hatch coaming and employees handling hatch beams and hatch covers are not protected by a coaming at least 24-inch (.61 m) high, a taut handline shall be provided along the side of the deckload. The requirements of §1918.35 are not intended to apply in this situation.
- (b) Intermediate decks
  - (1) There shall be a three-foot (.91 m) working space between the stowed cargo and the coaming at both sides and at one end of the hatches with athwartship hatch beams, and at both ends of those hatches with fore and aft hatch beams, before intermediate deck hatch covers and hatch beams are removed or replaced. Exception: The three-foot (.91 m) clearance is not required on the covered portion of a partially open hatch, nor is it required when lower decks have been filled to hatch beam height with cargo of such a nature as to provide a safe surface upon which employees may work.
  - (2) For purposes of paragraph (b)(1) of this section, fitted gratings that are in good condition shall be considered a part of the decking when properly placed within the three-foot (.91 m) area.

- (c) Grab rails or taut handlines shall be provided for the protection of employees handling hatch beams and hatch covers, when bulkheads, lockers, reefer compartments or large spare parts are within three feet (.91 m) of the coaming.
- (d) The clearances in this section do not apply to hatches opened or closed solely by hydraulic or other mechanical means; except that, in all cases in which the three-foot (.91 m) clearance does not exist, cargo that is stowed within three feet (.91 m) of the edge of the hatch shall be adequately secured to prevent cargo from falling into the hold.

**§1918.42 Hatch beam and pontoon bridles.**

- (a) Hatch beam and pontoon bridles shall be:
  - (1) Long enough to reach the holes, rings, or other lifting attachments on the hatch beams and pontoons easily;
  - (2) Of adequate strength to lift the load safely; and
  - (3) Properly maintained, including covering or blunting of protruding ends in wire rope splices.
- (b) Bridles for lifting hatch beams shall be equipped with toggles, shackles, or hooks, or other devices of such design that they cannot become accidentally dislodged from the hatch beams with which they are used. Hooks other than those described in this section may be used only when they are hooked into the standing part of the bridle. Toggles, when used, shall be at least one inch (2.54 cm) longer than twice the largest diameter of the holes into which they are placed.
- (c) Bridles used for lifting pontoons and plugs shall have the number of legs required by the design of the pontoon or plug, and all of which shall be used. Where any use of a bridle requires fewer than the number of legs provided, idle legs shall be hung on the hook or ring, or otherwise prevented from swinging free.
- (d) At least two legs of all strongback and pontoon bridles shall be equipped with a lanyard at least eight feet (2.44 m) long and in good condition. The bridle end of the lanyard shall be of chain or wire.

**§1918.43 Handling hatch beams and covers.**

- (a) Paragraphs (f)(2), (g), and (h) of this section apply only to folding, sliding, or hinged metal hatch covers or to those hatch covers handled by cranes.
  - (1) When hatch covers or pontoons are stowed on the weather deck abreast of hatches, they shall be arranged in stable piles not closer to the hatch coaming than three feet (.91 m). Exception: On the working side of the hatch, hatch covers or pontoons may be spread one high between the coaming and bulwark with no space between them, provided the height of the hatch coaming is no less than 24 inches (.61 m). Under no circumstances shall hatch covers or pontoons be stacked higher than the hatch coaming or bulwark on the working side of the hatch.
  - (2) On seagoing vessels, hatch boards or similar covers removed from the hatch beams in a section of partially opened hatch during cargo handling, cleaning or other operations shall not be stowed on the boards or covers left in place within that section.
- (b) Hatch beams shall be laid on their sides, or stood on edge close together and lashed. Exception: This paragraph (b) shall not apply in cases where hatch beams are of such design that:
  - (1) The width of the flange is 50 percent or more of the height of the web; and
  - (2) The flange rests flat on the deck when the hatch beam is stood upright.
- (c) Strongbacks, hatch covers, and pontoons removed from hatch openings and placed on the weather deck shall not obstruct clear fore- and-aft or coaming-to-bulwark passageways and shall be lashed or otherwise secured to prevent accidental dislodgement. Dunnage or other suitable material shall be used under and between tiers of strongbacks and pontoons to prevent them from sliding when stowed on steel decks.
- (d) Hatch covers unshipped in an intermediate deck shall be placed at least three feet (.91 m) from the coaming or they shall be removed to another deck. Strongbacks unshipped in an intermediate deck shall not be placed closer than six inches (15.24 cm) from the coaming and, if placed closer than three feet (.91 m), shall be secured so that they cannot be tipped or dragged into a lower

- compartment. If such placement or securement is not possible, strongbacks shall be removed to another deck.
- (e) Any hatch beam or pontoon left in place next to an open hatch section being worked shall be locked or otherwise secured, so that it cannot be accidentally displaced. All portable, manually handled hatch covers, including those bound together to make a larger cover, shall be removed from any working section, and adjacent sections, unless securely lashed.
  - (f) (1) The roller hatch beam at the edge of the open section of the hatch shall be lashed or pinned back so that it cannot be moved toward the open section.  
 (2) Rolling, sectional or telescopic hatch covers of barges which open in a fore and aft direction shall be secured against unintentional movement while in the open position.
  - (g) Hinged or folding hatch covers normally stowed in an approximately vertical position shall be positively secured when in the upright position, unless the design of the system otherwise prevents unintentional movement.
  - (h) Hatches shall not be opened or closed while employees are in the square of the hatch below.
  - (i) All materials such as dunnage, lashings, twist locks, or stacking cones shall be removed from the hatch cover or be secured to prevent them from falling off the cover before the hatch cover is moved.
  - (j) When a hatch is to be covered, hatch covers or night tents shall be used. Any covering that only partially covers the hatch, such as alternate hatch covers or strips of dunnage, shall not be covered by a tarpaulin. Exception: A tarpaulin may be used to cover an open or partially open hatch to reduce dust emissions during bulk cargo loading operations, if positive means are taken to prevent employees from walking on the tarpaulin.

**§1918.51 General requirements (See also §1918.11 and Appendix III of this part).**

- (a) The safe working load specified in the cargo gear certification papers or marked on the booms shall not be exceeded. Any limitations imposed by the certificating authority shall be followed.
- (b) All components of cargo handling gear, including tent gantlines and associated rigging, shall be inspected by the employer or a designated person before each use and at appropriate intervals during use. Any gear that is found unsafe shall not be used until it is made safe.
- (c) The employer shall determine the load ratings shown on the vessel's wire rope certificates for all wire rope and wire rope slings comprising part of ship's gear and shall observe these load ratings.
- (d) The following limitations shall apply to the use of wire rope as a part of the ship's cargo handling gear:
  - (1) Eye splices in wire ropes shall have at least three tucks with a whole strand of the rope and two tucks with one-half of the wire cut from each strand. Other forms of splices or connections that the employer demonstrates will provide the same level of safety may be used;
  - (2) Except for eye splices in the ends of wires, each wire rope used in hoisting or lowering, in guying derricks, or as a topping lift, preventer, segment of a multi-part preventer, or pendant, shall consist of one continuous piece without knot or splice; and
  - (3) Wire rope and wire rope slings exhibiting any of the defects or conditions specified in §1918.62(b)(3)(i) through (vi) shall not be used.
- (e) Natural and synthetic fiber rope slings exhibiting any of the defects or conditions specified in §1918.62(e)(1) through (7) shall not be used.
- (f) Synthetic web slings exhibiting any of the defects or conditions specified in §1918.62(g)(2)(i) through (vi) shall not be used.
- (g) Chains, including slings, exhibiting any of the defects or conditions specified in §1918.62(h)(3)(iii), (iv), or (h)(6) shall not be used.

**§1918.52 Specific requirements.**

- (a) Preventers.
  - (1) When preventers are used they shall be of sufficient strength for the intended purpose. They shall be secured to the head of the boom independent of working guys unless, for cast fittings, the strength of the fitting exceeds the total strength of all lines secured to it.

Any tails, fittings, or other means of making the preventers fast on the deck shall provide strength equal to that of the preventer itself.

- (2) Wire rope clips or knots shall not be used to form eyes in, nor to join sections of, preventer guys.
- (b) Stoppers.**
  - (1) Chain topping lift stoppers shall be in good condition, equipped with fiber tails, and long enough to allow not fewer than three half-hitches in the chain.
  - (2) Chain stoppers shall be shackled or otherwise secured so that their links are not bent by being passed around fittings. The point of attachment shall be of sufficient strength and so placed that the stoppers are in line with the normal topping lift lead at the time the stopper is applied.
  - (3) Patent stoppers of the clamp type shall be appropriate for the size of the rope used. Clamps shall be in good condition and free of any substance that would prevent their being drawn tight.
- (c) Falls.**
  - (1) The end of the winch fall shall be secured to the drum by clamps, U-bolts, shackles, or other equally strong methods. Fiber rope fastenings shall not be used.
  - (2) Winch falls shall not be used with fewer than three turns on the winch drum.
  - (3) Eyes in the ends of wire rope cargo falls shall not be formed by knots and, in single part falls, shall not be formed by wire rope clips.
  - (4) When the design of the winch permits, the fall shall be wound on the drum so that the cargo hook rises when the winch control lever is pulled back and lowers when the lever is pushed forward.
- (d) Heel blocks.**
  - (1) When an employee works in the bight formed by the heel block, a preventer at least three-quarters of an inch (1.91 cm) in diameter wire rope shall be securely rigged, or equally effective means shall be taken, to hold the block and fall if the heel block attachments fail. Where physical limitations prohibit the fitting of a wire rope preventer of the required size, two turns of a one-half inch (1.27 cm) diameter wire rope shall be sufficient.
  - (2) If the heel block is not so rigged as to prevent its falling when not under strain, it shall be secured to prevent alternate raising and dropping of the block. This requirement shall not apply when the heel block is at least 10 feet (3.05 m) above the deck when at its lowest point.
- (e) Coaming rollers.** Portable coaming rollers shall be secured by wire preventers in addition to the regular coaming clamps.
- (f) Cargo hooks.** Cargo hooks shall be as close to the junction of the falls as the assembly permits, but never farther than two feet (.61 m) from it. Exception: This provision shall not apply when the construction of the vessel and the operation in progress are such that fall angles are less than 120 degrees. Overhaul chains shall not be shortened by bolting or knotting.

### **§1918.53 Cargo winches.**

- (a)** Moving parts of winches and other deck machinery shall be guarded.
- (b)** Winches shall not be used if control levers operate with excessive friction or excessive play.
- (c)** Double gear winches or other winches equipped with a clutch shall not be used unless a positive means of locking the gear shift is provided.
- (d)** There shall be no load other than the fall and cargo hook assembly on the winch when changing gears on a two-gear winch.
- (e)** Any defect or malfunction of winches that could endanger employees shall be reported immediately to the officer in charge of the vessel, and the winch shall not be used until the defect or malfunction is corrected.
- (f)** Temporary seats and shelters for winch drivers that create a hazard to the winch operator or other employees shall not be used.
- (g)** Except for short handles on wheel type controls, winch drivers shall not be permitted to use winch control extension levers unless they are provided by either the ship or the employer. Such levers

shall be of adequate strength and securely fastened with metal connections at the fulcrum and at the permanent control lever.

- (h) Extension control levers that tend to fall due to their own weight shall be counterbalanced.
- (i) Winch brakes shall be monitored during use. If winch brakes are unable to hold the load, the winch shall be removed from service.
- (j) Winches shall not be used when one or more control points, either hoisting or lowering, are not operating properly. Only authorized personnel shall adjust control systems.
- (K) When winches are left unattended, control levers shall be placed in the neutral position and the power shall be shut off or control levers shall be locked at the winch or the operating controls.

**§1918.54 Rigging gear.**

- (a) Guy and preventer placement. Each guy or preventer shall be placed to prevent it from making contact with any other guy, preventer, or stay.
- (b) Guys. When alternate positions for securing guys are provided, the guys shall be so placed as to produce a minimum stress and not permit the boom to jackknife.
- (c) Boom placement. The head of the midship boom shall be spotted no farther outboard of the coaming than is necessary for control of the load.
- (d) Preventers.
  - (1) Preventers shall be properly secured to suitable fittings other than those to which the guys are secured, and shall be as nearly parallel to the guys as the fittings will permit.
  - (2) Unless the cleat is also a chock and the hauling part is led through the chock opening, the leads of preventers to cleats shall be such that the direction of the line pull of the preventer is as parallel as possible to the plane of the surface on which the cleat is mounted.
  - (3) Guys and associated preventers shall be adjusted to share the load as equally as possible where cargo operations are being conducted by burtoning. Exception: Where guys are designed and intended for trimming purposes only, and the preventer is intended to do the function of the guy, the guy may be left slack.
- (e) Cargo falls. Cargo falls under load shall not be permitted to chafe on any standing or other running rigging. Exception: Rigging shall not be construed to mean hatch coamings or other similar structural parts of the vessel.
- (f) Bull wire.
  - (1) Where a bull wire is taken to a winch head for lowering or topping a boom, the bull wire shall be secured to the winch head by shackle or other equally strong method. Securing by fiber rope fastening does not meet this requirement.
  - (2) When, in lowering or topping a boom, it is not possible to secure the bull wire to the winch head, or when the topping lift itself is taken to the winch head, at least five turns of wire shall be used.
- (g) Trimming and deckloads. When deck loads extend above the rail and there is less than 12 inches (30.48 cm) horizontal clearance between the edge of the deck load and the inside of the bulwark or rail, a pendant or other alternate device shall be provided to allow trimming of the gear and to prevent employees from going over the side.

**§1918.55 Cranes (see also §1918.11).**

The following requirements shall apply to the use of cranes forming part of a vessel's permanent equipment.

- (a) Defects. Cranes with a visible or known defect that affects safe operation shall not be used. Defects shall be reported immediately to the officer in charge of the vessel.
- (b) Operator's station.
  - (1) Cranes with missing, broken, cracked, scratched, or dirty glass (or equivalent) that impairs operator visibility shall not be used.
  - (2) Clothing, tools and equipment shall be stored so as not to interfere with access, operation or the operator's view.
- (c) Cargo operations.

- (1) Accessible areas within the swing radius of the body of a revolving crane or within the travel of a shipboard gantry crane shall be physically guarded or other equally effective means shall be taken during operations to prevent an employee from being caught between the body of the crane and any fixed structure, or between parts of the crane. Verbal warnings to employees to avoid the dangerous area do not meet this requirement.
  - (2) Limit switch bypass systems shall be secured during all cargo operations. Such bypass systems shall not be used except in an emergency or during non-cargo handling operations such as stowing cranes or derricks or performing repairs. Any time a bypass system is used, it shall be done only under the direction of an officer of the vessel.
  - (3) Under all operating conditions, at least three full turns of rope shall remain on ungrooved drums, and two full turns on grooved drums.
  - (4) Crane brakes shall be monitored during use. If crane brakes are unable to hold the load, the crane shall not be used.
  - (5) Cranes shall not be used if control levers operate with excessive friction or excessive play.
  - (6) When cranes are equipped with power down capability, there shall be no free fall of the gear when a load is attached.
  - (7) When two or more cranes hoist a load in unison, a designated person shall direct the operation and instruct personnel in positioning, rigging of the gear and movements to be made.
- (d) Unattended cranes. When cranes are left unattended between work periods, §1918.66(b)(4)(i) through (v) shall apply.

**§1918.61 General (see also Appendix IV of this part).**

- (a) Employer provided gear inspection. All gear and equipment provided by the employer shall be inspected by the employer or designated person before each use and, when appropriate, at intervals during its use, to ensure that it is safe. Any gear that is found upon such inspection to be unsafe shall not be used until it is made safe.
- (b) Safe working load.
  - (1) The safe working load of gear as specified in §1918.61 through §1918.66 shall not be exceeded.
  - (2) All cargo handling gear provided by the employer with a safe working load greater than five short tons (10,000 lbs. or 4.54 metric tons) shall have its safe working load plainly marked on it.
- (c) Gear weight markings. The weight shall be plainly marked on any article of stevedoring gear hoisted by ship's gear and weighing more than 2,000 lbs. (.91 metric tons).
- (d) Certification. The employer shall not use any material handling device listed in paragraphs (f) and (g) of this section until the device has been certificated, as evidenced by current and valid documents attesting to compliance with the requirements of paragraph (e) of this section.
- (e) Certification procedures. Each certification required by this section shall be performed in accordance with part §1919 of this chapter, by a person then currently accredited by OSHA as provided in that part.
- (f) Special gear.
  - (1) Special stevedoring gear provided by the employer, the strength of which depends upon components other than commonly used stock items such as shackles, ropes, or chains, and that has a Safe Working Load (SWL) greater than five short tons (10,000 lbs or 4.54 metric tons) shall be inspected and tested as a unit before initial use (see Table A in paragraph (f)(2) of this section). In addition, any special stevedoring gear that suffers damage necessitating structural repair shall be inspected and retested after repair and before being returned to service.
  - (2) Special stevedoring gear provided by the employer that has a SWL of five short tons (10,000 lbs. or 4.54 metric tons) or less shall be inspected and tested as a unit before initial use according to paragraphs (d) and (e) of this section or by a designated person (see Table A in this paragraph (f)(2)).

Safe working load	Proof load
Up to 20 short tons (18.1 metric tons)	25 percent in excess
From 20 through 50 short tons (18.1 to 45.4 metric tons)	5 short tons in excess
Over 50 short tons (45.4 metric tons)	10 percent in excess

- (g) Every spreader that is not a part of ship's gear and is used for handling intermodal containers shall be inspected and tested before initial use to a proof load equal to 25 percent greater than its rated capacity. In addition, any spreader that suffers damage necessitating structural repair shall be inspected and retested after repair and before being returned to service.
- (h) All cargo handling gear covered by this section with a SWL greater than five short tons (10,000 lbs. or 4.54 metric tons) shall be proof load tested according to Table A in paragraph (f) or paragraph (g), as applicable, of this section every four years and in accordance with paragraphs (d) and (e) of this section or by a designated person.
- (i) Certificates and inspection and test records attesting to the tests required by this section shall be available for inspection.

**§1918.62 Miscellaneous auxiliary gear.**

- (a) Routine inspection.

**Note to paragraph (a):** When manufacturers' specifications are not available to determine whether gear is defective, the employer shall use the appropriate paragraphs of this section to make these determinations.

- (1) At the completion of each use, loose gear such as slings, chains, bridles, blocks and hooks shall be so placed as to avoid damage to the gear. Loose gear shall be inspected and any defects corrected before reuse.
- (2) Defective gear, as defined by the manufacturers' specifications (when available), shall not be used. Distorted hooks, shackles or similar gear shall be discarded.
- (b) Wire rope and wire rope slings.
  - (1) The employer shall follow the manufacturers' recommended ratings for wire rope and wire rope slings provided for use aboard ship, and shall have such ratings available for inspection. When the manufacturer is unable to supply such ratings, the employer shall use the tables for wire rope and wire rope slings found in Appendix II to this part. A design safety factor of at least five shall be maintained for the common sizes of running wire used as falls in purchases, or in such uses as light load slings.
  - (2) Wire rope with a safety factor of less than five may be used only as follows:
    - (i) In specialized equipment, such as cranes, designed to be used with lesser wire rope safety factors;
    - (ii) According to design factors in standing rigging applications; or
    - (iii) For heavy lifts or other purposes for which a safety factor of five is not feasible and for which the employer can show that equivalent safety is ensured.
  - (3) Wire rope or wire rope slings provided by the employer and having any of the following conditions shall not be used:
    - (i) Ten randomly distributed broken wires in one rope lay or three or more broken wires in one strand in one rope lay;
    - (ii) Kinking, crushing, bird caging or other damage resulting in distortion of the wire rope structure;
    - (iii) Evidence of heat damage;
    - (iv) Excessive wear or corrosion, deformation or other defect in the wire or attachments, including cracks in attachments;
    - (v) Any indication of strand or wire slippage in end attachments; or
    - (vi) More than one broken wire close to a socket or swaged fitting.
  - (4) Protruding ends of strands in splices on slings and bridles shall be covered or blunted. Coverings shall be removable so that splices can be examined. Means used to cover or blunt ends shall not damage the wire.

- (5) Where wire rope clips are used to form eyes, the employer shall follow the manufacturers' recommendations, which shall be available for inspection. If "U" bolt clips are used and the manufacturers' recommendations are not available, Table 1 of Appendix II to this part shall be used to determine the number and spacing of clips. "U" bolts shall be applied with the "U" section in contact with the dead end of the rope.
  - (6) Wire rope shall not be secured by knotting.
  - (7) Eyes in wire rope bridles, slings, bull wires, or in single parts used for hoisting shall not be formed by wire rope clips or knots.
  - (8) Eye splices in wire ropes shall have at least three tucks with a whole strand of the rope, and two tucks with one-half of the wire cut from each strand. Other forms of splices or connections that the employer demonstrates to be equivalently safe may be used.
  - (9) Except for eye splices in the ends of wires and endless rope slings, each wire rope used in hoisting or lowering, or bulling cargo, shall consist of one continuous piece without knot or splice.
- (c) Natural fiber rope.**
- (1) The employer shall follow the manufacturers' recommended ratings for natural fiber rope and natural fiber rope slings provided for use aboard ship, and shall have such ratings available for inspection.
  - (2) If the manufacturers' recommended ratings and use recommendations are unavailable, the employer shall use Table 2 of Appendix II to this part to determine safe working loads of natural fiber rope slings comprising part of pre-slung drafts.
  - (3) Eye splices shall consist of at least three full tucks. Short splices shall consist of at least six tucks, three on each side of the centerline.
- (d) Synthetic rope.**
- (1) The employer shall follow the manufacturers' ratings and use recommendations for the specific synthetic fiber rope and synthetic fiber rope slings provided for use aboard ship, and shall have such ratings available for inspection.
  - (2) If the manufacturers' recommended ratings and use recommendations are unavailable, Tables 3A and B of Appendix II to this part shall be used to determine the safe working load of synthetic fiber rope and of synthetic rope slings that comprise this part of pre slung drafts.
  - (3) (i) Unless otherwise recommended by the manufacturer, when synthetic fiber ropes are substituted for fiber ropes of less than three inches (7.62 cm) in circumference, the substitute shall be of equal size. Where substituted for fiber rope of three inches or more in circumference, the size of the synthetic rope shall be determined from the formula:
 
$$C = \pm \sqrt{0.6C_s^2 + 0.4C_m^2}$$

Where C = the required circumference of the synthetic rope in inches, Cs= the circumference to the nearest one-quarter inch of a synthetic rope having a breaking strength not less than that of the size fiber rope that is required by paragraph (c) of this section and Cm=the circumference of the fiber rope in inches that is required by paragraph (c) of this section.
  - (ii) In making such substitution, it shall be ascertained that the inherent characteristics of the synthetic fiber are suitable for hoisting.
- (e) Removal of natural and synthetic rope from service.** Natural and synthetic rope having any of the following defects shall be removed from service:
- (1) Abnormal or excessive wear including heat and chemical damage;
  - (2) Powdered fiber between strands;
  - (3) Sufficient cut or broken fibers to affect the capability of the rope;
  - (4) Variations in the size or roundness of strands;
  - (5) Discolorations other than stains not associated with rope damage;
  - (6) Rotting; or
  - (7) Distortion or other damage to attached hardware.

- (f)** Thimbles. Properly fitting thimbles shall be used when any rope is secured permanently to a ring, shackle or attachment, where practicable.
- (g)** Synthetic web slings.
  - (1) Slings and nets or other combinations of more than one piece of synthetic webbing assembled and used as a single unit (synthetic web slings) shall not be used to hoist loads greater than the sling's rated capacity.
  - (2) Synthetic web slings shall be removed from service if they exhibit any of the following defects:
    - (i) Acid or caustic burns;
    - (ii) Melting or charring of any part of the sling surface;
    - (iii) Snags, punctures, tears or cuts;
    - (iv) Broken or worn stitches;
    - (v) Display of visible warning threads or markers designed to indicate excessive wear or damage.
    - (vi) Display of visible warning threads or markers designed to indicate excessive wear or damage.
  - (3) Defective synthetic web slings removed from service shall not be returned to service unless repaired by a sling manufacturer or an entity of similar competence. Each repaired sling shall be proof tested by the repairer to twice the sling's rated capacity before its return to service. The employer shall retain a certificate of the proof test and make it available for inspection.
  - (4) Synthetic web slings provided by the employer shall only be used according to the manufacturers' use recommendations, which shall be available.
  - (5) Fittings shall have a breaking strength at least equal to that of the sling to which they are attached and shall be free of sharp edges.
- (h)** Chains and chain slings used for hoisting.
  - (1) The employer shall follow the manufacturers' recommended ratings for safe working loads for the size of wrought iron and alloy steel chains and chain slings and shall have such ratings available for inspection. When the manufacturer does not provide such ratings, the employer shall use Table 4A of Appendix II to this part to determine safe working loads for alloy steel chains and chain slings only.
  - (2) Proof coil steel chain, also known as common or hardware chain, and other chain not recommended by the manufacturer for slinging or hoisting shall not be used for slinging or hoisting.
  - (3)
    - (i) Sling chains, including end fastenings, shall be inspected for visible defects before each day's use and as often as necessary during use to ensure integrity of the sling.
    - (ii) Thorough inspections of chains in use shall be made quarterly to detect wear, defective welds, deformation or increase in length or stretch. The month of inspection shall be shown on each chain by color of paint on a link or by other equally effective means.
    - (iii) Chains shall be removed from service when maximum allowable wear, as indicated in Table 4B of Appendix II to this part, is reached at any point of a link.
    - (iv) Chain slings shall be removed from service when stretch has increased the length of a measured section by more than 5 percent; when a link is bent, twisted or otherwise damaged; or when a link has a raised scarf or defective weld.
    - (v) Only designated persons shall inspect chains used for slinging and hoisting.
  - (4) Chains shall only be repaired by a designated person. Links or portions of a chain defective under any of the criteria of paragraph (h)(3)(iv) of this section shall be replaced with properly dimensioned links or connections of material similar to that of the original chain. Before repaired chains are returned to service, they shall be tested to the proof test load recommended by the manufacturer for the original chain. Tests shall be done by the manufacturer or shall be certified by an agency accredited for the purpose under part §1919 of this chapter. Test certificates shall be available for inspection.

- (5) (i) Wrought iron chains in constant use shall be annealed or normalized at intervals not exceeding six months. Heat treatment certificates shall be available for inspection. Alloy chains shall not be annealed.
- (5) (ii) Any part of a lifting appliance or item of loose gear installed after January 21, 1998 shall not be manufactured of wrought iron.
- (6) Kinked or knotted chains shall not be used for lifting. Chains shall not be shortened by bolting, wiring or knotting. Makeshift links or fasteners such as wire, bolts or rods shall not be used.
- (7) Hooks, rings, links and attachments affixed to sling chains shall have rated capacities at least equal to those of the chains to which they are attached.
- (8) Chain slings shall bear identification of size, grade and rated capacity.
- (i) Shackles.
  - (1) If the manufacturers' recommended safe working loads for shackles are available, they shall not be exceeded. If the manufacturers' recommendations are not available, Table 5 of Appendix II to this part shall apply.
  - (2) Screw pin shackles provided by the employer and used aloft, except in cargo hook assemblies, shall have their pins positively secured.
- (j) Hooks other than hand hooks.
  - (1) The manufacturer's recommended safe working loads for hooks shall not be exceeded. Hooks other than hand hooks shall be tested before initial use in accordance with the provisions of § 1919.31 (a), (c), and (d) of this chapter. **Exception:** Manufacturers' test certificates indicating performance to the criteria in § 1919.31 (a), (c) and (d) of this chapter shall be acceptable.
  - (2) Bent or sprung hooks shall be discarded.
  - (3) Teeth of case hooks shall be maintained in safe condition.
  - (4) Jaws of patent clamp-type plate hooks shall be maintained in condition to grip plates securely.
  - (5) Loads shall be applied to the throat of the hook only.
- (k) Pallets.
  - (1) Pallets shall be made and maintained to support and carry loads being handled safely. Fastenings of reusable pallets used for hoisting shall be bolts and nuts, drive screws (helicly threaded nails), annular threaded nails or fastenings of equivalent holding strength.
  - (2) Reusable wing or lip-type pallets shall be hoisted by bar bridles or other suitable gear and shall have an overhanging wing or lip of at least three inches (7.6 cm). They shall not be hoisted by wire slings alone.
  - (3) Loaded pallets that do not meet the requirements of this paragraph shall be hoisted only after being placed on pallets meeting such requirements, or shall be handled by other means providing equivalent safety.
  - (4) Bridles for handling flush end or box-type pallets shall be designed to prevent disengagement from the pallet under load.
  - (5) Pallets shall be stacked or placed to prevent falling, collapsing or otherwise causing a hazard under standard operating conditions.
  - (6) Disposable pallets intended only for one use shall not be reused for hoisting.

#### **§1918.63 Chutes, gravity conveyors and rollers.**

- (a) Chutes shall be of adequate length and strength to support the conditions of use, and shall be free of splinters and sharp edges.
- (b) When necessary for the safety of employees, chutes shall be equipped with sideboards to afford protection from falling objects.
- (c) When necessary for the safety of employees, provisions shall be made for stopping objects other than bulk commodities at the delivery end of the chute.
- (d) Chutes and gravity conveyor roller sections shall be firmly placed and secured to prevent displacement, shifting, or falling.

- (e) Gravity conveyors shall be of sufficient strength to support the weight of materials placed upon them safely. Conveyor rollers shall be installed in a way that prevents them from falling or jumping out of the frame.
- (f) Frames shall be kept free of burrs and sharp edges.

**§1918.64 Powered conveyors.**

- (a) Emergency stop. Readily accessible stop controls shall be provided for use in an emergency. Whenever the operation of any power conveyor requires personnel to work close to the conveyor, the conveyor controls shall not be left unattended while the conveyor is in operation.
- (b) Guarding. All conveyor and trimmer drives that create a hazard shall be adequately guarded.
- (c) Approved for location. Electric motors and controls on conveyors and trimmers used to handle grain and exposed to grain dust shall be of a type approved by a nationally recognized testing laboratory for use in Class II, Division I locations. (See §1910.7 of this chapter.)
- (d) Grain trimmer control box. Each grain trimmer shall have a control box on the weather deck close to the spout feeding the trimmer.
- (e) Grain trimmer power cable. Power cables between the deck control box and the grain trimmer shall be used only in continuous lengths without splice or tap between connections.
- (f) Portable conveyors. Portable conveyors shall be stable within their operating ranges. When used at variable fixed levels, the unit shall be secured at the operating level.
- (g) Delivery and braking. When necessary for the safety of employees, provisions shall be made for braking objects at the delivery end of the conveyor.
- (h) Electric brakes. Conveyors using electrically released brakes shall be constructed so that the brakes cannot be released until power is applied and the brakes are automatically engaged if the power fails or the operating control is returned to the "stop" position.
- (i) Starting powered conveyors. Powered conveyors shall not be started until all employees are clear of the conveyor or have been warned that the conveyor is about to start up.
- (j) Loading and unloading. The area around conveyor loading and unloading points shall be kept clear of obstructions during conveyor operations.
- (k) out/tagout.
  - (1) Conveyors shall be stopped and their power sources locked out and tagged out during maintenance, repair, and servicing. If power is necessary for testing or for making minor adjustments, power shall only be supplied to the servicing operation.
  - (2) The starting device shall be locked out and tagged out in the stop position before an attempt is made to remove the cause of a jam or overload of the conveying medium.
- (l) Safe practices.
  - (1) Only designated persons shall operate, repair or service powered conveyors.
  - (2) The employer shall ensure that each employee stays off operating conveyors.
  - (3) Conveyors shall be operated only with all overload devices, guards and safety devices in place and operable.

**§1918.65 Mechanically –powered vehicles used aboard vessels.**

- (a) Applicability. This section applies to every type of mechanically powered vehicle used for material or equipment handling aboard a vessel.
- (b) General.
  - (1) Modifications, such as adding counterweights that might affect the vehicle's capacity or safety, shall not be done without either the manufacturers' prior written approval or the written approval of a registered professional engineer experienced with the equipment, who has consulted with the manufacturer, if available. Capacity, operation and maintenance instruction plates, tags or decals shall be changed to conform to the equipment as modified.
  - (2) Rated capacities, with and without removable counterweights, shall not be exceeded. Rated capacities shall be marked on the vehicle and shall be visible to the operator. The vehicle weight, with and without a counterweight, shall be similarly marked.

- (3) If loads are lifted by two or more trucks working in unison, the total weight shall not exceed the combined safe lifting capacity of all trucks.
- (c) Guards for fork lift trucks.**
- (1) Except as noted in paragraph (c)(5) of this section, fork lift trucks shall be equipped with overhead guards securely attached to the machines. The guard shall be of such design and construction as to protect the operator from boxes, cartons, packages, bagged material, and other similar items of cargo that might fall from the load being handled or from stowage.
- (2) Overhead guards shall not obstruct the operator's view, and openings in the top of the guard shall not exceed six inches (15.24 cm) in one of the two directions, width or length. Larger openings are permitted if no opening allows the smallest unit of cargo being handled through the guard.
- (3) Overhead guards shall be built so that failure of the vehicle's mast tilting mechanism will not displace the guard.
- (4) Overhead guards shall be large enough to extend over the operator during all truck operations, including forward tilt.
- (5) An overhead guard may be removed only when it would prevent a truck from entering a work space and only if the operator is not exposed to low overhead obstructions in the work space.
- (6) Where necessary to protect the operator, fork lift trucks shall be fitted with a vertical load backrest extension to prevent the load from hitting the mast when the mast is positioned at maximum backward tilt. For this purpose, a **load backrest extension** means a device extending vertically from the fork carriage frame to prevent raised loads from falling backward.
- (d) Guards for bulk cargo-moving vehicles.**
- (1) Every crawler type, rider operated, bulk cargo-moving vehicle shall be equipped with an operator's guard of such design and construction as to protect the operator, when seated, against injury from contact with a projecting overhead hazard.
- (2) Overhead guards and their attachment points shall be so designed as to be able to withstand, without excessive deflection, a load applied horizontally at the operator's shoulder level equal to the drawbar pull of the machine.
- (3) Overhead guards are not required when the vehicle is used in situations in which the seated operator cannot contact projecting overhead hazards.
- (4) After July 26, 1999, bulk cargo-moving vehicles shall be equipped with rollover protection of such design and construction as to prevent the possibility of the operator being crushed because of a rollover or upset.
- (e) Approved trucks.**
- (1) **Approved power-operated industrial truck** means one listed as approved for the intended use or location by a nationally recognized testing laboratory (see §1910.7 of this chapter).
- (2) Approved power-operated industrial trucks shall bear a label or other identification indicating testing laboratory approval.
- (3) When the atmosphere in an area is hazardous (see §1918.2 and §1918.93), only approved power-operated industrial trucks shall be used.
- (f) Maintenance.**
- (1) Mechanically powered vehicles shall be maintained in safe working order. Safety devices shall not be removed or made inoperative except where permitted in this section. Vehicles with a fuel system leak or any other safety defect shall not be operated.
- (2) Braking systems or other mechanisms used for braking shall be operable and in safe condition.
- (3) Replacement parts whose function might affect operational safety shall be equivalent in strength and performance capability to the original parts that they replace.
- (4) Repairs to the fuel and ignition systems of mechanically powered vehicles that involve fire hazards shall be conducted only in locations designated as safe for such repairs.
- (5) Batteries on all mechanically powered vehicles shall be disconnected during repairs to the primary electrical system except when power is necessary for testing and repair. On

vehicles equipped with systems capable of storing residual energy, that energy shall be safely discharged before work on the primary electrical system begins.

- (6) Only designated persons shall do maintenance and repair.
- (g) Parking brakes. All mechanically powered vehicles purchased after January 21, 1998, shall be equipped with parking brakes.
- (h) Operation.
  - (1) Only stable and safely arranged loads within the rated capacity of the mechanically powered vehicle shall be handled.
  - (2) The employer shall require drivers to ascend and descend grades slowly.
  - (3) If the load obstructs the forward view, the employer shall require drivers to travel with the load trailing.
  - (4) Steering knobs shall not be used unless the vehicle is equipped with power steering.
  - (5) When mechanically powered vehicles use cargo lifting devices that have a means of engagement hidden from the operator, a means shall be provided to enable the operator to determine that the cargo has been engaged.
  - (6) No load on a mechanically powered vehicle shall be suspended or swung over any employee.
  - (7) When mechanically powered vehicles are used, provisions shall be made to ensure that the working surface can support the vehicle and load, and that hatch covers, truck plates, or other temporary surfaces cannot be dislodged by movement of the vehicle.
  - (8) When mechanically powered vehicles are left unattended, load-engaging means shall be fully lowered, controls neutralized, brakes set and power shut off. Wheels shall be blocked or curbed if the vehicle is on an incline.
  - (9) When lift trucks or other mechanically powered vehicles are being operated on open deck-type barges, the edges of the barges shall be guarded by railings, sideboards, timbers, or other means sufficient to prevent vehicles from rolling overboard. When such vehicles are operated on covered lighters where door openings other than those being used are left open, means shall be provided to prevent vehicles from rolling overboard through such openings.
  - (10) Unauthorized personnel shall not ride on mechanically powered vehicles. A safe place to ride shall be provided when riding is authorized.
  - (11) An employee may be elevated by fork lift trucks only when a platform is secured to the lifting carriage or forks. The platform shall meet the following requirements:
    - (i) The platform shall have a railing complying with §1917.112(c) of this chapter.
    - (ii) The platform shall have toeboards complying with §1917.112(d) of this chapter, if tools or other objects could fall on employees below.
    - (iii) When the truck has controls elevated with the lifting carriage, means shall be provided for employees on the platform to shut off power to the vehicle.
    - (iv) Employees on the platform shall be protected from exposure to moving truck parts.
    - (v) The platform floor shall be skid resistant.
    - (vi) An employee shall be at the truck's controls whenever employees are elevated.
    - (vii) While an employee is elevated, the truck may be moved only to make minor adjustments in placement.

**§1918.66 Cranes and derricks other than vessel's gear.**

- (a) General. The following requirements shall apply to the use of cranes and derricks brought aboard vessels for conducting longshoring operations. They shall not apply to cranes and derricks forming part of a vessel's permanent equipment.
  - (1) Certification. Cranes and derricks shall be certificated in accordance with part §1919 of this chapter.
  - (2) Posted weight. The crane weight shall be posted on all cranes hoisted aboard vessels for temporary use.
  - (3) Rating chart. All cranes and derricks having ratings that vary with boom length, radius (outreach) or other variables shall have a durable rating chart visible to the operator,

covering the complete range of the manufacturers' (or design) capacity ratings. The rating chart shall include all operating radii (outreach) for all permissible boom lengths and jib lengths, as applicable, with and without outriggers, and alternate ratings for optional equipment affecting such ratings. Precautions or warnings specified by the owner or manufacturer shall be included along with the chart.

- (4) Rated loads. The manufacturers' (or design) rated loads for the conditions of use shall not be exceeded.
- (5) Change of rated loads. Designated working loads shall not be increased beyond the manufacturers' ratings or original design limitations unless such increase receives the manufacturers' approval. When the manufacturers' services are not available or where the equipment is of foreign manufacture, engineering design analysis shall be done or approved by a person accredited for certifying the equipment under part §1919 of this chapter. Engineering design analysis shall be done by a registered professional engineer competent in the field of cranes and derricks. Any structural changes required by the change in rating shall be carried out.
- (6) Radius indicator. When the rated load varies with the boom radius, the crane or derrick shall be fitted with a boom angle or radius indicator visible to the operator.
- (7) Operator's station. The cab, controls and mechanism of the equipment shall be so arranged that the operator has a clear view of the load or signalman, when one is used. Cab glass, when used, shall be safety plate glass or equivalent. Cranes with missing, broken, cracked, scratched, or dirty glass (or equivalent), that impairs operator vision shall not be used. Clothing, tools, and equipment shall be stored so as not to interfere with access, operation, and the operator's view.
- (8) Counterweights or ballast. Cranes shall be operated only with the specified type and amount of ballast or counterweights. Ballast or counterweights shall be located and secured only as provided in the manufacturers' or design specifications, which shall be available for inspection.
- (9) Outriggers. Outriggers shall be used according to the manufacturers' specifications or design data, which shall be available for inspection. Floats, when used, shall be securely attached to the outriggers. Wood blocks or other support shall be of sufficient size to support the outrigger, free of defects that may affect safety, and of sufficient width and length to prevent the crane from shifting or toppling under load.
- (10) Exhaust gases. Engine exhaust gases shall be discharged away from crane operating personnel.
- (11) Electrical/Guarding. Electrical equipment shall be so placed or enclosed that live parts will not be exposed to accidental contact. Designated persons may work on energized equipment only if necessary during inspection, maintenance, or repair; otherwise the equipment shall be stopped and its power source locked out and tagged out.
- (12) Fire extinguisher.
  - (i) At least one portable approved or listed fire extinguisher of at least a 5-B:C rating or equivalent shall be accessible in the cab of the crane or derrick.
  - (ii) No portable fire extinguisher using carbon tetrachloride or chlorobromomethane extinguishing agents shall be used.
- (13) Rope on drums. At least three full turns of rope shall remain on ungrooved drums, and two turns on grooved drums, under all operating conditions. Wire rope shall be secured to drums by clamps, U-bolts, shackles or equivalent means. Fiber rope fastenings are prohibited.
- (14) Brakes.
  - (i) Each independent hoisting unit of a crane shall be equipped with at least one holding brake, applied directly to the motor shaft or gear train.
  - (ii) Each independent hoisting unit of a crane shall, in addition to the holding brake, be equipped with a controlled braking means to control lowering speeds.
  - (iii) Holding brakes for hoist units shall have not less than the following percentage of the rated load hoisting torque at the point where the brake is applied:
    - (A) 125 percent when used with an other than mechanically controlled braking means;

- (B) 100 percent when used with a mechanically controlled braking means; or
- (C) 100 percent when two holding brakes are provided.
- (iv) All power control braking means shall be capable of maintaining safe lowering speeds of rated loads.
- (15) Operating controls. Crane and derrick operating controls shall be clearly marked, or a chart showing their function shall be posted at the operator's position.
- (16) Booms. Cranes with elevatable booms and without operable automatic limiting devices shall be provided with boom stops if boom elevation can exceed maximum design angles from the horizontal.
- (17) Foot pedals. Foot pedals shall have a non-skid surface.
- (18) Access. Ladders, stairways, stanchions, grab irons, foot steps or equivalent means shall be provided as necessary to ensure safe access to footwalks, cab platforms, the cab and any portion of the superstructure that employees must reach.
- (b) Operations.**
  - (1) Use of cranes together. When two or more cranes hoist a load in unison, a designated person shall direct the operation and instruct personnel in positioning, rigging of the load and movements to be made.
  - (2) Guarding of swing radius. Accessible areas within the swing radius of the body of a revolving crane shall be physically guarded during operations to prevent an employee from being caught between the body of the crane and any fixed structure or between parts of the crane.
  - (3) Prohibited usage.
    - (i) Equipment shall not be used in a way that exerts side loading stresses upon the crane or derrick boom.
    - (ii) No crane or derrick having a visible or known defect that may affect safe operation shall be used.
  - (4) Unattended cranes. The following steps shall be taken before leaving a crane unattended between work periods:
    - (i) Suspended loads, such as those hoisted by lifting magnets or clamshell buckets, shall be landed unless the storage position or maximum hoisting of the suspended device will provide equivalent safety;
    - (ii) Clutches shall be disengaged;
    - (iii) The power supply shall be shut off;
    - (iv) The crane shall be secured against accidental travel; and
    - (v) The boom shall be lowered or secured against movement.
- (c) Protection for employees being hoisted.**
  - (1) No employee shall be hoisted by the load hoisting apparatus of a crane or derrick except on a platform meeting the following requirements:
    - (i) Enclosed by a railing or other means providing protection equivalent to that described in §1917.112(c) of this chapter;
    - (ii) Fitted with toe boards if the platform has open railings;
    - (iii) A safety factor of four based on ultimate strength;
    - (iv) Bearing a plate or permanent marking indicating maximum load rating, which shall not be exceeded, and the weight of the platform itself;
    - (v) Equipped with a device to prevent access doors, when used, from opening accidentally;
    - (vi) Equipped with overhead protection for employees on the platform if they are exposed to falling objects or overhead hazards; and
    - (vii) Secured to the load line by means other than wedge and socket attachments, unless the free (bitter) end of the line is secured back to itself by a clamp placed as close above the wedge as possible.
  - (2) Except in an emergency, the hoisting mechanism of all cranes or derricks used to hoist personnel shall operate only in power up and power down, with automatic brake application when not hoisting or lowering.
  - (3) All cranes and derricks used to hoist personnel shall be equipped with an anti-two-blocking device.

- (4) Variable radius booms of a crane or derrick used to hoist personnel shall be so constructed or secured as to prevent accidental boom movement.
  - (5) Platforms or devices used to hoist employees shall be inspected for defects before each day's use and shall be removed from service if defective.
  - (6) Employees being hoisted shall remain in continuous sight of and communication with the operator or signalman.
  - (7) Operators shall remain at the controls when employees are hoisted.
  - (8) Cranes shall not travel while employees are hoisted, except in emergencies or in normal tier-to-tier transfer of employees during container operations.
- (d) Routine inspection.**
- (1) Designated persons shall visually inspect each crane and derrick on each day of use for defects in functional operating components and shall report any defect found to the employer. The employer shall inform the operator of the result of the inspection.
  - (2) A designated person shall thoroughly inspect all functional components and accessible structural features of each crane or device at monthly intervals.
  - (3) Any defects found during such inspections that may create a safety hazard shall be corrected before further equipment use. Repairs shall be done only by designated persons.
  - (4) A record of each monthly inspection shall be maintained for six months in or on the crane or derrick or at the terminal.
- (e) Protective devices.**
- (1) When exposed moving parts such as gears, chains and chain sprockets present a hazard to employees during crane and derrick operations, those parts shall be securely guarded.
  - (2) Crane hooks shall be latched or otherwise secured to prevent accidental load disengagement.
- (f) Load-indicating devices.**
- (1) Unless exempted by the provisions of paragraph (f)(1)(viii) of this section, every crane used to load or discharge cargo into or out of a vessel shall be fitted with a load-indicating device or alternative device in proper working condition that shall meet the following criteria:
    - (i) The type or model of any load-indicating device used shall be such as to provide:
      - (A) A direct indication in the cab of actual weight hoisted or a means of determining this by reference to crane ratings posted and visible to the operator, except that the use of a dynamometer or simple scale alone will not meet this requirement; or
      - (B) An automatic weight-moment device (e.g., a computer) providing indications in the cab according to the radius and load at the moment; or
      - (C) A device that will prevent an overloaded condition.
    - (ii) The accuracy of the load-indicating device, weight-moment device, or overload protection device shall be such that any indicated load (or limit), including the sum of actual weight hoisted and additional equipment or "add ons" such as slings, sensors, blocks, etc., is within the range between 95 percent (5 percent underload) and 110 percent (10 percent overload) of the actual true total load. Such accuracy shall be required over the range of daily operating variables reasonably anticipated under the conditions of use.
    - (iii) \* The device shall enable the operator to decide before making any lift that the load indicating device or alternative device is operative. In the alternative, if the device is not so mounted or attached and does not include such means of checking, it shall be certified by the manufacturer to remain operative for a specific time. The device shall be checked for accuracy, using known values of the load, at the time of every certification survey (see §1918.11) and at such additional times as may be recommended by the manufacturer.
    - (iv) When the load indicating device or alternative device is so arranged in the supporting system (crane structure) that its failure could cause the load to be dropped, its strength shall not be the limiting factor of the supporting system (crane structure).

- (v) Units of measure in pounds or both pounds and kilograms (or other indicators of measurement, such as colored indicator lights), capacity of the indicating system, accuracy of the indicating system, and operating instructions and precautions shall be conspicuously marked. If the system used provides no readout but automatically ceases crane operation when the rated load limit is reached under any specific condition of use, the marking shall provide the make and model of the device installed, a description of what it does, how it is operated, and any necessary precautions regarding the system. All of these markings shall be readily visible to the operator.
- (vi) All load indicating devices shall operate over the full operating radius. Overall accuracy shall be based on actual applied loads and not on full scale (full capacity) load.

**Note to paragraph (f)(1)(vi):** If the accuracy of the load indicating device is based on full scale loads and the device is arbitrarily set at plus or minus 10 percent, it would accept a reading between 90,000 and 110,000 lbs. at full capacity for a machine with a maximum rating of 100,000 lbs. but would also show a reading of between zero and 20,000 lbs. at that outreach (radius) at which the load would be 10,000 lbs.; this is clearly unacceptable. If, however, the accuracy of the device is based on actual applied loads under the same conditions, the acceptable range would remain the same with the 100,000-lb. load but would show a figure between 9,000 and 11,000 lbs. at the 10,000-lb. load; this is an acceptable reading.

- (vii) When a load-indicating device uses the radius as a factor in its use or in its operating indications, the indicated radius (which may be in feet and/or meters, or degrees of boom angle, depending on the system used) shall be within the range between 97 percent and 110 percent of the actual (true) radius. When radius is presented in degrees, and feet or meters are required for necessary determinations, a conversion chart shall be provided.
- (vii) The load indicating device requirements of this paragraph do not apply to a crane:
  - (A) Of the trolley equipped bridge type while handling containers known to be and identified as empty, or loaded, and in either case according to the provisions of §1918.85(b) of this part, or while hoisting other lifts by means of a lifting beam supplied by the crane manufacturer for the purpose and in all cases within the crane rating;
  - (B) While handling bulk commodities or cargoes by means of clamshell bucket or magnet;
  - (C) While used to handle or hold hoses in connection with transfer of bulk liquids, or other hose-handled products; or
  - (D) While the crane is used exclusively to handle cargo or equipment whose total actual gross weight is marked on the unit or units hoisted, and the total actual gross weight never exceeds 11,200 lbs., and the load is less than the rated capacity of the crane at the maximum outreach possible at the time.

(2) [Reserved]

**§1918.67 Notifying the ship’s officers before using certain equipment.**

- (a) The employer shall notify the officer in charge of the vessel before bringing aboard ship internal combustion or electric powered tools, equipment or vehicles.
- (b) The employer shall also notify the officer in charge of the vessel before using the ship's electric power for the operation of any electric tools or equipment.

**§1918.68 Grounding.**

The frames of portable electrical equipment and tools, other than double insulated tools and battery operated tools, shall be grounded through a separate equipment conductor run with or enclosing the circuit conductors.

**§1918.69 Tools.**

(a) General. Employers shall not issue or permit the use of visibly unsafe tools.

(b) Portable electric tools.

- (1) Portable hand-held electric tools shall be equipped with switches of a type that must be manually held in a closed position in order to operate the tool.
- (2) All portable, power-driven circular saws shall be equipped with guards above and below the base plate or shoe. The upper guard shall cover the saw to the depth of the teeth, except for the minimum arc required to permit the base to be tilted for bevel cuts. The lower guard shall cover the saw to the depth of the teeth, except for the minimum arc required to allow proper retraction and contact with the work. When the tool is withdrawn from the work, the lower guard shall automatically and instantly return to the covering position.

**§1918.70**

[Reserved].

**§1918.71**

[Reserved].

**§1918.72**

[Reserved].

**§1918.73**

[Reserved].

**§1918.74**

[Reserved].

**§1918.75**

[Reserved].

**§1918.76**

[Reserved].

**§1918.77**

[Reserved].

**§1918.78**

[Reserved].

**§1918.79**

[Reserved].

**§1918.80**

[Reserved].

**§1918.81 Slinging.**

- (a) Drafts shall be safely slung before being hoisted. Loose dunnage or debris hanging or protruding from loads shall be removed.
- (b) Cargo handling bridles, such as pallet bridles, which are to remain attached to the hoisting gear while hoisting successive drafts, shall be attached by shackles, or other positive means shall be taken to prevent them from being accidentally disengaged from the cargo hook.
- (c) Drafts of lumber, pipe, dunnage and other pieces, the top layer of which is not bound by the sling, shall be slung in a way that prevents sliders. Double slings shall be used on unstrapped dunnage, unless, due to the size of hatch or deep tank openings, using them is impracticable.
- (d) Case hooks shall be used only with cases designed to be hoisted by these hooks.
- (e) Bales of cotton, wool, cork, wood pulp, gunny bags or similar articles shall not be hoisted by straps unless the straps are strong enough to support the weight of the bale. At least two hooks, each in a separate strap, shall be used.
- (f) Unitized loads bound by bands or straps may be hoisted by the banding or strapping only if the banding or strapping is suitable for hoisting and is strong enough to support the weight of the load.
- (g) Additional means to maintain the unitized loads during hoisting shall be employed to ensure safe lifting of such loads having damaged banding or strapping.
- (h) Loads requiring continuous manual guidance during handling shall be guided by guide ropes (taglines) that are long enough to control the load.
- (i) No draft shall be hoisted unless the winch or crane operator(s) can clearly see the draft itself or see the signals of a signalman who is observing the draft's movement.
- (j) Intermodal containers shall be handled in accordance with §1918.85.
- (k) The employer shall require that employees stay clear of the area beneath overhead drafts or descending lifting gear.
  - (1) The employer shall not permit employees to ride the hook or the load, except as provided for in §1918.85(g).

**§1918.82 Building drafts.**

- (a) Drafts shall be built or means shall be taken to prevent cargo from falling from them.
- (b) Buckets and tubs used in handling bulk or frozen cargo shall not be loaded above their rims.

**§1918.83 Stowed cargo; tiering and breaking down.**

- (a) When necessary to protect personnel working in a hold, the employer shall secure or block stowed cargo that is likely to shift or roll.
- (b) In breaking down stowed cargo, precautions shall be taken to prevent remaining cargo from falling.
- (c) Employees trimming bulk cargo shall be checked in and out by the job boss. Before securing any reefer compartment, a check shall be made to ensure that no employee remains inside. Frequent checks shall be made to ensure the safety of any employee working alone in a tank or cargo compartment.

**§1918.84 Bulling cargo.**

- (a) Bulling cargo shall be done with the bull line led directly from the heel block. However, bulling may be done from the head of the boom when the nature of the cargo and the surface over which it is dragged are such that the load cannot be stalled, or when the winch actually does not have sufficient strength, with the purchase used, to overload the boom.
- (b) Snatch blocks shall be used to provide a fair lead for the bull line to avoid unnecessary dragging of the bull line against coamings and obstructions.
- (c) Snatch blocks shall not be used with the point of the hook resting on the flange of a beam, but shall be hung from padeyes, straps, or beam clamps. Snatch blocks or straps shall not be made fast to batten cleats or other insecure fittings.
- (d) Beam frame clamps shall be so secured as to prevent their slipping, falling, or being pulled from their stationary attachment.
- (e) Falls led from cargo booms of vessels shall not be used to move scows, lighters or railcars.

**§1918.85 Containerized cargo operations.**

- (a) Container markings. Every intermodal container shall be legibly and permanently marked with:
  - (1) The weight of the container when empty, in pounds;
  - (2) The maximum cargo weight the container is designed to carry, in pounds; and
  - (3) The sum of the weight of the container and the maximum cargo weight, in pounds.
- (b) Container weight. No container shall be hoisted by any lifting appliance unless the following conditions have been met:
  - (1) The employer shall determine from the carrier whether a container to be hoisted is loaded or empty. Before loading or discharging, empty containers shall be identified in a manner that will inform every supervisor and job boss on the site and in charge of loading or discharging, or every crane or other hoisting equipment operator and signalman, that such container is empty. Methods of identification may include cargo plans, manifests, or markings on the container.
  - (2) For a loaded container:
    - (i) The actual gross weight shall be plainly marked and visible to the crane or other hoisting equipment operator or signalman, or to every supervisor or job boss on site and in charge of the operation; or
    - (ii) The cargo stowage plan or equivalent permanently recorded display serving the same purpose, containing the actual gross weight and the serial number or other positive identification of that specific container, shall be provided to the crane or other hoisting equipment operator and signalman, and to every supervisor and job boss on site and in charge of the operation.
  - (3) Every outbound container received at a marine terminal ready to load aboard a vessel without further consolidation or loading shall be weighed to obtain the actual gross weight, either at the terminal or elsewhere, before being hoisted.
  - (4) (i) When container weighing scales are found at a marine terminal, any outbound container with a load consolidated at that terminal shall be weighed to obtain the actual weight before being hoisted.

- (ii) If the terminal has no scales, the actual gross weight may be calculated from the container's contents and the container's empty weight. The weights used in the calculation shall be posted conspicuously on the container, with the name of the person making the calculation, and the date.
- (5) Open top vehicle-carrying containers, and those built specifically and used solely for the carriage of compressed gases, are excepted from paragraphs (b)(3) and (b)(4) of this section.
- (6) Closed dry van containers carrying vehicles are exempted from paragraph (b)(4) of this section if:
  - (i) The container carries only completely assembled vehicles and no other cargo;
  - (ii) The container is marked on the outside so that an employee can readily discern that the container is carrying vehicles; and
  - (iii) The vehicles were loaded into the container at the marine terminal.
- (7) The weight of loaded inbound containers from foreign ports shall be determined by weighing, by the method of calculation described in paragraph (b)(4)(ii) of this section or by shipping documents.
- (8) Any scale used within the United States to weigh containers for the requirements of this section shall meet the accuracy standards of the state or local public authority in which the scale is found.
- (c) Overloaded containers. No container shall be hoisted if its actual gross weight exceeds the weight marked as required in paragraph (a)(3) of this section, or it exceeds the capacity of the lifting appliance.
- (d) Container inspection.
  - (1) Prior to hoisting, each container shall be inspected for any visible defects in structural members and fittings that would make the handling of such container unsafe.
  - (2) Any container found to have such a defect shall either be handled by a special means to ensure safe handling or shall be emptied before handling.
- (e) Suspended containers. The employer shall prohibit employees from working beneath a suspended container.
- (f) Lifting fittings. Containers shall be handled using lifting fittings or other arrangements suitable and intended for the purpose as set forth in paragraphs (f)(1) and (f)(2) of this section, unless damage to an intermodal container makes special means of handling necessary.
  - (1) Loaded intermodal containers. Loaded intermodal containers of 20 feet (6.1 m) or more shall be hoisted as follows:
    - (i) When hoisting containers by the top fittings, the lifting forces shall be applied vertically from at least four such fittings. A less than vertical lift is permitted only under the following conditions:
      - (A) The container being lifted is an ISO **closed box container**;
      - (B) The condition of the box is sound;
      - (C) The speed of hoisting and lowering is moderated when heavily laden containers<sup>(5)</sup> are encountered;
      - (D) The lift angle is at 80 to 90 degrees;
      - (E) The distance between the lifting beam and the load is at least 8 feet, 2.4 inches (2.5 m); and
      - (F) The length of the spreader beam is at least 16.3 feet (5 m) for a 20-foot container, and at least 36.4 feet (11.1 m) for a 40-foot container.
    - (ii) When hoisting containers from bottom fittings, the hoisting connections shall bear on the fittings only, making no other contact with the container. The angles of the four bridle legs shall not be less than 30 degrees to the horizontal for 40-foot (12.19 m) containers; 37 degrees for 30-foot (9.14 m) containers; and 45 degrees for 20-foot (6.1 m) containers.
    - (iii) Lifting containers by fork lift trucks or grappling arms from above or from one side may be done only if the container is designed for this type of handling.
    - (iv) Other means of hoisting may be used only if the containers and hoisting means are designed for such use.
  - (2) Intermodal container spreaders.

- (l) When using intermodal container spreaders that employ lanyards for activation and load disengagement, all possible precautions shall be taken to prevent accidental release of the load.
  - (ii) Intermodal container spreaders that utilize automatic twist lock systems shall be designed and used so that a suspended load cannot accidentally be released.
- (g)** Safe container top access. A safe means of access shall be provided for each employee required to work on the top of an intermodal container. Unless ladders are used for access, such means shall comply with the requirements of §1917.45(j) of this chapter.
- (h)** Employee hoisting prohibition. Employees shall not be hoisted on intermodal container spreaders while a load is engaged.
- (i)** Portable ladder access. When other safer means are available, portable ladders shall not be used in gaining access to container stacks more than two containers high.
- (j)** Fall protection.
  - (1) Containers being handled by container gantry cranes.
    - (i) After July 26, 1999, where a container gantry crane is being used to handle containers, the employer shall ensure that no employee is on top of a container. Exception: An employee may be on top of a container only to perform a necessary function that cannot be eliminated by the use of positive container securing devices.<sup>(6)</sup>
    - (ii) After July 26, 1999, the employer shall ensure that positive container securing devices, such as semi-automatic twist locks and above deck cell guides, are used wherever container gantry cranes are used to hoist containers.
    - (iii) The employer shall ensure that each employee on top of a container is protected from fall hazards by a fall protection system meeting the requirements of paragraph (k) of this section.
  - (2) Containers being handled by other hoisting devices. Where containers are being handled by hoisting devices other than container gantry cranes, the employer shall ensure that each employee on top of a container is protected by a fall protection system meeting the requirements of paragraph (k) of this section.
  - (3) Other exposure to fall hazards. The employer shall ensure that each employee exposed to a fall hazard is protected by a fall protection system meeting the requirements of paragraph (k) of this section. Exception: Where the employer can demonstrate that fall protection for an employee would be infeasible or create a greater hazard due to vessel design, container design, container storage, other cargo stowage, container handling equipment, lifting gear, or port conditions, the employer shall alert the affected employee about the fall hazard and instruct the employee in ways to minimize exposure to that hazard.
- (k)** Fall protection systems. When fall protection systems required by paragraph (j) of this section are employed, the following shall apply:
  - (1) Each fall protection system component, except anchorages, shall have fall arrest/restraint as its only use.
  - (2) Each fall protection system subjected to impact loading shall be immediately withdrawn from service and not be used again until inspected and determined by a designated person to be undamaged and suitable for use.
  - (3) Each fall protection system shall be rigged so that a falling employee cannot contact any lower level stowage or vessel structure.
  - (4) Each fall protection system adopted for use shall have an energy absorbing mechanism that will produce an arresting force on an employee of not greater than 1800 pounds (8 kN).
  - (5) Each component of a fall protection system shall be designed and used to prevent accidental disengagement.
  - (6) Each fall protection system's fixed anchorages shall be capable of sustaining a force of 5,000 pounds (22.2 kN) or be certified as capable of sustaining at least twice the potential impact load of an employee's fall. Such certification must be made by a qualified person.<sup>(7)</sup> When more than one employee is attached to an anchorage, these limits shall be multiplied by the number of employees attached.

- (7) When **live** (activated) container gantry crane lifting beams or attached devices are used as anchorage points, the following requirements apply:
    - (i) The crane shall be placed into a **slow** speed mode;
    - (ii) The crane shall be equipped with a remote shut-off switch that can stop trolley, gantry, and hoist functions and that is in the control of the employee(s) attached to the beam; and
    - (iii) A visible or audible indicator shall be present to alert the exposed employee(s) when the remote shut-off is operational.
  - (8) Fall protection system components, other than the anchorages, shall be certified as a unit of being capable of sustaining at least twice the potential impact load of an employee's fall. Such certification shall be made by a qualified person.<sup>(8)</sup>
  - (9) Each fall protection system shall incorporate the use of a full body harness.
  - (10) Each device, such as a safety cage, used to transport an employee(s) by being attached to a container gantry crane spreader, shall have a secondary means to prevent accidental disengagement and the secondary means shall be engaged.
  - (11) Each fall protection system shall be inspected before each day's use by a designated person. Any defective components shall be removed from service.
  - (12) Before using any fall protection system, the employee shall be trained in the use and application limits of the equipment, proper hookup, anchoring and tie-off techniques, methods of use, and proper methods of equipment inspection and storage.
  - (13) The employer shall establish and implement a procedure to retrieve personnel safely in case of a fall.
- I)** Working along unguarded edges. The employer shall provide, and ensure that the employee use, fall protection meeting the requirements of paragraph (k) of this section whenever the employee works along an unguarded edge where a fall hazard exists (see §1918.2).

Footnote<sup>(5)</sup>

heavily laden container is one that is loaded to within 20 percent of its rated capacity.

Footnote<sup>(6)</sup>

Examples of work that may not be eliminated by positive container securing devices and that may require employees to work on top of containers include, but are not limited to: installing or removing bridge clamps; hooking up or detaching over-height containers; or freeing a jammed semi-automatic twist lock.

Footnote<sup>(7)</sup>

For the purposes of this paragraph, qualified person means one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of design, analysis, evaluation and specifications in the subject work, project, or product.

Footnote<sup>(8)</sup>

For the purposes of this paragraph, qualified person means one with a recognized degree or professional certificate and extensive knowledge and experience in the subject field who is capable of design, analysis, evaluation and specifications in the subject work, project, or product.

**§1918.86 Roll-on roll off (Ro-Ro) operations (see also ? §1918.2, Ro-Ro operations, and ? §1918.25).**

- (a)** Traffic control system. An organized system of vehicular and pedestrian traffic control shall be established and maintained at each entrance/exit ramp and on ramps within the vessel as traffic flow warrants.
- (b)** Ramp load limit. Each ramp shall be plainly marked with its load capacity. The marked capacity shall not be exceeded.
- (c)** Pedestrian traffic. Bow, stern, and side port ramps also used for pedestrian access shall meet the requirements of §1918.25. Such ramps shall provide a physical separation between pedestrian and vehicular routes. When the design of the ramp prevents physical separation, a positive means shall be established to prevent simultaneous use of the ramp by vehicles and pedestrians.
- (d)** Ramp maintenance. Ramps shall be properly maintained and secured.
- (e)** Hazardous routes. Before the start of Ro-Ro operations, the employer shall identify any hazardous routes or areas that could be mistaken for normal drive-on/drive-off routes. Such hazardous routes shall be clearly marked and barricaded.

- (f) Air brake connections. Each tractor shall have all air lines connected when pulling trailers equipped with air brakes and shall have the brakes tested before commencing operations.
- (g) Trailer load limits. After July 27, 1998, flat bed and low boy trailers shall be marked with their cargo capacities and shall not be overloaded.
- (h) Cargo weights. Cargo to be handled via a Ro-Ro ramp shall be plainly marked with its weight in pounds (kilograms). Alternatively, the cargo stow plan or equivalent record containing the actual gross weight of the load may be used to determine the weight of the cargo.
- (i) Tractors. Tractors used in Ro-Ro operations shall have:
  - (1) Sufficient power to ascend ramp inclines safely; and
  - (2) Sufficient braking capacity to descend ramp inclines safely.
- (j) Safe speeds. Power driven vehicles used in Ro-Ro operations shall be operated at speeds that are safe for prevailing conditions.
- (k) Ventilation. Internal combustion engine-driven vehicles shall be operated only where adequate ventilation exists or is provided. (Air contaminant requirements are found in §1918.94 and part §1910, subpart Z, of this chapter.)
- (l) Securing cargo. Cargo loaded or discharged during Ro-Ro operations shall be secured to prevent sliding loads.
- (m) Authorized personnel. Only authorized persons shall be permitted on any deck while loading or discharging operations are being conducted. Such authorized persons shall be equipped with high visibility vests (or equivalent protection <sup>(10)</sup>)

**Note To Paragraph (m):** High visibility vests or equivalent protection means high visibility/retro-reflective materials which are intended to make the user clearly visible by day through the use of high visibility (fluorescent) material and in the dark by vehicle headlights through the use of retro-reflective material. For example, an acceptable area of material for a vest or equivalent protection is .5 m<sup>2</sup> (760 in.<sup>2</sup>) for fluorescent (background) material and .13m<sup>2</sup> (197 in.<sup>2</sup>) for retro-reflective material. Vests or equivalent protection, such as high visibility/retro-reflective coveralls, that are available for industrial use, may also be acceptable.

- (n) Vehicle stowage positioning. Drivers shall not drive vehicles, either forward or backward, while any personnel are in positions where they could be struck.

Footnote<sup>(9)</sup> [reserved]

Footnote<sup>(10)</sup> Decals on hard hats will not be considered equivalent protection for the purposes of this paragraph.

#### **§1918.87 Ship's cargo elevators.**

- (a) Safe working load. The safe working loads of ship's cargo elevators shall be determined and followed.
- (b) Load distribution. Loads shall be evenly distributed and maintained on the elevator's platform.
- (c) Elevator personnel restrictions. Personnel shall not be permitted to ride on the elevator's platform if a fall hazard exists. (See §1918.2.)
- (d) Open deck barricades. During elevator operation, each open deck that presents a fall hazard to employees shall be effectively barricaded.

#### **§1918.88 Log operations.**

- (a) Working in holds. When loading logs into the holds of vessels and using dumper devices to roll logs into the wings, the employer shall ensure that employees remain clear of areas where logs being dumped could strike, roll upon, or pin them.
- (b) Personal flotation devices. Each employee working on a log boom shall be protected by a personal flotation device meeting the requirements of §1918.105(b)(2).
- (c) Footwear. The employer shall provide each employee that is working logs with appropriate footwear, such as spiked shoes or caulked sandals, and shall ensure that each employee wears appropriate footwear to climb or walk on logs.
- (d) Lifelines. When employees are working on log booms or cribs, lifelines shall be furnished and hung overside to the water's edge.

- (e) Jacob's ladder. When a log boom is being worked, a Jacob's ladder meeting the requirements of §1918.23 shall be provided for each gang working alongside unless other safe means of access (such as the vessel's gangway) is provided. However, no more than two Jacob's ladders are required for any single log boom being worked.
- (f) Life-ring. When working a log boom alongside a ship, a U.S. Coast Guard approved 30-inch (76.2 cm) life-ring, with no less than 90 feet (27.4 m) of line, shall be provided either on the floating unit itself or aboard the ship close to each floating unit being worked.
- (g) Rescue boat. When employees are working on rafts or booms, a rescue boat capable of effecting an immediate rescue shall be available. Powered rescue boats are required when the current exceeds one
- (h) Log rafts. When an employee is working logs out of the water, walking sticks <sup>(11)</sup> (safety sticks) shall be provided as follows:
  - (1) They shall be planked and be no less than 24 inches (.61 m) wide;
  - (2) They shall extend along the entire length of all rafts on the side(s) of the vessel being worked, and to the means of access to the log raft(s); and
  - (3) They shall be buoyant enough to keep the walking surface above the waterline when employees are walking on them.

Footnote<sup>(11)</sup> A **walking stick** is two logs bolted or otherwise secured together with two or three planks firmly attached on top that serves as a floating walking and working surface and that is used in the loading of logs onto vessels from the water.

**§1918.89 Handling hazardous cargo (See also §1918.2 and §1918.99).**

Hazardous cargo shall be slung and secured so that neither the draft nor individual packages can fall because of tipping of the draft or slacking of the supporting gear.

**1918.90 Hazard communication (See also §1918.1(b)(4))**

See §1918.1(b)(4).

**§1918.91 Housekeeping.**

- (a) General. Active work areas shall be kept free of equipment, such as lashing gear, and materials not in use, and clear of debris, projecting nails, strapping and other objects not necessary to the work in progress.
- (b) Slippery surfaces. The employer shall eliminate conditions causing slippery walking and working surfaces in immediate areas used by employees.
- (c) Free movement of drafts. Dunnage shall not be placed at any location where it interferes with the free movement of drafts.
- (d) Dunnage height. Dunnage racked against sweat battens or bulkheads shall not be used when the levels of such racks are above the safe reach of employees.
- (e) Coaming clearance. Dunnage, hatch beams, tarpaulins or gear not in use shall be stowed no closer than three feet (.91 m) to the port and starboard sides of the weather deck hatch coaming.
- (f) Nails.
  - (1) Nails that are protruding from shoring or fencing in the work area shall be rendered harmless.
  - (2) Dunnage, lumber, or shoring material in which there are visibly protruding nails shall be removed from the work area, or, if left in the area, the nails shall be rendered harmless.
- (g) Ice aloft. Employees shall be protected from ice that may fall from aloft.

**§1918.92 Illumination.**

- (a) Walking, working, and climbing areas. Walking, working, and climbing areas shall be illuminated. Unless conditions described in the regulations of the U.S. Coast Guard (33 CFR 154.570) exist

for specific operations, illumination for cargo transfer operations shall be of a minimum light intensity of five foot-candles (54 lux). Where work tasks require more light to be performed safely, supplemental lighting shall be used.

- (b) Intensity measurement. The lighting intensity shall be measured at the task/working surface, in the plane in which the task/working surface is present.
- (c) Arrangement of lights. Lights shall be arranged so that they do not shine into the eyes of winch-drivers, crane operators or hatch tenders. On Ro-Ro ships, stationary lights shall not shine directly into the eyes of drivers.
- (d) Portable lights. Portable lights shall meet the following requirements:
  - (1) Portable lights shall be equipped with substantial reflectors and guards to prevent materials from coming into contact with the bulb.
  - (2) Flexible electric cords used with temporary lights shall be designed by the manufacturer for hard or extra-hard usage. Temporary and portable lights shall not be suspended by their electric cords unless the cords and lights are designed for this means of suspension. Connections and insulation shall be maintained in safe condition.
  - (3) Electric conductors and fixtures for portable lights shall be so arranged as to be free from contact with drafts, running gear, and other moving equipment.
  - (4) Portable cargo lights furnished by the employer for use aboard vessels shall be listed as approved for marine use by the U.S. Coast Guard or by a nationally recognized testing laboratory (see §1910.7).
- (e) Entry into darkened areas. Employees shall not be permitted to enter dark holds, compartments, decks or other spaces without a flashlight or other portable light. The use of matches or open flames is prohibited.

**§1918.93 Hazardous atmosphere and substances (See also §1918.2(j)).**

- (a) Purpose and scope. This section covers areas in which the employer knows, or has reason to believe, that a hazardous atmosphere or substance may exist, except where one or more of the following sections apply: §1918.94(a), Carbon monoxide; §1918.94(b), Fumigated grains; §1918.94(c), Fumigated tobacco; §1918.94(d), Other fumigated cargoes; §1918.94(e), Catch of menhaden and similar species of fish.
- (b) Determination of the hazard. When the employer knows, or has reason to believe, that a space on a vessel contains or has contained a hazardous atmosphere, a designated and appropriately equipped person shall test the atmosphere prior to employee entry to detect whether a hazardous atmosphere exists.
- (c) Testing during ventilation. When mechanical ventilation is used to maintain a safe atmosphere, tests shall be made by a designated person to ensure that the atmosphere is not hazardous.
- (d) Entry into hazardous atmospheres. Only designated persons shall enter hazardous atmospheres, in which case the following provisions shall apply:
  - (1) Persons entering a space containing a hazardous atmosphere shall be protected by respiratory and emergency protective equipment meeting the requirements of subpart J of this part;
  - (2) Persons entering a space containing a hazardous atmosphere shall be instructed about the hazards, precautions to be taken, and the use of protective and emergency equipment. Standby observers, similarly equipped and instructed, shall continuously monitor the activity of employees within such space;
  - (3) Except in emergency or rescue operations, employees shall not enter any atmosphere identified as flammable or oxygen-deficient (less than 19.5% oxygen). Persons who may be required to enter flammable or oxygen-deficient atmospheres in emergency operations shall be instructed in the dangers attendant to those atmospheres and be instructed in the use of self-contained breathing apparatus which shall be used for entry.
  - (4) To prevent inadvertent employee entry into spaces identified as having hazardous, flammable or oxygen-deficient atmospheres, appropriate warning signs or equivalent means shall be posted at all means of access to those spaces.

- (e) Asbestos cargo leak. When the packaging of asbestos cargo leaks, spillage shall be cleaned up by designated employees protected from the harmful effects of asbestos as required by §1910.1001 of this chapter.

**§1918.94 Ventilation and atmospheric conditions (See also? §1918.2, definitions of Hazardous cargo, materials, substance or atmosphere and Ro-Ro operations).**

- (a) Ventilation with respect to carbon monoxide.
    - (1) When internal combustion engines exhaust into a hold, intermediate deck, or any other compartment, the employer shall ensure that the atmosphere is tested as frequently as needed to prevent carbon monoxide (CO) concentrations from exceeding allowable limits. Such tests shall be made in the area in which employees are working by persons competent in the use of the test equipment and procedures. If operations are in a deep tank or refrigerated compartment, the first test shall be made within one half hour of the time the engine starts. To decide the need for further testing, the initial test in all other cargo handling areas shall be taken no later than one hour after the time the engine starts.
      - (i) The CO content of the atmosphere in a compartment, hold, or any enclosed space shall be maintained at not more than 50 parts per million (ppm) (0.005%) as an eight hour average area level and employees shall be removed from the enclosed space if the CO concentration exceeds a ceiling of 100 ppm (0.01%). Exception: The ceiling shall be 200 ppm (0.02%) instead of 100 ppm (0.01%) for Ro-Ro operations <sup>(12)</sup>

**Note to paragraph (a)(1)(i):** The term eight hour average area level means that for any period in which the concentration exceeds 50 parts per million, the concentration shall be maintained for a corresponding period below 50 parts per million.

    - (ii) When both natural ventilation and the vessel's ventilation system are inadequate to keep the CO concentration within the allowable limits, the employer shall use supplementary means to bring such concentration within allowable limits, as determined by monitoring.
  - (2) The intakes of portable blowers and any exposed belt drives shall be guarded to prevent Injury to employees.
  - (3) The frames of portable blowers shall be grounded at the source of the current by means of an equipment grounding conductor run with or enclosing the circuit conductors. When the vessel is the source of the current, the equipment grounding conductor shall be bonded to the structure of the vessel. Electric cords shall be free from visible defects.
- (b) Fumigated grains.
  - (1) Before commencing to handle bulk grain in any compartment of a vessel in which employees will or may be present, the employer shall:
    - (i) Determine whether the grain has been or will be fumigated at the elevator; and
    - (ii) Determine whether that compartment, or any cargo within it loaded at a prior berth, has been treated with a fumigant or any other chemical.
  - (2) If fumigant or chemical treatment has been carried out, or if there is reason to suspect that such treatment has been carried out, it shall be determined by atmospheric testing that the compartment's atmosphere is within allowable limits. (See paragraph (b)(3) of this section.)
  - (3) A test of the fumigant concentration in the atmosphere of the compartment shall be made after loading begins and before employees enter the compartment. Additional tests shall be made as often as necessary to ensure that hazardous concentrations do not develop.
    - (i) Tests for fumigant concentration shall be conducted by a designated person, who shall be thoroughly familiar with the characteristics of the fumigant being used, the correct procedure for measurement, the proper measuring equipment to be used, the fumigant manufacturers' recommendations and warnings, and the proper use of personal protective equipment to guard against the specific hazard.
    - (ii) If the concentration in any compartment reaches the level specified as hazardous by the fumigant manufacturer, or exceeds the permissible exposure limits of part

- §1910, subpart Z of this chapter, whichever is lower, all employees shall be removed from such compartments and shall not be permitted to reenter until tests prove that the atmosphere is within allowable limits.
- (iii) No employee shall be permitted to enter any compartment in which grain fumigation has been carried out, or any compartment immediately next to such a compartment, until it has been determined by testing that the atmosphere in the compartment to be entered is within allowable limits for entry.
  - (iv) In the event a compartment containing a hazardous or unknown concentration of fumigants must be entered for testing of the atmosphere, or for emergency purposes, each employee entering shall be protected by respiratory protective equipment following the provisions of §1918.102, and by any protective clothing and other personal protective equipment recommended by the fumigant manufacturer for protection against the particular hazard. At least two other employees shall be stationed outside the compartment as observers, to provide rescue services in case of emergency. The observers shall be equipped with similar personal protective equipment.
  - (v) One or more employees on duty shall be equipped and trained to provide any specific emergency medical treatment stipulated for the particular fumigant.
  - (vi) Emergency equipment required by this paragraph shall be readily accessible wherever fumigated grains are being handled.
- (4) If a compartment is treated for local infestation before loading grain by a chemical other than a fumigant, the employee applying the treatment, and any other employees entering the compartment, shall be provided with and required to use any personal protective equipment recommended by the manufacturer of the product to protect them against the effects of exposure.
- (c)** Fumigated tobacco. The employer shall not load break-bulk tobacco until the carrier has provided written notification about whether or not the cargo has been fumigated. If break-bulk tobacco cargo has been treated with any toxic fumigant, loading shall not commence until a written warranty has been received from the fumigation facility that the aeration of the cargo has been such as to reduce the concentration of the fumigant to within the level specified as hazardous by the fumigant manufacturer, or does not exceed the permissible exposure limits of part §1910, subpart Z of this chapter, whichever is lower. Such notification and warranty shall be maintained for at least 30 days after the loading of the tobacco has been completed, and shall be available for inspection.
- (d)** Other fumigated cargoes. Before commencing to load or discharge fumigated cargo other than the cargo specifically addressed in paragraphs (b) and (c) of this section, the employer shall determine that the concentration of fumigants is within the level specified as hazardous by the fumigant manufacturer, or does not exceed the permissible exposure limits of part §1910, subpart Z of this chapter, whichever is lower.
- (e)** Grain dust. When employees are exposed to concentrations of grain dust greater than the allowable limit found in subpart Z of part §1910 of this chapter, they shall be protected by suitable respiratory protective equipment as required by §1918.102.
- (f)** Catch of menhaden and similar species of fish.
- (1) The provisions of this paragraph shall not apply to vessels having and utilizing refrigerated holds for the carriage of all cargo.
  - (2) After a vessel has arrived at berth for discharge of menhaden, but before personnel enter the hold, and as frequently thereafter as tests show to be necessary, tests shall be made of the atmosphere in the vessel's hold to ensure a safe work space. The tests shall be done for the presence of hydrogen sulfide and for oxygen deficiency.
  - (3) Tests required by paragraph (f)(2) of this section shall be made by designated supervisory personnel, trained and competent in the nature of hazards and the use of test equipment and procedures.
  - (4) Before employees enter a hold it shall be tested for hydrogen sulfide and oxygen deficiency. Employees shall not enter the hold when the hydrogen sulfide level exceeds 20 ppm ceiling or when the oxygen content is less than 19.5 percent, except in emergencies.

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Footnote (12) [reserved]

**§1918.95 Sanitation.**

- (a) Washing and toilet facilities.
  - (1) Accessible washing and toilet facilities sufficient for the sanitary requirements of employees shall be readily accessible at the worksite. The facilities shall have:
    - (i) Running water, including hot and cold or tepid water, at a minimum of one accessible location (when longshoring operations are conducted at locations without permanent facilities, potable water may be provided instead of running water);
    - (ii) Soap;
    - (iii) Individual hand towels, clean individual sections of continuous toweling, or warm air blowers; and
    - (iv) Fixed or portable toilets in separate compartments with latch-equipped doors. Separate toilet facilities shall be provided for male and female employees unless toilet rooms will be occupied by only one person at a time.
  - (2) Washing and toilet facilities shall be regularly cleaned and maintained in good order.
- (b) Drinking water.
  - (1) Potable drinking water shall be accessible to employees at all times.
  - (2) Potable drinking water containers shall be clean, containing only water and ice, and shall be fitted with covers.
  - (3) Common drinking cups are prohibited.
- (c) Prohibited eating areas. Consumption of food or beverages in areas where hazardous materials are stowed or being handled is prohibited.
- (d) Garbage and overboard discharges. Work shall not be conducted close to uncovered garbage or in the way of overboard discharges from the vessel's sanitary lines unless employees are protected from the garbage or discharge by a baffle or splash boards.

**§1918.96 Maintenance and repair work in the vicinity of longshoring operations.**

- (a) Noise interference (See also §1918.1(b)(6).) Longshoring operations shall not be carried on when noise interferes with communications of warnings or instructions.
- (b) Falling objects. Longshoring operations shall not be carried on in the hold or on deck beneath work being conducted overhead whenever such work exposes the employee to a hazard of falling objects.
- (c) Hot work. Longshoring operations shall not be carried on where the employee is exposed to damaging light rays, hot metal, or sparks from welding or cutting.
- (d) Abrasive blasting and spray painting. Longshoring operations shall not be carried on in the immediate vicinity of abrasive blasting or spray painting operations.
- (e) Machine guarding. (See also §1918.2, definition of **Danger zone**.)
  - (1) Danger zones on machines and equipment used by employees shall be guarded.
  - (2) The power supply to machines shall be turned off, locked out, and tagged out during repair, adjustment, or servicing.

**§1918.97 First aid and lifesaving facilities. (See Appendix V of this part).**

- (a) Injury reporting. The employer shall require each employee to report every work-related injury, regardless of severity, to the employer.
- (b) First aid. A first aid kit shall be available at or near each vessel being worked. At least one person holding a valid first aid certificate, such as is issued by the Red Cross or other equivalent organization, shall be available to render first aid when work is in progress.
- (c) First aid kits. First aid kits shall be weatherproof and shall contain individual sealed packages for each item that must be kept sterile. The contents of each kit shall be determined by a person certified in first aid and cognizant of the hazards found in marine cargo handling operations. The contents shall be checked at intervals that allow prompt replacement of expended items.
- (d) Stretchers.

- (1) For each vessel being worked, at least one Stokes basket stretcher, or its equivalent, shall be available to be permanently equipped with bridles for attachment to the hoisting gear.
  - (2) Stretchers shall be kept close to vessels and shall be positioned to avoid damage to the stretcher.
  - (3) A blanket or other suitable covering shall be available.
  - (4) Stretchers shall have at least four sets of effective patient restraints in operable condition.
  - (5) Lifting bridles shall be of adequate strength, capable of lifting 1,000 pounds (454 kg) with a safety factor of five (lifting capability of 5,000 pounds), and shall be maintained in operable condition. Lifting bridles shall be provided for making vertical patient lifts at container berths. Stretchers for vertical lifts shall have foot plates.
  - (6) Stretchers shall be maintained in operable condition. Struts and braces shall be inspected for damage. Wire mesh shall be secured and have no burrs. Damaged stretchers shall not be used until repaired.
  - (7) Stretchers in permanent locations shall be mounted to prevent damage and be protected from the elements if located out-of-doors. If concealed from view, enclosures shall be marked to indicate the location of the lifesaving equipment.
- (e) Life-rings.
- (1) The employer shall ensure that there is in the vicinity of each vessel being worked at least one U.S. Coast Guard approved 30-inch (76.2 cm) life-ring with no less than 90 feet (27.43 m) of line attached, and at least one portable or permanent ladder that will reach from the top of the apron to the surface of the water.
  - (2) In addition, when working a barge, scow, raft, lighter, log boom, or carfloat alongside a ship, a U.S. Coast Guard approved 30-inch (76.2 cm) life-ring, with no less than 90 feet (27.43 m) of line shall be provided either on the floating unit itself or aboard the ship in the immediate vicinity of each floating unit being worked.
- (f) Communication. Telephone or equivalent means of communication shall be readily available at the worksite.

**§1918.98 Qualifications of machinery operators and supervisory training.**

- (a) Qualification of machinery operators.
- (1) Only an employee determined by the employer to be competent by reason of training or experience, and who understands the signs, notices and operating instructions and is familiar with the signal code in use, shall be permitted to operate a crane, winch, or other power-operated cargo handling apparatus, or any power-operated vehicle, or give signals to the operator of any hoisting apparatus. However, an employee being trained and supervised by a designated person may operate such machinery and give signals to operators during training.
  - (2) No employee known to have defective uncorrected eyesight or hearing, or to be suffering from heart disease, epilepsy, or similar ailments that may suddenly incapacitate the employee, shall be permitted to operate a crane, winch or other power-operated cargo handling apparatus or a power-operated vehicle.

**Note to paragraph (a)(2):** OSHA is defining suddenly incapacitating medical ailments consistent with the Americans with Disabilities Act (ADA), 42 U.S.C. 12101 (1990). Therefore, employers who act in accordance with the employment provisions (Title I) of the ADA (42 U.S.C. 12111-12117), the regulations implementing Title I (29 CFR Part 1630), and the Technical Assistance Manual for Title I issued by the Equal Employment Opportunity Commission (Publication number: EEOC-M1A), will be considered as being in compliance with this paragraph.

- (b) Supervisory accident prevention proficiency.
- (1) By July 16, 1999, each immediate supervisor of a cargo handling operation of more than five persons shall satisfactorily complete a course in accident prevention.
  - (2) Each employee newly assigned to supervisory duties after that date shall be required to meet the provisions of this paragraph within 90 days of such assignment.
  - (3) The accident prevention course shall consist of instruction suited to the particular operations involved.<sup>(13)</sup>

Footnote <sup>(13)</sup> The following are recommended topics: Safety responsibility and authority; elements of accidents prevention; attitudes, leadership and motivation; hazards of longshoring, including peculiar local circumstances; hazard identification and elimination; applicable regulations; and accident investigations.

**§1918.99 Retention of DOT markings, placards and labels.**

- (a) Any employer who receives a package of hazardous material that is required to be marked, labeled or placarded in accordance with the U.S. Department of Transportation's Hazardous Materials Regulations (49 CFR parts 171 through 180) shall retain those markings, labels and placards on the package until the packaging is sufficiently cleaned of residues and purged of vapors to remove any potential hazards.
- (b) Any employer who receives a freight container, rail freight car, motor vehicle, or transport vehicle that is required to be marked or placarded in accordance with the Hazardous Materials Regulations shall retain those markings and placards on the freight container, rail freight car, motor vehicle or transport vehicle until the hazardous materials that require the marking or placarding are sufficiently removed to prevent any potential hazards.
- (c) Markings, placards and labels shall be maintained in a manner that ensures that they are readily visible.
- (d) For non-bulk packages that will not be reshipped, the provisions of the section are met if a label or other acceptable marking is affixed in accordance with OSHA's Hazard Communication Standard (29 CFR 1910.1200).
- (e) For the purposes of this section, the term **hazardous material** has the same definition as in the Hazardous Materials Regulations (49 CFR parts 171 through 180).

**§1918.100 Emergency action plans.**

- (a) Scope and application. This section requires all employers to develop and implement an emergency action plan.<sup>14</sup> The emergency action plan shall be in writing (except as provided in the last sentence of paragraph (e)(3) of this section) and shall cover those designated actions employers and employees must take to ensure employee safety from fire and other emergencies.
- (b) Elements. The following elements, at a minimum, shall be included in the plan:
  - (1) Emergency escape procedures and emergency escape route assignments;
  - (2) Procedures to be followed by employees who remain to operate critical operations before they evacuate;
  - (3) Procedures to account for all employees after emergency evacuation has been completed;
  - (4) Rescue and medical duties for those employees who are to perform them;
  - (5) The preferred means of reporting fires and other emergencies; and
  - (6) Names or regular job titles of persons or departments that can be contacted for further information or explanation of duties under the plan.
- (c) Alarm system. The employer shall establish an employee alarm system that provides warning for necessary emergency action or for reaction time for safe escape of employees from the workplace or the immediate work area, or both.
- (d) Evacuation. The employer shall establish the types of evacuation to be used in emergency circumstances.
- (e) Training.
  - (1) Before implementing the emergency action plan, the employer shall designate and train a sufficient number of persons to assist in the safe and orderly emergency evacuation of employees.
  - (2) The employer shall review the plan with each employee covered by the plan at the following times:
    - (i) Initially when the plan is developed;
    - (ii) Whenever the employee's responsibilities or designated actions under the plan change; and
    - (iii) Whenever the plan is changed.

- (3) The employer shall review with each employee upon initial assignment those parts of the plan that the employee must know to protect the employee in the event of an emergency. The written plan shall be kept at the workplace and made available for employee review. Employers with 10 or fewer employees may communicate the plan orally to employees and need not maintain a written plan.

FOOTNOTE (14) When an employer directs his employees to respond to an emergency that is beyond the scope of the Emergency Action Plan, a plan developed in accordance with §1910.120(q) of this chapter shall apply.

**§1918.101 Eye and face protection.**

- (a) The employer shall ensure that:
  - (1) Each affected employee uses appropriate eye and/or face protection where there are exposures to eye and/or face hazards. Such equipment shall comply with American National Standards Institute, ANSI Z-87.1-1989, "Practice for Occupational and Educational Eye and Face Protection."
  - (2) For an employee wearing corrective glasses, eye protection equipment required by paragraph (a)(1) of this section shall be of the type that can be worn over glasses. Prescription-ground safety lenses may be substituted if they provide equivalent protection.
- (b) Eye protection shall be maintained in good condition.
- (c) Used eye protection shall be cleaned and disinfected before issuance to another employee.

**§1918.102 Respiratory protection. (See §1918.1(b)(8)).**

**§1918.103 Head protection.**

- (a) The employer shall ensure that each affected employee wears a protective helmet when working in areas where there is a potential for injury to the head from falling objects.
- (b) Such equipment shall comply with American National Standards Institute, ANSI Z-89.1-1986, "Personnel Protection-Protective Headwear for Industrial Workers-Requirements."
- (c) Previously worn protective hats shall be cleaned and disinfected before issuance by the employer to another employee.

**§1918.104 Foot protection.**

- (a) The employer shall ensure that each affected employee wears protective footwear when working in areas where there is a danger of foot injuries due to falling or rolling objects or objects piercing the sole.
- (b) Such equipment shall comply with American National Standards Institute, ANSI Z-41-1991, "American National Standard for Personal Protection-Protective Footwear."

**§1918.105 Other protective measures.**

- (a) Protective clothing.
  - (1) The employer shall provide and shall require the wearing of special protective clothing for each employee engaged in work where protective clothing is necessary.
  - (2) When necessary, protective clothing shall be cleaned and disinfected before reissuance.
- (b) Personal flotation devices (PFDs).
  - (1) The employer shall provide and shall require the wearing of PFDs for each employee engaged in work in which the employee might fall into the water.
  - (2) PFDs (life preservers, life jackets, or work vests) worn by each affected employee must be United States Coast Guard (USCG) approved pursuant to 46 CFR part 160 (Type I, II,

- III, or V PFD) and marked for use as a work vest, for commercial use, or for use on vessels.
- (3) Personal flotation devices shall be maintained in safe condition and shall be considered unserviceable when damaged in a manner that affects buoyancy or fastening capability.

**§1918.106 Payment for protective equipment.**

- (a) Except as provided by paragraphs (b) through (f) of this section, the protective equipment, including personal protective equipment (PPE), used to comply with this part, shall be provided by the employer at no cost to employees.
- (b) The Employer is not required to pay for non-specialty safety-toe protective footwear (including steel-toe shoes or steel-toe boots) and non-specialty prescription safety eyewear, provided that the employer permits such items to be worn off the job-site.
- (c) When the employer provides metatarsal guards and allows the employee, at his or her request, to use shoes or boots with built-in metatarsal protection, the employer is not required to reimburse the employee for the shoes or boots.
- (d) The employer is not required to pay for:
- (1) Everyday clothing, such as long-sleeve shirts, long pants, street shoes, and normal work boots; or
  - (2) Ordinary clothing, skin creams, or other items, used solely for protection from weather, such as winter coats, jackets, gloves, parkas, rubber boots, hats, raincoats, ordinary sunglasses, and sunscreen.
- (e) The employer must pay for replacement PPE, except when the employee has lost or intentionally damaged the PPE.
- (f) Where an employee provides adequate protective equipment he or she owns, the employer may allow the employee to use it and is not required to reimburse the employee for that equipment. The employer shall not require an employee to provide or pay for his or her own PPE, unless the PPE is excepted by paragraphs (b) through (e).
- (g) This section shall become effective on February 13, 2008. Employers must implement the PPE payment requirements no later than May 15, 2008.

**Appendix I to Part §1918 - Cargo Gear Register and Certificates (Non-mandatory).**

**Note:** This Appendix is non-mandatory and provides guidance to part §1918 to assist employers and employees in complying with the requirements of this standard, as well as to provide other helpful information. Nothing in this Appendix adds or detracts from any of the requirements of this standard. The language in this appendix is taken directly from the recommended ILO document.  
Form No. 1

**Identity of National Authority or Competent Organization  
Register of Ships' Lifting Appliances and Cargo Handling Gear**

Name of Ship	
Official Number	
Call Sign	
Port of Registry	
Name of Owner	
Register Number	
Date of Issue	
Issued by	
Signature and Stamp	

**Note:** This register is the standard international form as recommended by the International Labour Office in accordance with the ILO Convention No. 152.  
**General**

The tests, examinations and inspections indicated in this register are based on the requirements of ILO Convention 152 and Recommendation 160. They are intended to ensure that ships having lifting appliances are initially certified by a competent person, and to establish periodically that they continue to be in safe working order to the satisfaction of a competent person acceptable to a competent authority. A Register of lifting appliances and items of loose gear shall be kept in a form prescribed by the competent authority, account being taken of this model recommended by the International Labour Office. This Register and related certificates shall be kept available to any person authorized by the competent authority. The Register and certificates for gear currently aboard the ship shall be preserved for at least five years after the date of the last entry.

### **Instruction**

#### **1. Initial Examination and Certification**

- 1.1. Every lifting appliance shall be certified by a competent person before being taken into use for the first time to ensure that it is of good design and construction and of adequate strength for the purpose for which it is intended.
- 1.2. Before being taken into use for the first time, a competent person shall supervise and witness testing, and shall thoroughly examine every lifting appliance.
- 1.3. Every item of loose gear shall, before being taken into use for the first time, shall be tested, thoroughly examined and certified by a competent person, in accordance with national law or regulations.
- 1.4. Upon satisfactory completion of the procedures indicated above, the competent person shall complete and issue the Register of lifting appliances and attach the appropriate certificates. An entry shall be made in part I of the Register.
- 1.5. A rigging plan showing the arrangement of lifting appliances shall be provided. In the case of derricks and derrick cranes, the rigging should show at least the following information:
  - (a) The position of guys;
  - (b) The resultant force on blocks, guys, wire ropes and booms;
  - (c) The position of blocks;
  - (d) The identification mark of individual items; and
  - (e) Arrangements and working range of union purchase.

#### **2. Periodic Examination and Re-testing**

- 2.1. All lifting appliances and every item of loose gear shall be thoroughly examined by a competent person at least once in every twelve months. The particulars of these thorough examinations shall be entered in part I of the Register.
- 2.2. Re-testing and thorough examination of all lifting appliances and every item of loose gear is to be carried out:
  - (a) after any substantial alteration or renewal, or after repair to any stress bearing part, and
  - (b) in the case of lifting appliances, at least once in every five years.
- 2.3. The retesting referred to in paragraph 2.2(a) may be omitted provided the part which has been renewed or repaired is subjected by separate test, to the same stress as would be imposed on it if it had been tested in-situ during the testing of the lifting appliance.
- 2.4. The thorough examinations and tests referred to in paragraph 2.2. are to be entered in part I of the Register.
- 2.5. No new item of loose gear shall be manufactured of wrought iron. Heat treatment of any existing wrought iron components should be carried out to the satisfaction of the competent person. No heat treatment should be applied to any item of loose gear unless the treatment is in accordance with the manufacturer's instruction; and to the satisfaction of the competent person. Any heat treatment and the associated examination are to be recorded by the competent person in part I of the Register.

#### **3. Inspections**

- 3.1. Regular visual inspections of every item of loose gear shall be carried out by a responsible person before use. A record of these regular inspections is to be entered in part II of the Register, but entries need only be made when the inspection has indicated a defect in the item.

#### **4. Certificates**

- 4.1. The certification forms to be used in conjunction with this Register (Form No. 1) are as follows:  
 (Form No. 2)--Certificate of test and thorough examination of lifting appliance.  
 (Form No. 2(U))--Certificate of test and thorough examination of derricks used in union purchase.

(Form No. 3)--Certificate of test and thorough examination of loose gear.

(Form No. 4)--Certificate of test and thorough examination of wire rope.

**Definitions**

- (a) The term **competent authority** means a minister, government department, or other authority empowered to issue regulations, orders or other instructions having the force of law.
- (b) The term **competent person** means a person appointed by the master of the ship or the owner of the gear to be responsible for the performance of inspections and who has sufficient knowledge and experience to undertake such inspections.
- (c) The term **thorough examination** means a detailed visual examination by a competent person, supplemented if necessary by other suitable means or measures in order to arrive at a reliable conclusion as to the safety of the lifting appliance or item of loose gear examined.
- (d) The term **lifting appliance** covers all stationary or mobile cargo handling appliances used on board ship for suspending, raising or lowering loads or moving them from one position to another while suspended or supported.
- (e) The term **loose gear** covers any gear by means of which a load can be attached to a lifting appliance, but which does not form an integral part of the appliance or load.

**THE FOLLOWING ARE SAMPLE FORMS OF CERTIFICATES AS RECOMMENDED BY THE ILO**

(Part I--Thorough Examination of Lifting Appliances and Loose Gear)

Situation and description of lifting appliances and loose gear (with distinguishing numbers or marks, if any) which have been thoroughly examined. (See note 1)  (1)	Certificate Nos.  (2)	Examination performed (see also note 2)  (3)	I certify that on the date to which I have appended my signature, the gear shown in col. (1) was thoroughly examined and no defects affecting its safe working condition were found other than those shown in col.(15) (date and signature)  (4)	Remarks (to be dated and signed)  (5)
	_____	_____	_____	
	_____	_____	_____	
	_____	_____	_____	

**Note 1:** If all the lifting appliances are thoroughly examined on the same date it will be sufficient to enter in Col. (1) **All lifting appliances and loose gear**. If not, the parts that have been thoroughly examined on the dates stated must be clearly indicated.

**Note 2:** The thorough examinations to be indicated in Col (3) include:

- (a) initial.
- (b) 12 monthly.
- (c) 5 yearly.
- (d) Repair/Damage.
- (e) Other thorough examinations.

(Part II--Regular Inspections of Loose Gear)

Situation and description of loose gear (with distinguishing numbers or marks, if any) that has been inspected. (See note 1)	Signature and date of the responsible person carrying the inspection	Remarks (to be dated and signed)

**Note 1:** All loose gear should be inspected before use. However, entries need only be made when the inspection discloses a defect.

Form No. 2

**Identity of National Authority or Competent Organization Certificate of Test and Thorough Examination of Lifting Appliances**

Name of Ship \_\_\_\_\_  
 Official Number \_\_\_\_\_  
 Call Sign \_\_\_\_\_  
 Port of Registry \_\_\_\_\_  
 Name of Owner \_\_\_\_\_  
 Certificate No. \_\_\_\_\_

Situation and description of lifting appliances (with distinguishing numbers or marks, if any) which have been tested and thoroughly examined.	Angle to the horizontal or radius at which test load applied	Test load (tonnes)	Safe working load at angle or radius shown in col. 2 (tonnes)

Name and address of the firm or competent person who witnessed testing and carried out thorough examination.

I certify that on the date to which I have appended my signature, the gear shown in Col. (1) was tested and thoroughly examined and no defects or permanent deformation was found and that the safe working load is as shown.

Date \_\_\_\_\_  
 Place \_\_\_\_\_  
 Signature \_\_\_\_\_

**Note:** This certificate is the standard international form as recommended by the International Labor Office in accordance with ILO Convention No. 152.

Reverse of Form No. 2

**Instructions**

- Every lifting appliance shall be tested with a test load which shall exceed the Safe Working Load (SWL) as follows:

SWL	Test Load
Up to 20 tonnes.....	25 percent in excess.
20 to 50 tonnes.....	5 tonnes in excess.
Over 50 tonnes.....	10 percent in excess.

- In the case of derrick systems, the test load shall be lifted with the ship's normal tackle with the derrick at the minimum angle to the horizontal for which the derrick system was designed (generally 15 degrees), or at such greater angle as may be agreed. The angle at which the test was made should be stated in the certificate.
  - The SWL shown is applicable to swinging derrick systems only. When derricks are used in union purchase, the SWL (U) is to be shown on Form 2 (U).
  - In the case of heavy derricks, care should be taken to ensure that the appropriate stays are correctly rigged.

3. In the case of cranes, the test load is to be hoisted and luffed at slow speed. Gantry and traveling cranes together with their trolleys, where appropriate, are to be traversed and traveled over the full length of their track.
- 3.1. In the case of variable load-radius cranes, the tests are generally to be carried out with the appropriate test load at maximum, minimum and intermediate radii.
- 3.2. In the case of hydraulic cranes where limitations of pressure make it impossible to lift a test load 25 percent in excess of the safe working load, it will be sufficient to lift the greatest possible load, but in general this should not be less than 10 percent in excess of the safe working load.
4. As a general rule, tests should be carried out using test loads, and no exception should be allowed in the case of initial tests. In the case of repairs/replacement or when the periodic examination calls for re-test, consideration may be given to the use of spring or hydraulic balances provided the SWL of the lifting appliance does not exceed 15 tonnes. Where a spring or hydraulic balance is used, it shall be calibrated and accurate to within  $\pm 2$  percent and the indicator should remain constant for five minutes.
- 4.1. If the test weights are not used, this is to be indicated in Col. (3).
5. The expression **tonne** shall mean a tonne of 1000 kg.
6. The terms **competent person**, **thorough examination**, and **lifting appliance** are defined in Form No. 1.

**Note:** For recommendations on test procedures reference may be made to the ILO document **Safety and Health in Dock Work**.

Form No. 2(U)

**Identity of National Authority or Competent Organization Certificate of Test and Thorough Examination of Derricks Used in Union Purchase**

Name of Ship \_\_\_\_\_  
 Official Number \_\_\_\_\_  
 Call Sign \_\_\_\_\_  
 Port of Registry \_\_\_\_\_  
 Name of Owner \_\_\_\_\_  
 Certificate No \_\_\_\_\_

Situation and description of derricks used in Union Purchase (with distinguishing numbers or marks which have been tested and thoroughly examined) (1)	Max. height of triangle plate above hatch coaming (m) or max. angle between rachers (2)	Test load (tonnes) (3)	Safe working load, SWL, when operating in union purchase (tonnes) (4)

Position of outboard preventer guy attachments:

(a) forward/aft \* of mast--(m) and

(b) from ship's centerline--(m) Position of inboard preventer guy attachments:

(a) forward/aft \* of mast--(m) and

(b) from ship's centerline--(m)

\* Delete as appropriate.

Name and address of the firm or competent person who witnessed testing and carried out thorough examination

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I certify that on the date to which I have appended my signature, the gear shown in Col. (1) was tested and thoroughly examined and no defects or permanent deformation was found and that the safe working load is as shown.

Date: \_\_\_\_\_  
 Signature: \_\_\_\_\_  
 Place: \_\_\_\_\_

**Note:** This certificate is the standard international form as recommended by the International Labour Office in accordance with ILO Convention No. 152.

Reverse Form No. 2 (U)

**Instructions**

1. Before being taken into use, the derricks rigged in Union Purchase shall be tested with a test load which shall exceed the Safe Working Load (SWL (U)) as follows:

SWL	Test Load
Up to 20 tonnes.....	25 percent in excess.
20 to 50 tonnes.....	5 tonnes in excess
Over 50 tonnes.....	10 percent in excess.

2. Tests are to be carried out at the approved maximum height of the triangle plate above the hatch coaming or at the angle between the cargo runners and with the derrick booms in their working positions, to prove the strength of deck eye plates and the Union Purchase system. These heights or angles must not exceed the values shown on the rigging plan.
3. Tests should be carried out using test loads.
4. The expression **tonne** shall mean a tonne of 1000 kg.
5. The terms **competent person**, **thorough examination** and **lifting appliance** are defined in Form No 1.

**Note:** For recommendations on test procedures, reference may be made to the ILO document **Safety and Health in Dock Work**.

Form 3

**Identity of National Authority or Competent Organization Certificate of Test and Thorough Examination of Loose Gear**

Name of Ship \_\_\_\_\_  
 Official Number \_\_\_\_\_  
 Call Sign \_\_\_\_\_  
 Port of Registry \_\_\_\_\_  
 Name of Owner \_\_\_\_\_  
 Certificate No. \_\_\_\_\_

Distinguishing number or mark	Description of loose gear	Number tested	Date of test	Test load (tonnes)	Safe work load (SWL) (tonnes)

Name and address of makers or suppliers:

Name and address of the firm or competent person who witnessed testing and carried out thorough examination.

I certify that the above items of loose gear were tested and thoroughly examined and no defects affecting their SWL were found.

Date: \_\_\_\_\_  
 Place: \_\_\_\_\_  
 Signature: \_\_\_\_\_

**Note:** This certificate is the standard international form as recommended by the International Labour Office in accordance with ILO Convention No. 152.

Reverse Form No. 3

**Instructions**

- Every item of loose gear is to be tested and thoroughly examined before being put into use for the first time and after any substantial alteration or repair to any part liable to affect its safety. The test loads to be applied shall be in accordance with the following table:

Item	Test Load (tonnes)
Single sheave blocks (See Note 1).....	4 x SWL
Multi sheave blocks (See Note 2):	
SWL < 25 tonnes .....	2 x SWL
25 tonnes < SWL ≤ 160 tonnes.....	(0.933 x SWL) + 27
SWL > 160 tonnes.....	1.1 x SWL
Chains, hooks, rings, shackles, swivels, etc:	
SWL < 25 tonnes.....	2 x SWL
SWL > 25 tonnes.....	(1.22 x SWL) + 20
Lifting beams, spreaders, frames and similar devices:	
SWL ≤ 10 tonnes.....	2 x SWL
10 tonnes < SWL ≤ 160 tonnes.....	(1.04 x SWL) + 9.6
SWL > 160 tonnes .....	1.1 x SWL

**Note:**

- The SWL for a single sheave block, including single sheave blocks with becketts, is to be taken as one-half of the resultant load on the head fitting.
- The SWL of a multi-sheave block is to be taken as the resultant load on the head fitting.
- This form may also be used for the certification of interchangeable components of lifting appliances.
- The expression **ton** shall mean a ton of 1,000 kg.
- The terms **competent person**, **thorough examination** and **loose gear** are defined in Form No. 1.

**Note:** For recommendations on test procedures reference may be made to the ILO document **Safety and Health in Dock Work**.

Form No. 4

**Identity of National Authority or Competent Organization Certificate of Test and Thorough Examination of Wire Rope**

Name of Ship \_\_\_\_\_  
 Official Number \_\_\_\_\_  
 Call Sign \_\_\_\_\_  
 Port of Registry \_\_\_\_\_  
 Name of Owner \_\_\_\_\_  
 Certificate No. \_\_\_\_\_

Name and address of maker supplier	
Nominal diameter of rope (mm)	
Number of strands	
Number of wires per strand	
Core	
Lay	
Quality of wire (N/mm <sup>2</sup> )	
Date of test of sample	
Load at which sample broke (tonnes)	
Safe working load of rope (tonnes)	
Intended use	

Name and address of the firm or competent person who witnessed testing and carried out thorough examination.

I certify that the above particulars are correct, and that the rope was tested and thoroughly examined and no defects affecting its SWL were found.

Date: \_\_\_\_\_  
 Place: \_\_\_\_\_  
 Signature: \_\_\_\_\_

**Note:** This certificate is the standard international form as recommended by the International Labour Office in accordance with ILO Convention No. 152.

Reverse Form No. 4

**Instructions**

1. Wire rope shall be tested by sample, a piece being tested to destruction.
2. The test procedure should be in accordance with an International or recognized National standard.
3. The SWL of the rope is to be determined by dividing the load at which the sample broke, by a coefficient of utilization, determined as follows:

Item	Coefficient
Wire rope forming part of a sling:	
SWL of the sling.....	5
SWL < 10 tonnes.....	10 <sup>6</sup>
10 tonnes < SWL ≤ 160 tonnes.....	(8.85 x SWL) + 1910
SWL > 160 tonnes.....	3
Wire rope as Integral part of a lifting appliance:	
SWL of lifting appliance.....	10+
WL ≤ 160 tonnes.....	(8.85 x SWL) + 1910
WL > 160 tonnes.....	3

These coefficients should be adopted unless other requirements are specified by a National Authority.

4. The expression **tonne** shall mean a tonne of 1000 kg.
5. The terms **competent person**, **thorough examination** and **lifting appliance** are defined in Form No. 1.

**Note:** For recommendations on test procedures reference may be made to the ILO document **Safety and Health in Dock Work**.

**Appendix II to Part §1918 - Tables for Selected Miscellaneous Auxiliary Gear (Mandatory).**

**Note:** This Appendix is mandatory and is to be used in the appropriate sections of part §1918 when certificates or the manufacturers' use recommendations are not available.

Improved plow steel, rope (Inches (cm)),	Minimum number of clips		Minimum spacing (Inches (cm))
	Drop forged	Other material	
1/2 or less (1.3)	3	4	3 (7.6)
5/8 (1.6)	3	4	3 <sup>3/4</sup> (9.5)
3/4 (1.9)	4	5	4 <sup>1/2</sup> (11.4)
7/8 (2.2)	4	5	5 <sup>1/4</sup> (13.3)
1 (2.5)	5	6	6 (15.2)
1 <sup>1/8</sup> (2.9)	6	6	6 <sup>3/4</sup> (17.1)
1 <sup>1/4</sup> (3.2)	6	7	7 <sup>1/2</sup> (19.1)
1 <sup>3/8</sup> (3.5)	7	7	8 <sup>1/4</sup> (21.0)
1 <sup>1/2</sup> (3.8)	7	8	9 (22.9)

Rope diameter nominal inch	Vertical hitch	Choker hitch	Angle of rope to vertical			
			0 deg.	30 deg.	45 deg.	60 deg.
1/2	550	250	1,100	900	750	550
9/16	700	350	1,400	1,200	1,000	700
5/8	900	450	1,800	1,500	1,200	900
3/4	1,100	550	2,200	1,900	1,500	1,100
13/16	1,300	650	2,600	2,300	1,800	1,300
7/8	1,500	750	3,100	2,700	2,200	1,500
1	1,800	900	3,600	3,100	2,600	1,800
1 <sup>1/16</sup>	2,100	1,100	4,200	3,600	3,000	2,100
1 <sup>1/8</sup>	2,400	1,200	4,800	4,200	3,400	2,400
1 <sup>1/4</sup>	2,700	1,400	5,400	4,700	3,800	2,700
1 <sup>5/16</sup>	3,000	1,500	6,000	5,200	4,300	3,000
1 <sup>1/2</sup>	3,700	1,850	7,400	6,400	5,200	3,700
1 <sup>5/8</sup>	4,500	2,300	9,000	7,800	6,400	4,500
1 <sup>3/4</sup>	5,300	2,700	10,500	9,200	7,500	5,300
2	6,200	3,100	12,500	10,500	8,800	6,200
2 <sup>1/8</sup>	7,200	3,600	14,500	12,500	10,000	7,200
2 <sup>1/4</sup>	8,200	4,100	16,500	14,000	11,500	8,200
2 <sup>1/2</sup>	9,300	4,700	18,500	16,000	13,000	9,300
2 <sup>5/8</sup>	10,500	5,200	21,000	18,000	14,500	10,500
Endless Sling						
1/2	950	500	1,900	1,700	1,400	950
9/16	1,200	600	2,500	2,200	1,800	1,200
5/8	1,600	800	3,200	2,700	2,200	1,600
3/4	2,000	950	3,900	3,400	2,800	2,000
13/16	2,300	1,200	4,700	4,100	3,300	2,300
7/8	2,800	1,400	5,600	4,800	3,900	2,800
1	3,200	1,600	6,500	5,600	4,600	3,200
1 <sup>1/16</sup>	3,800	1,900	7,600	6,600	5,400	3,800
1 <sup>1/8</sup>	4,300	2,200	8,600	7,500	6,100	4,300

1 <sup>1/4</sup>	4,900	2,400	9,700	8,400	6,900	4,900
1 <sup>5/16</sup>	5,400	2,700	11,000	9,400	7,700	5,400
1 <sup>1/2</sup>	6,700	3,300	13,500	11,500	9,400	6,700
1 <sup>5/8</sup>	8,100	4,100	16,000	14,000	11,500	8,100
1 <sup>3/4</sup>	9,500	4,800	19,000	16,500	13,500	9,500
2	11,000	5,600	22,500	19,500	16,000	11,000
2 <sup>1/8</sup>	13,000	6,500	26,000	22,500	18,500	13,000
2 <sup>1/4</sup>	15,000	7,400	29,500	25,500	21,000	15,000
2 <sup>1/2</sup>	16,500	8,400	33,500	29,000	23,500	16,500
2 <sup>5/8</sup>	18,500	9,500	37,000	32,500	26,500	18,500

**Table 3A. – Polypropylene Rope and Rope Slings -- Load Capacity in Pounds (lbs.)**  
 Safety Factor=6-- Eye and Eye Sling -- Basket Hitch  
 (Angle of rope to horizontal -- 90 deg. 60 deg. 45 deg. 30 deg.)

Rope diameter nominal in.	Vertical hitch	Choker hitch	Angle of rope to vertical			
			0 deg.	30 deg.	45 deg.	60 deg.
1/2	650	350	1,300	1,200	950	650
9/16	800	400	1,600	1,400	1,100	800
5/8	1,000	500	2,000	1,700	1,400	1,000
3/4	1,300	700	2,700	2,300	1,900	1,300
13/16	1,600	800	2,600	2,300	2,200	1,800
7/8	1,800	900	3,100	2,700	2,600	1,800
1	2,200	1,100	3,600	3,100	3,100	2,200
1 <sup>1/16</sup>	2,500	1,300	4,200	3,600	3,600	2,500
1 <sup>1/8</sup>	2,900	1,500	4,800	4,200	4,100	2,900
1 <sup>1/4</sup>	3,300	1,700	6,700	5,800	4,700	3,300
1 <sup>5/16</sup>	3,700	1,900	7,400	6,400	5,300	3,700
1 <sup>1/2</sup>	4,700	2,400	9,400	8,100	6,700	4,700
1 <sup>5/8</sup>	5,700	2,900	11,500	9,900	8,100	5,700
1 <sup>3/4</sup>	6,800	3,400	13,500	12,000	9,000	8,800
2	8,200	4,100	16,500	14,500	11,500	8,200
2 <sup>1/8</sup>	8,700	4,800	19,500	18,500	13,500	9,700
2 <sup>1/4</sup>	11,000	5,500	22,000	19,000	15,500	11,000
2 <sup>1/2</sup>	12,500	6,300	25,500	22,000	18,000	12,500
2 <sup>5/8</sup>	14,500	7,100	28,500	24,500	20,000	14,500

**Table 3B. – Polypropylene Rope and Rope Slings -- Load Capacity in Pounds (lbs.)**  
 Safety Factor=6—Endless Sling -- Basket Hitch  
 (Angle of rope to horizontal -- 90 deg. 60 deg. 45 deg. 30 deg.)

Rope diameter nominal in.	Vertical hitch	Choker hitch	Angle of rope to vertical			
			0 deg.	30 deg.	45 deg.	60 deg.
1/2	1,200	600	2,400	2,100	1,700	1,200
9/16	1,600	750	2,900	2,500	2,100	1,500
5/8	1,800	900	3,500	3,100	2,500	1,800
3/4	2,400	1,200	4,900	4,200	3,400	2,400
13/16	2,800	1,400	5,600	4,900	4,000	2,800
7/8	3,300	1,600	6,600	5,700	4,600	3,300
1	4,000	2,000	8,000	6,900	5,500	4,000
1 <sup>1/16</sup>	4,600	2,300	9,100	7,900	6,500	4,600
1 <sup>1/8</sup>	5,200	2,000	10,500	9,000	7,400	5,200
1 <sup>1/4</sup>	6,000	3,000	12,000	10,500	8,500	6,000
1 <sup>5/16</sup>	6,700	3,400	13,500	11,500	9,500	6,700

1½	8,500	4,200	17,000	14,500	12,000	8,500
1 <sup>5/8</sup>	10,500	5,100	20,500	18,000	14,500	10,500
1 <sup>3/4</sup>	12,500	5,100	24,500	21,000	17,500	12,500
2	15,000	7,400	29,500	25,500	21,000	15,000
2 <sup>1/8</sup>	17,500	8,700	35,500	30,100	24,500	17,500
2 <sup>1/4</sup>	19,500	9,900	39,500	34,000	28,000	19,500
2½	23,000	11,500	45,500	39,500	32,500	23,000
2 <sup>5/8</sup>	25,500	13,000	51,500	44,500	36,500	25,500

Chain size nominal		Single leg sling-90 deg. to horizontal loading		Rated load double leg sling horizontal angle (note 2)					
inch	mm	lb	kg	60 deg Double at 60 deg.		45 deg Double at 45 deg.		30 deg. Double at 30 deg.	
				lb	kg	lb	kg	lb	Kg
1/4	7	3,500	1,570	6,100	2,700	4,900	2,200	3,500	1,590
3/8	10	7,100	3,200	12,300	5,500	10,000	4,500	7,100	3,200
1/2	13	12,000	5,400	20,800	9,400	17,000	7,600	1,200	5,400
5/8	16	18,100	8,200	31,300	14,200	25,600	11,600	18,100	8,200
3/4	20	28,300	12,800	49,000	22,300	40,000	18,200	28,300	12,900
7/8	22	34,200	15,500	59,200	27,200	48,400	22,200	34,200	15,700
1	26	47,700	21,600	82,600	37,900	67,400	31,000	47,700	21,900
1 <sup>1/4</sup>	32	72,300	32,800	125,200	56,800	102,200	46,400	72,300	32,800

**Notes:**

(1) Other grades of proof tested steel chain include Proof Coil (Grade 28), Hi-Test (grade 43 Chain, and Transport (grade 70) Chain. These grades are not recommended for overhead lifting and therefore are not covered by this standard.

(2) Rating of multi-leg slings adjusted for angle of loading between the inclined leg and the horizontal plane of the load.

Table 4B. -- Maximum Allowable Wear at any Point of Link		
Nominal chain or coupling link size		Maximum allowable wear of cross-sectional diameter, in.
Inch	mm	
1/4	7	0.037
3/8	10	0.052
1/2	13	0.060
5/8	16	0.084
3/4	20	0.105
7/8	22	0.116
1	26	0.137
1 <sup>1/4</sup>	32	0.169

**Note:** For other sizes, consult chain or sling manufacturer

Table 5. -- Safe Working Loads for Shackles (In tons of 2,000 pounds)				
Material size		Pin diameter		Safe working load in 2,000 lb tons
Inches	(cm)	Inches	(cm)	
1/2	(1.3)	5/8	(1.6)	1.4
5/8	(1.6)	3/4	(1.9)	2.2
3/4	(1.9)	7/8	(2.2)	3.2
7/8	(2.2)	1	(2.5)	4.3
1	(2.5)	1 <sup>1/8</sup>	(2.9)	5.6
1 <sup>1/8</sup>	(2.9)	1 <sup>1/4</sup>	(3.2)	6.7
1 <sup>1/4</sup>	(3.2)	1 <sup>3/8</sup>	(3.5)	8.2
1 <sup>3/8</sup>	(3.5)	1 <sup>1/2</sup>	(3.8)	10.0
1 <sup>1/2</sup>	(3.8)	1 <sup>5/8</sup>	(4.1)	11.9
1 <sup>3/4</sup>	(4.4)	2	(5.1)	16.2
2	(5.1)	2 <sup>1/4</sup>	(5.7)	21.2

Wire Rope Table -- Rate Loads for Single Leg Slings 6x19 or 6x37 Classification Improved Plow Steel Grade Rope With Fiber Core (FC) (Rated loads (note 1), tons (2,000 lb))				
Rope diameter, inch	Vertical			Choker HT, MS&S
	HT	MS	S	
1/4	0.49	0.51	0.55	0.38
5/16	0.78	0.79	0.85	0.6
3/8	1.1	1.1	1.2	0.85
7/16	1.4	1.5	1.7	1.2
1/2	1.8	2.0	2.1	1.5
9/16	2.3	2.5	2.7	1.9
5/8	2.8	3.1	3.3	2.3
3/4	3.9	4.4	4.8	3.3
7/8	5.2	6.0	6.4	4.5
1	6.7	7.7	8.8	5.9
1 <sup>1/8</sup>	8.4	9.5	11	7.4
1 <sup>1/4</sup>	10	12	13	9.0
1 <sup>3/8</sup>	12	14	15	11
1 <sup>1/2</sup>	15	17	18	13
1 <sup>5/8</sup>	17	19	21	15
1 <sup>3/4</sup>	20	22	25	17

2	26	29	32	22
HT=Hand Tucked Splice For Hidden Tuck Splice (IWRC), use vales in HT (FC) columns MS=Mechanical Splice S=Poured Socket or Swaged Socket <b>Note:</b> <b>(1)</b> These values are based on slings being vertical. If they are not vertical, the rated load shall be reduced. If two or more slings are used, the minimum horizontal angle between the slings shall also be considered.				

Wire Rope Table -- Rated Loads for Single Leg Slings 6x19 or 6x37 Classification Extra Improved Plow Steel Grade Rope With Independent Wire Rope Core (IWRC) (Rated loads (note 1) , tons (2,000 lb))						
	Vertical			Choker	Vertical basket	
Rope diameter, inch	HT	MS	S	HT, MS&S	(Note (2)) HT	(Note (3)) MS&S
1/4	0.53	0.59	0.59	0.31	1.1	1.1
5/16	0.82	0.87	0.92	0.64	1.6	1.7
3/8	1.2	1.2	1.3	0.92	2.3	2.5
7/16	1.5	1.7	1.8	1.2	3.1	3.4
1/2	2.0	2.2	2.3	1.6	4.0	4.4
9/16	2.5	2.8	2.9	2.0	1.9	5.5
5/8	3.0	3.4	3.6	2.6	6.0	6.8
3/4	4.2	4.9	5.1	3.6	8.4	9.7
7/8	5.5	6.6	6.9	4.8	11	13
1	7.2	8.5	9.0	6.3	14	17
1 <sup>1/8</sup>	9.0	10	11	7.9	18	20
1 <sup>1/4</sup>	11	13	14	9.7	22	26
1 <sup>3/8</sup>	13	15	17	12	27	31
1 <sup>1/2</sup>	16	18	20	14	32	37
1 <sup>5/8</sup>	18	21	23	16	37	43
1 <sup>3/4</sup>	21	25	27	19	43	49
2	28	32	34	24	55	64
HT=Hand tucked Splice For Hidden Tuck Splice (IWRC), use values in HT columns of Table 3 MS=Mechanical Splice. S=Poured Socket or Swaged Socket <b>Notes:</b> <b>(1)</b> These values are based on slings being vertical. If they are not vertical, the rated load shall be reduced. If they are not vertical, the rated load shall be reduced. If two or more slings are used, the minimum horizontal angle between the slings shall also be considered. <b>(2)</b> These values only apply when the D/d ratio is 15 or greater. <b>(3)</b> These values only apply when the D/d ratio is 25 or greater. D=Diameter or curvature around which the body of the sling is bent. d=Diameter of rope						

Wire Rope Table-Rated Loads for Single Leg Slings 6x19 or 6x37 Classification Extra Improved Plow Steel Grade Rope With Independent Wire Rope Core (IWRC) (Rated loads (note 1), tons (2,000 lb))					
Rope diameter	Vertical		Choker	Vertical basket [note (2)]	
	MS	S	MS&S	MS&S	
1/4	0.65	0.68	0.48	1.3	
5/16	1.0	1.1	.074	2.0	
3/8	1.4	1.5	1.1	2.9	
7/16	1.9	2.0	1.4	3.9	
1/2	2.5	2.7	1.9	5.1	
9/16	3.2	3.4	2.4	6.4	
5/8	3.9	4.1	2.9	7.8	
3/4	5.6	5.9	4.1	11.0	
7/8	7.6	8.0	5.6	15.0	
1	9.8	10.0	7.2	20.0	
1 <sup>1/8</sup>	12.0	13.0	9.1	24.0	
1 <sup>1/4</sup>	15.0	16.0	11.0	30.0	
1 <sup>3/8</sup>	18.0	19.0	13.0	36.0	
1 <sup>1/2</sup>	21.0	23.0	16.0	42.0	
1 <sup>5/8</sup>	24.0	26.0	18.0	49.0	
1 <sup>3/4</sup>	28.0	31.0	21.0	57.0	
2	37.0	40.0	28.0	73.0	

HT=Hand tucked Splice  
For Hidden Tuck Splice (IWRC), use values in HT columns of Table 3.  
MS=Mechanical Splice  
S=Poured Socket or Swaged Socket  
**NOTE:**  
(1) These values are based on slings being vertical. If they are not vertical, the rated load shall be reduced. If they are not vertical, the rated load shall be reduced. If two or more slings are used, the minimum horizontal angle between the slings shall also be considered.  
(2) These values only apply when the D/d ratio is 25 or greater.

**Appendix III to Part §1918 -- The Mechanics of Conventional Cargo Gear (Non-mandatory)**

**Note:** This Appendix is non-mandatory and provides an explanation of the mechanics in the correct spotting of cargo handling gear.

Although the most prevalent method of cargo handling is accomplished through the use of modern shoreside container gantry cranes, there are occasions when break-bulk cargo is handled with conventional ship's cargo gear. This appendix provides a reference for those unfamiliar with such cargo gear.

§§1918.52, 1918.53, and §1918.54 all address the subject of rigging and operating vessel's cargo handling gear. It is important to understand that under the Burton System of cargo handling (conventional gear consisting of two cargo derricks with married falls), the midships or up-and-down boom should be spotted as close to the fore and aft centerline of the hatch as operationally possible. Such spotting of the up-and-down boom will allow the most effective leads for the guy(s) and preventer(s) to safely support the lateral stresses generated in the boom(s) by the married falls. As the lead of the guy(s) and preventer(s) approaches the vertical, in supporting the boom(s) head, the total stress in the guy(s) increases rapidly due to the increased vertical force that is generated in the guy(s) in order to counteract any particular horizontal or lateral force exerted on the boom(s) head. The appreciable vertical forces that are generated

in this process are transmitted, in substantial part, to the boom(s) and topping lift(s), causing proportionate compressive stresses in the boom(s) and tension stresses in the topping lift(s).

In general, guys and preventers must be located so that enough vertical resistance is developed so as to prohibit the boom(s) from jackknifing as cargo passes across the deck. Special care must be exercised in the proper placement of guys and preventers associated with the Burton or yard boom. Preventers, when used, must parallel as closely as possible the guys that they support. Guys and preventers must not be attached to the same fitting.

While under a load, the cargo falls (running rigging) must not be permitted to chafe on any standing or other running gear. Special attention must be paid to ensure that cargo runners work freely through the heel block, without chafing the cheek of the block. Also, bobbing chains and heel block preventers must be attached so as to not interfere with the movement of the cargo runners.

**Appendix IV to Part §1918 – Special Cargo Gear and Container Spreader Test Requirements (Mandatory) (See ? 1918.61 (f), (g), (h))**

Type gear	Test requirement	Tested by	Proof test	
<b>A. All Special Cargo Handling Gear Purchased or Manufactured on or After January 21, 1998</b>				
1. Safe Working Load -- greater than 5 short tons (10,000 lbs./4.5 metric tons).	Prior to initial use.	OSHA accredited agency only.	Up to 20 short tons.	125% SWL.
	Prior to reuse after structural damage repair. Every four years after initial proof load test.	OSHA accredited agency or designated person.	From 20 to 50 short tons. Over 50 short tons.	5 short tons in excess of SWL. 110% SWL.
2. Safe Working Load -- 5 short tons or less.	Prior to initial use.	OSHA accredited agency only.	125% SWL.	
	Prior to reuse after structural damage repair.	OSHA accredited agency or designated person.		
3. Intermodal container spreaders not part of vessel's cargo handling gear.	Prior to initial use.	OSHA accredited agency only.	125% SWL.	
	Prior to reuse after structural damage repair. Every four years after initial proof load test.	OSHA accredited agency or designated person.		

<b>B. All Special cargo Handling Gear in Use Prior to January 21, 1998 and Proof Load Tested Prior to Initial Use (See Note Below)</b>				
1. Safe Working Load -- greater than 5 short tons (10,000 lbs./ 4540 kg.).	Every four years starting on January 21, 1998.	OSHA accredited agency or designated person.	Up to 20 short tons.	125% SWL.
	Prior to reuse after structural damage repair.	OSHA accredited agency	From 20 to 50 short tons. Over 50 short tons.	5 short tons in excess of SWL. 110% SWL.
2. Safe Working Load -- 5 short tons or less.	Prior to reuse after structural damage repair.	OSHA accredited agency or designated person.	125% SWL.	
3. Intermodal container spreaders not part of vessel's cargo handling gear.	Every four years starting on January 21, 1998.	OSHA accredited agency or designated person.	125% SWL.	
	Prior to reuse after structural damage repair.	OSHA accredited agency.		

**Note to Appendix IV:** Special stevedoring gear in use prior to January 21, 1998 was covered by §1918.61(b), in effect prior to January 21, 1998. (See 29 CFR Parts 1911 to 1925 revised as of July 1, 1997). The assumption is made that gear in use prior to January 21, 1998, has already been proof load tested, although not necessarily by an accredited agency. However, if the employer cannot certify that such gear was proof load tested under §1918.61(b), in effect prior to January 21, 1998, (See 29 CFR Parts §1911 to §1925 revised as of July 1, 1997), then it must be proof load tested in accordance with §1918.61 in effect on January 21, 1998, (See 29 CFR Parts §1911 to §1925 revised as of July 1, 1998.)

**Appendix V to Part §1918 - Basic Elements of a First Aid Training Program Non-mandatory.**

**Note:** This Appendix is non-mandatory and provides guidelines for small businesses, institutions teaching first aid, and the recipients of first aid training.

**General Program Elements**

**A. Teaching Methods**

1. Trainees should develop **hands on** skills through the use of manikins and trainee partners during their training.
2. Trainees should be exposed to acute injury and illness settings as well as the appropriate response to those settings through the use of visual aids, such as video tape and slides.
3. Training should include a course workbook which discusses first aid principles and responses to settings that require interventions.
4. Training duration should allow enough time for particular emphasis on situations likely to be encountered in particular workplaces.
5. An emphasis on quick response to first aid situations should be incorporated throughout the program.

**B. Principles of Responding to a Health Emergency.** The training program should include instruction in:

1. Injury and acute illness as a health problem.

2. Interactions with the local emergency medical services system. Trainees have the responsibility for maintaining a current list of emergency telephone numbers (police, fire, ambulance, poison control) easily accessible to all employees.
  3. The principles of triage.
  4. The legal aspects of providing first aid services.
- C. Methods of Surveying the Scene and the Victim(s).** The training program should include instruction in:
1. The assessment of scenes that require first aid services including:
    - a. general scene safety.
    - b. likely event sequence.
    - c. rapid estimate of the number of persons injured.
    - d. identification of others able to help at the scene.
  2. Performing a primary survey of each victim including airway, breathing, and circulation assessments as well as the presence of any bleeding.
  3. The techniques and principles of taking a victim's history at the scene of an emergency.
  4. Performing a secondary survey of the victim including assessments of vital signs, skin appearance, head and neck, eye, chest, abdomen, back, extremities, and medical alert symbols.
- D. Basic Adult Cardiopulmonary Resuscitation (CPR).** Basic adult CPR training should be included in the program. Retesting should occur every year. The training program should include instruction in:
1. Establishing and maintaining adult airway patency.
  2. Performing adult breathing resuscitation.
  3. Performing adult circulatory resuscitation.
  4. Performing choking assessments and appropriate first aid interventions.
  5. Resuscitating the drowning victim.
- E. Basic First Aid Intervention.** Trainees should receive instruction in the principles and performance of:
1. Bandaging of the head, chest, shoulder, arm, leg, wrist, elbow, foot, ankle, fingers, toes, and knee.
  2. Splinting of the arm, elbow, clavicle, fingers, hand, forearm, ribs, hip, femur, lower leg, ankle, knee, foot, and toes.
  3. Moving and rescuing victims including one and two person lifts, ankle and shoulder pulls, and the blanket pull.
- F. Universal Precautions.** Trainees should be provided with adequate instruction on the need for and use of universal precautions. This should include:
1. The meaning of universal precautions, which body fluids are considered potentially infectious, and which are regarded as hazardous.
  2. The value of universal precautions for infectious diseases such as AIDS and hepatitis B.
  3. A copy of OSHA's standard for occupational exposure to bloodborne pathogens or information on how to obtain a copy.
  4. The necessity for keeping gloves and other protective equipment readily available and the appropriate use of them.
  5. The appropriate tagging and disposal of any sharp item or instrument requiring special disposal measures such as blood soaked material.
  6. The appropriate management of blood spills.
- G. First Aid Supplies.** The first aid provider should be responsible for the type, amount, and maintenance of first aid supplies needed for their particular worksite(s). These supplies need to be stored in a convenient area available for emergency access.
- H. Trainee Assessments.** Assessment of successful completion of the first aid training program should include instructor observation of acquired skills and written performance assessments. First aid skills and knowledge should be reviewed every three years.
- I. Program Update.** The training program should be periodically reviewed with current first aid techniques and knowledge. Outdated material should be replaced or removed.

## Specific Program Elements

### A. Type of Injury Training

1. Shock. Instruction in the principles and first aid intervention in:
  - a. shock due to injury.
  - b. shock due to allergic reactions.
  - c. the appropriate assessment and first aid treatment of a victim who has fainted.
2. Bleeding
  - a. the types of bleeding including arterial, venous, capillary, external, and internal.
  - b. the principles and performance of bleeding control interventions including direct pressure, pressure points, elevation, and pressure bandaging.
  - c. the assessment and approach to wounds including abrasions, incisions, lacerations, punctures, avulsions, amputations, and crush injuries.
  - d. the principles of wound care including infection precautions, wounds requiring medical attention, and the need for tetanus prophylaxis.
3. Poisoning. Instruction in the principles and first aid intervention of:
  - a. alkali, acid and systemic poisons. In addition, all trainees should know how and when to contact the local Poison Control Center.
  - b. inhaled poisons including carbon monoxide, carbon dioxide, smoke, and chemical fumes, vapors and gases as well as the importance of assessing the toxic potential of the environment to the rescuer and the need for respirators. Trainees should be instructed in the acute effect of chemicals utilized in their plants, the location of chemical inventories, material safety data sheets (MSDS's), chemical emergency information, and antidote supplies.
  - c. topical poisons including poison ivy, poison sumac, poison oak, and insecticides.
  - d. drugs of abuse including alcohol, narcotics such as heroin and cocaine, tranquilizers, and amphetamines.
4. Burns. Instruction in the principles and first aid intervention of:
  - a. assessing the severity of the burn including first degree, second degree, and third degree burns.
  - b. differentiating between the types of third degree burns (thermal, electrical, and chemical) and their specific interventions. Particular attention should be focused upon chemical burns, and the use of specific chemicals in the workplace which may cause them.
5. Temperature Extremes. Instruction in the principles and first aid intervention of:
  - a. exposure to cold including frostbite and hypothermia.
  - b. exposure to heat including heat cramps, heat exhaustion, and heat stroke.
6. Musculoskeletal Injuries. The training program should include instruction in the principles and first aid intervention in:
  - a. open fractures, closed fractures, and splinting.
  - b. dislocations, especially the methods of joint dislocations of the upper extremity. The importance of differentiating dislocations from fractures.
  - c. joint sprains.
  - d. muscle strains, contusions, and cramps.
  - e. head, neck, back, and spinal injuries.
7. Bites and Stings. Instruction in the principles and first aid intervention in:
  - a. human and animal (especially dog and snake) bites.
  - b. bites and stings from insects (spiders, ticks, scorpions, hornets and wasps). Interventions should include responses to anaphylactic shock; other allergic manifestations; rabies and tetanus prophylaxis.
8. Medical Emergencies. Instruction in the principles and first aid intervention of:
  - a. heart attacks
  - b. strokes
  - c. asthma attacks
  - d. diabetic emergencies including diabetic coma, insulin shock, hyperglycemia, and hypoglycemia.

- e. seizures including tonic-clonic and absence seizures. Importance of not putting gags in mouth.
  - f. Pregnancy including the appropriate care of any abdominal injury or vaginal bleeding.
9. Confined Spaces
- a. the danger of entering a confined space to administer first aid without having the appropriate respiratory protection.
  - b. if first aid personnel will be required to assist evacuations from confined spaces, additional training will be needed.
- B. Site of Injury Training.** Instruction in the principles and first aid intervention of injuries to the following sites:
1. Head and Neck
    - a. including skull fractures, concussions, and mental status assessments with particular attention to temporary loss of consciousness and the need for referral to a physician.
    - b. including the appropriate approach to the management of the individual who has suffered a potential neck injury or fracture.
  2. Eye
    - a. foreign bodies, corneal abrasions and lacerations.
    - b. chemical burns and the importance of flushing out the eye.
    - c. the importance of not applying antibiotics without physician supervision.
  3. Nose
    - a. nose injuries and nose bleeds.
  4. Mouth and Teeth
    - a. oral injuries, lip and tongue injuries, and broken and removed teeth. The importance of preventing inhalation of blood and teeth.
  5. Chest
    - a. rib fractures, flail chest, and penetrating wounds.
  6. Abdomen
    - a. blunt injuries, penetrating injuries, and protruding organs.
  7. Hand, Finger, and Foot Injuries
    - a. finger/toe nail hematoma, lacerations, splinters, finger nail avulsion, ring removal, and foreign bodies.
    - b. the importance of identifying amputation care hospitals in the area. When an amputation occurs, appropriate handling of amputated fingers, hands, and feet during the immediate transportation of the victim and body part to the hospital.