DEPARTMENT OF LABOR

Occupational Safety and Health Administration

29 CFR Parts 1915, 1916, and 1917

Occupational Safety and Health Standards for Shipyard Employment

AGENCY: Occupational Safety and Health Administration, Labor.

ACTION: Final rule; Consolidation of standards.

SUMMARY: By this action, the Occupational Safety and Health Administration (OSHA) is consolidating its existing standards pertaining to shipyard employment. These standards presently comprise Parts 1915, 1916, and 1917 of Title 29 of the Code of Federal Regulations and cover, respectively, ship repairing, shipbuilding and shipbreaking operations. This action consolidates these standards into a single, comprehensive Part 1915, thereby eliminating duplicative and overlapping provisions. Other minor, nonsubstantive changes are also included in this action.

EFFECTIVE DATE: This action will be effective May 20, 1982.

FOR FURTHER INFORMATION CONTACT: Mr. M. Robert Daly, Office of Maritime Safety Standards, Occupational Safety and Health Administration, Room N3471, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, D.C. 20210. (Phone: (202) 523–7234)).

SUPPLEMENTARY INFORMATION:

Background

OSHA's safety and health standards for shipyard employment are presently comprised of Parts 1915, 1916, and 1917 of Title 29 of the Code of Federal Regulations. These standards were originally issued by the Secretary of Labor pursuant to section 41 of the Longshoremen's and Harbor Workers' Compensation Act, as amended (33 U.S.C. 941). In May 1971, these regulations were adopted as occupational safety and health standards pursuant to section 6(a) of the Occupational Safety and Health Act (29 U.S.C. 655(a)). (See 36 FR 10466; May 29, 1971).

The organization of OSHA's shipyard standards to date has involved the use of three separate parts, each of which contains requirements applicable to a particular shipyard operation. Part 1915 (incorporated into the OSHA standards by §1910.13) contains standards applicable to ship repairing, Part 1916 (incorporated into the OSHA standards by § 1910.14) addresses shipbuilding, and Part 1917 (incorporated into the OSHA standards by § 1910.15) deals with shipbreaking. Since many of the work practices and requirements are the same for all three shipyard operations, the present organizational structure has resulted in the needless repetition of nearly identical provisions in each of the three parts. For example, Parts 1915, 1916 and 1917 each presently contain standards pertaining to welding and other "hot work," scaffolds and ladders, general working conditions, rigging and materials handling equipment, tools, and personal protective equipment which are almost identical in both the language used and the hazards addressed. (See Subparts D, E, F, G, H and I of Parts 1915, 1916 and 1917, respectively.)

Other standards are duplicated in two but not all three parts. For example, nearly identical provisions exist for ship repairing (Part 1915) and shipbuilding (Part 1916) with regard to surface preparation and preservation, ship's machinery and piping systems, and pressure vessels. (See Subparts C, J and K of Parts 1915 and 1916.) Similarly, nearly identical requirements for work in explosive or dangerous atmospheres exist in Parts 1915 (Ship Repairing) and 1917 (Shipbreaking). (See Subpart B of both parts.)

In order to eliminate the duplication and needless repetition of regulations which presently occurs throughout Parts 1915, 1916 and 1917, OSHA is hereby consolidating these three parts into a single, comprehensive part entitled "Part 1915—Occupational Safety and Health Standards for Shipyard Employment."

Benefits of Consolidation

OSHA believes that this consolidation has many advantages. First, by eliminating repetitive provisions, it will reduce the volume of the shipyard standards by approximately two-thirds. Further, it will place all of the shipyard standards within one comprehensive part. The new, consolidated format will ease research and maintenence burdens associated with the present organization of the standards and will make the standards easier for both the public and OSHA to use. This consolidation will also facilitate future substantive revisions to the shipyard standards.

OSHA wishes to emphasize that this consolidation action involves only editorial and other minor changes to the shipyard standards. It does not alter the substantive requirements of the standards themselves nor does it change their present scope and application. In short, substantive amendments to the shipyard standards are not included here and notice and comment on these changes are therefore not required.

OSHA anticipates that this action will facilitate future substantive revisions of the shipyard standards. Such substantive revisions will be developed through normal rulemaking procedures which will provide adequate public notice and opportunity for comment. In addition, OSHA wishes to emphasize that this consolidation has no effect on the applicability of general industry standards in 29 CFR Part 1910 to hazards or conditions in shipyard employments not specifically addressed in the shipyard standards (see § 1910.5(c)).

Format of Consolidation

The new, consolidated Part 1915 will apply to all three shipyard operations which are presently addressed separately in Parts 1915, 1916 and 1917. Various editorial and other nonsubstantive language changes have been made to the individual standards to consolidate requirements pertaining to ship repairing, shipbuilding and shipbreaking. However, as previously stated, the substantive requirements of the specific standards, as well as their scope and application, have not been changed.

Unless otherwise stated, each standard in the new Part 1915 will apply equally to ship repairing, shipbuilding and shipbreaking operations (see new § 1915.2). Where a certain standard or requirement within a standard applies to only one or two shipyard activities (e.g., ship repairing and shipbuilding, but not shipbreaking) scope and application language has been added to delineate the precise coverage of the standard or requirement involved (see e.g., new §§ 1915.11 and 1915.51(a)).

The internal organization of standards within the new Part 1915 follows the same subpart structure which presently exists in Parts 1915, 1916 and 1917. This subpart structure groups standards according to the type of work activity, hazard or equipment involved. The new Part 1915 thus utilizes an organizational format which is already familiar to present users of the shipyard standards and which provides for logical organization of related provisions.

Other Changes

In addition to the above-described editorial changes, certain other minor, nonsubstantive changes are also included as part of this action. These consist of (1) clarification of statutory authority; (2) changes to reflect the transfer of functions among Federal agencies; and (3) renumbering of the sections.

1. Clarification of Statutory Authority

As previously noted, the present shipyard standards were originally issued by the Secretary pursuant to section 41 of the Longshoremen's and Harbor Workers' Compensation Act, as amended, and then later adopted by the Secretary as occupational safety and health standards pursuant to section 6(a) of the Occupational Safety and Health Act (see 29 CFR 1910.13, 1910.14, and 1910.15). The shipyard standards thus derive their legal basis from both the Longshoremen's Act and the OSH Act. However, present language in Parts 1915, 1916 and 1917 cites only to the Longshoremen's Act (see existing §§ 1915.1(a), 1916.1(a) and 1917.1(a)). Accordingly, the purpose and authority section in the new Part 1915 has been revised to cite both the Longshoremen's Act and the OSH Act as statutory authority for the shipyard standards.

2. Changes To Reflect Transfer of Authority Between Federal Agencies

The new Part 1915 contains changes in references to various Federal agencies which reflect the fact that certain referenced functions have been transferred from one Federal agency to another. For example, testing and approval of respiratory protective equipment is no longer performed by the U.S. Bureau of Mines, but instead is now a joint function of the Mine Safety and Health Administration (MSHA) of the Department of Labor and the National Institute for Occupational Safety and Health (NIOSH) (see 30 CFR Part 11). Consequently, references to respirator approval in the new Part 1915 have been changed to reflect this transfer.

(See new §§ 1915.34(c)(3)(ii) and 1915.152(a)(1)). Similarly, responsibility for testing and approving explosion-proof lamps is no longer a function of the Bureau of Mines, but instead is the responsibility of MSHA (see 30 CFR Part 20). References in §§ 1815.13 (b) and (f), 1915.35(b)(7) and 1915.36(a)(4) of the new standards have been changed accordingly. Finally, the Energy Reorganization Act of 1974 (Pub. L. 93–438; 88 Stat. 1233) transferred authority over standards for protection against radiation from the Atomic Energy Commission (now abolished) to the Nuclear Regulatory Commission (see 10 CFR Part 20). New § 1915.57 reflects this transfer.

3. Numbering Changes

The standards in the new Part 1915 have been renumbered to reflect the new, consolidated format and to facilitate future additions and revisions. References within the standards to other sections have been changed to conform to the new section numbers. To help the public locate specific provisions under the new, consolidated format, a table is provided below which lists existing standards by section number and their corresponding section number in the new Part 1915 along with a brief description of any changes made.

DISTRIBUTION AND DERIVATION TABLE—SHIPYARD STANDARDS

Old section Nos.	New section No.	Summary of changes
1915.1, 1916.1, 1917.1	1915.1	Reference to Occupational Safety and Health Act added; references to Longshoremen's and Harbor Workers' Compensation Act shortened. Paragraph (b) renumbered to § 1915.2(b). Paragraphs (c), (d) and (e) of old § 1915.1 and paragraph (c) of old 1916.1 and 1917.1 moved to new § 1915.3.
1915.2, 1916.2, 1917.2	1915.4	Editorial changes and renumbering of referenced sections.
1915.5, 1916.5, 1917.5	1915.5	Renumbering of referenced sections.
1915.7, 1916.7, 1917.7		Deleted as unnecessary.
1915.10, 1916.10, 1917.10	1915.7	Moved to Subpart A. Editorial changes. Renumbering of referenced sections.
1915.11, 1917.11	1915.12	Editorial changes and renumbering of referenced sections.
1915.12, 1917.12	1915.13	References to U.S. Bureau of Mines in paragraphs (b) and (f) changed to refer to Mine Safety and Health Administration. Renumbering of referenced sections.
1915.13, 1917.13	1915.14	Editorial changes.
1915.14, 1917.14	1915.15	Editorial changes.
1915.15	1915.16	Renumbered.
1915.21, 1916.21	1915.32	Renumbering of referenced sections.
1915.22, 1916.22	1915.33	Renumbering of referenced sections.
1915.23, 1916.23	1915.34	Reference to U.S. Bureau of Mines in paragraph (c)(3)(ii) changed to refer to National Institute for Occupational Safety and Health and Mine Safety and Health Administration. Renumbering of referenced sections.
1915.24, 1916.24	1915.35	Reference to U.S. Bureau of Mines in paragraph (b)(7) changed to refer to Mine Safety and Health Administration. Renumbering of referenced sections.
1915.25, 1916.25	1915.36	Reference to U.S. Bureau of Mines in paragraph (a)(4) changed to refer to Mine Safety and Health Administration.
1915.31, 1916.31, 1917.31	1915.51	Scope and application language added. Editorial changes and renumbering of referenced sections.
1915.32, 1916.32, 1917.32	1915.52	Scope and application language added. Editorial changes.
1915.33, 1916.33, 1917.33	1915.53	Scope and application language added. Editorial changes and renumbering of referenced sections.
1915.34, 1916.34, 1917.34	1915.54	Renumbered.
1915.35, 1916.35, 1917.35	1915.55	Renumbered.
1915.36, 1916.36, 1917.36	1915.56	Editorial changes.
1915.37, 1916.37	1915.57	References to Atomic Energy Commission in paragraphs (a) and (b) changed to refer to Nuclear Regulatory Commission. Editorial changes.
1915.41, 1916.41, 1917.41	1915.71	Scope and application language added. Renumbering of section references.
1915.42, 1916.42, 1917.42	1915.72	Renumbered.
1915.43, 1916.43, 1917.43	1915.73	Scope and application language added. Renumbering of section references.
1915.44, 1916.44, 1917.44	1915.74	Renumbered.
1915.45, 1916.45, 1917.45	1915.75	Renumbering of section references.
1915.46, 1916.46, 1917.46	1915.76	Renumbering of section references.
1915.47, 1916.47, 1917.47	1915.77	Scope and application language added. Renumbering of section references.
1915.51, 1916.51, 1917.51	1915.91	Editorial changes.
1915.52, 1916.52, 1917.52	1915.92	Renumbering of section references.
1915.53, 1916.53, 1917.53	1915.93	Renumbered.
1915.54, 1916.54, 1917.54	1915.94	Renumbering of section reference.
1915.55, 1916.55	1915.95	Section title revised to show application of this section to ship repairing and shipbuilding operations only.
1915.56, 1916.56, 1917.56	1915.96	Renumbered.
1915.57, 1916.57, 1917.57	1915.97	Editorial changes.
1915.58, 1916.58, 1917.58	1915.98	Renumbered.
1915.59, 1916.59, 1917.59	1915.6	Moved to Subpart A.
1915.61, 1916.61, 1917.61	1915.111	Renumbering of section reference.
1915.62, 1916.62, 1917.62	1915.112	Renumbering of section references.
1915.63, 1916.63, 1917.63	1915.113	Renumbering of section reference.
1915.64, 1916.64, 1917.64	1915.114	Renumbered.
1915.65, 1916.65, 1917.65	1915.115	Editorial changes.
1915.66, 1916.66, 1917.66	1915.116	Scope and application language added.
1915.67, 1916.67, 1917.67	1915.117	Renumbered.
1915.68, 1916.68, 1917.68	1915.118	Renumbered.
1915.71, 1916.71, 1917.71	1915.131	Renumbered.
1915.72, 1916.72, 1917.72	1915.132	Language added to paragraph (e) to show application of this paragraph to ship repairing operations only.
1915.73, 1916.73, 1917.73	1915.133	Renumbered.
1915.74, 1916.74, 1917.74	1915.134	Renumbered.
1915.75, 1916.75	1915.135	Scope and application language added. Renumbering of section reference.
1915.76, 1916.76, 1917.76	1915.136	Renumbered.
1915.81, 1916.81, 1917.81	1915.151	Renumbering of section references.
1915.82, 1916.82, 1917.82	1915.152	Reference to U.S. Bureau of Mines in paragraph (a)(1) changed to refer to Mine Safety and Health Administration and National Institute for Occupational Safety and Health.
1915.83, 1916.83, 1917.83	1915.153	Renumbered.
1915.84, 1916.84, 1917.84	1915.154	Renumbered.
1915.91, 1916.91	1915.162	Renumbered.
1915.92, 1916.92	1915.163	Renumbered.
1915.93, 1916.93	1915.164	Renumbered.
1915.94, 1916.94	1915.165	Renumbered.
1915.101, 1916.101	1915.172	Renumbered.
1915.102, 1916.102	1915.173	No changes.
1915.111, 1916.111	1915.181	Scope and application language added.

The standards on ship repairing, shipbuilding, and shipbreaking were originally promulgated under the authority of section 41 of the Longshoremen's and Harbor Workers' Compensation Act (LHWCA), as 29 CFR Parts 1501, 1502, and 1503, respectively. The substantive provisions of these Parts were subsequently adopted as established Federal standards in 1971 under section 6(a) of the Occupational Safety and Health Act. As was noted at that time, and as set forth in §§ 1910.13, 1910.14, and 1910.15, the adoption of these standards as OSHA standards did not incorporate those provisions which dealt with application or interpretation of the LHWCA. Several such provisions have continued to be published in Parts 1915 through 1917, but their relevance is limited to LHWCA, and they are not governing under OSHA. The consolidation of the shipyard standards which is being accomplished today does not affect this coverage.

Regulatory Impact Assessment

OSHA finds that this action consists solely of the consolidation of existing standards and other minor changes which do not alter or add to the requirements presently applicable to employers engaged in shipyard activities. As already noted, this action will result in many benefits such as the elimination of duplicative provisions, reduction in the amount of regulatory text, the organization of related standards within one comprehensive part and the increased usability of the standards involved. At the same time, this action will not result in any increased costs or burdens for employers since the present substantive requirements are not being altered.

OSHA therefore finds that this is not a major rule which requires preparation of a regulatory impact analysis pursuant to Executive Order No. 12291. For the same reasons, OSHA further certifies that this action will not have a significant economic impact on a substantial number of small entities and, therefore, there is no need to prepare a regulatory flexibility analysis pursuant to the Regulatory Flexibility Act (Pub. L. 96–354, 94 Stat. 1164 (5 U.S.C. 601 *et seq.*)). OSHA will, of course, perform these analyses in conjunction with any ensuing project to substantively revise the shipyard standards if circumstances so require.

Exemption From Notice and Comment Procedures

With regard to this action, OSHA has determined that it is not required to follow procedures for public notice and comment rulemaking under either 4 of the Administrative Procedure Act (5 U.S.C. 553) or under section 6(b) of the Occupational Safety and Health Act (29 U.S.C. 655(b)). This action involves a reorganization and consolidation of existing standards and other minor changes which do not affect the substantive requirements or coverage of the standards themselves. This action does not modify or revoke existing rights or obligations nor does it establish new ones. OSHA, therefore, finds that notice and public procedure are impracticable and unnecessary within the meaning of 5 U.S.C. 553(b)(3)(B). For the same reasons, OSHA also finds that in accordance with 29 CFR 1911.5, good cause exists for dispensing with the public notice and comment procedures prescribed in section 6(b) of the Occupational Safety and Health Act.

Authority

This document was prepared under the direction of Thorne G. Auchter, Assistance Secretary for Occupational Safety and Health, U.S. Department of Labor, 200 Constitution Avenue, NW., Washington, D.C. 20210.

List of Subjects in 29 CFR Part 1915

Electric power, Explosives, Flammable materials, Footwear, Hazardous materials, Ladders and scaffolds, Machinery, Marine safety, Occupational safety and health, Protective equipment, Respiratory protection, Ship repair, Shipbreaking, Shipbuilding, Tools, Vessels, Welding.

Accordingly, pursuant to section 41 of the Longshoremen's and Harbor Workers' Compensation Act, as amended (72 Stat. 835; 33 U.S.C. 941), sections 6 and 8 of the Occupational Safety and Health Act of 1970 (84 Stat. 1593, 1598; 29 U.S.C. 655, 657), 5 U.S.C. 553, 29 CFR Part 1911 and Secretary of Labor's Order No. 8–76 (41 FR 25059), Parts 1916 and 1917 of Title 29, Code of Federal Regulations, are hereby removed, and Part 1915 is revised to read as set forth below.

Signed at Washington, D.C., this 9th day of April 1982.

Thorne G. Auchter,

Assistant Secretary of Labor.

PART 1915—OCCUPATIONAL SAFETY AND HEALTH STANDARDS FOR SHIPYARD EMPLOYMENT

Subpart A—General Provisions

Sec.

Subpart B—Explosive and Other Dangerous Atmospheres

Subpart C—Surface Preparation and Preservation

Subpart D—Welding, Cutting and Heating

Subpart E—Scaffolds, Ladders and Other Working Surfaces

Subpart F—General Working Conditions

Authority: Sec. 41, 44 Stat. 1444; sec. 1, 72 Stat. 835; 33 U.S.C. 941; secs. 6 and 8, 84 Stat. 1593, 1599, 1600; 29 U.S.C. 655, 657.

Subpart A—General Provisions

§ 1915.1 Purpose and authority.

The provisions in this part constitute safety and health regulations issued by the Secretary pursuant to section 41 of the Longshoremen's and Harbor Workers' Compensation Act, as amended (33 U.S.C. 941) and occupational safety and health standards issued by the Secretary pursuant to section 6 of the Occupational Safety and Health Act of 1970 (29 U.S.C. 655).

§ 1915.2 Scope and application.

(a) Except where otherwise provided, the provisions of this part shall apply to all ship repairing, shipbuilding and shipbreaking employments and related employments.

(b) This part does not apply to matters under the control of the United States Coast Guard within the scope of Title 52 of the Revised Statutes and acts supplementary or amendatory thereto (46 U.S.C. secs. 1–1388 passim) including, but not restricted to, the master, ship's officer, crew members, design, construction and maintenance of the vessel, its gear and equipment; to matters within the regulatory authority of the United States Coast Guard to safeguard vessels, harbors, ports and waterfront facilities under the provisions of the Espionage Act of June 17, 1917, as amended (50 U.S.C. 191 et seq.; 22 U.S.C. 401 et seq.); including the provisions of Executive Order 10173, as amended by Executive Orders 10277 and 10352 (3 CFR, 1949–1953 Comp., pp. 356, 778 and 873); or to matters within the regulatory authority of the United States Coast Guard with respect to lights, warning devices, safety equipment and other matters relating to the promotion of safety of lives and property under section 4(e) of the Outer Continental Shelf Lands Act (43 U.S.C. 1333).

§ 1915.3 Responsibility.

(a) The responsibility for compliance with the regulations of this part is placed upon "employers" as defined in § 1915.4.

(b) This part does not apply to owners, operators, agents or masters of vessels unless such persons are acting as "employers." However, this part is not intended to relieve owners, operators, agents or masters of vessels who are not "employers" from responsibilities or duties now placed upon them by law, regulation or custom.

(c) The responsibilities placed upon the competent person herein shall be deemed to be the responsibilities of the employer.

§ 1915.4 Definitions.

(a) The term "shall" indicates provisions which are mandatory.

(b) The term "Secretary" means the Secretary of Labor.

(c) The term "employer" means an employer, any of whose employees are employed, in whole or in part, in ship repairing, shipbuilding, shipbreaking or related employments as defined in this section on the navigable waters of the United States, including dry docks, graving docks and marine railways.

(d) The term "employee" means any person engaged in ship repairing, shipbuilding, shipbreaking or related employments on the navigable waters of the United States, including dry docks, graving docks and marine railways, other than the master, ship's officers, crew of the vessel, or any person engaged by the master to repair any vessel under 18 net tons.

(e) The term "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.

(f) The term "vessel" includes every description of watercraft or other artificial contrivance used, or capable of being used, as a means of transportation on water, including special purpose floating structures not primarily designed for or used as a means of transportation on water.

(g) For purposes of § 1915.74, the term "barge" means an unpowered, flat bottom, shallow draft vessel including scows, carfloats and lighters. For purposes of this section, the term does not include ship shaped or deep draft barges.

(h) For purposes of § 1915.74, the term "river tow boat" means a shallow draft, low free board, self-propelled vessel designed to tow river barges by pushing ahead. For purposes of this section, the term does not include other towing vessels.

(i) The term "shipyard employment" means ship repairing, shipbuilding, shipbreaking and related employments.

(j) The terms "ship repair" and "ship repairing" mean any repair of a vessel including, but not restricted to, alterations, conversions, installations, cleaning, painting, and maintenance work.

(k) The term "shipbuilding" means the construction of a vessel including the installation of machinery and equipment.

(l) The term "shipbreaking" means any breaking down of a vessel's structure for the purpose of scrapping the vessel, including the removal of gear, equipment or any component part of a vessel.

(m) The term "related employment" means any employment performed as an incident to or in conjunction with ship repairing, shipbuilding or shipbreaking work, including, but not restricted to, inspection, testing, and employment as a watchman.

(n) The term "hazardous substance" means a substance which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritant, or otherwise harmful is likely to cause injury.

(o) The term "competent person" for purposes of this part means a person who is capable of recognizing and evaluating employee exposure to hazardous substances or to other unsafe conditions and is capable of specifying

the necessary protection and precautions to be taken to ensure the safety of employees as required by the particular regulation under the condition to which it applies. For the purposes of Subparts B, C, and D of this part, except for § 1915.35(b)(8) and § 1915.36(a)(5), to which the above definition applies, the competent person must also meet the additional requirements of § 1915.7.

(p) The term "confined space" means a compartment of small size and limited access such as a double bottom tank, cofferdam, or other space which by its small size and confined nature can readily create or aggravate a hazardous exposure.

(q) The term "enclosed space" means any space, other than a confined space, which is enclosed by bulkheads and overhead. It includes cargo holds, tanks, quarters, and machinery and boiler spaces.

(r) The term "hot work" means riveting, welding, burning or other fire or spark producing operations.

(s) The term "cold work" means any work which does not involve riveting, welding, burning or other fire or spark producing operations.

(t) The term "portable unfired pressure vessel" means any pressure container or vessel used aboard ship, other than the ship's equipment, containing liquids or gases under pressure, excepting pressure vessels built to ICC regulations under 49 CFR Part 178, Subparts C and H.

(u) The term "powder actuated fastening tool" means a tool or machine which drives a stud, pin, or fastener by means of an explosive charge.

(v) For purposes of § 1915.97, the term "hazardous material" means a material which has one or more of the following characteristics: (1) Has a flash point below 140° F., closed cup, or is subject to spontaneous heating; (2) has a threshold limit value below 500 p.p.m. in the case of a gas or vapor, below 500 mg./m.^{3} for fumes, and below 25 m.p.p.c.f. in case of a dust; (3) has a single dose oral LD_{50} below 500 mg./kg.; (4) is subject to polymerization with the release of large amounts of energy; (5) is a strong oxidizing or reducing agent; (6) causes first degree burns to skin in short time exposure, or is systemically toxic by skin contact; or (7) in the course of normal operations, may produce dusts, gases, fumes, vapors, mists, or smokes which have one or more of the above characteristics.

§ 1915.5 Reference specifications, standards and codes.

Specifications, standards, and codes of agencies of the U.S. Government, to the extent specified in the text, form a part of the regulations of this part. In addition, under the authority vested in the Secretary under the Act, the specifications, standards, and codes of organizations which are not agencies of the U.S. Government, in effect on the date of the promulgation of the regulations of this part as listed below, to the extent specified in the text, form a part of the regulations of this part:

National Fire Protection Association, 60 Batterymarch Park, Quincy, Massachusetts 02269. Subpart B, § 1915.14(a).

Underwriter's Laboratories, Inc., 207 East Ohio Street, Chicago, Illinois 60611, Subpart B, § 1915.13(b) and (f); Subpart C, §§ 1915.35(b)(7), 1915.36(a)(4); Subpart H, § 1915.132(a).

American National Standards Institute Safety Code for Portable Wood Ladders, A14.1–1959, American National Standards Institute, 10 East 40th Street, New York, New York 10016, Subpart E, § 1915.72(a)(6).

American National Standards Institute Safety Code for Portable Metal Ladders, A14.2–1956, American National Standards Institute, 10 East 40th Street, New York, New York 10016, Subpart E, § 1915.72(a)(4).

American National Standards Institute Safety Code for Head, Eye, and Respiratory Protection, Z2.1–1959, American National Standards Institute, 10 East 40th Street, New York, New York 10016, Subpart I, §§ 1915.151(a)(1), 1915.153(b).

American Society of Mechanical Engineers, Boiler and Pressure Vessel Code, Section VIII, Rules for Construction of Unfired Pressure Vessels, 1963, American Society of Mechanical Engineers, 345 East 47th Street, New York, New York 10017, Subpart K, § 1915.172(a).

Threshold Limit Values, 1970, American Conference of Governmental Industrial Hygienists, 1014 Broadway, Cincinnati, Ohio 45202, Subpart B, § 1915.12(a)(3) and (b)(3); Subpart C, § 1915.32(b).

American National Standards Institute Safety Code for the Use, Care, and Protection of Abrasive Wheels, B7.1–1964, United States of America Standards Institute, Inc., 10 East 40th Street, New York, New York 10016, Subpart H, § 1915.134(c).

§ 1915.6 Commerical diving operations.

Commerical diving operations shall be subject to Subpart T of Part 1910, §§ 1910.401–1910.441 of this chapter.

§ 1915.7 Competent person.

(a) *Designation.* (1) For the purposes of Subparts B, C, D, and H of this part, except for §§ 1915.35(b)(8) and 1915.36(a)(5), one or more competent persons shall be designated by the employer in accordance with the applicable requirements of this section unless the requirements of Subparts B, C, D, and H of this part are always carried out by a National Fire Protection Association Certified Marine Chemist.

(2) The employer shall indicate on U.S. Department of Labor Form OSHA 73 "Designation of Competent Person" either those employees designated as competent persons or that the prescribed functions of such persons are always carried out by a National Fire Protection Association Certified Marine Chemist in addition to his professional duties. When additions or changes are made in the personnel so designated, a new Form OSHA 73 shall be executed. A copy of this executed form shall be forwarded to the nearest Area Office of the Occupational Safety and Health Administration.

(b) *Criteria.* The following criteria shall guide the employer in designating employees as competent persons:

(1) Ability to understand the meaning of designations on certificates and of any qualifications relating thereto and to carry out any instructions, either written or oral, left by the National Fire Protection Association Certified Marine Chemist or person authorized by the U.S. Coast Guard referred to in § 1915.14.

(2) Ability to use and interpret the readings of an oxygen indicator and a combustible gas indicator. The ability to use and interpret the readings of a carbon monoxide indicator and a carbon dioxide indicator, if the operations involved such hazardous gases.

(3) Familiarity with and understanding of Subparts B, C, D, and H of this part.

(4) Familiarity with the structure and knowledge of the location and designation of spaces of the types of vessels on which repair work is done.

(5) Capability to perform the tests and inspections required by Subparts B, C, D, and H of this part and to write the required logs.

(c) *Logging of inspections and tests.* (1) When tests and inspections required to be performed by a competent person by any provisions of Subparts B, C, D, and H of this part, except those referred to in §§ 1915.35(b)(8) and 1915.36(a)(5) are made, a record of the locations, operations performed and date, time, and results of the tests and any instructions resulting therefrom shall be recorded on U.S. Department of Labor Form OSHA 74, "Log of Inspections and Tests by Competent Person." A separate form shall be used for each vessel on which tests and inspections are made.

(2) This record shall be available for inspection in the immediate vicinity of the affected operations while they are in progress. This record or copy thereof shall be kept on file for a period of at least three months from the date of the completion of the job.

(3) A copy of any certificate issued in accordance with § 1915.14 and of any instructions issued by the National Fire Protection Association Certified Marine

Chemist shall be kept on file with the log for a period of at least three months from the date of the completion of the job. The certificate and instructions issued by the person doing the fumigation referred to in § 1915.12(b)(1)(ii) shall also be kept on file for a period of at least 3 months from the date of the completion of the job.

(d) *Application.* The provisions of this section are intended to apply in their entirety to employers engaged in general ship repair, shipbuilding and shipbreaking. They do not apply in their entirety to employers whose work involves only certain portions of Subparts B, C, or D of this part, such as repair work on small craft in boat yards where only combustible gas indicator tests are necessary for fuel tank leaks or when using flammable paints below decks, the building of some wooden vessels where only knowledge of the precautions to be taken when using flammable paints is necessary and the breaking of vessels with no exposure to fuel oil or other flammable hazards. In such cases, employers may designate persons who are competent on the basis of the applicable portions of the criteria set forth in paragraph (b) of this section.

Subpart B—Explosive and Other Dangerous-Atmospheres

§ 1915.11 Scope and application of subpart.

Sections 1915.12 through 1915.15 of this subpart shall apply to ship repairing and shipbreaking and shall not apply to shipbuilding. Section 1915.16 shall apply only to ship repairing.

§ 1915.12 Precautions before entering.

(a) *Flammable atmospheres and residues.* (1) Before employees are initially permitted to enter any of the ship's spaces designated in paragraphs (a)(1) (i) and (ii) of this section, the atmosphere within the space to be entered shall be tested by a competent person to determine the concentration of flammable vapors or gases within the space.

(i) Cargo spaces or other spaces containing or having last contained combustible or flammable liquids or gases in bulk.

(ii) Spaces immediately adjacent to those described in paragraph (a)(1)(i) of this section.

(2) If the tests indicate that the atmosphere in the space to be entered contains a concentration of flammable vapor or gas greater than 10 percent of the lower explosive limit, the space shall be ventilated to reduce the concentration below 10 percent of the lower explosive limit before men are permitted to enter.

(3) If the atmosphere in the space to be entered is found to contain a concentration of flammable vapor or gas below the level immediately dangerous to life as defined in § 1915.152(b)(1), but above the threshold limit value, employees shall be protected in accordance with the requirements of § 1915.152 (a), and (c), (d), or (e), whichever is applicable.

(b) *Toxic atmospheres and residues.* (1) Before employees are initially permitted to enter any of the ship's spaces designated in paragraphs (b)(1)(i), (ii), and (iii) of this section, the atmosphere in the space to be entered shall be tested for toxic atmospheric contaminants, and the space inspected for the presence of toxic or corrosive residues by a Marine Chemist, Industrial Hygienist or other person qualified to make these tests and inspections.

(i) Cargo spaces or other spaces containing or having last contained bulk liquids, gases, or solids of a toxic, corrosive, or irritant nature.

(ii) Spaces which have been fumigated.

(iii) Spaces immediately adjacent to those described in paragraphs (b)(1)(i) and (ii) of this section.

(2) If the tests indicate that the atmosphere in the space to be entered contains a concentration of toxic contaminants above the level which is immediately dangerous to life, the space shall be ventilated to reduce the concentration below the level immediately dangerous to life as defined in § 1915.152(b)(1).

(3) If the atmosphere in the space to be entered is found to contain a concentration of toxic contaminants below the level immediately dangerous to life as defined in § 1915.152(b)(1), but above the threshold limit value, employees shall be protected in accordance with the requirements of § 1915.152 (a), and (c), (d), or (e), whichever is applicable.

(4) The person qualified to make the tests and inspections referred to in paragraph (b)(1) of this section shall make a record of the tests, inspections and instructions pertaining to paragraph (a)(3) of this section and paragraphs (b)(2) and (b)(3) of this section on U.S. Department of Labor Form OSHA 74, which shall be available for inspection and kept on file in accordance with § 1915.7(c)(2).

(c) *Oxygen deficient atmospheres.* (1) Before employees are initially permitted to enter any of the ship's spaces designated in paragraphs (c)(1)(i) through (v) of this section, the atmosphere in the spaces to be entered shall be tested by a competent person with an oxygen indicator or other suitable device to ensure that it contains at least 16.5 percent oxygen.

(i) Spaces in which the test required by paragraphs (a) and (b) of this section indicate that no flammable or toxic contaminants are present in the atmosphere.

(ii) Compartments which have been sealed.

(iii) Spaces which have been coated and closed up.

(iv) Nonventilated compartments which have been freshly painted.

(v) Cargo spaces containing cargoes or residues of cargoes which absorb oxygen, such as scrap iron, fresh fruit and molasses, and various vegetable drying oils in bulk.

(2) If the tests indicate that the atmosphere in the space to be entered contains less than 16.5 percent oxygen, the space shall be ventilated until tests indicate an oxygen content above this level.

(d) *Exceptions.* In emergencies and in cases of work of brief duration necessary to accomplish the ventilation required or to start operations, work may be performed in atmospheres containing concentrations of flammable contaminants above the upper explosive limit or otherwise immediately dangerous to life, provided employees are protected in accordance with the requirements of § 1915.152 (a) and (b).

§ 1915.13 Cleaning and other cold work.

(a) Employees shall be permitted to perform manual cleaning to remove residue materials, scale, and debris or to perform other cold work in spaces described in § 1915.12(a)(1) (i) and (ii) and (b)(1)(i) through (iii) before they have been certified as gas free only under the following conditions:

(1) Liquid residues of flammable and toxic materials shall be removed from the spaces as thoroughly as practicable before employees start actual cleaning operations in these spaces. Drippings and spills of these materials on deck or elsewhere alongside the vessel shall be cleaned up as the work progresses. Special care shall be taken to prevent the spilling or the draining of these materials into the water surrounding the vessel.

(2) Continuous natural or mechanical ventilation shall be provided to keep the concentration of flammable vapors below ten (10) percent of the lower explosive limit in all parts of the space: *Provided,* That if, because of the high volatility of the residues, a uniform concentration of less than ten (10) percent of the lower explosive limit

cannot be achieved, sufficient exhaust ventilation shall be provided to reduce the concentration to or below that level in the major portions of the compartment.

(3) Tests shall be made by a competent person prior to commencement of cold work and with sufficient frequency thereafter, in accordance with temperature, volatility of the residues and other existing conditions in and about the spaces, to ensure that the concentration stated in paragraph (a)(2) of this section is not exceeded.

(4) Cold work only shall be permitted.

(5) Tests shall be made by a competent person to ensure that the exhaust vapors from these spaces are not accumulating in other areas within or around the vessel, marine railway, drydock, graving dock, or under the pier where sources of ignition may be present. Should such accumulations be found, any sources of ignition within the affected area shall be removed or extinguished.

(b) Only approved explosion-proof, self-contained, battery-fed, portable lamps shall be used in spaces described in paragraph (a) of § 1915.14 before the spaces have been certified as "Safe for Men." Battery-fed, portable lamps bearing the approval of the Underwriters' Laboratories for use in Class I, Group D atmospheres, or approved as permissible by the Mine Safety and Health Administration, and such lamps listed by the U.S. Coast Guard as approved for such use are deemed to meet the requirements of this paragraph.

(c) Signs shall be posted on the open deck adjacent to the access to spaces described in paragraph (a) of § 1915.14 prohibiting smoking and the use of open flames.

(d) The metallic parts of air moving devices, including fans, blowers, and jet-type air movers, and all duct work shall be electrically bonded to the vessel's structure.

(e) All motors and control equipment shall be of the explosion-proof type. Fans shall have nonferrous blades. Portable air ducts shall also be of nonferrous materials. All motors and associated control equipment shall be properly maintained and grounded.

(f) In spaces described in paragraph (a) of § 1915.14 which have been certified "Safe for Men," either battery lamps or explosion-proof lights, approved by the Underwriters' Laboratories for use in Class I, Group D atmospheres, or approved as permissible by the Mine Safety and Health Administration or the U.S. Coast Guard, shall be used: *Provided,* The lights are mounted to the space openings from the exterior, or suspended within the space with the cables so led as to protect them from injury.

(g) In spaces certified "Safe for Fire" nonexplosion proof lights may be used.

§ 1915.14 Certification before hot work is begun.

Paragraphs (a) through (c) of this section apply to ship repairing and shipbreaking. Paragraph (d) of this section applies to shipbreaking only.

(a) Employees shall not be permitted to engage in hot work or the use of powder actuated fastening tools in or on the following spaces, boundaries or pipe lines until a certificate setting forth that the hot work can be done in safety is issued. Such certificate shall be acceptable only if issued by a Marine Chemist certificated by the National Fire Protection Association, except that a certificate issued by another person authorized by the U.S. Coast Guard pursuant to the provisions of 46 CFR 35.01–1(c)(1) for tank vessels, 46 CFR 71.60–1(c)(1) for passenger vessels, and 46 CFR 91.50–1(c)(1) for cargo and miscellaneous vessels is acceptable for a particular inspection:

(1) *On tank vessels.* (i) Within or on the boundaries of cargo tanks which have been used to carry combustible or flammable liquids and gases in bulk, or within spaces adjacent to such cargo tanks.

(ii) Within or on the boundaries of fuel tanks.

(iii) On pipe lines, heating coils, pumps, fittings, or other appurtenances connected to such cargo or fuel tanks.

(2) *On dry cargo, miscellaneous and passenger vessels.* (i) Within or on the boundaries of cargo tanks which have been used to carry combustible or flammable liquids and gases in bulk.

(ii) Within spaces adjacent to cargo tanks which have been used to carry flammable gases, or liquids with a flash point below 150° F., except where the distance between such cargo tanks and the work to be performed is not less than twenty-five (25) feet.

(iii) Within or on the boundaries of fuel tanks.

(iv) On pipe lines, heating coils, pumps, fittings, or other appurtenances connected to such cargo or fuel tanks.

(b) In dry cargo holds for which a Marine Chemist's certificate is not required by paragraph (a)(2)(ii) of this section, hot work may be performed only after a competent person has carefully examined the hold and found it to be free of flammable liquids, gases, and vapors. If flammable liquids, gases, or vapors are found, hot work shall not be performed within the space until the flammable liquids, gases, or vapors have been removed and a test indicates that the space is safe for fire.

(c) Before hot work is performed in engine room and boiler room spaces of any vessel for which a Marine Chemist's certificate is not required by the provision of paragraph (a) of this section or in fuel tank and engine compartments of boats, the bilges shall be inspected and tested by a competent person to ensure that they are free of flammable liquids, gases, and vapors. If flammable liquids, gases, or vapors are found, hot work shall not be performed within the space until the flammable liquids, gases, or vapors have been removed and a test indicates that the space is safe for fire.

(d) Before hot work is performed from open decks or in tanks or compartments from which the overhead has been completely removed, on the boundaries of cargo spaces or other spaces containing or having last contained combustible or flammable liquids or gases in bulk, the following steps shall be taken:

(1) Tests shall be made by a competent person to determine the concentration of flammable vapors in these spaces. The permissible level of concentration of flammable vapors shall not exceed ten (10) percent of the lower explosive limit in all parts of the spaces.

(2) When the tests indicate that a space contains a concentration of flammable vapors above the permissible concentration, the space shall be inerted with a nonflammable gas or with water, or sufficient ventilation shall be provided to reduce the concentration below the permissible level.

(3) When the bottom of a space contains flammable residues, it shall be flooded with water to cover all parts of the space to a depth of at least one (1) foot unless the space is inerted.

§ 1915.15 Maintaining gas free conditions.

Paragraph (a) of this section applies to ship repair only. Paragraph (b) of this section applies to shipbreaking only.

(a) *Requirements applicable to ship repairing only.* (1) Pipe lines which may convey hazardous substances into the spaces certified "Safe For Men—Safe For Fire" shall be disconnected or blanked off, or other positive means shall be used to prevent discharge of hazardous substances from entering the space. Manholes and other closures which were secured when tests were made shall remain secured. If such manholes or other closures are opened or any manipulation of valves takes place which tends to alter existing conditions, work in the affected spaces or areas shall be stopped and not

resumed until such times as the areas have been retested and again certified "Safe For Men—Safe For Fire" in accordance with the requirements of § 1915.14(a).

(2) Before hot work is commenced on the weather deck over spaces which, under these regulations, are not required to be gas freed or inerted, all valves, closures and vents, except those which are vented up masts, connecting with nongas free tanks or compartments below, shall be closed. Valves, closures and vents shall not be opened until hot work is completed unless the hot work is stopped and the work location posted as unsafe for fire. The latter notice shall not be removed nor hot work resumed until the area is again made safe.

(3) The employer shall inform masters and chief engineers of vessels of the provisions of this section and shall confirm that they are aware of their responsibilities for seeing that their crews understand and obey all warning signs, tags, and the limitations stated on the marine chemist's certificates.

(4) When conditions in a tank are such that there is a possibility of hazardous vapor being released from residues or other sources after a marine chemist's certificate has been issued, a competent person shall make tests to insure that the gas-free condition is maintained irrespective of whether hot work is being performed in the tank. When the competent person finds that atmospheric conditions have altered, work shall be stopped and a new marine chemist's certificate in accordance with the requirements of § 1915.14(a) shall be obtained before work is resumed.

(5) Before hot work is begun on any metal covered with preservative coatings, the requirements of § 1915.53 shall be met.

(b) *Requirements applicable to shipbreaking only.* (1) During the performance of hot work from open decks or in tanks or compartments from which the overhead has been completely removed, on the boundaries of spaces described in § 1915.14(d), other than those filled with water, the competent person shall make frequent tests to ensure that the inert atmosphere is being maintained or that the concentration of flammable vapors remains below ten (10) percent of the lower explosive limit.

(2) When conditions in spaces below decks described in § 1915.14(a)(1) and (2) are such that there is a possibility of hazardous vapors being released from residues or other sources, after a Marine Chemist's certificate has been issued, a competent person shall make tests to ensure that the gas free condition is maintained irrespective of whether hot work is being performed in or on the aforementioned spaces. When the competent person finds that the atmospheric conditions have altered, work shall be stopped and a new Marine Chemist's certificate in accordance with § 1915.14(a)(1) and (2) shall be obtained, before work is resumed.

§ 1915.16 Warning signs.

The provisions of this section apply to ship repairing only.

(a) Except as provided in paragraph (c) of this section, all tanks, compartments, or spaces which have been certified "Safe For Men—Not Safe For Fire," or "Not Safe For Men—Not Safe For Fire" shall be plainly and conspicuously marked with paint or signs indicating that no hot work shall be performed on such tanks, compartments, or spaces or in the vicinity thereof.

(b) Except as provided in paragraph (c) of this section, all tanks, compartments or spaces which have been inerted with gas or certified "Not Safe For Men—Safe For Fire" shall be plainly and conspicuously marked with paint or signs indicating that the tank, compartment or space contains a gas which will not support life or is hazardous to employees.

(c) The warning marks or signs required by paragraphs (a) and (b) of this section need not be posted on individual tanks, compartments or spaces if the entire vessel has been certified "Safe For Men—Not Safe For Fire," "Not Safe For Men—Not Safe For Fire," or if the entire vessel has been inerted or certified "Not Safe For Men—Safe For Fire," and if a sign to this effect is conspicuously posted at the gangway and at all other means of access to the vessel.

Subpart C—Surface Preparation and Preservation

§ 1915.31 Scope and application of subpart.

The standards contained in this subpart shall apply to ship repairing and shipbuilding and shall not apply to shipbreaking.

§ 1915.32 Toxic cleaning solvents.

(a) When toxic solvents are used, the employer shall employ one or more of the following measures to safeguard the health of employees exposed to these solvents.

(1) The cleaning operation shall be completely enclosed to prevent the escape of vapor into the working space.

(2) Either natural ventilation or mechanical exhaust ventilation shall be used to remove the vapor at the source and to dilute the concentration of vapors in the working space to a concentration which is safe for the entire work period.

(3) Employees shall be protected against toxic vapors by suitable respiratory protective equipment in accordance with the requirements of § 1915.152 (a) and (c), and, where necessary, against exposure of skin and eyes to contact with toxic solvents and their vapors by suitable clothing and equipment.

(b) The principles in the threshold limit values to which attention is directed in § 1915.4 will be used by the Department of Labor in enforcement proceedings in defining a safe concentration of air contaminants.

(c) When flammable solvents are used, precautions shall be taken in accordance with the requirements of § 1915.36.

§ 1915.33 Chemical paint and preservative removers.

(a) Employees shall be protected against skin contact during the handling and application of chemical paint and preservative removers and shall be protected against eye injury by goggles or face shields in accordance with the requirements of § 1915.151 (a) and (b).

(b) When using flammable paint and preservative removers, precautions shall be taken in accordance with the requirements of § 1915.36.

(c) When using chemical paint and preservative removers which contain volatile and toxic solvents, such as benzol, acetone and amyl acetate, the provisions of § 1915.32 shall be applicable.

(d) When using paint and rust removers containing strong acids or alkalies, employees shall be protected by suitable face shields to prevent chemical burns on the face and neck.

(e) When steam guns are used, all employees working within range of the blast shall be protected by suitable face shields. Metal parts of the steam gun itself shall be insulated to protect the operator against heat burns.

§ 1915.34 Mechanical paint removers.

(a) *Power tools.* (1) Employees engaged in the removal of paints, preservatives, rusts or other coatings by means of power tools shall be protected against eye injury by goggles or face shields in accordance with the requirements of § 1915.151(a).

(2) All portable rotating tools used for the removal of paints, preservatives, rusts or other coatings shall be adequately guarded to protect both the operator and nearby workers from flying missiles.

(3) Portable electric tools shall be grounded in accordance with the requirements of § 1915.132.

(4) In a confined space, mechanical exhaust ventilation sufficient to keep the dust concentration to a minimum shall be used, or employees shall be protected by respiratory protective equipment in accordance with the requirements of § 1915.152 (a) and (d).

(b) *Flame removal.* (1) Hardened preservative coatings shall not be removed by flame in enclosed spaces unless the employees exposed to fumes are protected by air line respirators in accordance with the requirements of § 1915.152(a). Employees performing such an operation in the open air, and those exposed to the resulting fumes, shall be protected by a fume filter type respirator in accordance with requirements of paragraphs (a) and (d)(2)(iv) of § 1915.152.

(2) Flame or heat shall not be used to remove soft and greasy preservative coatings.

(c) *Abrasive blasting*—(1) *Equipment.* Hoses and fittings used for abrasive blasting shall meet the following requirements:

(i) *Hoses.* Hose of a type to prevent shocks from static electricity shall be used.

(ii) *Hose couplings.* Hose lengths shall be joined by metal couplings secured to the outside of the hose to avoid erosion and weakening of the couplings.

(iii) *Nozzles.* Nozzles shall be attached to the hose by fittings that will prevent the nozzle from unintentionally becoming disengaged. Nozzle attachments shall be of metal and shall fit onto the hose externally.

(iv) *Dead man control.* A dead man control device shall be provided at the nozzle end of the blasting hose either to provide direct cutoff or to signal the pot tender by means of a visual and audible signal to cut off the flow, in the event the blaster loses control of the hose. The pot tender shall be available at all times to respond immediately to the signal.

(2) *Replacement.* Hoses and all fittings used for abrasive blasting shall be inspected frequently to insure timely replacement before an unsafe amount of wear has occurred.

(3) *Personal protective equipment.* (i) Abrasive blasters working in enclosed spaces shall be protected by hoods and air fed respirators or by air helmets of a positive pressure type in accordance with the requirements of § 1915.152(a).

(ii) Abrasive blasters working in the open shall be protected as indicated in paragraph (c)(3)(i) of this section except that when synthetic abrasives containing less than one percent free silica are used jointly, filter type respirators approved jointly by the National Institute for Occupational Safety and Health and the Mine Safety and Health Administration for exposure to lead dusts may be used in accordance with § 1915.152(a) and (d).

(iii) Employees, other than blasters, including machine tenders and abrasive recovery men, working in areas where unsafe concentrations of abrasive materials and dusts are present shall be protected by eye and respiratory protective equipment in accordance with the requirements of §§ 1915.151(a) and (b) and 1915.152(a) and (d).

(iv) The blaster shall be protected against injury from exposure to the blast by appropriate protective clothing, including gloves.

(v) Since surges from drops in pressure in the hose line can be of sufficient proportions to throw the blaster off the staging, the blaster shall be protected by a safety belt when blasting is being done from elevations where adequate protection against falling cannot be provided by railings.

§ 1915.35 Painting.

(a) *Paints mixed with toxic vehicles or solvents.* (1) When paints mixed with toxic vehicles or solvents are sprayed, the following conditions shall apply:

(i) In confined spaces, employees continuously exposed to such spraying shall be protected by air line respirators in accordance with the requirements of § 1915.152(a).

(ii) In tanks or compartments, employees continuously exposed to such spraying shall be protected by air line respirators in accordance with the requirements of § 1915.152(a). Where mechanical ventilation is provided, employees shall be protected by respirators in accordance with the requirements of §§ 1915.152(a) and (e).

(iii) In large and well ventilated areas, employees exposed to such spraying shall be protected by respirators in accordance with the requirements of §§ 1915.152(a) and (e).

(2) Where brush application of paints with toxic solvents is done in confined spaces, or other areas where lack of ventilation creates a hazard, employees shall be protected by filter respirators in accordance with the requirements of §§ 1915.152(a) and (c).

(3) When flammable paints or vehicles are used, precautions shall be taken in accordance with the requirements of § 1915.36.

(4) The metallic parts of air moving devices, including fans, blowers, and jet-type air movers, and all duct work shall be electrically bonded to the vessel's structure.

(b) *Paints and tank coatings dissolved in highly volatile, toxic and flammable solvents.* Several organic coatings, adhesives and resins are dissolved in highly toxic, flammable and explosive solvents with flash points below 80° F. Work involving such materials shall be done only when all of the following special precautions have been taken:

(1) Sufficient exhaust ventilation shall be provided to keep the concentration of solvent vapors below ten (10) percent of the lower explosive limit. Frequent tests shall be made by a competent person to ascertain the concentration.

(2) If the ventilation fails or if the concentration of solvent vapors rises above ten (10) percent of the lower explosive limit, painting shall be stopped and the compartment shall be evacuated until the concentration again falls below ten (10) percent of the lower explosive limit. If the concentration does not fall when painting is stopped, additional ventilation to bring the concentration down to ten (10) percent of the lower explosive limit shall be provided.

(3) Ventilation shall be continued after the completion of painting until the space or compartment is gas free. The final determination as to whether the space or compartment is gas free shall be made after the ventilating equipment has been shut off for at least 10 minutes.

(4) Exhaust ducts shall discharge clear of working areas and away from sources of possible ignition. Periodic tests shall be made to ensure that the exhausted vapors are not accumulating in other areas within or around the vessel or dry dock.

(5) All motors and control equipment shall be of the explosion-proof type. Fans shall have nonferrous blades. Portable air ducts shall also be of nonferrous materials. All motors and associated control equipment shall be properly maintained and grounded.

(6) Only non-sparking paint buckets, spray guns and tools shall be used. Metal parts of paint brushes and rollers shall be insulated. Staging shall be erected in a manner which ensures that it is non-sparking.

(7) Only explosion proof lights, approved by the Underwriters' Laboratories for use in Class I, Group D atmospheres, or approved as permissible by the Mine Safety and Health Administration or the U.S. Coast Guard, shall be used.

(8) A competent person shall inspect all power and lighting cables to ensure that the insulation is in excellent condition, free of all cracks and worn spots, that there are no connections within fifty (50) feet of the operation,

that lines are not overloaded, and that they are suspended with sufficient slack to prevent undue stress or chafing.

(9) The face, eyes, head, hands, and all other exposed parts of the bodies of employees handling such highly volatile paints shall be protected. All footwear shall be non-sparking, such as rubbers, rubber boots or rubber soled shoes without nails. Coveralls or other outer clothing shall be of cotton. Rubber, rather than plastic, gloves shall be used because of the danger of static sparks.

(10) No matches, lighted cigarettes, cigars, or pipes, and no cigarette lighters or ferrous articles shall be taken into the area where work is being done.

(11) All solvent drums taken into the compartment shall be placed on nonferrous surfaces and shall be grounded to the vessel. Metallic contact shall be maintained between containers and drums when materials are being transferred from one to another.

(12) Spray guns, paint pots, and metallic parts of connecting tubing shall be electrically bonded, and the bonded assembly shall be grounded to the vessel.

(13) All employees continuously in a compartment in which such painting is being performed, shall be protected by air line respirators in accordance with the requirements of § 1915.152(a) and by suitable protective clothing. Employees entering such compartments for a limited time shall be protected by filter cartridge type respirators in accordance with the requirements of §§ 1915.152(a) and (e).

(14) All employees doing exterior paint spraying with such paints shall be protected by suitable filter cartridge type respirators in accordance with the requirements of §§ 1915.152(a) and (e) and by suitable protective clothing.

§ 1915.36 Flammable liquids.

(a) In all cases when liquid solvents, paint and preservative removers, paints or vehicles, other than those covered by §1915.35(b), are capable of producing a flammable atmosphere under the conditions of use, the following precautions shall be taken:

(1) Smoking, open flames, arcs and spark-producing equipment shall be prohibited in the area.

(2) Ventilation shall be provided in sufficient quantities to keep the concentration of vapors below ten (10) percent of their lower explosive limit. Frequent tests shall be made by a competent person to ascertain the concentration.

(3) Scrapings and rags soaked with these materials shall be kept in a covered metal container.

(4) Only explosion proof lights, approved by the Underwriters' Laboratories for use in Class I, Group D atmospheres, or approved as permissible by the Mine Safety and Health Administration or the U.S. Coast Guard, shall be used.

(5) A competent person shall inspect all power and lighting cables to ensure that the insulation is in excellent condition, free of all cracks and worn spots, that there are no connections within fifty (50) feet of the operation, that lines are not overloaded, and that they are suspended with sufficient slack to prevent undue stress or chafing.

(6) Suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for instant use.

Subpart D—Welding, Cutting and Heating

§ 1915.51 Ventilation and protection in welding, cutting and heating.

(a) The provisions of this section shall apply to all ship repairing, shipbuilding, and shipbreaking operations; except that paragraph (e) of this section shall apply only to ship repairing and shipbuilding. Paragraph (g) of this section shall apply only to ship repairing.

(b) *Mechanical ventilation requirements.* (1) For purposes of this section, mechanical ventilation shall meet the following requirements:

(i) Mechanical ventilation shall consist of either general mechanical ventilation systems or local exhaust systems.

(ii) General mechanical ventilation shall be of sufficient capacity and so arranged as to produce the number of air changes necessary to maintain welding fumes and smoke within safe limits.

(iii) Local exhaust ventilation shall consist of freely movable hoods intended to be placed by the welder or burner as close as practicable to the work. This system shall be of sufficient capacity and so arranged as to remove fumes and smoke at the source and keep the concentration of them in the breathing zone within safe limits.

(iv) Contaminated air exhausted from a working space shall be discharged into the open air or otherwise clear of the source of intake air.

(v) All air replacing that withdrawn shall be clean and respirable.

(vi) Oxygen shall not be used for ventilation purposes, comfort cooling, blowing dust or dirt from clothing, or for cleaning the work area.

(c) *Welding, cutting and heating in confined spaces.* (1) Except as provided in paragraphs (c)(3) and (d)(2) of this section either general ventilation meeting the requirements of paragraph (b) of this section shall be provided whenever welding, cutting or heating is performed in a confined space.

(2) The means of access shall be provided to a confined space and ventilation ducts to this space shall be arranged in accordance with §§ 1915.76(b) (1) and (2).

(3) When sufficient ventilation cannot be obtained without blocking the means of access, employees in the confined space shall be protected by air line respirators in accordance with the requirements of § 1915.152(a), and an employee on the outside of such a confined space shall be assigned to maintain communication with those working within it and to aid them in an emergency.

(d) *Welding, cutting or heating of metals of toxic significance.* (1) Welding, cutting or heating in any enclosed spaces aboard the vessel involving the metals specified below shall be performed with either general mechanical or local exhaust ventilation meeting the requirements of paragraph (a) of this section:

(i) Zinc-bearing base or filler metals or metals coated with zinc-bearing materials.

(ii) Lead base metals.

(iii) Cadmium-bearing filler materials.

(iv) Chromium-bearing metals or metals coated with chromium-bearing materials.

(2) Welding, cutting or heating in any enclosed spaces aboard the vessel involving the metals specified below shall be performed with local exhaust ventilation in accordance with the requirements of paragraph (b) of this section or employees shall be protected by air line respirators in accordance with the requirements of § 1915.152(a):

(i) Metals containing lead, other than as an inpurity, or metals coated with lead-bearing materials.

(ii) Cadmium-bearing or cadmium coated base metals.

(iii) Metals coated with mercury-bearing metals.

(iv) Beryllium-containing base or filler metals. Because of its high toxicity, work involving beryllium shall be done with both local exhaust ventilation and air line respirators.

(3) Employees performing such operations in the open air shall be protected by filter type respirators in accordance with the requirements of paragraphs (a) and (d)(2)(iv) of § 1915.152, except that employees

performing such operations on beryllium-containing base or filler metals shall be protected by air line respirators in accordance with the requirements of § 1915.152(a).

(4) Other employees exposed to the same atmosphere as the welders or burners shall be protected in the same manner as the welder or burner.

(e) *Inert-gas metal-arc welding.* (1) Since the inert-gas metal-arc welding process involves the production of ultraviolet radiation of intensities of 5 to 30 times that produced during shielded metal-arc welding, the decomposition of chlorinated solvents by ultraviolet rays, and the liberation of toxic fumes and gases, employees shall not be permitted to engage in, or be exposed to the process until the following special precautions have been taken:

(i) The use of chlorinated solvents shall be kept at least two hundred (200) feet from the exposed arc, and surfaces prepared with chlorinated solvents shall be thoroughly dry before welding is permitted on such surfaces.

(ii) Helpers and other employees in the area not protected from the arc by screening as provided in § 1915.56(e) shall be protected by filter lenses meeting the requirements of §§ 1915.151 (a) and (c). When two or more welders are exposed to each other's arc, filter lens goggles of a suitable type meeting the requirements of §§ 1915.151 (a) and (c) shall be worn under welding helmets or hand shields to protect the welder against flashes and radiant energy when either the helmet is lifted or the shield is removed.

(iii) Welders and other employees who are exposed to radiation shall be suitably protected so that the skin is covered completely to prevent burns and other damage by ultraviolet rays. Welding helmets and hand shields shall be free of leaks and openings, and free of highly reflective surfaces.

(iv) When inert-gas metal-arc welding is being performed on stainless steel, the requirements of paragraph (d)(2) of this section shall be met to protect against dangerous concentrations of nitrogen dioxide.

(f) *General welding, cutting, and heating.* (1) Welding, cutting and heating not involving conditions or materials described in paragraphs (c), (d) or (e) of this section may normally be done without mechanical ventilation or respiratory protective equipment, but where, because of unusual physical or atmospheric conditions, an unsafe accumulation of contaminants exists, suitable mechanical ventilation or respiratory protective equipment shall be provided.

(2) Employees performing any type of welding, cutting or heating shall be protected by suitable eye protective equipment in accordance with the requirements of §§ 1915.151 (a) and (c).

(g) *Residues and cargoes of metallic ores.* (1) Residues and cargoes of metallic ores of toxic significance shall be removed from the area or protected from the heat before ship repair work which involves welding, cutting or heating is begun.

§ 1915.52 Fire prevention.[1]

(a) Paragraph (a) applies to ship repairing, shipbuilding and shipbreaking, and paragraph (b) applies to ship repairing and shipbuilding only.

(1) When practical, objects to be welded, cut or heated shall be moved to a designated safe location or, if the object to be welded, cut or heated cannot be readily moved, all movable fire hazards including residues of combustible bulk cargoes in the vicinity shall be taken to a safe place.

(2) If the object to be welded, cut or heated cannot be moved and if all the fire hazards including combustible cargoes cannot be removed, positive means shall be taken to confine the heat, sparks, and slag, and to protect the immovable fire hazards from them.

(3) When welding, cutting or heating is performed on tank shells, decks, overheads and bulkheads, since direct penetration of sparks or heat tranfer may introduce a fire hazard to an adjacent compartment, the same precautions shall be taken on the opposite side as are taken on the side on which the welding is being performed.

(4) In order to eliminate the possibility of fire in confined spaces as a result of gas escaping through leaking or improperly closed torch valves, the gas supply to the torch shall be positively shut off at some point outside the confined space whenever the torch is not to be used or whenever the torch is left unattended for a substantial period of time, such as during the lunch hour. Overnight and at the change of shifts, the torch and hose shall be removed from the confined space. Open end fuel gas and oxygen hoses shall be immediately removed from confined spaces when they are disconnected from the torch or other gas consuming device.

(b) The provisions of this paragraph shall apply to ship repairing and shipbuilding only.

(1) No welding, cutting or heating shall be done where the application of flammable paints or the presence of other flammable compounds or of heavy dust concentrate creates a hazard.

(2) Suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for instant use. In addition, when hot work is being performed aboard a vessel and pressure is not available on the vessel's fire system, an auxiliary supply of water shall be made available where practicable, consistent with avoiding freezing of the lines or hose.

(3) When the welding, cutting, or heating operation is such that normal fire prevention precautions are not sufficient, additional personnel shall be assigned to guard against fire while the actual welding, cutting, or heating operation is being performed and for a sufficient period of time after completion of the work to insure that no possibility of fire exists. Such personnel shall be instructed as to the specific anticipated fire hazards and how the fire fighting equipment provided is to be used.

(4) Vaporizing liquid extinguishers shall not be used in enclosed spaces.

(5) Except when the contents are being removed or transferred, drums, pails, and other containers which contain or have contained flammable liquids shall be kept closed. Empty containers shall be removed to a safe area apart from hot work operations, or open flames.

(c) In all cases, suitable fire extinguishing equipment shall be immediately available in the work area and shall be maintained in a state of readiness for instant use. Personnel assigned to contain fires within controllable limits shall be instructed as to the specific anticipated fire hazards and how the fire fighting equipment provided is to be used. The provisions of this paragraph shall apply to shipbreaking only.

§ 1915.53 Welding, cutting and heating in way of preservative coatings.

(a) The provisions in this section shall apply to all ship repairing, shipbuilding and shipbreaking operations except for paragraphs (e) and (f) of this section which shall apply to ship repairing and shipbulding and shall not apply to shipbreaking.

(b) Before welding, cutting or heating is commenced on any surface covered by a preservative coating whose flammability is not known, a test shall be made by a competent person to determine its flammability. Preservative coatings shall be considered to be highly flammable when scrapings burn with extreme rapidity.

[1] 46 CFR 146.02–20 contains Coast Guard regulations pertaining to welding and cutting while explosives and dangerous cargoes are being handled.

(c) Precautions shall be taken to prevent ignition of highly flammable hardened preservative coatings. When coatings are determined to be highly flammable they shall be stripped from the area to be heated to prevent ignition, or, where shipbreaking is involved, the coatings may be burned away under controlled conditions. A 1½ inch or larger fire hose with fog nozzle, which has been uncoiled and placed under pressure, shall be immediately available for instant use in the immediate vicinity, consistent with avoiding freezing of the hose.

(d) *Protection against toxic preservative coatings.* (1) In enclosed spaces, all surfaces covered with toxic preservatives shall be stripped of all toxic coatings for a distance of at least 4 inches from the area of heat application or the employees shall be protected by air line respirators meeting the requirements of § 1915.152(a).

(2) In the open air, employees shall be protected by a filter type respirator in accordance with the requirements of §§ 1915.152 (a) and (d).

(e) Before welding, cutting or heating is commenced in enclosed spaces on metals covered by soft and greasy preservatives, the following precautions shall be taken:

(1) A competent person shall test the atmosphere in the space to ensure that it does not contain explosive vapors, since there is a possibility that some soft and greasy preservatives may have flash points below temperatures which may be expected to occur naturally. If such vapors are determined to be present, no hot work shall be commenced until such precautions have been taken as will ensure that the welding, cutting or heating can be performed in safety.

(2) The preservative coatings shall be removed for a sufficient distance from the area to be heated to ensure that the temperature of the unstripped metal will not be appreciably raised. Artificial cooling of the metal surrounding the heated area may be used to limit the size of the area required to be cleaned. The prohibition contained in § 1915.34(b)(2) shall apply.

(f) Immediately after welding, cutting or heating is commenced in enclosed spaces on metal covered by soft and greasy preservatives, and at frequent intervals thereafter, a competent person shall make tests to ensure that no flammable vapors are being produced by the coatings. If such vapors are determined to be present, the operation shall be stopped immediately and shall not be resumed until such additional precautions have been taken as are necessary to ensure that the operation can be resumed safely.

§ 1915.54 Welding, cutting and heating of hollow metal containers and structures not covered by § 1915.12.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Drums, containers, or hollow structures which have contained flammable substances shall, before welding, cutting, or heating is undertaken on them, either be filled with water or thoroughly cleaned of such substances and ventilated and tested.

(b) Before heat is applied to a drum, container, or hollow structure, a vent or opening shall be provided for the release of any built-up pressure during the application of heat.

(c) Before welding, cutting, heating or brazing is begun on structural voids such as skegs, bilge keels, fair waters, masts, booms, support stanchions, pipe stanchions or railings, a competent person shall inspect the object and, if necessary, test it for the presence of flammable liquids or vapors. If flammable liquids or vapors are present, the object shall be made safe.

(d) Objects such as those listed in paragraph (c) of this section shall also be inspected to determine whether water or other non-flammable liquids are present which, when heated, would build up excessive pressure. If such liquids are determined to be present, the object shall be vented, cooled, or otherwise made safe during the application of heat.

(e) Jacketed vessels shall be vented before and during welding, cutting or heating operations in order to release any pressure which may build up during the application of heat.

§ 1915.55 Gas welding and cutting.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) *Transporting, moving and storing compressed gas cylinders.* (1) Valve protection caps shall be in place and secure. Oil shall not be used to lubricate protection caps.

(2) When cylinders are hoisted, they shall be secured on a cradle, slingboard or pallet. They shall not be hoisted by means of magnets or choker slings.

(3) Cylinders shall be moved by tilting and rolling them on their bottom edges. They shall not be intentionally dropped, struck, or permitted to strike each other violently.

(4) When cylinders are transported by vehicle, they shall be secured in position.

(5) Valve protection caps shall not be used for lifting cylinders from one vertical position to another. Bars shall not be used under valves or valve protection caps to pry cylinders loose when frozen. Warm, not boiling, water shall be used to thaw cylinders loose.

(6) Unless cylinders are firmly secured on a special carrier intended for this purpose, regulators shall be removed and valve protection caps put in place before cylinders are moved.

(7) A suitable cylinder truck, chain, or other steadying device shall be used to keep cylinders from being knocked over while in use.

(8) When work is finished, when cylinders are empty or when cylinders are moved at any time, the cylinder valves shall be closed.

(9) Acetylene cylinders shall be secured in an upright position at all times except, if necessary, for short periods of time while cylinders are actually being hoisted or carried.

(b) *Placing cylinders.* (1) Cylinders shall be kept far enough away from the actual welding or cutting operation so that sparks, hot slag or flame will not reach them. When this is impractical, fire resistant shields shall be provided.

(2) Cylinders shall be placed where they cannot become part of an electrical circuit. Electrodes shall not be struck against a cylinder to strike an arc.

(3) Fuel gas cylinders shall be placed with valve end up whenever they are in use. They shall not be placed in a location where they would be subject to open flame, hot metal, or other sources of artificial heat.

(4) Cylinders containing oxygen or acetylene or other fuel gas shall not be taken into confined spaces.

(c) *Treatment of cylinders.* (1) Cylinders, whether full or empty, shall not be used as rollers or supports.

(2) No person other than the gas supplier shall attempt to mix gases in a cylinder. No one except the owner of the cylinder or person authorized by him shall refill a cylinder. No one shall use a cylinder's contents for purposes other than those intended by the supplier. Only cylinders bearing Interstate Commerce Commission identification and inspection markings shall be used.

(3) No damaged or defective cylinder shall be used.

(d) *Use of fuel gas.* The employer shall thoroughly instruct employees in the safe use of fuel gas, as follows:

(1) Before connecting a regulator to a cylinder valve, the valve shall be opened slightly and closed immediately. (This action is generally termed "cracking" and is intended to clear the valve of dust or dirt that might otherwise enter the regulator.) The person cracking the valve shall stand to one side of the outlet, not in front of it. The valve of a fuel gas cylinder shall not

be cracked where the gas would reach welding work, sparks, flame or other possible sources of ignition.

(2) The cylinder valve shall always be opened slowly to prevent damage to the regulator. To permit quick closing, valves on fuel gas cylinders shall not be opened more than 1½ turns. When a special wrench is required, it shall be left in position on the stem of the valve while the cylinder is in use so that the fuel gas flow can be shut off quickly in case of an emergency. In the case of manifolded or coupled cylinders, at least one such wrench shall always be available for immediate use. Nothing shall be placed on top of a fuel gas cylinder, when in use, which may damage the safety device or interfere with the quick closing of the valve.

(3) Fuel gas shall not be used from cylinders through torches or other devices which are equipped with shut-off valves without reducing the pressure through a suitable regulator attached to the cylinder valve or manifold.

(4) Before a regulator is removed from a cylinder valve, the cylinder valve shall always be closed and the gas released from the regulator.

(5) If, when the valve on a fuel gas cylinder is opened, there is found to be a leak around the valve stem, the valve shall be closed and the gland nut tightened. If this action does not stop the leak, the use of the cylinder shall be discontinued, and it shall be properly tagged and removed from the vessel. In the event that fuel gas should leak from the cylinder valve rather than from the valve stem and the gas cannot be shut off, the cylinder shall be properly tagged and removed from the vessel. If a regulator attached to a cylinder valve will effectively stop a leak through the valve seat, the cylinder need not be removed from the vessel.

(6) If a leak should develop at a fuse plug or other safety device, the cylinder shall be removed from the vessel

(e) *Fuel gas and oxygen manifolds.* (1) Fuel gas and oxygen manifolds shall bear the name of the substance they contain in letters at least one (1) inch high which shall be either painted on the manifold or on a sign permanently attached to it.

(2) Fuel gas and oxygen manifolds shall be placed in safe and accessible locations in the open air. They shall not be located within enclosed spaces.

(3) Manifold hose connections, including both ends of the supply hose that lead to the manifold, shall be such that the hose cannot be interchanged between fuel gas and oxygen manifolds and supply header connections. Adapters shall not be used to permit the interchange of hose. Hose connections shall be kept free of grease and oil.

(4) When not in use, manifold and header hose connections shall be capped.

(5) Nothing shall be placed on top of a manifold, when in use, which will damage the manifold or interfere with the quick closing of the valves.

(f) *Hose.* (1) Fuel gas hose and oxygen hose shall be easily distinguishable from each other. The contrast may be made by different colors or by surface characteristics readily distinguishable by the sense of touch. Oxygen and fuel has hoses shall not be interchangeable. A single hose having more than one gas passage, a wall failure of which would permit the flow of one gas into the other gas passage, shall not be used.

(2) When parallel sections of oxygen and fuel gas hose are taped together not more than 4 inches out of 8 inches shall be covered by tape.

(3) All hose carrying acetylene, oxygen, natural or manufactured fuel gas, or any gas or substance which may ignite or enter into combustion or be in any way harmful to employees, shall be inspected at the beginning of each shift. Defective hose shall be removed from service.

(4) Hose which has been subjected to flashback or which shows evidence of severe wear or damage shall be tested to twice the normal pressure to which it is subject, but in no case less than two hundered (200) psi. Defective hose or hose in doubtful condition shall not be used.

(5) Hose couplings shall be of the type that cannot be unlocked or disconnected by means of a straight pull without rotary motion.

(6) Boxes used for the stowage of gas hose shall be ventilated.

(g) *Torches.* (1) Clogged torch tip openings shall be cleaned with suitable cleaning wires, drills or other devices designed for such purpose.

(2) Torches shall be inspected at the beginning of each shift for leaking shutoff valves, hose couplings, and tip connections. Defective torches shall not be used.

(3) Torches shall be lighted by friction lighters or other approved devices, and not by matches or from hot work.

(h) *Pressure regulators.* Oxygen and fuel gas pressure regulators including their related gauges shall be in proper working order while in use.

§ 1915.56 Arc welding and cutting.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) *Manual electrode holders.* (1) Only manual electrode holders which are specifically designed for arc welding and cutting and are of a capacity capable of safely handling the maximum rated current required by the electrodes shall be used.

(2) Any current carrying parts passing through the portion of the holder which the arc welder or cutter grips in his hand, and the outer surfaces of the jaws of the holder, shall be fully insulated against the maximum voltage encountered to ground.

(b) *Welding cables and connectors.* (1) All arc welding and cutting cables shall be of the completely insulated, flexible type, capable of handling the maximum current requirements of the work in progress, taking into account the duty cycle under which the arc welder or cutter is working.

(2) Only cable free from repair or splices for a minimum distance of ten (10) feet from the cable end to which the electrode holder is connected shall be used, except that cables with standard insulated connectors or with splices whose insulating quality is equal to that of the cable are permitted.

(3) When it becomes necessary to connect or splice lengths of cable one to another, substantial insulated connectors of a capacity at least equivalent to that of the cable shall be used. If connections are effected by means of cable lugs, they shall be securely fastened together to give good electrical contact, and the exposed metal parts of the lugs shall be completely insulated.

(4) Cables in poor repair shall not be used. When a cable other than the cable lead referred to in paragraph (b)(2) of this section becomes worn to the extent of exposing bare conductors, the portion thus exposed shall be protected by means of rubber and friction tapes or other equivalent insulation.

(c) *Ground returns and machine grounding.* (1) A ground return cable shall have a safe current carrying capacity equal to or exceeding the specified maximum output capacity of the arc welding or cutting unit which it services. When a single ground return cable services more than one unit, its safe current carrying capacity shall equal or exceed the total specified maximum output capacities of all the units which it services.

(2) Structures or pipe lines, except pipe lines containing gases of flammable liquids or conduits containing electrical circuits, may be used as part of the ground return circuit, provided that the pipe or structure has a current carrying capacity equal to that required by paragraph (c)(1) of this section.

(3) When a structure or pipe line is employed as a ground return circuit, it shall be determined that the required electrical contact exists at all joints. The generation of an arc, sparks or heat at any point shall cause rejection of the structure as a ground circuit.

(4) When a structure or pipe line is continuously employed as a ground return circuit, all joints shall be bonded, and periodic inspections shall be conducted to ensure that no condition of electrolysis or fire hazard exists by virtue of such use.

(5) The frames of all arc welding and cutting machines shall be grounded either through a third wire in the cable containing the circuit conductor or through a separate wire which is grounded at the source of the current. Grounding circuits, other than by means of the vessel's structure, shall be checked to ensure that the circuit between the ground and the grounded power conductor has resistance low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current.

(6) All ground connections shall be inspected to ensure that they are mechanically strong and electrically adequate for the required current.

(d) *Operating instructions.* Employers shall instruct employees in the safe means of arc welding and cutting as follows:

(1) When electrode holders are to be left unattended, the electrodes shall be removed and the holders shall be so placed or protected that they cannot make electrical contact with employees or conducting objects.

(2) Hot electrode holders shall not be dipped in water, since to do so may expose the arc welder or cutter to electric shock.

(3) When the arc welder or cutter has occasion to leave his work or to stop work for any appreciable length of time, or when the arc welding or cutting machine is to be moved, the power supply switch to the equipment shall be opened.

(4) Any faulty or defective equipment shall be reported to the supervisor.

(e) *Shielding.* Whenever practicable, all arc welding and cutting operations shall be shielded by noncombustible or flame-proof screens which will protect employees and other persons working in the vicinity from the direct rays of the arc.

§ 1915.57 Uses of fissionable material.

The provisions of this section apply to ship repairing and shipbuilding only.

(a) In activities involving the use of and exposure to sources of ionizing radiation not only on conventionally powered but also on nuclear powered vessels, the applicable provisions of the Nuclear Regulatory Commission's Standards for Protection Against Radiation (10 CFR Part 20), relating to protection against occupational radiation exposure, shall apply.

(b) Any activity which involves the use of radiocative material, whether or not under license from the Nuclear Regulatory Commission, shall be performed by competent persons specially trained in the proper and safe operation of such equipment. In the case of materials used under Commission license, only persons actually licensed, or competent persons under direction and supervision of the licensee, shall perform such work.

Subpart E—Scaffolds, Ladders and Other Working Surfaces

§ 1915.71 Scaffolds or staging.

(a) *Scope and application.* The provisions of this section shall apply to all ship repairing, shipbuilding and shipbreaking operations except that paragraphs (b)(8) through (b)(10) and paragraphs (c) through (f) of this section shall only apply to ship repairing and shipbuilding operations and shall not apply to shipbreaking.

(b) *General requirements.* (1) All scaffolds and their supports whether of lumber, steel or other material, shall be capable of supporting the load they are designed to carry with a safety factor of not less than four (4).

(2) All lumber used in the construction of scaffolds shall be spruce, fir, long leaf yellow pine, Oregon pine or wood of equal strength. The use of hemlock, short leaf yellow pine, or short fiber lumber is prohibited.

(3) Lumber dimensions as given in this subpart are nominal except where given in fractions of an inch.

(4) All lumber used in the construction of scaffolds shall be sound, straight-grained, free from cross grain, shakes and large, loose or dead knots. It shall also be free from dry rot, large checks, worm holes or other defects which impair its strength or durability.

(5) Scaffolds shall be maintained in a safe and secure condition. Any component of the scaffold which is broken, burned or otherwise defective shall be replaced.

(6) Barrels, boxes, cans, loose bricks, or other unstable objects shall not be used as working platforms or for the support of planking intended as scaffolds or working platforms.

(7) No scaffold shall be erected, moved, dismantled or altered except under the supervision of competent persons.

(8) No welding, burning, riveting or open flame work shall be performed on any staging suspended by means of fiber rope.

(9) Lifting bridles on working platforms suspended from cranes shall consist of four legs so attached that the stability of the platform is assured.

(10) Unless the crane hook has a safety latch or is moused, the lifting bridles on working platforms suspended from cranes shall be attached by shackles to the lower lifting block or other positive means shall be taken to prevent them from becoming accidentally disengaged from the crane hook.

(c) *Independent pole wood scaffolds.* (1) All pole uprights shall be set plump. Poles shall rest on a foundation of sufficient size and strength to distribute the loan and to prevent displacement.

(2) In light-duty scaffolds, not more than 24 feet in height, poles may be spliced by overlapping the ends not less than 4 feet and securely nailing them together. A substantial cleat shall be nailed to the lower section to form a support for the upper section except when bolted connections are used.

(3) All other poles to be spliced shall be squared at the ends of each splice, abutted, and rigidly fastened together by not less than two cleats securely nailed or bolted thereto. Each cleat shall overlap each pole end by at least 24 inches and shall have a width equal to the face of the pole to which it is attached. The combined cross sectional area of the cleats shall be not less than the cross sectional area of the pole.

(4) Ledgers shall extend over two consecutive pole spaces and shall overlap the poles at each end by not less than 4 inches. They shall be left in position to brace the poles as the platform is raised with the progress of the work. Ledgers shall be level and shall be securely nailed or bolted to each pole and shall be placed against the inside face of each pole.

(5) All bearers shall be set with their greater dimension vertical and shall extend beyond the ledgers upon which they rest.

(6) Diagonal bracing shall be provided between the parallel poles, and cross bracing shall be provided between the inner and outer poles or from the outer poles to the ground.

(7) Minimum dimensions and spacing of members shall be in accordance with Table E–1 in § 1915.118.

(8) Platform planking shall be in accordance with the requirements of paragraph (i) of this section.

(9) Backrails and toeboards shall be in accordance with the requirements of paragraph (j) of this section.

(d) *Independent pole metal scaffolds.* (1) Metal scaffold members shall be maintained in good repair and free of corrosion.

(2) All vertical and horizontal members shall be fastened together with a coupler or locking device which will form a positive connection. The locking device shall be of a type which has no loose parts.

(3) Posts shall be kept plumb during erection and the scaffold shall be subsequently kept plumb and rigid by means of adequate bracing.

(4) Posts shall be fitted with bases supported on a firm foundation to distribute the load. When wooden sills are used, the bases shall be fastened thereto.

(5) Bearers shall be located at each set of posts, at each level, and at each intermediate level where working platforms are installed.

(6) Tubular bracing shall be applied both lengthwise and crosswise as required.

(7) Platform planking shall be in accordance with the requirements of paragraph (h) of this section.

(8) Backrails and toeboards shall be in accordance with the requirements of paragraph (j) of this section.

(e) *Wood trestle and extension trestle ladders.* (1) The use of trestle ladders, or extension sections or base sections of extension trestle ladders longer than 20 feet is prohibited. The total height of base and extension may, however, be more than 20 feet.

(2) The minimum dimensions of the side rails of the trestle ladder, or the base sections of the extension trestle ladder, shall be as follows:

(i) Ladders up to and including those 16 feet long shall have side rails of not less than 1 5/16 x 2¾ inch lumber.

(ii) Ladders over 16 feet long and up to and including those 20 feet long shall have side tails of not less than 1 5/16 x 3 inch lumber.

(3) The side rails of the extension section of the extension trestle ladder shall be parallel and shall have minimum dimensions as follows:

(i) Ladders up to and including 12 feet long shall have side rails of not less than 1 5/16 x 2¼ inch lumber.

(ii) Ladders over 12 feet long and up to and including those 16 feet long shall have side rails of not less than 1 5/16 x 2½ inch lumber.

(iii) Ladders over 16 feet long and up to and including those 20 feet long shall have side rails of not less than 1 5/16 x 2¾ inch lumber.

(4) Trestle ladders and base sections of extension trestle ladders shall be so spread that when in an open position the spread of the trestle at the bottom, inside to inside, shall be not less than 5½ inches per foot of the length of the ladder.

(5) The width between the side rails at the bottom of the trestle ladder or of the base section of the extension trestle ladder shall be not less than 21 inches for all ladders and sections 6 feet or less in length. For longer lengths of ladder, the width shall be increased at least 1 inch for each additional foot of length. The width between the side rails of the extension section of the trestle ladder shall be not less than 12 inches.

(6) In order to limit spreading, the top ends of the side rails of both the trestle ladder and of the base section of the extension trestle ladder shall be beveled, or of equivalent construction, and shall be provided with a metal hinge.

(7) A metal spreader or locking device to hold the front and back sections in an open position, and to hold the extension section securely in the elevated position, shall be a component of each trestle ladder or extension ladder.

(8) Rungs shall be parallel and level. On the trestle ladder, or on the base section of the extension trestle ladder, rungs shall be spaced not less than 8 inches nor more than 18 inches apart; on the extension section of the extension trestle ladder, rungs shall be spaced not less than 6 inches nor more than 12 inches apart.

(9) Platform planking shall be in accordance with the requirements of paragraph (i) of this section, except that the width of the platform planking shall not exceed the distance between the siderails.

(10) Backrails and toeboards shall be in accordance with the requirements of paragraph (j) of this section.

(f) *Painters' suspended scaffolds.* (1) The supporting hooks of swinging scaffolds shall be constructed to be equivalent in strength to mild steel or wrought iron, shall be forged with care, shall be not less than ⅞ inch in diameter, and shall be secured to a safe anchorage at all times.

(2) The ropes supporting a swinging scaffold shall be equivalent in strength to first-grade ¾ inch diameter manila rope properly rigged into a set of standard 6 inch blocks consisting of at least one double and one single block.

(3) Manila and wire ropes shall be carefully examined before each operation and thereafter as frequently as may be necessary to ensure their safe condition.

(4) Each end of the scaffold platform shall be supported by a wrought iron or mild steel stirrup or hanger, which in turn is supported by the suspension ropes.

(5) Stirrups shall be constructed so as to be equivalent in strength to wrought iron ¾ inch in diameter.

(6) The stirrups shall be formed with a horizontal bottom member to support the platform, shall be provided with means to support the guardrail and midrail and shall have a loop or eye at the top for securing the supporting hook on the block.

(7) Two or more swinging scaffolds shall not at any time be combined into one by bridging the distance between them with planks or any other form of platform.

(8) No more than two men shall be permitted to work at one time on a swinging scaffold built to the minimum specifications contained in this paragraph. Where heavier construction is used, the number of men permitted to work on the scaffold shall be determined by the size and the safe working load of the scaffold.

(9) Backrails and toeboards shall be in accordance with the requirements of paragraph (j) of this section.

(10) The swinging scaffold platform shall be one of the three types described in paragraphs (f)(11), (12), and (13) of this section.

(11) The ladder-type platform consists of boards upon a horizontal ladder-like structure, referred to herein as the ladder, the side rails of which are parallel. If this type of platform is used the following requirements shall be met.

(i) The width between the side rails shall be no more than 20 inches.

(ii) The side rails of ladders in ladder-type platforms shall be equivalent in strength to a beam of clear straight-grained spruce of the dimensions contained in Table E–2 in § 1915.118.

(iii) The side rails shall be tied together with tie rods. The tie rods shall be not less than 5/16 inch in diameter, located no more than 5 feet apart, pass through the rails, and be riveted up tight against washers at both ends.

(iv) The rungs shall be of straight-grained oak, ash, or hickory, not less than 1⅛ inches diameter, with ⅞ inch tenons mortised into the side rails not less than ⅞ inch and shall be spaced no more than 18 inches on centers.

(v) Flooring strips shall be spaced no more than ⅝ inch apart except at the side rails, where 1 inch spacing is permissible.

(vi) Flooring strips shall be cleated on their undersides.

(12) The plank-type platform consists of planks supported on the stirrups or hangers. If this type of platform is used, the following requirements shall be met:

(i) The planks of plank-type platforms shall be of not less than 2 x 10 inch lumber.

(ii) The platform shall be no more than 24 inches in width.

(iii) The planks shall be tied together by cleats of not less than 1 x 6 inch lumber, nailed on their undersides at intervals of not more than 4 feet.

(iv) The planks shall extend not less than 6 inches nor more than 18 inches beyond the supporting stirrups.

(v) A cleat shall be nailed across the platform on the underside at each end outside the stirrup to prevent the platform from slipping off the stirrup.

(vi) Stirrup supports shall be not more than 10 feet apart.

(13) The beam-type platform consists of longitudinal side stringers with cross beams set on edge and spaced not more than 4 feet apart on which longitudinal platform planks are laid. If this type platform is used, the following requirements shall be met:

(i) The side stringers shall be of sound, straight-grained lumber, free from knots, and of not less than 2 x 6 inch lumber, set on edge.

(ii) The stringers shall be supported on the stirrups with a clear span between stirrups of not more than 16 feet.

(iii) The stringers shall be bolted to the stirrups by U-bolts passing around the stirrups and bolted through the stringers with nuts drawn up tight on the inside face.

(iv) The ends of the stringers shall extend beyond the stirrups not less than 6 inches nor more than 12 inches at each end of the platform.

(v) The platform shall be supported on cross beams of 2 x 6 inch lumber between the side stringers securely nailed thereto and spaced not more than 4 feet on centers.

(vi) The platform shall be not more than 24 inches wide.

(vii) The platform shall be formed of boards ⅞ inch in thickness by not less than 6 inches in width, nailed tightly together, and extending to the outside face of the stringers.

(viii) The ends of all platform boards shall rest on the top of the cross beams, shall be securely nailed, and at no intermediate points in the length of the platform shall there be any cantilever ends.

(g) *Horse scaffolds.* (1) The minimum dimensions of lumber used in the construction of horses shall be in accordance with Table E–3 in § 1915.118.

(2) Horses constructed of materials other than lumber shall provide the strength, rigidity and security required of horses constructed of lumber.

(3) The lateral spread of the legs shall be equal to not less than one-third of the height of the horse.

(4) All horses shall be kept in good repair, and shall be properly secured when used in staging or in locations where they may be insecure.

(5) Platform planking shall be in accordance with the requirements of paragraph (i) of this section.

(6) Backrails and toeboards shall be in accordance with paragraph (j) of this section.

(h) *Other types of scaffolds.* (1) Scaffolds of a type for which specifications are not contained in this section shall meet the general requirements of paragraphs (b), (i), and (j) of this section, shall be in accordance with recognized principles of design and shall be constructed in accordance with accepted standards covering such equipment.

(i) *Scaffold or platform planking.* (1) Except as otherwise provided in paragraphs (f)(11) and (13) of this section, platform planking shall be of not less than 2 x 10 inch lumber. Platform planking shall be straight-grained and free from large or loose knots and may be either rough or dressed.

(2) Platforms of staging shall be not less than two 10 inch planks in width except in such cases as the structure of the vessel or the width of the trestle ladders make it impossible to provide such a width.

(3) Platform planking shall project beyond the supporting members at either end by at least 6 inches but in no case shall project more than 12 inches unless the planks are fastened to the supporting members.

(4) Table E–4 in § 1915.118 shall be used as a guide in determining safe loads for scaffold planks.

(j) *Backrails and toeboards.* (1) Scaffolding, staging, runways, or working platforms which are supported or suspended more than 5 feet above a solid surface, or at any distance above the water, shall be provided with a railing which has a top rail whose upper surface is from 42 to 45 inches above the upper surface of the staging, platform, or runway and a midrail located halfway between the upper rail and the staging, platform, or runway.

(2) Rails shall be of 2 x 4 inch lumber, flat bar or pipe. When used with rigid supports, taut wire or fiber rope of adequate strength may be used. If the distance between supports is more than 8 feet, rails shall be equivalent in strength to 2 x 4 inch lumber. Rails shall be firmly secured. Where exposed to hot work or chemicals, fiber rope rails shall not be used.

(3) Rails may be omitted where the structure of the vessel prevents their use. When rails are omitted, employees working more than 5 feet above solid surfaces shall be protected by safety belts and life lines meeting the requirements of § 1915.154(b), and employees working over water shall be protected by buoyant work vests meeting the requirements of § 1915.154(a).

(4) Employees working from swinging scaffolds which are triced out of a vertical line below their supports or from scaffolds on paint floats subject to surging, shall be protected against falling toward the vessel by a railing or a safety belt and line attached to the backrail.

(5) When necessary, to prevent tools and materials from falling on men below, toeboards of not less than 1 x 4 inch lumber shall be provided.

(k) *Access to staging.* (1) Access from below to staging more than 5 feet above a floor, deck or the ground shall consist of well secured stairways, cleated ramps, fixed or portable ladders meeting the applicable requirements of § 1915.72 or rigid type non-collapsible trestles with parallel and level rungs.

(2) Ramps and stairways shall be provided with 36-inch handrails with midrails.

(3) Ladders shall be so located or other means shall be taken so that it is not necessary for employees to step more than one foot from the ladder to any intermediate landing or platform.

(4) Ladders forming integral parts of prefabricated staging are deemed to meet the requirements of these regulations.

(5) Access from above to staging more than 3 feet below the point of access shall consist of a straight, portable ladder meeting the applicable requirements of § 1915.72 or a Jacob's ladder properly secured, meeting the requirements of § 1915.74(d).

§ 1915.72 Ladders.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) *General requirements.* (1) The use of ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction is prohibited. When ladders with such defects are discovered, they shall be immediately withdrawn from service. Inspection of metal ladders shall include checking for corrosion of interiors of open end, hollow rungs.

(2) When sections of ladders are spliced, the ends shall be abutted, and not fewer than 2 cleats shall be securely nailed or bolted to each rail. The combined cross sectional area of the cleats shall be not less than the cross sectional area of the side rail. The dimensions of side rails for their total length shall be those specified in paragraphs (b) or (c) of this section.

(3) Portable ladders shall be lashed, blocked or otherwise secured to prevent their being displaced. The side rails of ladders used for access to any level shall extend not less than 36 inches above that level. When this is not practical, grab rails which will provide a secure grip for an employee moving to or from the point of access shall be installed.

(4) Portable metal ladders shall be of strength equivalent to that of wood ladders. Manufactured portable metal ladders provided by the employer shall be in accordance with the provisions of the American National Standards Institute Safety Code for Portable Metal Ladders, A14.2—1972.

(5) Portable metal ladders shall not be used near electrical conductors nor for electric arc welding operations.

(6) Manufactured portable wood ladders provided by the employer shall be in accordance with the provisions of the American National Standards Institute Safety Code for Portable Wood Ladders, A14—1975.

(b) *Construction of portable wood cleated ladders up to 30 feet in length.* (1) Wood side rails shall be made from West Coast hemlock, Eastern spruce, Sitka spruce, or wood of equivalent strength. Material shall be seasoned, straight-grained wood, and free from shakes, checks, decay or other defects which will impair its strength. The use of low density woods is prohibited.

(2) Side rails shall be dressed on all sides and kept free of splinters.

(3) All knots shall be sound and hard. The use of material containing loose knots is prohibited. Knots shall not appear on the narrow face of the rail and, when in the side face, shall be not more than ½ inch in diameter or within ½ inch of the edge of the rail or nearer than 3 inches to a tread or rung.

(4) Pitch pockets not exceeding ⅛ inch in width, 2 inches in length and ½ inch in depth are permissible in wood side rails, provided that not more than one such pocket appears in each 4 feet of length.

(5) The width between side rails at the base shall be not less than 11½ inches for ladders 10 feet or less in length. For longer ladders this width shall be increased at least ¼ inch for each additional 2 feet in length.

(6) Side rails shall be at least 1⅝ x 3⅝ inches in cross section.

(7) Cleats (meaning rungs rectangular in cross section with the wide dimension parallel to the rails) shall be of the material used for side rails, straight-grained and free from knots. Cleats shall be mortised into the edges of the side rails ½ inch, or filler blocks shall be used on the rails between the cleats. The cleats shall be secured to each rail with three 10d common wire nails or fastened with through bolts or other fasteners of equivalent strength. Cleats shall be uniformly spaced not more than 12 inches apart.

(8) Cleats 20 inches or less in length shall be at least 25/32 x 3 inches in cross section. Cleats over 20 inches but not more than 30 inches in length shall be at least 25/32 x 3¾ inches in cross section.

(c) *Construction of portable wood cleated ladders from 30 to 60 feet in length.* (1) Ladders from 30 to 60 feet in length shall be in accordance with the specifications of paragraph (b) of this section with the following exceptions:

(i) Rails shall be of not less than 2 x 6 inch lumber.

(ii) Cleats shall be of not less than 1 x 4 inch lumber.

(iii) Cleats shall be nailed to each rail with five 10d common wire nails or fastened with through bolts or other fastenings of equivalent strength.

§ 1915.73 Guarding of deck openings and edges.

(a) The provisions of this section shall apply to ship repairing and shipbuilding operations and shall not apply to shipbreaking.

(b) When employees are working in the vicinity of flush manholes and other small openings of comparable size in the deck and other working surfaces, such openings shall be suitably covered or guarded to a height of not less than 30 inches, except where the use of such guards is made impracticable by the work actually in progress.

(c) When employees are working around open hatches not protected by coamings to a height of 24 inches or around other large openings, the edge of the opening shall be guarded in the working area to height of 36 to 42 inches, except where the use of such guards is made impracticable by the work actually in progress.

(d) When employees are exposed to unguarded edges of decks, platforms, flats, and similar flat surfaces, more than 5 feet above a solid surface, the edges shall be guarded by adequate guardrails meeting the requirements of § 1915.71(j) (1) and (2), unless the nature of the work in progress or the physical conditions prohibit the use or installation of such guardrails.

(e) When employees are working near the unguarded edges of decks of vessels afloat, they shall be protected by personal flotation devices, meeting the requirements of § 1915.154(a).

(f) Sections of bilges from which floor plates or gratings have been removed shall be guarded by guardrails except where they would interfere with work in progress. If these open sections are in a walkway at least two 10-inch planks placed side by side, or equivalent, shall be laid across the opening to provide a safe walking surface.

(g) Gratings, walkways, and catwalks, from which sections or ladders have been removed, shall be barricaded with adequate guardrails.

§ 1915.74 Access to vessels.

(a) *Access to vessels afloat.* The employer shall not permit employees to board or leave any vessel, except a barge or river towboat, until the following requirements have been met:

(1) Whenever practicable, a gangway of not less than 20 inches walking surface of adequate strength, maintained in safe repair and safely secured shall be used. If a gangway is not practicable, a substantial straight ladder, extending at least 36 inches above the upper landing surface and adequately secured against shifting or slipping shall be provided. When conditions are such that neither a gangway nor a straight ladder can be used, a Jacob's ladder meeting the requirements of paragraphs (d) (1) and (2) of this section may be used.

(2) Each side of such gangway, and the turn table if used, shall have a railing with a minimum height of approximately 33 inches measured perpendicularly from rail to walking surface at the stanchion, with a mid rail. Rails shall be of wood, pipe, chain, wire or rope and shall be kept taut at all times.

(3) Gangways on vessels inspected and certificated by the U.S. Coast Guard are deemed to meet the foregoing requirements, except in cases where the vessel's regular gangway is not being used.

(4) The gangway shall be kept properly trimmed at all times.

(5) When a fixed tread accommodations 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.

(6) When the lower end of a gangway overhangs the water between the ship and the dock in such a manner that

there is danger of employees falling between the ship and the dock, a net or other suitable protection shall be rigged at the foot of the gangway in such a manner as to prevent employees from falling from the end of the gangway.

(7) If the foot of the gangway is more than one foot away from the edge of the apron, the space between them shall be bridged by a firm walkway equipped with railings, with a minimum height of approximately 33 inches with midrails on both sides.

(8) Supporting bridles shall be kept clear so as to permit unobstructed passage for employees using the gangway.

(9) When the upper end of the means of access rests on or flush with the top of the bulwark, substantial steps properly secured and equipped with at least one substantial handrail approximately 33 inches in height shall be provided between the top of the bulwark and the deck.

(10) Obstructions shall not be laid on or across the gangway.

(11) The means of access shall be adequately illuminated for its full length.

(12) Unless the construction of the vessel makes it impossible, the means of access shall be so located that drafts of cargo do not pass over it. In any event, loads shall not be passed over the means of access while employees are on it.

(b) *Access to vessels in drydock or between vessels.* Gangways meeting the requirements of paragraphs (a) (1), (2), (9), (10), (11) of this section shall be provided for access from wingwall to vessel or, when two or more vessels, other than barges or river towboats, are lying abreast, from one vessel to another.

(c) *Access to barges and river towboats.* (1) Ramps for access of vehicles to or between barges shall be of adequate strength, provided with side boards, well maintained and properly secured.

(2) Unless employees can step safely to or from the wharf, float, barge, or river towboat, either a ramp in accordance with the requirements of paragraph (a)(7) of this section shall be provided. When a walkway is impracticable, a substantial straight ladder, extending at least 36 inches above the upper landing surface and adequately secured against shifting or slipping, shall be provided. When conditions are such that neither a walkway nor a straight ladder can be used, a Jacob's ladder in accordance with the requirements of paragraph (d) of this section may be used.

(3) The means of access shall be in accordance with the requirements of paragraphs (a) (9), (10), and (11) of this section.

(d) *Jacob's ladders.* (1) Jacob's ladders shall be of the double rung or flat tread type. They shall be well maintained and properly secured.

(2) A Jacob's ladder shall either hang without slack from its lashings or be pulled up entirely.

§ 1915.75 Access to and guarding of dry docks and marine railways.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) A gangway, ramp or permanent stairway of not less than 20 inches walking surface, of adequate strength, maintained in safe repair and securely fastened, shall be provided between a floating dry dock and the pier or bulkhead.

(b) Each side of such gangway, ramp or permanent stairway, including those which are used for access to wing walls from dry dock floors, shall have a railing with a mid rail. Such railings on gangways or ramps shall be approximately 42 inches in height; and railings on permanent stairways shall be not less than approximately 30 or more than approximately 34 inches in height. Rails shall be of wood, pipe, chain, wire, or rope, and shall be kept taut at all times.

(c) Railings meeting the requirements of paragraph (b) of this section shall be provided on the means of access to and from the floors of graving docks.

(d) Railings approximately 42 inches in height, with a mid rail, shall be provided on the edges of wing walls of floating dry docks and on edges of graving docks. Sections of the railings may be temporarily removed where necessary to permit line handling while a vessel is entering or leaving the dock.

(e) When employees are working on the floor of a floating dry dock where they are exposed to the hazard of falling into the water, the end of the dry dock shall be equipped with portable stanchions and 42 inch railings with a mid rail. When such a railing would be impracticable or ineffective, other effective means shall be provided to prevent men from falling into the water.

(f) Access to wing walls from floors of dry docks shall be by ramps, permanent stairways or ladders meeting the applicable requirements of § 1915.72.

(g) Catwalks on stiles of marine railways shall be no less than 20 inches wide and shall have on at least one side a guardrail and midrail meeting the requirements of § 1915.71(j) (1) and (2).

§ 1915.76 Access to cargo spaces and confined spaces.

The provisions of this section apply to ship repairing, shipbuilding and shipbreaking except that paragraph (a)(4) of this section applies to ship repairing only.

(a) *Cargo spaces.* (1) There shall be at least one safe and accessible ladder in any cargo space which employees must enter.

(2) When any fixed ladder is visibly unsafe, the employer shall prohibit its use by employees.

(3) Straight ladders of adequate strength and suitably secured against shifting or slipping shall be provided as necessary when fixed ladders in cargo spaces do not meet the requirements of paragraph (a)(1) of this section. When conditions are such that a straight ladder cannot be used, a Jacob's ladder meeting the requirements of § 1915.74(d) may be used.

(4) When cargo is stowed within 4 inches of the back of ladder rungs, the ladder shall be deemed "unsafe" for the purpose of this section.

(5) Fixed ladders or straight ladders provided for access to cargo spaces shall not be used at the same time that cargo drafts, equipment, materials, scrap or other loads are entering or leaving the hold. Before using these ladders to enter or leave the hold, the employee shall be required to inform the winchman or crane signalman of his intention.

(b) *Confined spaces.* (1) More than one means of access shall be provided to a confined space in which employees are working and in which the work may generate a hazardous atmosphere in the space except where the structure or arrangement of the vessel makes this provision impractical.

(2) When the ventilation ducts required by these regulations must pass through these means of access, the ducts shall be of such a type and so arranged as to permit free passage of an employee through at least two of these means of access.

§ 1915.77 Working surfaces.

(a) Paragraphs (b) through (d) of this section shall apply to ship repairing, shipbuilding operations and shall not apply to shipbreaking. Paragraph (e) of this section shall apply to shipbuilding, ship repairing and shipbreaking operations.

(b) When firebox floors present tripping hazards of exposed tubing or of missing or removed refractory, sufficient planking to afford safe footing shall be laid while work is being carried on within the boiler.

(c) When employees are working aloft, or elsewhere at elevations more than 5 feet above a solid surface, either scaffolds or a sloping ladder, meeting the requirements of this subpart, shall be used to afford safe footing, or the employees shall be protected by safety belts and lifelines meeting the requirements of § 1915.154(b). Employees visually restricted by blasting hoods, welding helmets, and burning goggles shall work from scaffolds, not from ladders, except for the initial and final welding or burning operation to start or complete a job, such as the erection and dismantling of hung scaffolding, or other similar, nonrepetitive jobs of brief duration.

(d) For work performed in restricted quarters, such as behind boilers and in between congested machinery units and piping, work platforms at least 20 inches wide meeting the requirements of § 1915.71(i)(1) shall be used. Backrails may be omitted if bulkheading, boilers, machinery units, or piping afford proper protection against falling.

(e) When employees are boarding, leaving, or working from small boats or floats, they shall be protected by personal flotation devices meeting the requirements of § 1915.154.

Subpart F—General Working Conditions

§ 1915.91 Housekeeping.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking except that paragraphs (c) and (e) of this section do not apply to shipbreaking.

(a) Good housekeeping conditions shall be maintained at all times. Adequate aisles and passageways shall be maintained in all work areas. All staging platforms, ramps, stairways, walkways, aisles, and passageways on vessels or dry docks shall be kept clear of all tools, materials, and equipment except that which is in use, and all debris such as welding rod tips, bolts, nuts, and similar material. Hose and electric conductors shall be elevated over or placed under the walkway or working surfaces or covered by adequate crossover planks.

(b) All working areas on or immediately surrounding vessels and dry docks, graving docks, or marine railways shall be kept reasonably free of debris, and construction material shall be so piled as not to present a hazard to employees.

(c) Slippery conditions on walkways or working surfaces shall be eliminated as they occur.

(d) Free access shall be maintained at all times to all exits and to all fire-alarm boxes or fire-extinguishing equipment.

(e) All oils, paints thinners, solvents, waste, rags, or other flammable substances shall be kept in fire resistant covered containers when not in use.

§ 1915.92 Illumination.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) All means of access and walkways leading to working areas as well as the working areas themselves shall be adequately illuminated.

(b) Temporary lights shall meet the following requirements:

(1) Temporary lights shall be equipped with guards to prevent accidental contact with the bulb, except that guards are not required when the construction of the reflector is such that the bulb is deeply recessed.

(2) Temporary lights shall be equipped with heavy duty electric cords with connections and insulation maintained in safe condition. Temporary lights shall not be suspended by their electric cords unless cords and lights are designed for this means of suspension. Splices which have insulation equal to that of the cable are permitted.

(3) Cords shall be kept clear of working spaces and walkways or other locations in which they are readily exposed to damage.

(c) Exposed non-current-carrying metal parts of temporary lights furnished by the employer shall be grounded either through a third wire in the cable containing the circuit conductors or through a separate wire which is grounded at the source of the current. Grounding shall be in accordance with the requirements of § 1915.132(b).

(d) Where temporary lighting from sources outside the vessel is the only means of illumination, portable emergency lighting equipment shall be available to provide illumination for safe movement of employees.

(e) Employees shall not be permitted to enter dark spaces without a suitable portable light. The use of matches and open flame lights is prohibited. In nongas free spaces, portable lights shall meet the requirements of § 1915.13.

(f) Temporary lighting stringers or streamers shall be so arranged as to avoid overloading of branch circuits. Each branch circuit shall be equipped with overcurrent protection of capacity not exceeding the rated current carrying capacity of the cord used.

§ 1915.93 Utilities.

The provisions of this section shall apply to ship repairing, shipbuilding, and shipbreaking except that paragraph (c) of this section applies to ship repairing and shipbuilding only.

(a) *Steam supply and hoses.* (1) Prior to supplying a vessel with steam from a source outside the vessel, the employer shall ascertain from responsible vessel's representatives, having knowledge of the condition of the plant, the safe working pressure of the vessel's steam system. The employer shall install a pressure gauge and a relief valve of proper size and capacity at the point where the temporary steam hose joins the vessel's steam piping system or systems. The relief valve shall be set and capable of relieving at a pressure not exceeding the safe working pressure of the vessel's system in its present condition, and there shall be no means of isolating the relief valve from the system which it protects. The pressure gauge and relief valve shall be located so as to be visible and readily accessible.

(2) Steam hose and fittings shall have a safety factor of not less than five (5).

(3) When steam hose is hung in a bight or bights, the weight shall be relieved by appropriate lines. The hose shall be protected against chafing.

(4) Steam hose shall be protected from damage and hose and temporary piping shall be so shielded where passing through normal work areas as to prevent accidental contact by employees.

(b) *Electric power.* (1) When the vessel is supplied with electric power from a source outside the vessel, the following precautions shall be taken prior to energizing the vessel's circuits:

(i) If in dry dock, the vessel shall be adequately grounded.

(ii) The employer shall ascertain from responsible vessel's representatives, having knowledge of the condition of the vessel's electrical system, that all circuits to be energized are in a safe condition.

(iii) All circuits to be energized shall be equipped with overcurrent protection of capacity not exceeding the rated current carrying capacity of the cord used.

(c) *Infrared electrical heat lamps.* (1) All infrared electrical heat lamps shall be equipped with guards that surround the lamps with the exception of the face, to minimize accidental contact with the lamps.

§ 1915.94 Work in confined or isolated spaces.

The provisions of this section shall apply to ship repairing, shipbuilding and

shipbreaking. When any work is performed in a confined space, except as provided in § 1915–.51(c)(3), or when an employee is working alone in an isolated location, frequent checks shall be made to ensure the safety of the employees.

§ 1915.95 Work on or in the vicinity of radar and radio.

The provisions of this section shall apply to ship repairing and shipbuilding.

(a) No employees other than radar or radio repairmen shall be permitted to work on masts, king posts or other aloft areas unless the radar and radio are secured or otherwise made incapable of radiation. In either event, the radio and radar shall be appropriately tagged.

(b) Testing of radar or radio shall not be done until the employer can schedule such tests at a time when no work is in progress aloft or personnel can be cleared from the danger area according to minimum safe distances established for and based on the type, model, and power of the equipment.

§ 1915.96 Work in or on lifeboats.

The provisions of this section shall apply to ship repairing, shipbuilding, and shipbreaking except that paragraph (b) of this section applies to ship repairing and shipbuilding only.

(a) Before employees are permitted to work in or on a lifeboat, either stowed or in a suspended position, the employer shall ensure that the boat is secured independently of the releasing gear to prevent the boat from falling due to accidental tripping of the releasing gear and movement of the davits or capsizing of a boat in chocks.

(b) Employees shall not be permitted to remain in boats while the boats are being hoisted into final stowed position.

(c) Employees shall not be permitted to work on the outboard side of lifeboats stowed on their chocks unless the boats are secured by gripes or otherwise secured to prevent them from swinging outboard.

§ 1915.97 Health and sanitation.

The provisions of this section shall apply to ship repairing, shipbuilding, and shipbreaking except where indicated otherwise.

(a) No chemical product, such as a solvent or preservative; no structural material, such as cadmium or zinc coated steel, or plastic material; and no process material, such as welding filler metal; which is a hazardous material within the meaning of § 1915.3(v), shall be used until the employer has ascertained the potential fire, toxic, or reactivity hazards which are likely to be encountered in the handling, application, or utilization of such a material.

(b) In order to ascertain the hazards, as required by paragraph (a) of this section, the employer shall obtain the following items of information which are applicable to a specific product or material to be used:

(1) The name, address, and telephone number of the source of the information specified in this paragraph, preferably those of the manufacturer of the product or material.

(2) The trade name and synonyms for a mixture of chemicals, a basic structural material, or for a process material; and the chemical name and synonyms, chemical family, and formula for a single chemical.

(3) Chemical names of hazardous ingredients, including, but not limited to, those in mixtures, such as those in: (i) Paints, preservatives, and solvents; (ii) alloys, metallic coatings, filler metals and their coatings or core fluxes; and (iii) other liquids, solids, or gases (e.g., abrasive materials).

(4) An indication of the percentage, by weight of volume, which each ingredient of a mixture bears to the whole mixture, and of the threshold limit value of each ingredient, in appropriate units.

(5) Physical data about a single chemical or mixture of chemicals, including boiling point, in degrees Fahrenheit; vapor pressure, in millimeters of mercury; vapor density of gas or vapor (air=1); solubility in water, in percent by weight; specific gravity of material (water=1); percent volatile, by volume, at 70° F.; evaporation rate for liquids (either butyl acetate or ether may be taken as 1); and appearance and odor.

(6) Fire and explosion hazard data about a single chemical or a mixture of chemicals, including flash point, in degrees Fahrenheit; flammable limits, in percent by volume in air; suitable extinguishing media or agents; special fire fighting procedures; and unusual fire and explosion hazard information.

(7) Health hazard data, including threshold limit value, in appropriate units, for a single hazardous chemical or for the individual hazardous ingredients of a mixture, as appropriate; effects of overexposure; and emergency and first aid procedures.

(8) Reactivity data, including stability, incompatibility, hazardous decomposition products, and hazardous polymerization.

(9) Procedures to be followed and precautions to be taken in cleaning up and disposing of materials leaked or spilled.

(10) Special protection information, including use of personal protective equipment, such as respirators, eye protection, and protective clothing, and of ventilation, such as local exhaust, general, special, or other types.

(11) Special precautionary information about handling and storing.

(12) Any other general precautionary information.

(c) The pertinent information required by paragraph (b) of this section shall be recorded either on U.S. Department of Labor Form OSHA 20, Material Safety Data Sheet, or on an essentially similar form which has been approved by the Occupational Safety and Health Administration. Copies of form OSHA 20 may be obtained at any of the following regional offices of the Occupational Safety and Health Administration:

(1) Boston-Region I (Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island and Vermont):
U.S. Department of Labor, OSHA, JFK Federal Building, Room 1804, Government Center, Boston, Massachusetts 02203

(2) New York City, Region II (New Jersey, New York and Puerto Rico):
U.S. Department of Labor, OSHA, 1515 Broadway (1 Astor Plaza), Room 3445, New York, New York 10036

(3) Philadelphia, Region III (Delaware, District of Columbia, Maryland, Pennsylvania, Virginia and West Virginia):
U.S. Department of Labor, OSHA, Gateway Building, Suite 2100, 3535 Market Street, Philadelphia, Pennsylvania 19104

(4) Atlanta, Region IV (Alabama, Florida, Georgia, Kentucky, Mississippi, North Carolina, South Carolina and Tennessee):
U.S. Department of Labor, OSHA, 1375 Peachtree Street, N.E., Suite 587, Atlanta, Georgia 30309

(5) Chicago, Region V (Indiana, Illinois, Michigan, Minnesota, Ohio and Wisconsin):
U.S. Department of Labor, OSHA, 32nd Floor, Room 3263, 230 Dearborn Street, Chicago, Illinois 60604

(6) Dallas, Region VI (Arkansas, Louisiana, New Mexico, Oklahoma and Texas):
U.S. Department of Labor, OSHA, 555 Griffin Square Bldg., Room 602, Dallas, Texas 75202

(7) Kansas City, Region VII (Iowa, Kansas, Missouri and Nebraska):
U.S. Department of Labor, OSHA, 911 Walnut Street, Room 3000 Kansas City, Missouri 64106

(8) Denver, Region VIII (Colorado, Montana, North Dakota, South Dakota, Utah and Wyoming):
U.S. Department of Labor, OSHA, Federal Building, Room 1554, 1961 Stout Street, Denver, Colorado 80294

(9) San Francisco, Region IX (American Samoa, Arizona, California, Guam, Hawaii, Nevada, Trust Territories of the Pacific Islands):
U.S. Department of Labor, OSHA, 9470 Federal Building, 450 Golden Gate Avenue, P.O. Box 36017, San Francisco, California 94102

(10) Seattle, Region X (Alaska, Idaho, Oregon and Washington):
U.S. Department of Labor, OSHA, Federal Office Building, Room 6048, 909 First Avenue, Seattle, Washington 98174

A completed form shall be preserved and available for inspection for a period of 3 months from the date of the completion of the job.

(d) The employer shall instruct employees who will be exposed to the hazardous materials as to the nature of the hazards and the means of avoiding them.

(e) The employer shall provide all necessary controls, and the employees shall be protected by suitable personal protective equipment against the hazards identified under paragraph (a) of this section and those hazards for which specific precautions are required in Subparts B, C, and D of this part.

(f) The employer shall provide adequate washing facilities for employees engaged in the application of paints or coatings or in other operations where contaminants can, by ingestion or absorption, be detrimental to the health of the employees. The employer shall encourage good personal hygiene practices by informing the employees of the need for removing surface contaminants by thorough washing of hands and face prior to eating or smoking.

(g) The employer shall not permit employees to eat or smoke in areas undergoing surface preparation or preservation or where shipbreaking operations produce atmospheric contaminants.

(h) The employer shall not permit employees engaged in ship repair work on a vessel to work in the immediate vicinity of uncovered garbage and shall ensure that employees working beneath or on the outboard side of a vessel are not subject to contamination by drainage or waste from overboard discharges.

(i) No minor under 18 years of age shall be employed in shipbreaking or related employments.

§ 1915.98 First aid.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Unless a first aid room and a qualified attendant are close at hand and prepared to render first aid to employees on behalf of the employer, the employer shall furnish a first aid kit for each vessel on which work is being performed, except that when work is being performed on more than one small vessel at one pier, only one kit shall be required. The kit, when required, shall be kept close to the vessel and at least one employee, close at hand, shall be qualified to administer first aid to the injured.

(b) The first aid kit shall consist of a weatherproof container with individual sealed packages for each type of item. The contents of such kit shall contain a sufficient quantity of at least the following types of items:

Gauze roller bandages, 1 inch and 2 inch.
Gauze compress bandages, 4 inch.
Adhesive bandages, 1 inch.
Triangular bandage, 40 inch.
Ammonia inhalants and ampules.
Antiseptic applicators or swabs.
Burn dressing.
Eye dressing.
Wire or thin board splints.
Forceps and tourniquet.

(c) The contents of the first aid kit shall be checked before being sent out on each job and at least weekly on each job to ensure that the expended items are replaced.

(d) There shall be available for each vessel on which ten (10) or more employees are working one Stokes basket stretcher, or equivalent, permanently equipped with bridles for attaching to the hoisting gear, except that no more than two strechers are required on each job location. A blanket or other liner suitable for transferring the patient to and from the stretcher shall be provided. Stretchers shall be kept close to the vessels. This paragraph does not apply where ambulance services which are available are known to carry such stretchers.

Subpart G—Gear and Equipment for Rigging and Materials Handling

§ 1915.111 Inspection.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) All gear and equipment provided by the employer for rigging and materials handling shall be inspected before each shift and when necessary, at intervals during its use to ensure that it is safe. Defective gear shall be removed and repaired or replaced before further use.

(b) The safe working load of gear as specified in §§ 1915.112 and 1915.113 shall not be exceeded.

§ 1915.112 Ropes, chains and slings.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) *Manila rope and manila rope slings.* (1) Table G–1 in § 1915.118 shall be used to determine the safe working load of various sizes of manila rope and manila rope slings at various angles, except that higher safe working loads are permissible when recommended by the manufacturer for specific, identifiable products, provided that a safety factor of not less than five (5) is maintained.

(b) *Wire rope and wire rope slings.* (1) Tables G–2 through G–5 in § 1915.118 shall be used to determine the safe working loads of various sizes and classifications of improved plow steel wire rope and wire rope slings with various types of terminals. For sizes, classifications and grades not included in these tables, the safe working load recommended by the manufacturer for specific, identifiable products shall be followed, provided that a safety factor of not less than five (5) is maintained.

(2) Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

(3) Where U-bolt wire rope clips are used to form eyes, Table G–6 in § 1915.118 shall be used to determine the number and spacing of clips. The U-bolt shall be applied so that the "U" section is in contact with the dead end of the rope.

(4) Wire rope shall not be secured by knots.

(c) *Chains and chain slings.* (1) Tables G–7 and G–8 in § 1915.118 shall be used to determine the working load limit of various sizes of wrought iron and alloy steel chains and chain slings, except that higher safe working loads are permissible when recommended by the manufacturer for specific, identifiable products.

(2) All sling chains, including end fastenings, shall be given a visual inspection before being used on the job. A thorough inspection of all chains in use shall be made every 3 months. Each chain shall bear an indication of the month in which it was thoroughly inspected. The thorough inspection shall include inspection for wear, defective welds, deformation and increase in length or stretch.

(3) Interlink wear, not accompanied by stretch in excess of 5 percent, shall be noted and the chain removed from service when maximum allowable wear at any point of link, as indicated in Table G–9 in § 1915.18 has been reached.

(4) Chain slings shall be removed from service when, due to stretch, the increase in length of a measured section exceeds five (5) percent; when a link is bent, twisted or otherwise damaged; or when raised scarfs or defective welds appear.

(5) All repairs to chains shall be made under qualified supervision. Links or portions of the chain found to be defective as described in paragraph

(c)(4) of this section shall be replaced by links having proper dimensions and made of material similar to that of the chain. Before repaired chains are returned to service, they shall be proof tested to the proof test load recommended by the manufacturer.

(6) Wrought iron chains in constant use shall be annealed or normalized at intervals not exceeding six months when recommended by the manufacturer. The chain manufacturer shall be consulted for recommended procedures for annealing or normalizing. Alloy chains shall never be annealed.

(7) A load shall not be lifted with a chain having a kink or knot in it. A chain shall not be shortened by bolting, wiring or knotting.

§ 1915.113 Shackles and hooks.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) *Shackles.* (1) Table G–10 in § 1915.118 shall be used to determine the safe working loads of various sizes of shackles, except that higher safe working loads are permissible when recommended by the manufacturer for specific, identifiable products, provided that a safety factor of not less than (5) is maintained.

(b) *Hooks.* (1) The manufacturer's recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available shall be tested to twice the intended safe working load before they are initially put into use. The employer shall maintain a record of the dates and results of such tests.

(2) Loads shall be applied to the throat of the hook since loading the point overstresses and bends or springs the hook.

(3) Hooks shall be inspected periodically to see that they have not been bent by overloading. Bent or sprung hooks shall not be used.

§ 1915.114 Chain falls and pull-lifts.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Chain falls and pull-lifts shall be clearly marked to show the capacity and the capacity shall not be exceeded.

(b) Chain falls shall be regularly inspected to ensure that they are safe, particular attention being given to the lift chain, pinion, sheaves and hooks for distortion and wear. Pull-lifts shall be regularly inspected to ensure that they are safe, particular attention being given to the ratchet, pawl, chain and hooks for distortion and wear.

(c) Straps, shackles, and the beam or overhead structure to which a chain fall or pull-lift is secured shall be of adequate strength to support the weight of load plus gear. The upper hook shall be moused or otherwise secured against coming free of its support.

(d) Scaffolding shall not be used as a point of attachment for lifting devices such as tackles, chain falls, and pull-lifts unless the scaffolding is specifically designed for that purpose.

§ 1915.115 Hoisting and hauling equipment.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Derrick and crane certification:

(1) Derricks and cranes which are part of, or regularly placed aboard barges, other vessels, or on wingwalls of floating drydocks, and are used to transfer materials or equipment from or to a vessel or drydock, shall be tested and certificated in accordance with the standards provided in Part 1919 of this title by persons accredited for the purpose.

(b) The moving parts of hoisting and hauling equipment shall be guarded.

(c) Mobile crawler or truck cranes used on a vessel: (1) The maximum manufacturer's rated safe working loads for the various working radii of the boom and the maximum and minimum radii at which the boom may be safely used with and without outriggers shall be conspicuously posted near the controls and shall be visible to the operator. A radius indicator shall be provided.

(2) The posted safe working loads of mobile crawler or truck cranes under the conditions of use shall not be exceeded.

(d) Accessible areas within the swing radius of the outermost part of the body of a revolving derrick or crane wither permanently or temporarily mounted, shall be guarded in such a manner as to prevent an employee from being in such a position as to be struck by the crane or caught between the crane and fixed parts of the vessel or of the crane itself.

(e) *Marine railways.* (1) The cradle or carriage on the marine railway shall be positively blocked or secured when in the hauled position to prevent it from being accidentally released.

§ 1915.116 Use of gear.

(a) The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking except that paragraphs (c) and (d) of this section shall apply to ship repairing and shipbuilding only.

(b) Loads shall be safely rigged before being hoisted.

(c) Plates shall be handled on and off hulls by means of shackles whenever possible. Clips or pads of ample size shall be welded to the plate to receive the shackle pins when there are no holes in the plate. When it is not possible to make holes in or to weld pads to the plate, alligator tongs, grab clamps or screw clamps may be used. In such cases special precautions shall be taken to keep employees from under such lifts.

(d) Tag lines shall be provided on loads likely to swing or to need guidance.

(e) When slings are secured to eye-bolts, the slings shall be so arranged, using spreaders if necessary, that the pull is within 20 degrees of the axis of the bolt.

(f) Slings shall be padded by means of wood blocks or other suitable material where they pass over sharpe edges or corners of loads so as to prevent cutting or kinking.

(g) Skips shall be rigged to be handled by not less than 3 legged bridles, and all legs shall always be used. When open end skips are used, means shall be taken to prevent the contents from falling.

(h) Loose ends of idle legs of slings in use shall be hung on the hook.

(i) Employees shall not be permitted to ride the hook or the load.

(j) Loads (tools, equipment or other materials) shall not be swung or suspended over the heads of employees.

(k) Pieces of equipment or structure susceptible to falling or dislodgement shall be secured or removed as early as possible.

(l) An individual who is familiar with the signal code in use shall be assigned to act as a signalman when the hoist operator cannot see the load being handled. Communications shall be made by means of clear and distinct visual or auditory signals except that verbal signals shall not be permitted.

(m) Pallets, when used, shall be of such material and contruction and so maintained as to safely support and carry the loads being handled on them.

(n) A section of hatch through which materials or equipment are being raised, lowered, moved, or otherwise shifted manually or by a crane, winch, hoist, or derrick, shall be completely opened. The beam or pontoon left in place adjacent to an opening shall be sufficiently lashed, locked or otherwise secured to prevent it from being unshipped so that it cannot be displaced by accident.

(o) Hatches shall not be open or closed while employees are in the square of the hatch below.

(p) Before loads or empty lifting gear are raised, lowered, or swung, clear and sufficient advance warning shall be given to employees in the vincinity of such operations.

(q) At no time shall an employee be permitted to place himself in a hazardous position between a swinging load and a fixed object.

§ 1915.117 Qualifications of operators.

Paragraphs (a) and (d) of this section shall apply to ship repairing and shipbuilding only. Paragraphs (b) and (c) of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) When ship's gear is used to hoist materials aboard, a competent person shall determine that the gear is properly rigged, that it is in safe condition, and that it will not be overloaded by the size and weight of the lift.

(b) Only those employees who understand the signs, notices, and operating instructions, and are familiar with the signal code in use, shall be permitted to operate a crane, winch, or other power operated hoisting apparatus.

(c) No employee known to have defective uncorrected eyesight or hearing, or to be suffering from heart disease, epilepsy, or similar ailments which may suddenly incapacitate him, shall be permitted to operate a crane, winch or other power operated hoisting apparatus.

(d) No minor under eighteen (18) years of age shall be employed in occupations involving the operation of any power-driven hoisting apparatus or assisting in such operations by work such as hooking on, loading slings, rigging gear, etc.

§ 1915.118 Tables

The provisions of this section apply to ship repairing, shipbuilding and shipbreaking.

TABLE E-1.—DIMENSIONS AND SPACING OF WOOD INDEPENDENT-POLE SCAFFOLD MEMBERS

Structural members	Light duty (Up to 25 pounds per square foot)—Height in feet			Heavy duty (25 to 75 pounds per square foot)—Height in feet		
	24 or less	24–40	40–60	24 or less	24–40	40–60
Poles or uprights (in inches)	2 x 4	3 x 4 or 2 x 6	4 x 4	3 x 4	4 x 4	4 x 6
Bearers (in inches)	2 x 6	2 x 6	2 x 6	2 x 8	2 x 8	2 x 10
Ledgers (in inches)	2 x 6	2 x 6	2 x 6	2 x 8	2 x 8	2 x 8
Stringers (not supporting bearers) (in inches)	1 x 6	1 x 6	1 x 6	1 x 6	1 x 6	1 x 6
Braces (in inches)	1 x 4	1 x 6	1 x 6	1 x 6	1 x 6	1 x 6
Pole spacing—longitudinally (in feet)	7½	7½	7½	7	7	7
Pole spacing—transversely (in feet)	6½ min	7½ min	8½ min	6½	10	10
Ledger spacing—vertically (in feet)	7	7	7	4½	4½	4½

TABLE E-2.—SPECIFICATIONS FOR SIDE RAILS OF LADDERS

Length (in feet)	Cross section (in inches)	
	At ends	At center
15	1⅞ x 2¾	1⅞ x 3¾
16	1⅞ x 2¾	1⅞ x 3¾
18	1⅞ x 3	1⅞ x 4
20	1⅞ x 3	1⅞ x 4
24	1⅞ x 3	1⅞ x 4½

TABLE E-3.—SPECIFICATIONS FOR THE CONSTRUCTION OF HORSES

Structural members	Height in feet		
	Up to 10	10 to 16	16 to 20
	inches	*inches*	*inches*
Legs	2 x 4	3 x 4	4 x 6
Bearers or headers	2 x 6	2 x 8	4 x 6
Crossbraces	2 x 4 or 1 x 8	2 x 4	2 x 6
Longitudinal braces	2 x 4	2 x 6	2 x 6

TABLE E-4.—SAFE CENTER LOADS FOR SCAFFOLD PLANK OF 1,100 POUNDS FIBRE STRESS

Span in feet	Lumber dimensions in inches									
	A	B	A	B	A	B	A	B	A	B
	2 x 10	1⅝ x 9½	2 x 12	1⅝ x 11½	3 x 8	2⅝ x 7½	3 x 10	2⅝ x 9½	3 x 12	2⅝ x 11½
6	256		309		526		667		807	
8	192		232		395		500		605	
10	153		186		316		400		484	
12	128		155		263		333		404	
14	110		133		225		286		346	
16			116		197		250		303	

(A)—Rough lumber.
(B)—Dressed lumber.

TABLE G-1.—MANILA ROPE

[In pounds or tons of 2,000 pounds]

Circumferences	Diameter in inches	Single leg	60° bridle	45° bridle	30° bridle
		lbs.	lbs.	lbs.	lbs.
¾	¼	120	204	170	120
1	5/16	200	346	282	200
1⅛	⅜	270	467	380	270
1¼	7/16	350	605	493	350
1⅜	1 1/32	450	775	635	450

TABLE G-1.—MANILA ROPE—Continued

[In pounds or tons of 2,000 pounds]

Circumferences	Diameter in inches	Single leg	60° bridle	45° bridle	30° bridle
		lbs.	lbs.	lbs.	lbs.
1½	½	530	915	798	530
1⅝	9/16	690	1190	973	690
2	⅝	880	1520	1240	880
2¼	¾	1080	1870	1520	1080
2½	1 3/16	1300	2250	1830	1300
2¾	⅞	1540	2660	2170	1540
3	1	1800	3120	2540	1800
		Tons	Tons	Tons	Tons
3⅛	1 1/16	1.0	1.7	1.4	1.0
3½	1⅛	1.2	2.1	1.7	1.2
3¾	1¼	1.35	2.3	1.9	1.35
4	1 5/16	1.5	2.6	2.1	1.5
4½	1½	1.8	3.1	2.5	1.8
5	1⅝	2.25	3.9	3.2	2.25
5½	1¾	2.6	4.5	3.7	2.6
6	2	3.1	5.4	4.4	3.1
6½	2⅛	3.6	6.2	5.1	3.6

TABLE G-2.—RATED CAPACITIES FOR IMPROVED PLOW STEEL, INDEPENDENT WIRE ROPE CORE, WIRE ROPE AND WIRE ROPE SLINGS

[In tons of 2,000 pounds]

Rope diameter	Single leg					
	Vertical			Choker		
	A	B	C	A	B	C
	6 x 19 Classification					
¼"	.59	.56	.53	.44	.42	.40
⅜"	1.3	1.2	1.1	.98	.93	.86
½"	2.3	2.2	2.0	1.7	1.6	1.5
⅝"	3.6	3.4	3.0	2.7	2.5	2.2
¾"	5.1	4.9	4.2	3.8	3.6	3.1
⅞"	6.9	6.6	5.5	5.2	4.9	4.1
1"	9.0	8.5	7.2	6.7	6.4	5.4
1⅛"	11	10	9.0	8.5	7.8	6.8
	6 x 37 Classification					
1¼"	13	12	10	9.9	9.2	7.9
1⅜"	16	15	13	12	11	9.6
1½"	19	17	15	14	13	11
1¾"	26	24	20	19	18	15
2"	33	30	26	25	23	20
2¼"	41	38	33	31	29	25

(A)—Socket or Swaged Terminal attachment.
(B)—Mechanical Sleeve attachment.
(C)—Hand Tucked Splice attachment.

TABLE G-3.—RATED CAPACITIES FOR IMPROVED PLOW STEEL, INDEPENDENT WIRE ROPE CORE, WIRE ROPE SLINGS

[In tons of 2,000 pounds]

Rope diameter	Two-leg bridle or basket hitch											
	Vertical			60° bridle			45° bridle			30° bridle		
	A	B	C	A	B	C	A	B	C	A	B	C
	6 x 19 Classification											
¼"	1.2	1.1	1.0	1.0	.97	.92	.83	.79	.75	.59	.56	.53
⅜"	2.6	2.5	2.3	2.3	2.1	2.0	1.8	1.8	1.6	1.3	1.2	1.1
½"	4.6	4.4	3.9	4.0	3.8	3.4	3.2	3.1	2.8	2.3	2.2	2.0
⅝"	7.2	6.8	6.0	6.2	5.9	5.2	5.1	4.8	4.2	3.6	3.4	3.0
¾"	10	9.7	8.4	8.9	8.4	7.3	7.2	6.9	5.9	5.1	4.9	4.2
⅞"	14	13	11	12	11	9.6	9.8	9.3	7.8	6.9	6.6	5.5
1"	18	17	14	15	15	12	13	12	10	9.0	8.5	7.2
1⅛"	23	21	18	19	18	16	16	15	13	11	10	9.0
	6 x 37 Classification											
1¼"	26	24	21	23	21	18	19	17	15	13	12	10
1⅜"	32	29	25	28	25	22	22	21	18	16	15	13
1½"	38	35	30	33	30	26	27	25	21	19	17	15
1¾"	51	47	41	44	41	35	36	33	29	26	24	20
2"	66	621	53	57	53	46	47	43	37	33	30	26
2¼"	83	76	66	72	66	57	58	54	47	41	38	33

(A)—Socket or Swaged Terminal Attachment.
(B)—Mechanical Sleeve Attachment.
(C)—Hand Tucked Splice Attachment.

TABLE G-4.—RATED CAPACITIES FOR IMPROVED PLOW STEEL, FIBER CORE, WIRE ROPE AND WIRE ROPE SLINGS

[in tons of 2,000 pounds]

Rope diameter	Single leg					
	Vertical			Choker		
	A	B	C	A	B	C
6 x 19 Classification						
¼"	.55	.51	.49	.41	.38	.37
⅜"	1.2	1.1	1.1	.91	.85	.80
½"	2.1	2.0	1.8	1.6	1.5	1.4
⅝"	3.3	3.1	2.8	2.5	2.3	2.1
¾"	4.8	4.4	3.9	3.6	3.3	2.9
⅞"	6.4	5.9	5.1	4.8	4.5	3.9
1"	8.4	7.7	6.7	6.3	5.8	5.0
1⅛"	10	9.5	8.4	7.9	7.1	6.3
6 x 37 Classification						
1¼"	12	11	9.8	9.2	8.3	7.4
1⅜"	15	13	12	11	10	8.9
1½"	17	16	14	13	12	10
1¾"	24	21	19	18	16	14
2"	31	28	25	23	21	18

(A)—Socket or Swaged Terminal attachment.
(B)—Mechanical Sleeve attachment.
(C)—Hand Tucked Splice attachment.

TABLE G-5—RATED CAPACITIES FOR IMPROVED PLOW STEEL, FIBER CORE, WIRE ROPE SLINGS

[In tons of 2,000 pounds]

Rope diameter	Two-leg bridle or basket hitch											
	Vertical			60° bridle			45° bridle			30° bridle		
	A	B	C	A	B	C	A	B	C	A	B	C
6 × 19 Classification												
¼"	1.1	1.0	.99	.95	.88	.85	.77	.72	.70	.55	.51	.49
⅜"	2.4	2.2	2.1	2.1	1.9	1.8	1.7	1.6	1.5	1.2	1.1	1.1
½"	4.3	3.9	3.7	3.7	3.4	3.2	3.0	2.8	2.6	2.1	2.0	1.8
⅝"	6.7	6.2	5.6	5.8	5.3	4.8	4.7	4.4	4.0	3.3	3.1	2.8
¾"	9.5	8.8	7.8	8.2	7.6	6.8	6.7	6.2	5.5	4.8	4.4	3.9
⅞"	13	12	10	11	10	8.9	9.1	8.4	7.3	6.4	5.9	5.1
1"	17	15	13	14	13	11	12	11	9.4	8.4	7.7	6.7
1⅛"	21	19	17	18	16	14	15	13	12	10	9.5	8.4
6 × 37 Classification												
1¼"	25	22	20	21	19	17	17	16	14	12	11	9.8
1⅜"	30	27	24	26	23	20	21	19	17	15	13	12
1½"	35	32	28	30	27	24	25	22	20	17	16	14
1¾"	48	43	38	41	37	33	34	30	27	24	21	19
2"	62	55	49	53	48	43	43	39	35	31	28	25

(A)—Socket or Swaged Terminal attachment.
(B)—Mechanical Sleeve attachment.
(C)—Hand Tucked Splice attachment.

TABLE G-6—NUMBER AND SPACING OF U-BOLT WIRE ROPE CLIPS

Improved plow steel, rope diameter, inches	Number of clips		Minimum spacing, inches
	Drop forged	Other material	
(1)			
½	3	4	3
⅝	3	4	3¾
¾	4	5	4½
⅞	4	5	5¼
1	4	6	6
1⅛	5	6	6¾
1¼	5	7	7½
1⅜	6	7	8¼
1½	6	8	9

[1] Three clips shall be used on wire size less than ⅛-inch diameter.

TABLE G-7—WROUGHT IRON CHAIN

[In pounds or tons of 2,000 pounds]

Nominal size chains stock	Single leg	60° bndle	45° birdle	30° bndle
¼" [1]	1060	1835	1500	1060
5/16" [1]	1655	2865	2340	1655
⅜" [1]	2385	2.1	3370	2385
7/16" [1]	3250	2.8	2.3	3250
½"	2.1	3.7	3.0	2.1
9/16" [1]	2.7	4.6	3.8	2.7
⅝"	3.3	5.7	4.7	3.3
¾"	4.8	8.3	6.7	4.8
⅞"	6.5	11.2	9.2	6.5
1"	8.5	14.7	12.0	8.5
1⅛"	10.0	17.3	14.2	10.0
1¼"	12.4	21.4	17.5	12.4
1⅜"	15.0	25.9	21.1	15.0
1½"	17.8	30.8	25.2	17.8
1⅝"	20.9	36.2	29.5	20.9
1¾"	24.2	42.0	34.3	24.2
1⅞"	27.6	47.9	39.1	27.6
2"	31.6	54.8	44.8	31.6

[1] These sizes of wrought iron chain are no longer manufactured in the United States.

TABLE G-8.—ALLOY STEEL CHAIN

(In tons of 2,000 pounds)

Nominal size chain stock	Single leg	60° bndle	45° bndle	30° bridle
¼"	1.62	2.82	2.27	1.62
⅜"	3.30	5.70	4.65	3.30
½"	5.62	9.75	7.90	5.62
⅝"	8.25	14.25	11.65	8.25
¾"	11.5	19.9	16.2	11.5
⅞"	14.3	24.9	20.3	14.3
1"	19.3	33.5	27.3	19.8
1⅛"	22.2	38.5	31.5	22.2
1¼"	28.7	49.7	40.5	28.7
1⅜"	33.5	58.0	47.0	33.5
1½"	39.7	68.5	56.0	39.7
1⅝"	42.5	73.5	59.5	42.5
1¾"	47.0	81.5	62.0	47.0

TABLE G-9.—MAXIMUM ALLOWABLE WEAR AT ANY POINT OF LINK

Chain size in inches	Maximum allowable wear in fraction of inches
¼(5/32)	3/64
⅜	5/64
½	7/64
⅝	9/64
¾	5/32
⅞	11/64
1	3/16
1⅛	7/32
1¼	¼
1⅜	9/32
1½	5/16
1¾	11/32

TABLE G-10.—SAFE WORKING LOADS FOR SHACKLES

[In tons of 2,000 pounds]

Material size (inches)	Pin diameter (inches)	Safe working load
½	⅝	1.4
⅝	¾	2.2
¾	⅞	3.2
⅞	1	4.3
1	1⅛	5.6
1⅛	1¼	6.7
1¼	1⅜	8.2
1⅜	1½	10.0
1½	1⅝	11.9
1¾	2	16.2
2	2¼	21.2

TABLE I-1.—FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY

Operation	Shade No.
Soldering	2.
Torch Brazing	3 or 4.
Light cutting, up to 1 inch	3 or 4.
Medium cutting, 1–6 inches	4 or 5.
Heavy cutting, over 6 inches	5 or 6.
Light gas welding, up to ⅛ inch.	4 or 5.
Medium gas welding, ⅛–½ inch.	5 or 6.
Heavy gas welding, over ½ inch.	6 or 8.
Shielded Metal-Arc Welding 1/16 to 5/32-inch electrodes.	10.
Inert-gas Metal-Arc Welding (Non-ferrous) 1/16- to 5/32-inch electrodes.	11.
Shielded Metal-Arc Welding: 5/32-to ¼-inch electrodes	12.

TABLE I-1.—FILTER LENSES FOR PROTECTION AGAINST RADIANT ENERGY—Continued

Operation	Shade No.
5/32- and 3/16-inch electrodes	14.

Subpart H—Tools and Related Equipment

§ 1915.131 General precautions.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Hand lines, slings, tackles of adequate strength, or carriers such as tool bags with shoulder straps shall be provided and used to handle tools, materials, and equipment so that employees will have their hands free when using ship's ladders and access ladders. The use of hose or electric cords for this purpose is prohibited.

(b) When air tools of the reciprocating type are not in use, the dies and tools shall be removed.

(c) 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 are 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 are 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.

(d) The moving parts of machinery on dry dock shall be guarded.

(e) Before use, pneumatic tools shall be secured to the extension hose or whip by some positive means to prevent the tool from becoming accidentally disconnected from the whip.

(f) The moving parts of drive mechanisms, such as gearing and belting on large portable tools, shall be adequately guarded.

(g) Headers, manifolds and widely spaced hose connection on compressed air lines shall bear the work "air" in letters at least 1 inch high, which shall be painted either on the manifold or separate hose connections, or on signs permanently attached to the manifolds or connections. Grouped air connections may be marked in one location.

(h) Before use, compressed air hose shall be examined. Visibly damaged and unsafe hose shall not be used.

§ 1915.132 Portable electric tools.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking except that paragraph (e) of this section applies to ship repairing only.

(a) The frames of portable electric tools and appliances, except double insulated tools approved by Underwriters' Laboratories, shall be grounded either through a third wire in the cable containing the circuit conductors or through a separate wire which is grounded at the source of the current.

(b) Grounding circuits, other than by means of the structure of the vessel on which the tool is being used, shall be checked to ensure that the circuit between the ground and the grounded power conductor has resistance which is low enough to permit sufficient current to flow to cause the fuse or circuit breaker to interrupt the current.

(c) Portable electric tools which are held in the hand shall be equipped with switches of a type which must be manually held in the closed position.

(d) Worn or frayed electric cables shall not be used.

(e) The employer shall notify the officer in charge of the vessel before using electric power tools operated with the vessel's current.

§ 1915.133 Hand tools.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

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

(b) Wrenches, including crescent, pipe, end and socket wrenches, shall not be used when jaws are sprung to the point that slippage occurs.

(c) Impact tools, such as drift pins, wedges, and chisels, shall be kept free of mushroomed heads.

(d) The wooden handles of tools shall be kept free of splinters or cracks and shall be kept tight in the tool.

§ 1915.134 Abrasive wheels.

This section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) Floor stand and bench mounted abrasive wheels used for external grinding shall be provided with safety guards (protection hoods). The maximum angular exposure of the grinding wheel periphery and sides shall be not more than 90 degrees, except that when work requires contact with the wheel below the horizontal plane of the spindle, the angular exposure shall not exceed 125 degrees. In either case the exposure shall begin not more than 65 degrees above the horizontal plane of the spindle. Safety guards shall be strong enough to withstand the effect of a bursting wheel.

(b) Floor and bench mounted grinders shall be provided with work rests which are rigidly supported and readily adjustable. Such work rests shall be kept a distance not to exceed 1/8 inch from the surface of the wheel.

(c) Cup type wheels used for external grinding shall be protected by either a revolving cup guard or a band type guard in accordance with the provisions of the United States of America Standard Safety Code for the Use, Care, and Protection of Abrasive Wheels, B7.1. All other portable abrasive wheels used for external grinding shall be provided with safety guards (protection hoods) meeting the requirements of paragraph (e) of this section, except as follows:

(1) When the work location makes it impossible, in which case a wheel equipped with safety flanges as described in paragraph (f) of this section shall be used.

(2) When wheels 2 inches or less in diameter which are securely mounted on the end of a steel mandrel are used.

(d) Portable abrasive wheels used for internal grinding shall be provided with safety flanges (protection flanges) meeting the requirements of paragraph (f) of this section, except as follows:

(1) When wheels 2 inches or less in diameter which are securely mounted on the end of a steel mandrel are used.

(2) If the wheel is entirely within the work being ground while in use.

(e) When safety guards are required, they shall be so mounted as to maintain proper alignment with the wheel, and the guard and its fastenings shall be of sufficient strength to retain fragments of the wheel in case of accidental breakage. The maximum angular exposure of the grinding wheel periphery and sides shall not exceed 180 degrees.

(f) When safety flanges are required, they shall be used only with wheels designed to fit the flanges. Only safety flanges of a type and design and properly assembled so as to insure that the pieces of the wheel will be retained in case of accidental breakage shall be used.

(g) All abrasive wheels shall be closely inspected and ring tested before mounting to ensure that they are free from cracks or defects.

(h) Grinding wheels shall fit freely on the spindle and shall not be forced on. The spindle nut shall be tightened only enough to hold the wheel in place.

(i) The power supply shall be sufficient to maintain the rated spindle speed under all conditions of normal grinding. The rated maximum speed of the wheel shall not be exceeded.

(j) All employees using abrasive wheels shall be protected by eye protection equipment in accordance with the requirements of §§ 1915.151 (a) and (b), except when adequate eye protection is afforded by eye shields which are permanently attached to the bench or floor stand.

§ 1915.135 Powder actuated fastening tools.

(a) The section shall apply to ship repairing and shipbuilding only.

(b) General precautions. (1) Powder actuated fastening tools shall be tested each day before loading to ensure that the safety devices are in proper working condition. Any tool found not to be in proper working order shall be immediately removed from service until repairs are made.

(2) Powder actuated fastening tools shall not be used in an explosive or flammable atmosphere.

(3) All tools shall be used with the type of shield or muzzle guard appropriate for a particular use.

(4) Fasteners shall not be driven into very hard or brittle materials such as cast iron, glazed tile, surface hardened steel, glass block, live rock, face brick or hollow title.

(5) Fasteners shall not be driven into soft materials unless such materials are backed by a substance that will prevent the pin or fastener from passing completely through and creating a flying missile hazard on the opposite side.

(6) Unless a special guard, fixture or jig is used, fasteners shall not be driven directly into materials such as brick or concrete within 3 inches of the unsupported edge or corner, or into steel surfaces within ½ inch of the unsupported edge or corner. When fastening other material, such as 2 x 4 inch lumber to a concrete surface, fasteners of greater than 7/32 inch shank diameter shall not be used and fasteners shall not be driven within 2 inches of the unsupported edge or corner of the work surface.

(7) Fasteners shall not be driven through existing holes unless a positive guide is used to secure accurate alignment.

(8) No attempt shall be made to drive a fastener into a spalled area caused by an unsatisfactory fastening.

(9) Employees using powder actuated fastening tools shall be protected by eye protection equipment in accordance with the requirements of §§ 1915.151 (a) and (b).

(c) Instruction of operators. Before employees are permitted to use powder actuated tools, they shall have been thoroughly instructed by a competent person with respect to the requirements of paragraph (b) of this section and the safe use of such tools as follows:

(1) Before using a tool, the operator shall inspect it to determine that it is clean, that all moving parts operate freely and that the barrel is free from obstructions.

(2) When a tool develops a defect during use, the operator shall immediately cease to use it and shall notify his supervisor.

(3) Tools shall not be loaded until just prior to the intended firing time and the tool shall not be left unattended while loaded.

(4) The tool, whether loaded or empty, shall not be pointed at any person, and hands shall be kept clear of the open barrel end.

(5) In case of a misfire, the operator shall hold the tool in the operating position for at least 15 seconds and shall continue to hold the muzzle against the work surface during disassembly or opening of the tool and removal of the powder load.

(6) Neither tools nor powder charges shall be left unattended in places where they would be available to unauthorized persons.

§ 1915.136 Internal combustion engines, other than ship's equipment.

The provisions of this section shall apply to ship repairing, shipbuilding and shipbreaking.

(a) When internal combustion engines furnished by the employer are used in a fixed position below decks, for such purposes as driving pumps, generators, and blowers, the exhaust shall be led to the open air, clear of any ventilation intakes and openings through which it might enter the vessel.

(b) All exhaust line joints and connections shall be checked for tightness immediately upon starting the engine, and any leaks shall be corrected at once.

(c) When internal combustion engines on vehicles, such as forklifts and mobile cranes, or on portable equipment such as fans, generators, and pumps exhaust into the atmosphere below decks, the competent person shall make tests of the carbon monoxide content of the atmosphere as frequently as conditions require to ensure that dangerous concentrations do not develop. Employees shall be removed from the compartment involved when the carbon monoxide concentration exceeds 50 parts per million (0.005%). The employer shall use blowers sufficient in size and number and so arranged as to maintain the concentration below this allowable limit before work is resumed.

Subpart I—Personal Protective Equipment

§ 1915.151 Eye protection.

(a) *General precautions.* (1) All eye protection equipment required by these regulations shall meet the specifications prescribed by the American Standard Safety Code for Head, Eye and Respiratory Protection, Z2.1.

(2) Eye protection equipment shall be maintained in good condition.

(3) Eye protection equipment which has previously been used shall be cleaned and disinfected before it is issued by the employer to another employee.

(4) Employees who wear corrective spectacles while engaged in eye hazardous work shall be protected by eye protection equipment of a type which can be worn over personnel spectacles, except that glasses with prescription ground safety lenses may be worn in lieu of cover goggles when such glasses provide suitable protection against the hazard involved.

(b) *Protection against impact.* (1) In any operations such as chipping, caulking, drilling, riveting, grinding, and pouring babbitt metal, in which the eye hazard of flying particles, molten metal, or liquid chemical exists, employees shall be protected by suitable face shields or goggles meeting the requirements of paragraph (a) of this section.

(c) *Protection against radiant energy.* (1) In any operation in which the eye hazard of injurious light rays or other radiant energy exists, depending upon the intensity of the radiation to which employees are exposed, they shall be protected by spectacles, cup goggles, helmets, hand shields, or face shields equipped with filter lenses meeting the requirements of paragraphs (a) and (c)(2) of this section.

(2) Filter lenses shall be of a shade number appropriate to the type of work to be performed as indicated in Table I–1 in § 1915.118, except that variation of one or two shade numbers are permissible to suit individual preferences.

(3) If filter lenses are used in the goggles worn under the helmet, the shade number of the lens in the helmet may be reduced so that the sum of the shade numbers of the two lenses will equal the value shown in Table I–1 in § 1915.118.

§ 1915.152 Respiratory protection.

(a) *General.* (1) All respiratory equipment required by this Part shall be approved for the use for which it is intended by the Mine Safety and Health

Administration and the National Institute of Occupational Safety and Health pursuant to the provisions of 30 CFR Part 11. Respiratory protective equipment shall be used only for the purpose intended and no modifications of the equipment shall be made.

(2) Respiratory protective equipment shall be inspected regulatory and maintained in good condition. Gas mask canisters and chemical cartridges shall be replaced as necessary so as to provide complete protection. Mechanical filters shall be cleaned or replaced as necessary so as to avoid undue resistance to breathing.

(3) Respiratory protective equipment which has been previously used shall be cleaned and disinfected before it is issued by the employer to another employee. Emergency rescue equipment shall be cleaned and disinfected immediately after each use.

(4) Employees required to use respiratory protective equipment approved for use in atmospheres immediately dangerous to life shall be thoroughly trained in its use. Employees required to use other types of respiratory protective equipment shall be instructed in the use and limitations of such equipment.

(5) When an air line respirator is used, the air line shall be fitted with a pressure regulating valve and a filter which will remove oil water and rust particles. The air intake shall be from a source which is free from all contaminants, such as the exhaust from internal combustion engines.

(6) In all cases when an employee is stationed outside a compartment, tank or space as a tender or safety man for men working inside in an atmosphere immediately dangerous to life, the tender shall have immediately available for emergency use respiratory protective equipment equivalent to that required for the men in the compartment. When a tender is stationed outside a compartment for men working inside in an atmosphere not immediately dangerous to life, the tender shall wear respiratory protective equipment equivalent to that required for the men in the compartment if he is exposed for prolonged periods to the same concentration of atmospheric contaminants.

(b) *Protection in atmospheres immediately dangerous to life.* (1) Atmospheres immediately dangerous to life are those which contain less than 16.5 percent oxygen, or which by reason of the high toxicity of the contaminant, as in fumigation, or high concentration of the contaminant, as with carbon dioxide, would endanger the life of a person breathing them for even a short period of time.

(2) In atmospheres immediately dangerous to life the only approved types of respiratory protective equipment are the following:

(i) Self-contained breathing apparatus, in which the wearer carries with him a supply of oxygen, air, or an oxygen generating material.

(ii) Hose mask with blower, in which a hand or motor operated blower supplies air at high volume and low pressure through a large diameter hose through which the wearer can draw air in case the blower fails.

(iii) If there is known to be more than 16 percent oxygen and less than 2 percent gas by volume, a gas mask equipped with a canister approved for the particular type gas involved.

Note.—A gas mask offers absolutely no protection in an atmosphere deficient in oxygen.

(3) Work in atmospheres immediately dangerous to life shall be performed only in an emergency, as when rescuing a man who has been overcome or when shutting off a source of contamination that cannot otherwise be controlled. When an employee enters such an atmosphere he shall be provided with and use an adequate, attended life line.

(4) In the vicinity of each vessel in which there is a danger of employees being exposed to an atmosphere immediately dangerous to life, the employer shall have on hand and ready for use respiratory protective equipment approved for such use. When such equipment is required, one or more persons shall be thoroughly trained in the use of the equipment.

(c) *Protection against gaseous contaminants not immediately dangerous to life.* (1) Gaseous contaminants not immediately dangerous to life are gases present in concentrations that could be breathed for a short period without endangering the life of a person breathing them, but which might produce discomfort and possible injury after a prolonged single exposure or repeated short exposures.

(2) When employees are exposed to a gaseous contaminated atmosphere not immediately dangerous to life, they shall be protected by respiratory protective equipment approved for use in the type and concentration of the gaseous contaminant as follows:

(i) In high or unknown concentrations, a hose mask or an air line respirator. The use of either a hose mask or an air line respirator in lower concentrations is permissible.

(ii) In concentrations of ammonia of less than 3 percent, or of other gases less than 2 percent, by volume, a canister type gas mask equipped with the proper type of canister. Different canisters are approved for specific use against the following gases or groups of gases: Acid gases, hydrocyanic acid gas, chlorine gas, organic vapors, ammonia gas, carbon monoxide, or combination of the above.

(iii) In low concentrations (less than 0.1 percent by volume), a chemical cartridge respirator equipped with the type of cartridge approved for use against the particular gases or groups of gases listed in paragraph (c)(2)(ii) of this section.

(d) *Protection against particulate contaminants not immediately dangerous to life.* (1) When employees are exposed to unsafe concentrations of particular contaminants, such as dusts and fumes, mists and fogs or combinations of solids and liquids, they shall be protected by either air line or filter respirators, except as otherwise provided in this part.

(2) Filter respirators shall be equipped with the proper type of filter. Different filters are approved for specific protection against groups of contaminants, as follows:

(i) Pneumoconiosis-producing dust and nuisance dust filters which provide respiratory protection against pneumoconiosis-producing dusts, such as aluminum, cellulose, cement, charcoal, coal, coke, flour, gypsum, iron ore, limestone and wood.

(ii) Toxic dust filters which provide respiratory protection against toxic dusts that are not significantly more toxic than lead, such as arsenic, cadmium, chromium, lead, manganese, selenium, vanadium, and their compounds.

(iii) Mist filters which provide respiratory protection against pneumoconiosis-producting mists, chromic acid mists, and nuisance mists.

(iv) Fume filters which provide respiratory protection against fumes (solid dispersoids or particulate matter formed by the condensation of vapors, such as those from heated metals and other substances).

(v) Filters which provide respiratory protection against combinations of two or more of the contaminants described in paragraphs (d)(2) (i) through (iv) of this section.

(e) *Protection against combinations of gaseous and particulate contaminants not immediately dangerous to life.* (1) When employees are exposed to combinations of gaseous and particulate contaminants not immediately dangerous to life, as in spray painting they shall be protected by respiratory

protective equipment approved for use in the type and concentration of the contaminants, as follows:

(i) In high or unknown concentrations, a hose mask or an air line respirator. The use of either a hose mask or an air line respirator is permissible in lower concentrations.

(ii) In concentrations of gaseous contaminants of less than 2 percent by volume, a canister type gas mask with a combination canister approved for the particular type of gaseous contaminant as specified in paragraph (c)(2) of this section and a filter for the particular type of particulate contaminant as specified in paragraph (d)(1) of this section.

(iii) In low concentrations of gaseous contaminants (less than 0.1 percent by volume) a respirator equipped with the type of cartridge and filter as specified in paragraph (e)(ii) of this section.

§ 1915.153 Head, foot and body protection.

(a) When employees are working in areas where there is danger of falling objects they shall be protected by protective hats.

(b) Protective hats shall meet the specifications contained in the United States of America Standard Safety Code for Head, Eye, and Respiratory Protection, Z2.1. Hats without dielectric strength shall not be used where there is the possibility of contact with electric conductors.

(c) Protective hats which have been previously worn shall be cleaned and disinfected before they are issued by the employer to another employee.

(d) The employer shall arrange through means such as vendors or local stores, or otherwise, to make safety shoes readily available to all employees, and shall encourage their use. Metal toe caps from which the covering has been worn shall be insulated when employees are working on exposed energized circuits of the vessel's electrical system.

(e) Employees shall not be permitted to wear excessively greasy clothing when performing hot work operations.

(f) Employees shall be protected by suitable gloves when engaged in operations hazardous to their hands.

§ 1915.154 Lifesaving equipment.

(a) *Personal flotation devices.* (1) Any personal flotation device shall be approved by the United States Coast Guard as a Type I PFD, Type II PFD, Type III PFD, or Type V PFD or their equivalent, pursuant to 46 CFR Part 160 (Coast Guard Lifesaving Equipment Specifications) and 33 CFR 175.23 (Coast Guard table devices equivalent to personal flotation devices).

(2) Prior to each use, personal flotation devices shall be inspected for dry rot, chemical damage, or other defects which may affect their strength and buoyancy. Defective personal flotation devices shall not be used.

(b) *Safety belts and lifelines.* (1) Safety belts shall be equipped with lifelines which in use are secured with a minimum of slack to a fixed structure.

(2) Prior to each use, belts and lifelines shall be inspected for dry rot, chemical damage, or other defects which may affect their strength. Defective belts and lifelines shall not be used.

(3) When employees are working in any location requiring a safety belt and a lifeline, care shall be exercised to ensure that the lifeline is not cut, pinched, or led over a sharp edge. In hot work operations or those involving the use of acids, solvents, or caustics, the line shall be kept clear to avoid its being burned or weakened. In order to keep the lifeline continuously attached with a minimum of slack to a fixed structure the attachment point of the lifeline shall be appropriately changed as the work progresses.

(c) *Life rings and ladders.* (1) At least three 30 inch Coast Guard approved life rings with lines attached shall be kept in easily visible and readily accessible places aboard each vessel afloat on which work is being performed. Life rings shall be located, one forward, one aft, and one on the gangway, except on vessels, under 200 feet in length, in which case one at the gangway will be sufficient.

(2) At least one life ring with a line attached shall be located on each staging float alongside a vessel on which work is being performed.

(3) At least 90 feet of line shall be attached to each life ring. Life rings and lines shall be maintained in good condition.

(4) In the vicinity of each vessel afloat in which work is being performed there shall be at least one portable or permanent ladder of sufficient length to assist employees to reach safety in the event that they fall into the water.

Subpart J—Ship's Machinery and Piping Systems

§ 1915.161 Scope and application.

The standards contained in this subpart shall apply to ship repairing and shipbuilding and shall not apply to shipbreaking.

§ 1915.162 Ship's boilers.

(a) Before work is performed in the fire, steam, or water spaces of a boiler where employees may be subject to injury from the direct escape of a high temperature medium such as steam, or water, oil, or other medium at a high temperature entering from an interconnecting system, the employer shall insure that the following steps are taken:

(1) The isolation and shutoff valves connecting the dead boiler with the live system or systems shall be secured, blanked, and tagged indicating that employees are working in the boiler. This tag shall not be removed nor the valves unblanked until it is determined that this may be done without creating a hazard to the employees working in the boiler, or until the work in the boiler is completed. Where valves are welded instead of bolted at least two isolation and shutoff valves connecting the dead boiler with the live system or systems shall be secured, locked, and tagged.

(2) Drain connections to atmosphere on all of the dead interconnecting systems shall be opened for visual observation of drainage.

(3) A warning sign calling attention to the fact that employees are working in the boilers shall be hung in a conspicuous location in the engine room. This sign shall not be removed until it is determined that the work is completed and all employees are out of the boilers.

§ 1915.163 Ship's piping systems.

(a) Before work is performed on a valve, fitting, or section of piping in a piping system where employees may be subject to injury from the direct escape of steam, or water, oil, or other medium at a high temperature, the employer shall insure that the following steps are taken:

(1) The isolation and shutoff valves connecting the dead system with the life system or systems shall be secured, blanked, and tagged indicating that employees are working on the systems. This tag shall not be removed nor the valves unblanked until it is determined that this may be done without creating a hazard to the employees working on the system, or until the work on the system is completed. Where valves are welded instead of bolted at least two isolation and shutoff valves connecting the dead system with the live system or systems shall be secured, locked, and tagged.

(2) Drain connections to atmosphere on all of the dead interconnecting systems shall be opened for visual observation of drainage.

§ 1915.164 Ship's propulsion machinery.

(a) Before work is performed on the main engine, reduction gear, or

connecting accessories, the employer shall ensure that the following steps are taken:

(1) The jacking gear shall be engaged to prevent the main engine from turning over. A sign shall be posted at the throttle indicating that the jacking gear is engaged. This sign shall not be removed until the jacking gear can be safely disengaged.

(2) If the jacking gear is steam driven, the stop valves to the jacking gear shall be secured, locked, and tagged indicating that employees are working on the main engine.

(3) If the jacking gear is electrically driven, the circuit controlling the jacking gear shall be deenergized by tripping the circuit breaker, opening the switch or removing the fuse, whichever is appropriate. The breaker, switch, or fuse location shall be tagged indicating that employees are working on the main engine.

(b) Before the jacking engine is operated, the following precautions shall be taken:

(1) A check shall be made to ensure that all employees, equipment, and tools are clear of the engine, reduction gear, and its connecting accessories.

(2) A check shall be made to ensure that all employees, equipment and tools are free of the propeller.

(c) Before work is started on or in the immediate vicinity of the propeller, a warning sign calling attention to the fact that employees are working in that area shall be hung in a conspicuous location in the engine room. This sign shall not be removed until it is determined that the work is completed and all employees are free of the propeller.

(d) Before the main engine is turned over (e.g., when warming up before departure or testing after an overhaul) a check shall be made to ensure that all employees, equipment, and tools are free of the propeller.

§ 1915.165 Ship's deck machinery.

(a) Before work is performed on the anchor windlass or any of its attached accessories, the employer shall ensure that the following steps are taken:

(1) The devil claws shall be made fast to the anchor chains.

(2) The riding pawls shall be in the engaged position.

(3) In the absence of devil claws and riding pawls, the anchor chains shall be secured to a suitable fixed structure of the vessel.

Subpart K—Portable, Unfired Pressure Vessels, Drums and Containers, Other Than Ship's Equipment

§ 1915.171 Scope and application of subpart.

The standards contained in this subpart shall apply to ship repairing and shipbuilding and shall not apply to shipbreaking.

§ 1915.172 Portable air receivers and other unfired pressure vessels.

(a) Portable, unfired pressure vessels, built after the effective date of this regulation, shall be marked and reported indicating that they have been designed and constructed to meet the standards of the American Society of Mechanical Engineers Boiler and Pressure Vessel Code, Section XIII, Rules for Construction of Unfired Pressure Vessels, 1963. They shall be subjected to a hydrostatic pressure test of one and one-half times the working pressure of the vessels.

(b) Portable, unfired pressure vessels, not built to the code requirements of paragraph (a) of this section, and built prior to the effective date of this regulation, shall be examined quarterly by a competent person. They shall be subjected yearly to a hydrostatic pressure test of one and one-half times the working pressure of the vessels.

(c) The relief valves on the portable, unfired pressure vessels in paragraphs (a) and (b) of this section shall be set to the safe working pressure of the vessels, or set to the lowest safe working pressure of the systems, whichever is lower.

(d) A record of such examinations and tests made in compliance with the requirements of paragraphs (a) and (b) of this section shall be maintained.

§ 1915.173 Drums and containers.

(a) Shipping drums and containers shall not be pressurized to remove their contents.

(b) A temporarily assembled pressurized piping system conveying hazardous liquids or gases shall be provided with a relief valve and by-pass to prevent rupture of the system and the escape of such hazardous liquids or gases.

(c) Pressure vessels, drums and containers containing toxic or flammable liquids or gases shall not be stored or used where they are subject to open flame, hot metal, or other sources of artificial heat.

(d) Unless pressure vessels, drums and containers of 30 gallon capacity or over containing flammable or toxic liquids or gases are placed in an out-of-the-way area where they will not be subject to physical injury from an outside source, barriers or guards shall be erected to protect them from such physical injury.

(e) Containers of 55 gallons or more capacity containing flammable or toxic liquid shall be surrounded by dikes or pans which enclose a volume equal to at least 35 percent of the total volume of the containers.

(f) Fire extinguishers adequate in number and suitable for the hazard shall be provided. These extinguishers shall be located in the immediate area where pressure vessels, drums and containers containing flammable liquids or gases are stored or in use. Such extinguishers shall be ready for use at all times.

Subpart L—Electrical Machinery

§ 1915.181 Electrical circuits and distribution boards.

(a) The provisions of this section shall apply to ship repairing and shipbuilding and shall not apply to shipbreaking.

(b) Before an employee is permitted to work on an electrical circuit, except when the circuit must remain energized for testing and adjusting, the circuit shall be deenergized and checked at the point at which the work is to be done to insure that it is actually deenergized. When testing or adjusting an energized circuit a rubber mat, duck board, or other suitable insulation shall be used underfoot where an insulated deck does not exist.

(c) Deenergizing the circuit shall be accomplished by opening the circuit breaker, opening the switch, or removing the fuse, whichever method is appropriate. The circuit breaker, switch, or fuse location shall be tagged to indicate that an employee is working on the circuit. Such tags shall not be removed nor the circuit energized until it it definitely determined that the work on the circuit has been completed.

(d) When work is performed immediately adjacent to an open-front energized board or in back of an energized board, the board shall be covered or some other equally safe means shall be used to prevent contact with any of the energized parts.

PART 1916 [REMOVED]

PART 1917 [REMOVED]

(Sec. 41, 44 Stat. 1444; 33 U.S.C. 941, secs. 6, 8, 84 Stat. 1593, 1599, 1600; 29 U.S.C. 655, 657; 29 CFR Part 1911)

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