

CHAPTER 2: INSPECTIONS OF VESSEL EQUIPMENT AND MATERIALS

A. GENERAL PRINCIPLES

1. Reasons for Coast Guard Control All items of equipment installed on vessels subject to Coast Guard inspection and certification are subject to some degree of inspection and approval. Certain items are subject to inspection and approval even when carried aboard vessels not required to be inspected and certificated, such as fishing vessels and yachts. The extent of inspection and the type of approval varies with the requirements of laws and regulations, as well as the hazards involved. In judging the quality and suitability of equipment used on vessels, the primary considerations are:

- Safety of the Vessel a. To safeguard the vessel, equipment must be of good quality and suitable for its intended use. In judging suitability, the marine inspector must consider potential hazards of fire, explosion, failure of watertight integrity, and the risks involved if the equipment fails to function.
- Safety of Personnel b. The vessel's equipment must provide the maximum practicable safety for passengers and crew. For example, cargo pumps and piping used in carrying dangerous liquids or gases must be designed, constructed, and maintained to transfer cargoes efficiently and safely.
- Performance of a Safety Function c. Many items, such as lifesaving equipment and firefighting equipment, are carried solely to perform a safety function. They are not used on a daily basis, but they must perform immediately and effectively in an emergency. It is essential that such items are of good quality, suitable for its intended use, maintained in good condition, and readily accessible.

2. What the Coast Guard Controls

- Design a. Various statutes and regulations provide for control of the design of equipment to be used aboard vessels. The degree of control exerted by the Coast Guard depends upon the potential hazards involved, and is discussed in the inspection regulations. In approving a particular design, marine inspectors must consider the safety of the vessel and its personnel, and the ability of the equipment to perform its intended function in the event of emergency.
- Construction b. The degree of control exerted is specified in the applicable regulations. Depending upon the hazards involved, such control might extend to specification of materials, methods of welding or riveting, and inspections and tests during and after construction.

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Installation

c. Although certain qualities of equipment installation are controlled through construction and plan approval, the primary responsibility for ensuring the suitability of an installation rests with the inspector. Regardless of the general requirements of the regulations, or specific approvals of plans and specifications, the inspector must determine at the initial inspection (during or following installation) that the installed equipment is safe and will perform as intended. Careful consideration is essential at this point, because approved installations normally should not be subjected to different requirements at later inspections. In considering the suitability of an installation, the inspector must consider security against movement, safeguards to personnel, and location with respect to other items on the vessel.

3. How the Coast Guard Controls

Standards

a. The standards for the design, construction, and installation of equipment on vessels may be specified in the regulations, or contained in other recognized, published standards. When no specific standard is given, the officer in charge, marine inspection (OCMI) shall determine if this equipment is suitable for its intended use.

Plan Approvals

b. Plans may be required by the Commandant for equipment of new, unusual, or potentially hazardous design.

Type Approvals

c. Various regulations require equipment to be of types approved by the Commandant. When type approval is required, the Coast Guard establishes specifications or standards that must be met. Manufacturers must show that their products meet these standards before type approval is given.

Tests and Inspections

d. Various regulations require certain tests and inspections of vessel equipment to determine its suitability. Depending upon the hazards involved, tests and inspections may be conducted throughout the manufacturing process, during the installation, or both. These tests and inspections are intended to determine whether the applicable standards are met, whether the equipment is safe for the vessel and personnel involved, and whether it will serve its function.

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B. RESPONSIBLE PARTIES

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- 1. Manufacturers** Manufacturers of marine equipment have a basic responsibility to supply equipment that is satisfactory for its intended use and in compliance with applicable standards. Regulations contain specific requirements for manufacturers to follow in certain cases, but for many items only good commercial quality is required.

 - 2. Vessel Owners** Owners are expected to supply and maintain the equipment aboard their vessels in accordance with applicable regulations. When the regulations do not specify requirements for vessel equipment, the vessel owner must supply equipment that is safe and suitable for its intended use. Such equipment shall be installed under the cognizance of the OCMI, and the vessel owner shall be responsible for its continued maintenance.

 - 3. Vessel Personnel** The vessel's officers and crew are required to maintain equipment in a satisfactory condition, ready to perform its intended function.

 - 4. Class Societies** Perform some equipment manufacture oversight and some survey responsibility for ensuring proper equipment.

 - 5. Coast Guard Technical Personnel** Commandant (G-MOC and G-MSE) and the Marine Safety Center (MSC) review plans and specifications for compliance with the regulations and suitability with the intended use of equipment.

 - 6. Coast Guard Inspection Personnel** Marine inspectors have the final responsibility for determining whether a piece of equipment complies with requirements and is suitable for its intended use.
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C. CATEGORIES OF ACCEPTABLE EQUIPMENT

1. Equipment Manufactured Under Coast Guard Control Certain items of equipment are required to be manufactured under Coast Guard control. This control requires the submittal and approval of plans, materials, and methods of construction, and tests and inspections by the Coast Guard during and after both manufacture and installation.

2. Approved Equipment

General Approvals a. Various items of lifesaving, firefighting, pollution prevention equipment, and miscellaneous equipment used aboard inspected and uninspected vessels are required by statutes and regulations to be of types that are "approved" by the Commandant. To be an "approved" type, equipment must be manufactured in accordance with standards published in 46 CFR, Subchapter Q (Specifications) or, when specifically permitted by regulation, must comply with the standards of a classification society, such as the American Bureau of Shipping (ABS), that is recognized by the Commandant. To this end, the manufacturer must submit plans and specifications to the Commandant. After their approval, the product must be labeled so that it can be identified as approved equipment.

Certification b. Equipment that is approved by a classification society without plan review by the Coast Guard must likewise be labeled to indicate compliance with required standards and approval. Types of equipment that are considered to conform to Subchapter Q specifications are formally listed in the Federal Register (FR). A certificate of approval is issued to the manufacturer of the equipment by Commandant (G-MOC). Equipment of an approved type that meets the specifications in Subchapter Q is listed in Equipment Lists, Commandant Instruction (COMDTINST) M16714.3A and MSIS. (See paragraph 18.D.5 below concerning the approved equipment card index system.)

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**3. Equipment
Acceptable
Under
Affidavit**

General

- a. The requirements that manufacturers must meet to have their products accepted on an affidavit basis and listed in Equipment Lists/MSIS are detailed in 46 CFR 50.25; such items include certain valves, fittings, and flanges. Manufacturers of affidavit products that are not included in Equipment Lists may provide valves, fittings, and flanges for acceptance on an individual vessel basis. Other items, such as piping, tubing, standard pipe-joining fittings, bolting, castings, forgings, plates, and bar stock may be accepted on the basis of a manufacturer's or mill certificate. Such certificates contain the applicable standard society's specifications. 46 CFR Table 50.25-1(a) is an aid to the inspector in determining what is required of the manufacturer.

Verification of
Markings

- b. A manufacturer typically makes some products that comply with the regulations and some that do not, simply because the marine market is generally a small percentage of its business. The manufacturer is required only to make one valve, fitting, or flange that complies with material requirements to receive an affidavit for the equipment and be listed in Equipment Lists/MSIS. Therefore, it should not be construed that because a manufacturer is affidavit that its product is satisfactory. Products of affidavit manufacturers should be reviewed to determine acceptability in the same manner that products of nonaffidavit manufacturers are reviewed. The marine inspector should check the markings on a component when installed to verify that it is of the required type, as indicated on the approved plans. In cases of discrepancies, the inspector shall contact the MSC for guidance.

**4. Equipment
Acceptable
after Type
Tests**

Equipment of a given design may be given general acceptance for use on inspected vessels after it has proven satisfactory by type tests. Coast Guard approval of plans and specifications may also be required prior to type tests. Under 46 CFR 58.30-15(f), hydraulic system components fabricated from certain ferrous or aluminum alloys which exhibit a low ductility, must be impact-shock tested by an independent laboratory acceptable to the Commandant. Hydraulic components that have proven satisfactory by impact-shock tests are listed in Equipment Lists/MSIS. Inquiries as to whether a particular testing laboratory may conduct the required tests should be addressed to Commandant (G-MSE).

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- 5. Equipment Types Acceptable Upon Plan Approval** Equipment of a given design may receive approval for use on inspected vessels after Commandant (MSC) has examined all plans and specifications, and has determined that it will meet applicable requirements. Approvals are limited to the installation(s) for which plans were submitted. Previously approved plans may be used in subsequent installations by following the requirements in 46 CFR 50.20-15. Type approvals are issued only under Subchapter Q (under 46 CFR Table 50.25-1(a) for hydraulic system components that require testing, as indicated in paragraph 18.C.4 above).
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- 6. Portable Equipment** Portable electric equipment may be accepted in several ways. Portable cargo lights are covered under the Underwriters Laboratories, Inc. (UL) "Standards for Marine-Type Electric Lighting Fixtures." These lights are labeled to indicate UL approval as "marine types"; portable items covered by this category are considered satisfactory. Portable items not labeled by UL must be checked to ensure compliance with 46 CFR, Subchapter J. Portable fixtures should be referred to the MSC for determination. Approval of portable lighting devices by inspectors is not advisable, as temperature test data are needed to evaluate these fixtures properly. Portable tools can be accepted if the design appears to be commercially sound. This can be verified by a UL listing under the classification "Tools - Commercial Type."
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- 7. Individual Items Accepted Under Society Standards** Individual items of equipment are acceptable for use on inspected vessels when they meet the standards of a classification society specified by the applicable regulations. For example, 46 CFR 58.01-5 provides for the acceptance of main and auxiliary machinery that meets the standards established by ABS. Lighting fixtures listed under the UL "Standard for Marine-Type Electric Lighting Fixtures" are accepted for use on inspected vessels (see 46 CFR 111.75-20). Other electrical equipment, such as junction boxes and switches, that have a UL Marine Listing or Marine Listing for Vessels Over 65 Feet are also acceptable for use on inspected vessels, provided they have the necessary rating and their enclosures are appropriate for the location in which they will be installed.
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- 8. Equipment Required to Meet Installation Standards** Throughout the regulations, there are requirements covering the safe installation of equipment. In many cases, specific inspections and tests are required during or after installation.
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- 9. Permitted Articles of a Dangerous Nature** Articles of a dangerous nature for ships' stores and supplies are prohibited by 46 CFR, Subchapter N (Dangerous Cargoes), unless specifically permitted aboard. Certificates are issued to manufacturers of permitted articles that comply with these requirements.
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10. Equipment for Which Standards are Not Specified Items of equipment for which specific standards are not specified by law or regulation are required to meet an acceptable standard of safety, and must be suitable for the purpose intended. Normally, such items that meet the standards of a recognized code or "good marine practice" will be considered suitable by the Commandant.

11. Equivalent Equipment Throughout the regulations, there is authority for the Commandant, district commander, or OCMI to accept substitute equivalent equipment or materials, and alternate materials or methods of construction. For example, an equivalence has been filed with the International Maritime Organization (IMO) for substitution of life rafts for lifeboats on vessels under 1600 gross tons (GT) making international voyages, under certain conditions. The text of the equivalence notice is as follows: "Regulation 35 of Chapter III of the International Convention for the Safety of Life at Sea (SOLAS), 1960 provides that every cargo ship, with certain exceptions, shall carry lifeboats on each side of the ship of such aggregate capacity as will accommodate all persons on board and, in addition, shall carry life rafts sufficient to accommodate half that number. The Government of the United States of America gives notification of acceptance of the following equivalent arrangement under the provisions of Regulation 5, Chapter I of the convention: Cargo vessels of 500 GT and over but less than 1600 GT, except tankers, may be equipped as follows:

- a. On each side of the vessel, one or more davit-launched inflatable life rafts of sufficient capacity to accommodate the total number of persons aboard;
- b. A minimum of one launching device on each side of the vessel. Operation of the raft launching device shall not require anyone to remain aboard;
- c. Sufficient float-free inflatable life rafts with capacity to accommodate not less than one half of the total persons allowed on board;
- d. On a vessel for which persons aboard will have an escape route not requiring them to board inflatable life rafts by first entering the water nor to descend to them a distance in excess of 4-1/2 meters, float-free inflatable life rafts of sufficient capacity on each side of the vessel to accommodate the total number of persons aboard may be substituted for the davit-launched rafts and launching equipment required by a and b above;
- e. A motor-propelled rescue boat suitable for ocean service with a davit or other suitable launching device capable of launch by no more than three persons."

NOTE: In accordance with current regulations, only the Commandant can approve such an equivalent arrangement. Requests for such substitutions shall be forwarded to Commandant (G-MOC).

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D. REFERENCES

**1. SOLAS 74
ILLC 66
MARPOL**

SOLAS 74 contains specific requirements for the equipment used on vessels making international voyages; these requirements are also in the regulations. The International Load Line Convention of 1966 contains provisions affecting equipment used on inspected vessels. Also, MARPOL/Resolution 393 requires equipment to be approved.

2. Regulations

- a. 33 CFR 151-159 (Subchapter O) contains requirements for oil and hazardous substance equipment such as oil-water separators, oil content monitors and alarms, as well as marine sanitation devices (MSD's).
- b. 33 CFR 173-183 (Subchapter S) contains safe powering and equipment requirements for recreational boats and boats carrying six or less passengers.
- c. 46 CFR 2.75 and 159 contain requirements and procedures for equipment type approvals, filing of affidavits by equipment manufacturers, and requirements covering the acceptance of portable fire extinguishers.
- d. 46 CFR 2.95-10 contains information and requirements concerning retention of records of approved equipment by manufacturers.
- e. 46 CFR 160-164 (Subchapter Q) contains specifications for equipment that is given type approval.

NOTE: Equipment that is not mentioned in these regulations must be acceptable to the Coast Guard.

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3. Equipment Lists, COMDTINST M16714.3A

This publication (old CG-190) contains listings of various lifesaving, firefighting, pollution abatement, engineering, electrical, and miscellaneous equipment used on vessels. These items are approved or accepted by the Commandant, as required by certain laws and regulations. Changes to this publication are issued in the Federal Register and reprinted in the Proceedings of the Marine Safety Council. It contains four sections that deal with:

- a. Approved instruments, machines, and equipment;
- b. Manufacturers who have submitted affidavits for valves, fittings, and flanges (see paragraph 18.C.3 above);
- c. Acceptable hydraulic components; and
- d. Formerly approved instruments, machines, and equipment that are no longer manufactured as approved equipment. Unless otherwise noted, such items may be used as long as they are in good and serviceable condition.

6. Industry Standards

Effective 28 August 1991, Federal Regulations were revised to incorporate industry standards for various marine engineering equipment. Incorporation of industry standards reduced the need for detailed regulations. In some cases, regulations concerning the design, construction and testing of equipment have been removed. Manufacturers may continue to build and mark approved products affected by the new regulations until their Certificate of Approval expires.

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E. MARINE ENGINEERING EQUIPMENT

1. Unfired Pressure Vessels

Construction Standards

- a. Pressure vessels shall be designed, constructed, and tested in accordance with the requirements of 46 CFR 54, which modifies the rules of Section VIII (Pressure Vessels) of the American Society of Mechanical Engineers (ASME) Code. All pressure vessels intended for ships' service, such as compressed air tanks, heat exchangers, and refrigeration equipment are covered by these rules. (Refer to MSM VOL IV for details)

NOTE: See MSM II, Sec. A, Ch. 4 for further information on plan submittal.

Hydraulic Accumulators

- b. These components are inspected, stamped, and approved in a manner similar to pressure vessels, including the use of Form CG-2936, the Manufacturer's Data Report for Boilers, Pressure Vessels, or Nuclear Pressure Vessels. Regulations dealing with the peculiarities of these accumulators are established in 46 CFR 58.30-25. The general design, fabrication, inspection, testing, and stamping requirements are contained in 46 CFR 54. The regulations require accumulators to meet the applicable requirements of 46 CFR 54.01-5(c)(3), (c)(4), and (d), or the remaining requirements in Part 54. Existing installations that do not have Coast Guard stamped accumulators shall be referred to Commandant (G-MTH-2). The biennial inspection of accumulators, as required by 46 CFR 61.10-5, shall be limited to an operating test to avoid damaging the internal parts of the accumulator.

TAO 187 Class Vessels

- c. The ram tensioners on the fueling at sea (FAS) and replenishment at sea (RAS) stations, on the TAO 187 class vessels have been determined to be hydraulic accumulators. Periodic testing shall be conducted as noted in paragraph b above. The air receivers serving the ram tensioners for the FAS and RAS stations should be built in accordance with 46 CFR 54.01-5(c)(3) and properly marked and stamped in accordance with 46 CFR 54.10. If marking and stamping is not found during inspection of these air receivers, the vessel owner must again provide satisfactory evidence to the OCMI that the air receivers on board have been built in accordance with 46 CFR Part 54. The air receivers serving the FAS and RAS stations require periodic testing. However, they may be examined internally in accordance with 46 CFR 61.10-5(e)(4). Use of a borescope, ultrasonic thickness testing or acoustic emission testing may be used to satisfy the internal and external inspection requirements of 46 CFR 61.10-5(b).

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Compressed Air
Cylinders/Pressure
Vessels in Totally
Enclosed Lifeboats

- d. Two types of cylinders/pressure vessels are approved for use in totally enclosed lifeboats on offshore platforms, mobile offshore drilling units (MODUs), and other vessels. These compressed air systems provide combustion air for the engine and breathing air for the crew when operating in a closed condition. One type of pressure vessel is approved by the Coast Guard under 46 CFR, Subchapter F; the other type is approved under the Materials Transportation Bureau's (MTBs) regulations, 49 CFR 173 and 178, Subpart C, which were formerly promulgated by the Interstate Commerce Commission (ICC). The type of device can be determined by its markings. Coast Guard approved pressure vessels should be periodically inspected and tested as required by 46 CFR 61.10. MTB/ICC cylinders should be periodically inspected and tested as required by 49 CFR 173.34(e). (Refer to NVIC 3-95)

**2. Welding
Equipment**

Electric Welding
Equipment

- a. There are no specific prohibitions of the installation of electric welding machines on vessels, including passenger, tank, and cargo vessels. However, 46 CFR 35.01-1, 50.05-10, 71.55-1, and 91.45-1(a) require the approval of the OCMI before repairs are undertaken with such systems. Installation of electric welding machines should be discouraged on tank vessels. When welding machines are permitted, adequate instructions for their safe use shall be posted aboard the vessel. These instructions should call attention to the Coast Guard regulations concerning repairs to vessels and their equipment.

Oxyacetylene
Welding Equipment

- b. Specific permission from the OCMI is not required for a vessel to carry such equipment. However, it must be stored in accordance with and in quantities not exceeding those allowed by 46 CFR 147.05-100. Suitable safety instructions on the use of this equipment shall be posted on the vessel. Hard pipe oxygen and acetylene distribution systems are not authorized.

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3. Pipe Fittings

Cargo Hose
Couplings

- a. Oil transfer hoses carried aboard vessels are subject to the requirements of 33 CFR 154.500. Each hose assembly must have fully threaded connections, flanged connections that meet the American National Standards Institute (ANSI) Standard B16.5 or B16.24, or quick disconnect couplings shall be designed, constructed and tested in accordance with American Society of Testing and Materials Standard (ASTM) F-1122. Quick disconnect hose couplings are divided into: Standard Class and Class I. Vessels carrying hazardous material in bulk are required to use Class I quick disconnect couplings. Class I quick disconnect couplings and hose assemblies are subject to the requirements of 33 CFR 153.940. Quick disconnect couplings must be marked with the ASTM specification number and "CL I" if they are Class I adapters or couplers.

NOTE: The Coast Guard no longer maintains a list of quick disconnect couplings accepted under 33 CFR 154.500 and 153.940.

Aluminum Flanges

- b. Aluminum flanges were previously approved under 33 CFR 154.500 by reference to ANSI B16.31. This reference was removed from the regulations when ANSI dropped the standard for revision. In the interim, aluminum flanges manufactured and stamped under the old B16.31 standard are approved for oil transfer service as long as they remain in good condition and comply with the testing requirements of 33 CFR 156.170. For new flanges not stamped ANSI B16.31, it is the operator's responsibility to provide documentation from the manufacturer that it is equivalent to the old standard. The B16 Committee is presently developing a new standard for aluminum flanges.

Nickel Flanges

- c. Nickel alloy flanges (stainless steel), once part of the old B16.31 standard, were moved to ANSI B16.5.

Inspection of
Flexible Hose
Assemblies

- d. Nonmetallic flexible hoses shall be designed, constructed and tested in accordance with Society of Automotive Engineers (SAE) J-1942. This standard refers to SAE 1475 for fitting standards. Hoses that meet the requirements of 46 CFR 56.60-25(c) are approved as long as they remain in good condition. These hoses have exterior coverings that when damaged could allow moisture to enter the inner tube material and wire braid, causing rapid corrosion and failure of the hose. When replacement is necessary, they should be replaced with hoses meeting SAE J-1942 standards.

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- (1) Use of Flexible Hoses. The use of the flexible hoses is restricted to vital and non-vital fresh and salt water systems, non-vital pneumatic systems, lube oil and fuel systems, and fluid power systems. To ensure the reliability of these systems, a thorough examination of these hoses shall be made at the regular inspection period. Minor breaks, cuts, or abrasions in the covering may be allowed. However, the hose shall be replaced if corrosion of the interior material is found.
- (2) Markings. The list of approved hoses should be checked to determine the acceptability of a specific hose.

NOTE: The Coast Guard is negotiating for SAE to assume responsibility for maintaining an up-to-date list.

- (a) Hoses and hose assemblies meeting SAE-J1942 must be marked with the maximum operating pressure, manufacturer's name and part number, and hose size.
- (b) Hoses may be marked in accordance with SAE J-517 standards. SAE J-517 is the basic standard for hydraulic hoses. The markings will include the following:
 - (i) SAE hose specification number (including type designation where applicable);
 - (ii) maximum operating pressure;
 - (iii) manufacturer's name, part number; and
 - (iv) hose size.
 - (v) Identifying the recommended service is optional. However, hoses may be marked with the following codes from SAE-J1942:

CODE	SERVICE DESCRIPTION
HF	All Services
H	Fluid Power
F	Lube Oil and Fuel Oil Systems
VW	Vital and Nonvital Fresh and Salt Water
NVW	Nonvital Water and Pneumatic

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- (vi) To expedite inspections, hoses may also be marked with the propeller symbol followed by the appropriate alphanumeric code. An example is "SAE J-517, ABC Co. P/N A35, 100R2AT-8 FEB 89 HF." This example describes a hose that is 1/2 in. I.D., 2-Wire, Type AT, 3500psi hydraulic service rating, acceptable for All Services applications."

NOTE: Identifying hoses as acceptable for the intended service may be complicated, especially since using the service code is optional. For instance, hoses marked HF may have different pressure ratings for different services. Often, only the highest pressure rating is marked on the hose. Also, hoses marked as complying with SAE J-517 may not have undergone the fire test required by SAE J-1942 and are not acceptable for fuel/lube oil service. The suitability and pressure rating for the intended service should always be verified with the manufacturer.

Flexible Pipe
Couplings

- e. The regulations in 46 CFR 56.30-35 and 40 describe the limitations and installation requirements for the various types of flexible pipe couplings. Flexible couplings should be equipped with positive restraints to limit angular deflection and to keep the pipe from "creeping." Couplings should not be used as a vibration dampener, or to correct excessive misalignment. Pipe brackets and supports should be included in the inspection of flexible couplings and their restraining devices. Damaged or deteriorated gaskets shall not be reinstalled. Indications of excessive or premature wear shall be further investigated and steps taken to correct the cause before placing the joint back in service. The OCMI shall be satisfied that new and existing flexible pipe couplings are suitable for the service intended.

**4. Spark and
Flame
Arresters**

Spark Arresters in
Exhaust Lines

- a. Requirements for spark arresters in gasoline and diesel engines are contained in 46 CFR 58.10-5, 58.10-10, 182.15-20, and 182.20-20. The Coast Guard does not have a specification for such spark arresters. They shall be accepted after installation and a demonstration that the spark arrester will prevent the emission of glowing embers.

Flame Arresters for
Gasoline Engines

- b. Manufacturers must comply with the requirements contained in SAE 1928 for backfire flame arresters and engine and fuel air induction systems or UL 1111 for backfire flame arresters. The requirements contained in 46 CFR 162.041 - 162.043 have been removed from the regulations.

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*Engine Air
Induction Systems*

- (1) 46 CFR 58.10-5(b)(3)(iii) has been revised to allow a manufacturer to incorporate an engine air induction system without formal approval and labeling if it meets the flame dispersal, construction, and installation criteria contained therein. The difference between this type of system and a system that is required to meet an adopted standard is that the flame is dispersed outside the vessel.

*Two Cycles
Engines With Reed
Valve Assembly*

- (2) Two-cycle engines using a reed valve assembly do not require backfire flame arresters. Reed valves inherently protect against backfire. They are not subject to Coast Guard approval. Owners must provide satisfactory evidence of reed valve installations, such as a manufacturer's certificate or a proper maintenance manual.

Markings

- (3) Permanent markings attesting to compliance with either standard must be clearly evident. The marking shall include the following:
- (a) manufacturer's name or trademark;
 - (b) identification by style, type or model number; and
 - (c) the word "MARINE".

NOTE: The marking for engine and fuel air induction system will probably be located on the carburetor cover.

**Tank Vent Flame
Arresters**

- c. Tank vent flame arresters shall be designed, constructed and tested in accordance with ASTM F-1273. Arresters are classed either Type I (end of line) or Type II (in line). The markings must include the following:
- Manufacturer's name or trademark;
 - Style, type, model or other manufacturer's designation;
 - Size of the inlet or outlet;
 - Type of device;
 - Direction of flow;
 - Test laboratory and report number;
 - Lowest maximum experimental safe gap (MESG);
 - Ambient air temperature range; and
 - ASTM designation F-1273.

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5. Equipment Using Liquefied Petroleum Gas (LPG) or Compressed Natural Gas (CNG)

A forthcoming regulation change may permit the use of LPG and CNG for cooking appliances aboard all uninspected vessels, provided ABYC Standards A-1-78 or A-22-78 and pertinent NFPA standards (for CNG) are met, in addition to other requirements of the proposed regulations.

6. Keel Coolers

Most keel coolers are integral parts of the hull (generally, extra-heavy pipe halves or structural angles welded to the bottom of the vessel); independent units known as grid coolers have also been utilized. Keel coolers must be fitted with shut-off valves located at the skin of the vessel, as required by 46 CFR 56.50-96(a), except that a shut-off valve may be omitted if the requirements of 46 CFR 56.50-96 (a) (1) and (2) are met.

7. Sliding Watertight Doors

a. Sliding watertight doors shall be designed, constructed and tested in accordance with ASTM F-1196. The requirements for controls and operating mechanisms associated with the watertight doors are contained in ASTM F-1197. ASTM F-1196 and F-1197 apply only to Class 2 and Class 3 sliding watertight doors. The watertight door shall pass the following installation tests described in the standard:

- (1) Visual inspection of the sealing surface for surface defects.
- (2) Feeler gauge test - a test of the tightness of the door closure using a 0.003 inch feeler gauge.
- (3) Hose test - Water at a hose pressure of 50 psi at a distance of not more than five feet from the door.
- (4) Closure test - Using a maximum force of 25 pounds (50 pounds during wedging if applicable):
 - A watertight door must close in not less than 20 seconds or more than 40 seconds in power operation mode.
 - All watertight doors must close in less than 90 seconds in the manual operation mode.
 - All power operated doors must be closed in less than 60 seconds after activation of the master mode switch.

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- b. The watertight door shall have a nameplate permanently attached to the door on which is stamped the name of the manufacturer, manufacturer's serial number, ASTM specification designation (ASTM 1196), pressure head and date. The nameplate must also include the following additional phrase:

"Suitable for installation in subdivision bulkheads aboard vessels inspected and certified by the U.S. Coast Guard."

INSTALLATION SPECIFIC NOTE: ASTM F-1196 and F-1197 do not incorporate the latest guidance from the International Maritime Organization, Maritime Safety Committee (MSC Circular .541) for watertight doors installed above the bulkhead deck. Watertight doors installed in these locations which do not meet the minimum ASTM standard for a 20 foot design head will be approved by Commandant (G-MSO) on a case-by-case basis.

8. Spill Valves

Spill valves shall be designed, constructed and tested in accordance with ASTM F-1271. Spill valves are no longer approved by the Commandant under 46 CFR 153.365(a)(3). ASTM F-1271 prohibits positive closure of spill valves as a means to prevent the opening of spill valves due to sloshing. For new valves, the old practice of dogging the valves closed while enroute is no longer acceptable. Since 46 CFR 39.20-9(c) requires a means to prevent spillage due to sloshing, an alternative means must be provided. Valves which are presently installed are still acceptable and dogging is still permitted for these valves. However, new ones meeting the ASTM standard are to be installed when replacement is required. The provisions of both the ASTM standard and this regulation may be satisfied by either valve design or design of the valve installation (i.e. tank baffling or stilling well not part of the valve assembly).

- a. During the installation of vapor recovery systems, spill valves must be replaced with new ones meeting the ASTM standard. Spill valves are often the limiting factor for a vessel's maximum allowable transfer rate.
- b. Markings. The spill valve markings must include the following:
- Manufacturer's name or trademark;
 - Style, type, model or other manufacturer's designation;
 - Direction of flow;
 - Maximum rated flow;
 - ASTM designation F1271;
 - Relief pressure setting at full flow rating;
 - Set (opening) pressure; and
 - Indication of the proper orientation of the valve, if critical.

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F. MISCELLANEOUS DECK EQUIPMENT

1. Air Breathing Apparatus

Introduction

- a. Introduction. Title 46, CFR, Subchapters D, H, I, I-A, R, and U require self-contained breathing apparatus (SCBA) as required equipment on certain vessels. These SCBA must be of the pressure-demand, open-circuit type, approved by the Mine Safety and Health Administration and by the National Institute for Occupational Safety and Health. They must have a full facepiece and an air supply of at least 30 minutes. SCBA not meeting these criteria may be allowed to remain on board, depending on the grandfather clause in the applicable subchapter. Replacements for grandfathered SCBA must be as described above.

Fresh Air Breathing Apparatus

- b. Fresh Air Breathing Apparatus. Such appliances approved under subpart 160.011 were required equipment on most tankships. They may continue in use until November 23, 1994, if they were part of the vessel's equipment on November 23, 1992, and as long as they are maintained in good condition to the satisfaction of the OCMI. An examination of such appliances should include the following items:
- Facepiece Cracked or badly scratched faceplate lens? Loss of flexibility? Incorrectly mounted faceplate lens?
 - Head Straps Broken? Loss of elasticity? Broken or malfunctioning buckles? Excessively worn serrations on head straps that may permit slippage?
 - Breathing Tubes Broken, missing, or loose connectors? Missing or loose hose clamps? Deterioration? (Stretch tube and look for cracks.)
 - Crank Bellows Hose connections tight? Crank available? Operation successful?
 - Air Hose Examine entire length for pliability and signs of deterioration, cuts, or cracks; examine connectors.

NOTE: Although vessel requirements specify 45.72 meters (150 ft) maximum lengths, fresh air lines of up to 91.44 meters (300 ft) have proven satisfactory in tests.

SAFETY NOTE: Fresh air breathing appliances that become unserviceable shall be replaced by SCBA described in 46 CFR 35.30-20(c)(1).

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SCBA

- c. Self-Contained Breathing Apparatus (SCBA). An examination of such appliances should include the following items:

EXAMINING A SELF-CONTAINED BREATHING APPARATUS (SCBA)	
CYLINDERS	
	<ul style="list-style-type: none"> • Is the cylinder fully charged? • Has the cylinder been hydrostatically tested within the prescribed interval? • Does the cylinder show visible signs of corrosion or damage? • Are they properly stowed?
HOSES	
	<ul style="list-style-type: none"> • Do they show signs of deterioration? • Are they properly connected?
FACE MASK	
	<ul style="list-style-type: none"> • Is the faceplate cracked/badly scratched? • Is there loss of flexibility? • Cracking at edges of seal? • Incorrectly mounted lens?
HEAD STRAPS	
	<ul style="list-style-type: none"> • Are there breaks? • Loss of elasticity? • Broken or malfunctioning buckles? • Excessive wear of head harness serrations that might permit slippage?

- 2. ReflectORIZED Signs** Prior approval is not required for the use of "Scotchlite" signs on merchant vessels. The Commandant has no objection to the use of reflectORIZED signs to mark emergency equipment, instructions, and escape routes. However, such signs must comply with the intent and specifics of the applicable regulations governing required markings. The use of reflectORIZED signs is subject to any special limitations that may be imposed by the OCMI within whose jurisdiction the vessel is inspected.

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G. ELECTRICAL EQUIPMENT

1. Approved Equipment See section 18.D above concerning electrical equipment considered acceptable for use aboard inspected vessels.

2. Cartridge Fuses On 4 December 1959, 46 CFR 111.53 was amended to require cartridge fuses, if used, to be of a nonrenewable type; however, this requirement is not retroactive. Thus, inspectors shall encourage the use of nonrenewable cartridge fuses in all cases. Replacement of renewable link cartridges shall be required only for those vessels contracted on or after 4 December 1959.

3. Marine-Type Lighting Fixtures The Commandant will accept marine-type light fixtures listed by UL for installation on inspected vessels. However, the Commandant may reject any fixture not considered suitable for a specific application. Submittal of drawings to the Coast Guard for approval will not be required for fixtures listed and labeled by UL. However, just because a particular lighting fixture has a UL marine label does not mean that it may be installed anywhere aboard an inspected vessel. For example, in hazardous locations, the fixture must be of suitable explosion proof construction, and must be so labeled. UL listings are divided into three classes:

- a. "Outside," used where the fixture will be exposed to the weather or sea conditions;
- b. "Inside-dripproof," installed in other wet or damp locations; and
- c. "Inside." Where the regulations permit only incombustible materials in passageways and stairway enclosures, only materials such as metal and glass shall be used in fixture housings. Cables used to connect UL marine-type lighting fixtures must have UL listed insulation, to ensure that they are suitable for the operating temperatures of the fixtures.

4. Television and/or Radio Antennas and Radar Installations The Coast Guard does not regulate installation of television and radio antennas on vessels. Federal Communications Commission (FCC) inspectors may require changes in an antenna installation if it will likely interfere with the proper operation of the vessel's main radio transmitter or receiver. Television antenna installations on inspected vessels are considered to be under the cognizance of the master or a competent crewmember designated by the master (likewise, the FCC has jurisdiction over marine radar installations). Coast Guard inspections shall normally be limited to spot-checking for unsafe and overall safety.

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H. LIFESAVING EQUIPMENT

1. General Requirements

- | | |
|--|--|
| Equipment Approvals | a. The navigation and vessel inspection laws require life preservers, exposure suits, ring buoys, lifeboats, life rafts, and certain other types of lifesaving equipment to be approved by the Commandant. This approval must be granted before the equipment is placed aboard the vessel to fulfill requirements for lifesaving equipment. Tests and inspections of lifesaving equipment at the inspection for certification are prescribed in the various regulations. This section and NVIC 2-63, "Guide For the Inspection and Repair of Lifesaving Equipment," should be used as further guides. |
| Alterations of Approved Equipment | b. In every case when lifesaving equipment or appliances directly connected with them cannot be manufactured to the approved design or specification, substitutions shall not be made until they have been first accepted by Commandant (G-MOC). |
| Penalties | c. It has become evident that certain lifesaving equipment has been manufactured and sold under approved labels despite its failure to conform to the material specifications or design, or both, as originally approved by the Coast Guard. In the past, such equipment failed to function properly in an emergency or was found to be deficient under service conditions. Such practices will not be tolerated. Those found by a marine inspector shall be brought to the attention of the OCMI and district commander immediately. Steps shall be taken to suspend the approval, as provided by 46 CFR 2.75-40 and 2.75-50, or to invoke the various penalties and sanctions provided, including prosecution under 46 U.S.C. 3318(b). Under 14 U.S.C. 639, manufacturers may be prosecuted for advertising items that have never received Coast Guard approval as having done so. |
| Lifesaving Installations and Plans for Boat Deck Approvals | d. These are discussed in volume IV of this manual. The approval of the lifesaving and emergency plan is the responsibility of the OCMI. Particular attention should be given to lifeboat locations. Lifeboats should be located away from cargo tanks and preferably in a sheltered location. In addition to embarkation concerns, the lowering and retrieval should be considered. Boat location in relation to the ship's propellers is also addressed in volume IV of this manual. |
| SOLAS Equivalency | e. The lifesaving equipment requirements in the 1983 Amendments to SOLAS may be considered as an equivalent for all U.S. vessels. Proposals to use the 1983 Amendments to SOLAS may be accepted by the Officer in Charge, Marine Inspection, without specific Commandant approval in cases where there is a conflict between the U.S. regulations and the 1983 Amendments to SOLAS. However, lifesaving equipment provided in accordance with SOLAS requirements must still bear a Coast Guard approval number if it is an item subject to approval under 46 CFR Part 160. |

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2. Lifeboats

Recertified
Lifeboats

- a. Requests for a reduction in the number of persons a lifeboat is certified to carry are sometimes made to avoid overloading the davits, or because the owners do not wish to equip a boat with food and water beyond the requirements for the personnel aboard the vessel. In such cases, the OCMI may accept such a request if:
- (1) The reduced capacity of the lifeboats is adequate to accommodate the personnel aboard.
 - (2) The old capacity painted on each bow and the thwarts is deleted and the new capacity substituted therefore.
 - (3) An additional nameplate is affixed to the bow, showing that it has been recertified for a different number of persons. The plate shall also contain the boat's serial number, date of change, port, and the inspector's initials.
 - (4) The Certificate of Inspection (COI) for the vessel is amended.

NOTE: A request for an increase to the original number of persons for which a lifeboat was approved should be handled similarly. However, the weight of the fully equipped and loaded lifeboat shall not exceed the approved working load of the davits. The lesser capacity that was painted on each bow and the thwarts shall be deleted, and the greater capacity substituted. The original nameplate showing the reduced capacity shall be removed and the vessel's COI shall be amended to reflect the increased lifeboat capacity.

Lifeboat Releasing
Gear

b. Lifeboat Releasing Gear.

Mills-Type

- (1) The Mills-type releasing gear was approved on 12 January 1943 for installation by the Imperial Boat Co. This releasing gear has no retaining device to prevent the accidental release of the hook attachment if the lifeboat should become momentarily waterborne during launching operations in rough seas. When such arrangements are found on a vessel, they shall be corrected. One satisfactory remedy is to weld a small flat bar to the cheek plate of the lower block.

Steward-Type

- (2) The Steward-type releasing gear presents problems similar to the Mills-type releasing gear. It should be likewise checked during each inspection. Retaining devices attached to installations of this type have been found in defective condition or entirely broken off, due to neglect or misuse. New retaining devices, similar to those originally approved for this type of gear, should be installed when unsatisfactory conditions are found.

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- Rottmer-Type* (3) In some instances, examination of the Rottmer-Type of gear revealed that lifeboat footings had been placed over the releasing gear lever for the disengaging apparatus. This arrangement required the lifting of the footings before the releasing gear could be operated. This practice is unsafe and requires correction. A clear, open space shall be provided in the way of the releasing gear lever. The footings shall be removed from this space, and should be well secured elsewhere in the lifeboat until the lifeboat has been launched and is clear of the ship. A stenciled notice to this effect shall be placed on the footings. At all annual inspections of Rottmer-type installations, particular attention shall also be directed to the center pieces of the universal joints in the releasing mechanism. If the center pieces indicate any undue stress, such as bent lugs or hairline cracks, they shall be replaced with center pieces made from solid bronze. The upper and lower guide bearings of the releasing gear should be thoroughly lubricated. The entire releasing mechanism shall be tested for satisfactory operation. Ship personnel shall be instructed to lubricate the upper and lower guide bearings periodically.
- Installations in Existing Lifeboats* (4) When releasing gears are to be welded to the stem, sternpost, or keel of an existing lifeboat, the welding details shall conform to the approved drawings for the new installation. The welding shall be performed by a qualified welder. The plating shall be removed in way of welds to permit the welder to have a clear lead, and to ensure a proper weld. All galvanized surfaces within 5 cm (2 inches) of the work area shall be ground to bare steel. Areas in way of the welded and ground surfaces shall be given two coats of "red lead," zinc chromate, or a similar coating.
- Hand-Propelled Lifeboats* c. These are fitted with hand-operated propelling gear that meet the requirements set forth in Regulation 10, Chapter 3 of the SOLAS Convention. They should not be confused with motor lifeboats, which have different specifications and requirements by SOLAS. An oar-propelled lifeboat does not qualify as a hand-propelled lifeboat (see 46 CFR 160.034).
- Steel Wire Sea Painters* d. The Commandant does not approve of the use of steel wire, in lieu of manila line, for sea painters. Such wire is not as easy to handle, may be difficult to release under tension, and can develop short ends of wire ("fishhooks") that are injurious to bare hands.

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New Nameplates
for Lifeboats

- e. When a lifeboat nameplate is no longer legible, the inspector shall require it to be replaced. The new plate should normally be obtained from the manufacturer of the lifeboat, and should be similar to and contain the same information as the original. When the replacement cannot be obtained from the manufacturer, a new one should be fabricated under the cognizance of the OCMI. The inspector shall check the installation of the new nameplate, make an appropriate entry in the vessel's inspection files, and stamp the new nameplate with his or her initials. The replacement plate should be made of brass or bronze, and stamped as follows:

Manufacturer's Name		Serial No.	
Length		Beam	
Capacity		Cu. Ft	
Air Tanks		Cu. Ft	
Weight of Boat in Condition A		and Condition B	
REPLACEMENT NAMEPLATE			
Inspector		(initials)	
Date		CG Port	

Plastic Buoyancy
Units

- f. Accepted plastic buoyancy units shall be used to replace metal air tanks in lifeboats used on inspected vessels. These units are accepted on the basis of samples, plans, and affidavits submitted by the manufacturer; tests of the product by the Coast Guard; and a check of the manufacturing procedure by a the MSC. When authorized by the Commandant, the MSC may issue an acceptance letter to the manufacturer.

NOTE: Such units are not given approval certificates.

Nameplate

- (1) Inspectors may recognize accepted units by the nameplate in the following format:

Type (or Model)	
Lifeboat Buoyancy Unit	
Cu. Ft.	
Wgt	
Name and Address of Manufacturer	

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Acceptance Requirements

- (2) Plastic buoyancy units may be accepted for use in lifeboats, subject to the following two conditions:
 - (a) When used as replacements for metal air tanks in existing lifeboats, the buoyancy units shall be the same size and shape as the metal tanks they replace; and
 - (b) Each installation shall be satisfactory to the cognizant OCMI.

Repairs to Built-In Side Tanks by Foam-In-Place Materials

- g. Certain types of these materials, such as rigid polyurethane, have been authorized for use in repairs to lifeboats with built-in side tanks, as well as for other types of lifeboats, when accepted by the OCMI. Such repairs shall be made in accordance with NVIC 2-63.

3. Life Rafts, Lifefloats, And Buoyant Apparatus

Repairs & Reconditioning

- a. No lifefloats or buoyant apparatus may be repaired or rebuilt for use on inspected vessels without having the original builder's nameplate affixed. This plate must contain the initials of the marine inspector who passed the equipment. Lifefloats or buoyant apparatus shall be examined by a marine inspector before any repair or rebuilding, to determine what work is necessary. If considered necessary, the canvas wrapping may be required to be completely removed for examination of the buoyant material. Periodic inspections shall be made as the work progresses; a final inspection shall be made when the work is completed. Any lifefloat or buoyant apparatus requiring complete or partial recovering, or renewal of the wooden platform shall have an additional nameplate affixed that bears the following data:

REBUILT BY (Name and Address of Company)
_____ _____ _____ _____
Date _____
Inspected by (Inspector's initials) _____

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- (1) Lifefloats or buoyant apparatus requiring only painting, renewal of netting, lines, seine floats, etc., shall not be fitted with this additional nameplate. All materials used and procedures followed shall conform to the specifications in 46 CFR 160.027 or 160.010, as applicable.

- (2) When large numbers of lifefloats or buoyant apparatus are reconditioned, at least one in every lot of 25 shall be subjected to a drop test and a buoyancy test, as described in the applicable specification. When small lots are reconditioned, one of the items should be tested in this way. If the inspector determines that the condition of the renovated equipment is adequate, the drop and buoyancy tests may be dispensed with. However, the inspector shall require all such tests as deemed necessary, regardless of the number of floats or buoyant apparatus involved. (See NVIC 12-61 for the inspection procedures for approved inflatable life rafts that have been stored for extended periods of time since their manufacture or last servicing.)

Substitutions for
Lifeboats

b. Substitutions for Lifeboats

- (1) For vessels not making international voyages, 46 CFR 33.07, 75.10-25, 94.10-55, and 192.10-55 permit substitutions of inflatable life rafts in varying quantities, for other types of life rafts, lifeboats, and buoyant devices. When substitutions are made in accordance with these provisions, a vessel shall be equipped with:
 - (a) On each side of the vessel, one or more davit-launched inflatable life rafts of sufficient capacity to accommodate the total number of persons aboard.
 - (b) On each side of the vessel, at least one launching device, the operation of which shall require no one to remain aboard. Installations shall meet the requirements of 46 CFR 75.27 and 75.37.
 - (c) Sufficient float-free inflatable life rafts to accommodate at least half of all persons aboard. On vessels with after and forward accommodation spaces, these rafts shall be divided between the two spaces in proportion to the number of persons normally berthed at each location.

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Alternate Arrangements c. Alternate Arrangements. When persons aboard will have an escape route not requiring them to board inflatable life rafts by first entering the water, or descending to them farther than 4.5 meters (14.9 feet), float-free inflatable life rafts may be substituted for the davit-launched rafts and launching equipment required by subparagraphs 18.H.3.d.(1) above. In addition, a motor-propelled rescue boat, suitable for ocean launching with a davit or other suitable gear by no more than three persons, may be accepted in lieu of one lifeboat aboard vessels of 1600 or less GT.

Life Raft Launching Apparatus d. Life Raft Launching Apparatus. The number of raft launching devices installed on the vessel, and the number of rafts assigned to each launching device, must be sufficient to put all persons aboard the vessel into life rafts in the water in no more than 30 minutes in calm weather. Rafts shall be distributed equally on each side of the vessel. They shall be stowed in the immediate vicinity of the launching devices, protected from weather and damage. Operation of launching devices shall not interfere with embarkation aids and emergency lighting.

Requests for Substitutions e. Requests for Substitutions. Under the regulations, all requests for substitutions aboard vessels of 3000 or more GT shall be forwarded to Commandant (G-MOC) for consideration. OCMI's should inform vessel owners and operators that the Commandant will review any request for substitution in light of these requirements. For vessels not making international voyages, equipment meeting equivalent standards, as indicated in paragraph 18.C.11 above, are acceptable.

4. Life Preservers

Cork and Balsa Wood Preservers a. Cork and Balsa Wood Preservers. The SOLAS Convention requires a life preserver to support the head and turn an unconscious wearer face-up in the water. Cork and balsa wood life preservers manufactured under 46 CFR 160.003 and 160.004 do not meet these requirements. Manufacture of these life preservers ended on 1 July 1965, and all approvals for these items have been terminated. Cork and balsa wood life preservers manufactured prior to 1 July 1965 must have been retired from service by March 11, 1999, regardless of whether or not they remain in serviceable condition. However, they may not be used on any passenger, cargo, or tank vessel built or contracted after 26 May 1965 that is engaged in international voyages and is subject to SOLAS. Further, they may not be cleaned or repaired.

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|---|---|
| Numbers of Preservers Required | b. On tank, cargo, and miscellaneous vessels, the OCMI shall require one life preserver for each person carried, plus an additional life preserver for each person on watch in the engine room, pilothouse, and the bow lookout station. For example, if the total number of persons carried on a vessel is 43, and 3 persons are carried on watch on the bridge and 3 on watch in the machinery space, the entry on the COI shall be: "50 life preservers, adult." |
| Stowage on Tank, Cargo, And Miscellaneous Vessels | c. Life preservers shall be stowed aboard these vessels in accordance with applicable regulations. For additional life preservers provided for watchstanders in the engine room, pilothouse, and bow lookout station, any method of stowage that reasonably meets these requirements shall be accepted (i.e., they must be stowed so as to be readily accessible). |
| Stowage on Small Passenger Vessels | d. Stowage on Small Passenger Vessels. Life preservers shall be stowed aboard "T-boats" in accordance with 46 CFR 180.78. An appropriate number of these life preservers shall be stowed so as to be readily accessible to all hands at their operating stations. |
| Alternate Marking for Certain Life Preservers | e. Standard adult kapok and foam life preservers have been tested and determined to be suitable for children over 1.45 m (57 in) tall or weighing over 34 kg (75 lb). NVIC 14-92 specifies the manufacturers, model numbers and USCG approval numbers affected by this determination. Since, for standard designs, the 1.45 m/34 kg (57 in/75 lb) cutoff has now superseded the old limit of 41 kg (90 lb), manufacturers will be incorporating this change into their required device markings. The new markings for these select models will now state that these devices are "approved for use on all vessels by persons over 57 in tall or weighing over 75 lb" These alternate markings supersede those previously required by 46 CFR 160.002 and 46 CFR 160.055. |
| Military-Type Life Jackets | f. Military-Type Life Jackets. The military-type life jacket differs markedly in construction from that of the commercial, Coast Guard approved type. It has numerous leg and collar straps, removable pads in zippered compartments, and twice the number of strap adjustments. Also, the envelope, webbing, and tie tapes are not mildew inhibited. Finally, they are not generally available through commercial sources except as government surplus equipment; as such, their true condition will be questionable. Accordingly, military-type life jackets are not Coast Guard approved and may not be used in lieu of Coast Guard approved personal flotation devices (PFDs). For their use aboard Military Sealift Command (MSC) vessels and Department of Defense (DOD)/National Aeronautics and Space Administration (NASA) instrumentation vessels, see chapter 12 of this volume. |

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5. Exposure Suits

Walk Stations

- a. Certain vessels operating in ocean, coastwise, and Great Lakes service are required to carry exposure (survival) suits for all personnel on board, plus additional suits for each "work station," except where quarters are readily accessible. There is a difference in wording between the "work stations" requirement for exposure suits and the "persons on watch" requirement for life preservers. The older language for life preservers ignores the possibility that people may be on watch or at work in locations away from their quarters other than in the pilothouse, engineroom, or the bow lookout station. For non-typical vessels, such as an oceanographic research vessel with on board laboratories, or a service vessel with shop facilities, each "work station" must be evaluated to determine the number of exposure suits required for persons who work there, but do not live in adjacent quarters. The logic behind each calculation of exposure suits required should be documented in the local vessel file.

NOTE: Although many vessel regulations still use the term "exposure suit," the current approval category for these suits is "immersion suit" and the terms may be used interchangeably.

Exposure Suits in Exempt Areas

- b. Exposure Suits in Exempt Areas. If a vessel normally operates in an exempt area, but its COI does not restrict operations to the exempt area, the COI shall be endorsed to require carriage of exposure suits when the vessel is operating in an area where exposure suits are required. The purpose of such suits is to prevent hypothermia through the use of closed-cell foam insulation and watertight integrity of the suit. They should be inspected during the vessel inspection to ensure that they will perform adequately.

Exposure Suit Drills

- c. Exposure Suit Drills. 46 CFR 97.15-35 and 46 CFR 199.180 require the master to ensure that each crewmember wears an exposure suit in at least one fire and boat drill per month. The master may conduct lifeboat drills without requiring the donning of exposure suits at his or her discretion, based on existing conditions. However, if the wearing of exposure suits is not required at lifeboat drills, the master shall immediately afterward conduct an exposure suit drill.

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Scope of Drill

d. Scope of Drill. A reasonable exposure suit drill requires each crewmember to don a suit and receive a training lecture. This practice ensures that:

- Each crewmember can don an exposure suit properly;
- Each suit is in satisfactory condition and fits properly; and
- The correct number of suits are aboard.
- Following the donning of the suits, the master should have two or three crewmembers perform some relevant physical action, such as moving a life raft, to demonstrate the reduced mobility while in such suits.

Unapproved Exposure Suits

e. A number of questions have been raised regarding unapproved exposure suits that are identical to approved suits, except for lack of inflatable collars. The inflatable collar is not necessary for buoyancy, but keeps the wearer's head in a more upright position. This is considered to lessen the wearer's fatigue and, therefore, increase the wearer's chances for survival. As the inflatable collars are not essential to the buoyancy of an exposure suit, existing suits that do not have them should be accepted for purposes of compliance with 46 CFR 94.41-5(d). This regulation permits unapproved suits in use before 1 November 1980 to remain in service if they are otherwise similar to approved exposure suits. Owners of suits that can be altered by attaching inflatable collars should be encouraged, but not required, to provide them.

6. Davits, Winches, And Falls

Boat Falls

The Commandant has no objection to the use of nylon or polypropylene line for lifeboat falls, provided that the requirements of 46 CFR 33.10-10, 46 CFR 75.33, or 46 CFR 94.33 (as appropriate) are met. All installations must be acceptable to the OCMI. It shall be demonstrated during installation tests that the operation and handling properties of such line are satisfactory for the purpose; strength comparable to the original manila line shall be required. Polypropylene line is acceptable as a substitute for manila line on a size-for-size basis. Both polypropylene and nylon should have black or blue pigments dispersed in them to resist ultraviolet sunlight deterioration.

NOTE: Three-inch circumference polypropylene is acceptable in lieu of 3-1/2 inch manila. **Stainless steel wire is not accepted.**

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Lifeboat Winch
Systems Over Ride
Clutches

- b. Over-Ride Clutches. If a winch has been observed to be operating in an unsatisfactory condition such as the winch's hand brake is allowing the load to slip or is failing to stop the load when hoisting a load either by power or hand-cranking, or when lowering a load under the force of gravity, an internal examination of an over-ride clutch system should be required by the inspector. In general it would be unreasonable to expect CG inspectors to perform anything more than a cursory examination of the internal workings of over-ride clutches. The focus of the inspector's attention should be on the operational performance of the lifeboat winch system.

Once a faulty over-ride clutch has been identified by an inspector action to correct its defects will of necessity require the participation of factory experts and servicing technicians. After overhaul of a faulty clutch mechanism, the presence of a marine inspector will again be necessary to observe that the problems have been corrected.

Davit Stopper-Bars
for Gravity Davits

- c. A primary concern in the arrangement of davit stopper-bars is their ability to be unshipped without having to raise the boat by handcrank or electric power. An acceptable arrangement is one in which the stopper-bars are freed simultaneously with the gripes, as the bars pivot at one end and swing outboard parallel to the tracks when released by a lever on each davit arm. Free and unimpeded lowering from the stowed position must be ensured. Certain arrangements have been proposed to reduce the likelihood of damage by raising the davits against a stopper-bar in place. These should not be used because the stopper-bar cannot be freed easily if the davit arm bears upon it. Clips that do not permit the stopper-bars to be unshipped without lifting the lifeboat are unauthorized modifications to approved equipment, contrary to the regulations, and should be removed whenever found.

SECTION C: INSPECTION OF ENGINEERING SYSTEMS, EQUIPMENT, AND MATERIALS

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Fiege Wire Sockets

- d. A fiege clevis socket assembly is installed by seizing the wire near the end, driving a sleeve onto the rope, unlaying the end of the rope, fanning out the strand ends, cropping the hemp core, inserting a tapered fluted plug between the strands, and driving the plug to a solid seat inside the sleeve. The strands are compressed between the plug and sleeve by the tightening action of a covering socket, after which the seizing is removed. There is an inspection hole in the side of the socket through which the wire can be viewed to see if it is fully in place. Close attention shall be paid to these sockets. Their inspection shall include a determination as to the tightness and condition of the sleeve, and a sighting of the inspection hole to ensure that the wire is well up into the socket. Whenever the sleeve is found to be loose or worn, the fitting should be removed and inspected, the wire cropped, and the socket refitted. If the sleeve is worn or distorted, it should be renewed. Care should be taken that the new sleeve is sufficiently long, or has been fitted far enough back on the wire, that the wire end extends to the limit of the socket cavity. The fitting should be proof tested after installation. For further details, see the Aids To Navigation Manual - Seamanship.

NOTE: The use of fiege fittings is discouraged. "Poured" sockets, swaged fittings are more reliable when made up professionally and load tested before use.

Davit Span Wires and Manropes

- e. Gravity and mechanical davits are required to have manropes suspended by a davit span wire. However, for davits used for launching enclosed lifeboats, the davit span wires and manropes may be omitted, as they cannot be properly used.

Limit Switches for Gravity Davits

- f. Under 46 CFR 160.015-3(k)(2), limit switches must be installed on all gravity davits. Their purpose is to bring the davit winch to a stop before the davit arm strikes the inboard limit of its travel. The final 12 inches of travel are then handcranked. This avoids straining or breaking of the falls. Under 160.015-3(i), the safety factor provided by limit switches is necessary on gravity davits whether the motors for their winches are built-in or portable. The use of a portable powering unit (such as an air or electric drill) does not exempt a gravity davit from the requirement for two limit switches.

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7. Considerations for Lifeboat Handling

Blocks

- a. The sheave enclosures of lifeboat davits and the blocks of their falls require regular examination for evidence of corrosion and excessive sheave clearance. This must include the floating blocks and the lower part of the tackle attached to the lifeboat. In one reported casualty, extensive corrosion of the steel bucket strap on an upper tackle block caused the strap to part when the lifeboat was swung out for a drill. Outwardly, the block appeared satisfactory; however, the strap behind a cheek plate had wasted away. Hidden corrosion of this kind can be detected only through close examination and hammer testing. If the clearance between a sheave and its enclosing cheek plates is excessive, an opening may exist in which the wire rope fall can become wedged. Sheaves on the davit arms and tackles should be viewed through the opening of the enclosure to determine if this condition exists. If so, it is sufficiently serious to require corrective action.

Gravity Davits

- b. Examination of gravity davits aboard one vessel revealed an incorrect coil retainer replacement that might have short-circuited the master control switch, and a rearrangement of the controller wiring that might have rendered operation of the limit switches useless. As a result, power to the hoisting motor could have been secured only by opening the emergency disconnect switch. It was also reported that trackway switches were so gummed by paint that the springs which would normally return them to the open position were unable to operate; wheels on the limit switch arms were frozen with paint and rust; rollers on the davit arms were frozen with rust, and that the lettering on the various switches indicating "on" and "off" positions were obliterated by paint. Inspectors shall be satisfied that the ship's crew maintains gravity davits in safe operating condition (see 46 CFR 111.95-7 concerning main line emergency disconnect switches, master switches, and limit switches).

- c. Rottmer-Type Releasing Gear on Globe American Lifeboats.

Rottmer-Type Releasing Gear on Globe American Lifeboats

- (1) During World War II, the Globe American Corporation manufactured many 24 X 8 foot steel, oar, and motor propelled lifeboats, with built-in tanks. These lifeboats were fitted with Rottmer-type releasing gear, manufactured under license, and most were installed aboard "Victory" ships. Since the war, some of these lifeboats may have found their way to other types of vessels. The Globe American releasing gear employed the use of so-called "aluminum bronze" for the hook lock, upper guide bearing, and lower guide bearing. This particular alloy has an ultimate tensile strength exceeding 100,000 pounds per square inch, but is subject to stress corrosion cracking in the marine environment. This cracking, not always readily discernible, may cause failure of the gear with only the weight of the light boat on the hooks.

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- (2) Requirements. Vessels fitted with 24-foot Globe American lifeboats shall have all Rottmer-type releasing gear carefully inspected at each inspection for certification. This inspection requires complete dismantling, so that all parts of the gear may be carefully examined. Of particular concern are the hook lock and the upper and lower guide bearings. Any fractures in these items, however slight, is sufficient causes for replacement of the part. Such fractures may not be brazed; any part found to have been previously repaired by brazing shall be replaced.

8. Upkeep of Wire Lifeboat Falls

Introduction

- a. A review of casualties involving lifeboats and associated equipment has revealed a number of material problem areas. Failure of wire lifeboat falls accounted for more than 50 percent of these casualties. Recent statistics show that the number of casualties involving the failure of wire lifeboat falls are increasing. The most common cause of wire fall failure is lack of maintenance in areas that are normally inaccessible. Careful examination of these casualties showed that falls parted at inaccessible points in the vicinity of sheaves and guards, or where they remained stationary on the davit sheaves. Additionally, wire falls may be exposed to severe atmospheric conditions, frequent inundations by salt water and spray, and corrosive soot and stack gases. These elements combine with uneven wear to promote excessive deterioration of lifeboat falls.

Maintenance and Lubrication

- b. Maintenance and Lubrication.
- (1) General. Wire rope falls must be free of broken strands and damaging corrosion, and must be well lubricated along their entire length. Particular attention should be paid to areas where the falls pass through blocks, sheaves, and other obstructed areas. The exposed portions of the wire falls can be lubricated without lowering the lifeboats. However, in places where falls are hidden by blind sheaves or guards, they cannot be properly lubricated without lowering the lifeboats and exposing all sections of the wire rope. Wire rope that has a fiber core may absorb moisture, which causes internal corrosion.

NOTE: Even after lowering the lifeboats, there may be sections of the wire rope that do not move, where it is impossible to lubricate the surface riding hard against the sheave.

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CHAPTER 2: INSPECTIONS OF VESSEL EQUIPMENT AND MATERIALS

- (2) Lubricating Options. One way to lubricate unexposed areas of the wire lifeboat falls is to lower the boat a few feet so that these critical spots are clear. Another is to take the load off the falls and free them from the hidden areas in the blocks. These parts of the wire rope should have lubricant thoroughly worked into and completely around the strands. The best lubricants are lightbodied compounds, with rust inhibitors, that have good penetrating properties. These lubricants can be dipped, swabbed, or sprayed onto the wire rope.
- c. All lifeboat falls shall be thoroughly examined at least once every 2 years. The marine inspector shall require the lifeboat to be cradled or stopped off, with the load taken off the falls. The surface of the wire rope shall be checked for wear and for the presence of "fishhooks" or splinters. A marlinspike can be passed into the lay of the wire and backed to expose the interior of the wire rope. If there is any doubt about the condition of the falls, they shall be replaced. If they are deemed satisfactory for continued service, but there is some question as to their maintenance in those areas that have been in contact with sheaves or covered by guards, the falls should be end-for-ended.

NOTE: If it is more practicable to cut a few feet from the standing end of the wire falls to reposition those questionable areas, the inspector may accept this action.

Workbooks

- d. All maintenance performed on lifeboat falls should be recorded in the vessel's workbook. The inspector should examine these records to determine the age of the falls and whether any shipboard maintenance has been performed since the falls were last renewed.

9. Hydraulic Starting Systems for Survival Craft

General

- a. Good safety practices require lifesaving equipment to be properly maintained and ready for immediate use. Under the regulations, the motors of lifeboats aboard inspected vessels must be operated for at least 5 minutes, once a week (see 46 CFR 33.01-15, 33.25-20, 78.17-60, 97.15-45, and 196.15-45). Certain motor lifeboats and survival capsules are equipped with hydraulic starting systems that store power in pressurized accumulators. Occasionally, a system leak occurs when an accumulator loses pressure and becomes ineffective. If the leak is external and allows oil to be lost from the hydraulic system, pumping may not restore system pressure and starting of the engine will be impossible.

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Inspection
Requirements

- b. Masters and persons in charge should routinely examine such hydraulic systems during weekly fire and boat drills to ensure that they do not have leaks that allow the accumulators to discharge. Each accumulator should be at full pressure at the conclusion of the engine test and not lose pressure between tests. A short-term check of the system can be made by bringing the accumulator up to full pressure. After several hours, there should be no noticeable loss registered on the pressure gauge. A minimal interval of 4 hours between tests is recommended, although a 24-hour interval is more effective. Marine inspectors shall check the condition of the hydraulic systems of lifeboats and survival capsules during regular inspections.

**10. Emergency
Water and
Provisions for
Survival Craft**

Emergency water, provisions, and condensed milk, like all other items of survival craft equipment, are required to be "of good quality, efficient for the purpose they are intended to serve, and kept in good condition." Emergency water, provisions, and canned milk which are overage, or in leaking, rusting, bulging, or otherwise damaged containers, do not meet these standards and must be replaced.

Emergency water

- a. Emergency water.
- (1) Canned water should be checked for vacuum retention by the "slap test." Any clicking sound is evidence of an acceptable vacuum. Doubtful cans can be checked by opening some of them. If a hiss is heard consistently as these cans are opened, the rest of the doubtful cans may be accepted, and only the opened cans need to be replaced.
 - (2) Water in flexible pouches should be checked by squeezing the pouch. Any leaking water or air is cause for rejection.
 - (3) All approved water containers are marked with a packing date, and some may have an expiration date. All containers past their expiration date should be replaced. Containers without an expiration date should be replaced if they have been packed more than five years before the date of inspection.
 - (4) Lifeboats meeting the 1983 SOLAS Amendments (those with approval numbers starting with "160.135") must carry 3 liters (3.17 quarts) of water per person.
 - (5) Inflatable liferafts meeting the 1983 SOLAS Amendments (those with approval numbers starting with "160.151") must carry 1.5 liters (1.58 quarts) per person.

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- (6) Approved desalting apparatus may replace up to 1/3 of the water carried in survival craft. In addition to chemical treatment systems, manually operated reverse osmosis desalinators are now approved to replace the quantity of water they are rated to produce in 48 hours, up to the limit of 1/3 or the water required.

Emergency provisions

- b. Emergency provisions.
 - (1) Canned emergency provisions can be checked only by visual examination of the condition of the container.
 - (2) Emergency provisions in vacuum-packed flexible pouches should have packaging material tightly compressed against the contents. Loose contents indicate a loss of the vacuum seal, and such pouches should be replaced. Non-vacuum-packed pouches should be squeezed to check for air leakage, as with flexible water pouches.
 - (3) Expiration Dates. Approved emergency provisions are marked with a packing date, and some may have an expiration date. All packages past their expiration date should be replaced. Packages without an expiration date should be replaced if they are more than five years old. Canned provisions with no dates are well over five years old and should be replaced. None of these undated cans were vacuum-packed, therefore air in the container will cause fats in the provisions to turn rancid over time. If an operator objects to the rejection of old provisions, the operator should be given the option of submitting a sample of the provisions in question to a food laboratory to determine fitness for human consumption.
 - (4) Lifeboat Regulation. Lifeboats meeting the 1983 SOLAS Amendments (those with approval numbers starting with "160.135") must carry provisions equaling at least 10,000 kJ (2400 calories) per person.
 - (5) International Liferaft Regulation. Inflatable liferafts with "SOLAS A" Packs meeting the 1983 SOLAS Amendments (those with approval numbers starting with "160.151") must carry provisions equaling 10,000 kJ (2400 calories) per person.
 - (6) Calorie Counts. In order to be consistent with new SOLAS requirements, many emergency provisions will be packed in sizes other than multiples of 3600 calories (1 lifeboat ration) and 1800 calories (1 liferaft ration). Total calorie counts rather than package counts or weights, should be used to determine the minimum amount of provisions required.

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- (7) Emergency provisions have approval numbers starting either with "160.026" or "160.046". Both are acceptable and may be used interchangeably.

- (8) Canned Condensed Milk. Unless otherwise indicated on its container, canned condensed milk is not intended for long term storage, and should be replaced each year during the annual stripping and cleaning of the lifeboat. An operator may be given the option of submitting samples to a food laboratory for determination of fitness for human consumption, if the operator feels that the milk can be carried for an additional year.
 - (a) Operators should also be given the option of replacing canned condensed milk with approved emergency rations, using 1400 calories as the equivalent of 1 lb. of canned milk.
 - (b) Lifeboats meeting the 1983 SOLAS Amendments are not required to carry condensed milk.

Substitutions

- c. Lifeboats other than those meeting the 1983 SOLAS Amendments should not be permitted to substitute the 1983 SOLAS emergency water and provision quantities unless all equipment in the lifeboat is to the 1983 SOLAS Amendment Standards. Substitutions should not be made in inflatable liferafts, unless part of an approved modification to the manufacturer's servicing manual.
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SECTION C: INSPECTION OF ENGINEERING SYSTEMS, EQUIPMENT, AND MATERIALS

CHAPTER 2: INSPECTIONS OF VESSEL EQUIPMENT AND MATERIALS

I. FIRE PROTECTION EQUIPMENT

1. Introduction Tests and inspections of firefighting equipment during the inspection for certification are prescribed in the regulations. This subpart covers situations requiring particular attention or further explanation. NVIC 6-72 and its Change 1 provide additional guidance for the design and review of fixed firefighting equipment aboard merchant vessels. In particular, Change 1 specifies the conditions under which Halon 1301 extinguishing systems are equivalent to CO2 systems. For several years, small Halon 1301 systems have been approved for use on recreational boats, and on uninspected vessels such as tugs and fishing vessels. These units are so marked and bear an approval No. "160.029/--/--." Halon 1301 is not a hazardous vaporizing liquid, so it is not prohibited by 46 CFR 25.30-10(e); it is approved under 46 CFR 25.15 as equivalent to the CO2 system required by 46 CFR 25.30-15(a). These systems should be installed in accordance with approved manufacturers' installation manuals.

Fixed mechanical foam systems shall be required to have a foam analysis completed which certifies that the foam concentrate remains within acceptable parameters established by the manufacturer. At each Inspection for Certification, it is incumbent upon the vessel owner/operator to obtain from the foam manufacturer or his authorized representative documentation which details the specific gravity, pH, percentage of water dilution and solid contents of the foam. The documentation shall also certify the foam suitable for firefighting per requirements as detailed in 46 CFR 31.10-18, 46 CFR 107.235(b)(2)iii) and NVIC 6-72.

2. Excess Equipment

Inspected Vessels a. For uniformity in the listing of firefighting equipment carried aboard inspected vessels, the COI shall record only the fire hose, fire extinguishers, and other gear required by law and regulations. To compel the recording of excess equipment would effectively compel its carriage on all voyages, even though the regulatory requirements might be considerably exceeded. However, all excess firefighting equipment that is carried aboard an inspected vessel must be of approved types (as required by 46 U.S.C. 3306), tested at inspections, and kept in good operating condition.

Uninspected Vessels b. Under 46 CFR 25.30-5(b), all fire extinguishing equipment aboard uninspected vessels must be of approved types.

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3. Portable Fire Extinguishers

- Identification
- a. Portable fire extinguishers are identified as approved by one of the following methods:
 - (1) Presence of a UL, UL of Canada (ULC), or Factory Mutual Research (FM) label on the extinguisher bearing a marine-type marking, such as "Marine Type USCG B-1," "Marine Type USCG Type B:C, Size II," and "Marine Type USCG Type B:C, Size I, Approval No. 162.028/"; or
 - (2) A make and model number that corresponds to the listing under the manufacturer's name in the "Formerly Approved" section of Equipment Lists.

INSPECTION GUIDANCE: Extinguishers that cannot be identified as types that are approved or previously accepted on a case-by-case basis shall be removed.

- Coast Guard Certificates of Approval for Portable Extinguishers
- b. Certificates of Approval for portable fire extinguishers are no longer issued by the Coast Guard. All outstanding certificates were terminated on 1 January 1962. From that date, portable extinguishers have been given approvals based on UL listings. All fire extinguishers manufactured while Certificates of Approval were in effect may be used, provided they are in serviceable condition. However, the use of vaporizing liquid fire extinguishers manufactured after 1 January 1962 is prohibited.

- Acceptance of UL Listed Fire Extinguishers
- c. UL listed extinguishers not bearing Coast Guard marine-type markings are acceptable as equivalent to those bearing such markings, provided that they are of the appropriate types and sizes for their service. NVIC 13-86 provides a table comparing appropriate types and sizes of extinguishers.

4. Semiportable Fire Extinguishers

- Substitution
- a. Substitution of a required minimum sized semiportable fire extinguisher with smaller units totaling equal or greater capacity is not authorized, because the time required to position and activate a second extinguisher may be too long to prevent a fire from reflash.
- Outside Use
- b. Footnotes to 46 CFR 34.50-5(c) and 108.495(b) require doubling the quantity of agent if the unit is used outside. This double capacity must be provided by a single unit.

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5. Carbon Dioxide Systems

Small Passenger Vessels Uninspected Vessels

- a. Small Passenger Vessels Uninspected Vessels
 - (1) Provisions for the use of a single portable or semiportable CO2 fire extinguisher as a fixed system on small passenger vessels, under certain conditions, are contained in 46 CFR 181.20-5. Vessels built before 1 June 1958 were permitted to use up to two such extinguishers for this purpose, provided controls were capable of discharging both units simultaneously. These installations may remain in use, provided they are maintained in good condition.
 - (2) Provisions for fixed CO2 systems on uninspected vessels are contained in 46 CFR 25.30-15.

Potential Hazards and Means of Escape

- b. Potential Hazards and Means of Escape. Fixed CO2 systems pose a potential hazard to vessel personnel and marine inspectors. A casualty at sea, which was given widespread notice in Commandant Notice (COMDTNOTE) 16711 of 23 August 1978, illustrated the need to ensure adequate means of escape from CO2-served spaces. In this casualty, the chief engineer inadvertently discharged CO2 in a space with an inward-opening door. Crewmembers were unable to open the door until pressure in the space subsided, and some were asphyxiated. Similar accidents have occurred during system testing and servicing. The inspector should ensure that adequate precautions are taken. During servicing, no one should be permitted in spaces served by CO2 unless all CO2 bottles are completely disconnected. During inspections, CO2 storage provisions and means of escape shall be evaluated. Recommended protective measures include outward-hinged doors, kick-out panels in doors or bulkheads, a stenciled warning to lock the door open when the space is occupied, and sufficient vent openings to the atmosphere. Regulation 5.1.13, Chapter II-2 of SOLAS 74/78 also acknowledges these hazards by requiring outward-opening access doors in CO2-served spaces aboard subject vessels.

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6. Fire Hose

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| Markings | a. Markings. Questions have arisen as to the proper marking and testing of fire hoses installed under the provisions of 46 CFR 34.10-10(l), 76.10-10(l)(3), and 95.10-10(l)(4). The prescribed marking consists of the words "Underwriters Laboratories, Inc., Inspected, Rubber Lined (or Unlined) Fire Hose," followed by a serial number. These words appear on a cloth or rubber label permanently affixed to the fire hose. If a fire hose does not bear the UL label, the vessel owner shall provide the OCMI with certified copies of a test report by an independent laboratory, showing that the fire hose conforms to the appropriate specifications noted in the above regulations. |
| Testing | b. Testing. Questions have also arisen over the recommendations of both UL and the NFPA that lined fire hose never be wetted except for use at a fire. The Commandant believes that the benefits derived from the periodic pressure tests required by regulations outweigh any harmful effects of wetting, provided the hose is properly dried before stowage. Therefore, inspectors should caution shipboard personnel that particular care is necessary to dry fire hose thoroughly after each wetting to avoid deterioration. All new hose placed aboard vessels shall be tested in accordance with the regulations at regular inspection intervals. |
| Length | c. UL standards call for nominal 50' and 75' lengths for fire hoses designated as "50-ft." or "75-ft." lengths. In most cases, such hose should not be less than 48 feet for the former, 71 feet for the latter. On approximately one out of every ten lengths, a UL inspector will conduct a burst test. The sample used in the burst test will be cut off and used for physical and chemical tests (in no case will this sample be greater than 40 inches in length). |
| Fire Hose | d. In general, 2-1/2 inch hoses should be limited to use in exterior spaces or large cargo holds, such as on roll-on/roll-off (RO/RO) vessels. When a 4-foot applicator is required at the fire station, only 1-1/2 inch hoses should be used. |
| Defective Hoses | e. Under 46 U.S.C. 3305, fire hose so defective as to be incapable of repair must be destroyed in the presence of the inspector. |

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**7. Combination
Fire Hose
Nozzles**

New Installations

- a. New installations and replacements of combination nozzles shall be of approved types, as required by 46 CFR 34.10-10, 76.10-10, and 95.10-10. The approved types are listed in the Equipment Lists. The 1-1/2 inch/4 ft. applicators are intended for use with 1-1/2 inch combination nozzles in propulsion machinery spaces that contain oil-fired boilers, internal combustion machinery, or oil fuel units. Because of orifice sizes on approved nozzles, neither self-cleaning line strainers nor internal strainers are required.

Existing
Installations

- b. Certain combination solid stream and water spray fire hose nozzles were previously accepted pending development and adoption of new designs. Those installed on vessels prior to approval of combination nozzles under 46 CFR 162.027 may be continue in service, provided they are in serviceable condition. Self-cleaning line strainers are required with these nozzles, unless they are fitted with internal self-cleaning strainers. The accepted nozzles are:
 - (1) Types SG-40 and SG-47, manufactured by the Rockwood Sprinkler Co., Worcester, MA; and
 - (2) FOGNOZL 4-AN and 4-NAP, manufactured by the Akron Brass Manufacturing Co., Inc., Wooster, OH.

**8. Fire
Main/Foam
Cut-Out
Valves**

Identification

- a. Identification. Regulations provide that fire main cut-out valves shall be sealed open, except when closed to prevent freezing. The original provisions for cut-out valves and drains in the fire main were intended to prevent freezing in parts of the fire main system located on weather decks. In more clement weather, the cut-out valves were to be kept open for efficient use of the fire main system in event of emergency. With the advent of dual-purpose ships (those built for easy conversion to military use), the trend has been toward the use of cut-out valves to isolate or cross-connect different sections of fire mains. Therefore, a means for quickly identifying that fire main or foam cut-out valves are maintained in an open position has become necessary. All isolation or cut-out valves should be conspicuously marked and labeled (see 46 CFR 34.10-15(c)). In addition, the fire control plan shall show all isolation or cut-out valves, and shall be permanently displayed for use in an emergency.

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Regulatory Intent b. Regulatory Intent. The intent of the word "sealed" in the regulations was that a seal cannot be easily broken without the use of a key, axe, or chisel, and will indicate that the valve should normally remain open. In addition, it is easy to see whether sealed valves are open or closed. The sealing of these valves in an open position is a function of the vessel's operators. It is not intended that the valves be sealed open by the marine inspector. Therefore, the inspector shall accept seals provided by the vessel's operators to obtain the results intended by 46 CFR 76.10-10(e) and 95.10-10(e).

9. Sprinkler Systems

Introduction a. Introduction. Many instances have been found where the operation and maintenance of vessel sprinkler systems have not met required standards. Reports of deficiencies for various sprinkler systems show failure in every category: corroded and shorted electrical fittings; frozen and deteriorated mechanical items; piping that was corroded, completely plugged (including the pump suction line), fractured, and air-bound; plugged sprinkler heads and system secured at the pump so it would not have operated automatically.

Inspection Procedures b. Inspection Procedures. On small passenger or "excursion" vessels, tests and examinations of the sprinkler systems shall be made during the inspection for certification. On large vessels operating on fixed schedules, such tests and inspections may be spread out over the 12-month period under conditions and schedules established by the OCMI and the vessel's owners or operators. All automatic features of wet or dry-pipe systems shall be tested and examined to ensure efficient operation. Each zone shall be thoroughly flushed out with fresh water for a sufficient period of time to clear the system of scale and sediment. The flushing discharge shall be routed through drain valves, test vents, or openings from which sprinkler heads have been removed. As many drain openings shall be provided as necessary to clean the entire system.

Examination of Sprinklers c. Examination of Sprinklers. Dry-pipe and manually operated sprinkler systems shall be thoroughly drained after tests have been completed. Scheduled checks for accumulated water in dry-pipe systems should be made after the vessel is returned to service. Regardless of the system type, a sufficient number of sprinkler heads shall be removed for examination of both the head and piping, with particular emphasis on dropped heads and low branch lines. The conditions found in this examination will determine to what extent additional removals should be made. After checking and examining the heads, the system should be reassembled, inspected, and checked to ensure satisfactory operation.

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Potential Problems
& Corrections

d. Potential Problems/Corrections.

- Closed valves in the system (have the chief engineer chain and lock them open if necessary ...no action of the crew should be necessary for system operation).
- Pump won't come on automatically (consider detaining the vessel until problem is determined and repaired).
- No emergency power to the pump (consider detaining the vessel until emergency power is available).
- Flow sensors inoperative, thus incapacitating one zone of the fire detection system (Does the vessel have an additional fire or smoke detection system to cover the same area? If yes, require timely repair, if no, consider detaining the vessel and requiring immediate repair).
- Distribution system piping wasted and holed (discovered because system was not charged to the sprinkler heads). Consider detaining vessel, requiring immediate repair of the piping so sprinkler system can be fully pressurized. If repairs must be accomplished at a shipyard, consider removing passengers and extraneous crew, requiring extra precautions and patrols to protect the crew members who will be remaining on board for the transit.

**10. International
Shore
Connection**

International shore connections are subject to the requirements of ASTM F-1121. Fabrication either on board a vessel, in a shipyard, or other shore facility is not precluded by the standard. No specific marking is required by the ASTM standard.

SECTION C: INSPECTION OF ENGINEERING SYSTEMS, EQUIPMENT, AND MATERIALS

CHAPTER 2: INSPECTIONS OF VESSEL EQUIPMENT AND MATERIALS

J. NAVIGATION EQUIPMENT

- 1. Inland & International Rules** Vessels must be equipped with navigation lights and sound-producing devices as prescribed in 33 U.S.C. 1601-1608 (International) and 33 U.S.C. 2001-2072 (Inland). Penalty provisions are contained in 33 U.S.C. 1608 and 2072.

Vessels operating seaward of the demarcation lines described in 33 CFR 80 must comply with the International Regulations for Preventing Collisions at Sea, 1972 (72 COLREGS). Vessels which are in compliance with the construction and equipment requirements of the International Rules are in compliance with the Inland Navigation Rules Act of 1980 (Inland Rules). The 72 COLREGS became effective on 15 July 1977. The Inland Rules, enacted on 24 December 1980, became effective on 24 December 1981, except for the Great Lakes where they became effective 1 March 1983. Specifications for lights and sound signal appliances are prescribed in the Navigation Rules, reprinted in Navigation Rules, International - Inland, COMDTINST M16672.2A.

2. Navigation Lights

- Light Specifications a. Annex I of the International and Inland Rules specifies navigation light requirements in terms of colors, arcs, ranges of visibility, and position.
- Fixtures b. Fixtures. The regulations applicable to electric navigation lights are contained in 46 CFR 111.75-17. There are no regulations that specifically prohibit the use of non-electric lights, except where the use of open flames is prohibited. However, the requirement in the regulation for a navigation light indicator panel generally precludes use of non-electric lights.

3. Sound Signal Appliances

Annex III of the International and Inland Rules contains sound-producing appliance requirements which are aimed at increasing the mariner's ability to identify targets audibly through the use of different sound characteristics for vessels of different lengths. The sounds produced by whistles, bells, and gongs should all be distinctive so that they are not confused with each other. The sound produced by most whistles is generally shrill, and is accomplished by forcing a stream of air or steam through a circumferential slot into a cylindrical chamber. The tone and sound of a bell must not be confused with those of a gong. Under the Navigation Rules, a "fog horn" is no longer specified as part of the signaling equipment. A fog horn may not be substituted for the whistle required by those rules.

- a. Electronic Sound Devices. Annex III 2.(b) specifies that a bell be made of corrosion resistant material and further specifies bell mouth diameter. However, electronic devices which meet the sound requirements may be substituted for the mechanical equivalent if a manual back-up is provided.

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Fog Gongs b. Fog Gongs. The Navigation Rules require fog gongs aboard vessels of 100 or more meters (328 ft.) in length. The sound produced by the gong must be easily distinguished from that of the ship's fog bell, at an equal audible range. The gong shall meet the specifications in Annex III to the Navigation Rules. When there is doubt about the suitability of an instrument, a demonstration shall be conducted under the supervision of the OCMI and a report submitted to Commandant (G-MOC) via the chain of command.

Vessels Less Than 12 Meters in Length c. Vessels Less Than 12 Meters in Length. These vessels are not required to carry whistles and bells that meet the technical standards in Annex III of the Navigation Rules. However, if no such equipment is carried, the vessel shall be provided with some other means of making an efficient sound signal. Whistles and other sound-producing mechanical devices (e.g., a Freon-operated horn) may be accepted for use aboard vessels less than 12 meters in length, provided they are in proper working condition and produce an efficient sound signal.

4. Technical Requirements Specific requirements for navigation lights, which are similar for Inland and International Rules, are contained in Annex I to the 72 COLREGS and the Inland Rules. Annex III of the Rules provides technical details of sound-producing appliances.

5. Definitions & Interpretations The following definitions or interpretations are in addition to those listed in the Navigation Rules (Rule 3 or Annex I):

- "*At or near the side of the vessel*" in Annex I 3.(b) means not more than 10 percent of the breadth of the vessel inboard from the side, up to a maximum of 2 meters.
- "*Existing*" vessel means a vessel built (keel laid or corresponding stage of construction) prior to the effective date of the 72 COLREGS (15 July 1977) or enactment of the Inland Rules (24 December 1980).
- "*Forward masthead light*" is interpreted as describing either a single masthead light or the forward most masthead light on vessels with more than one masthead light (Annex I 2.(g) or 3.(b)).
- "*In front of*" means forward of. Sidelights may be "*in line*" with the forward masthead light, but not "in front of."
- "*Length*" means length overall (LOA).
- "*Masthead light*" is used in the Annex for vessels less than 20 meters in length which are unlikely to have 2 masthead lights.

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- "*Measurements*"; all vertical height measurements are to be taken from the center of the lens; horizontal measurements are to be taken from or along the centerline of the vessel.
- "*Normal conditions of trim*" in Annex I 2.(b) means all conditions either loaded or ballast for ocean voyages.

6. Extensions To facilitate the transition from the old International, Inland, and Western Rivers to the new International and Inland Rules, certain exemptions or extensions were provided. Rule 38 in both Rules authorized an extension period of 4 to 9 years from the effective date of the Rules to bring the vessel into compliance with some of the more significant rule changes. The time allowed by these extensions has been considered sufficient to bring existing vessels into compliance. There are not provisions in the Rules for further extensions or exemptions. The Coast Guard does not have the authority, except as provided for under Certificates of Alternative Compliance (CACs), to waive any requirements.

7. Exemptions

- a. An exemption from the requirements of International Rule 23 (a) provided they comply with the Inland Rule 23 (a)(i) by carrying a masthead light as far forward as practicable, has been issued to. All commercial, recreational and public vessels less than 20 meters which are:
- (1) Inspected vessels;
 - (2) Federally documented;
 - (3) Registered with a state;
 - (4) Public vessels; or
 - (5) Built in the United States and intended for sale in the United States or its territories.
- b. This exemption applies retroactively to vessels built before issuance of this waiver. Specific information about this exemption is contained in COMDTINST 16672.4 of 11 May 1993.
-

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8. Problems in Compliance with Light Requirements

The new Rule requirements have posed certain problems relative to "existing vessels":

- Ranges
 - a. The range requirements for most lights have increased under the new sets of Rules; the relationship between range of visibility and luminous intensity has also changed. However, many lights on existing vessels were much brighter than originally required and may meet the new Rules.
- Color
 - b. Color coordinates for green lights have been narrowed from those required for "existing vessels." This has resulted in a shift toward a bluish tint in the manufacturing of "green" dyes for navigation light lenses. The most commonly manufactured green plastic dyes do not have good ultraviolet stabilization; constant exposure to solar ultraviolet radiation will alter the green tint in a few years. This may be beneficial, in that it moves the color coordinates of an older light lens into the region required by the new Rules. It may also move them beyond the acceptable region.

NOTE: Tests will determine the color coordinates of the lens only at the time of testing, as navigation lights are constantly exposed to ultraviolet radiation.

- Horizontal Sectors
 - c. Annex I of both sets of Rules gives specific arcs in which certain intensities of light are required. For example, sidelights as fitted on the vessel must show the minimum required intensities in the forward direction. The intensity must decrease to reach "practical cut-off" (i.e., one-eighth of the minimum required sector intensity) between 1 and 3 degrees outside the prescribed sectors. Prior to adoption of the 72 COLREGS and Inland Rules, lights were "eyeballed" for a "reasonable decrease" in intensity at the sector boundaries; no values were assigned to the intensity in the cut-off region. The new Rules state that the lights must achieve the specified cut-off as fitted. In the forward direction, the 72 COLREGS require sidelights, as installed, to reach practical cut-off between 1 and 3 degrees outside the prescribed sector. The 72 COLREGS have been interpreted as requiring the intensity between 0 and 1 degrees outside the prescribed sector to be greater than the practical cut-off value. This allows both sidelights to be visible dead ahead of the vessel at a distance dependent upon their separation. This may present a problem for some vessels. For example, containers stacked forward of the sidelights could act as large screens, preventing the 1 degree spillover. A CAC is not appropriate in such cases; the lights should be relocated or the obstruction removed.
- Vertical Sectors
 - d. Annex I of both sets of Rules also establishes requirements for vertical sectors of navigation lights. Previously, this parameter was not even considered. Consequently, "existing vessels" may not be in compliance.

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- Masthead Separation
- e. Masthead lights must be separated by a horizontal distance of one-half the length of the vessel but need not be more than 100 meters (Annex I 2.(b)). Most vessels with a midship house were built with the after mast located amidships and will not meet this separation requirement without moving the mast(s). Also, moving the after mast from the midship house to the after house generally requires the after mast to be higher than original to meet height separation requirements. For this reason, Rule 38 exempted vessels under 150 meters (492.1 ft.) and gave larger vessels 9 years to comply. This extension was made with two-house vessels in mind and in consideration of the economic hardships involved with moving/raising masts. Therefore, CACs should not be granted for masthead separation unless moving the masts would interfere with the special purpose of the vessel.
- Sidelight Placement
- f. Sidelights must not be "in front" of the forward masthead light (Annex I 2.(g), 3.(b)). This rule also applies to single masted vessels and will require sidelight repositioning on many vessels in the 20-50 meter range. Some vessels (i.e., tugboats, workboats, or fishing vessels) may qualify for CACs due to the special purpose of the vessel.
- Sidelight Screens
- g. Sidelight screens must be painted matte (flat) black to comply with the 72 COLREGS/Inland Rules. Under Inland Rules, a vessel less than 20 meters in length needs to be fitted with screens only if they are necessary to bring the sidelights into compliance with the horizontal sector requirements of the Inland Rules.

9. Certificates of Alternative Compliance (CACs)

Regulations give provisions for alternative compliance with the 72 COLREGS in 33 CFR 81.5 (International) and 33 CFR 89.5 (Inland). CACs are intended only for U.S. vessels which cannot fully comply with the Navigation Rules. These are available for vessels of special or unique design which cannot meet the Rules without interfering with their mission. CACs cannot be used as a means for granting an extension of time for compliance.

- Issuance of CAC's
- a. Issuance of CAC's. The authority to issue CACs has been delegated to the chief, marine safety division at each district office for the purpose of permitting closer review of the actual vessel and to make Headquarters available for appeals. Since the potential for a lack of uniformity between districts exists, communication between districts is strongly encouraged. Certificates should include the information required in 33 CFR 81.9 or 89.9 and a copy of the certificates forwarded to Commandant (G-MOC-2), along with a copy of the Federal Register notice required by 33 CFR 81.18. After review by Commandant (G-MOC-1), the certificates will be filed with Commandant (G-NSR-3). Any questions or unusual cases should be referred to Commandant (G-NSR-3) for Rules (both Inland and COLREGS) interpretation; Commandant (G-MOC-1) for inspection and compliance; or Commandant (G-MTH-2) for technical assistance and fixture approvals.

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- "Class" Certificates
- b. "Class" Certificates. When an owner has several vessels of the same general configuration which would qualify for a CAC, a "class" certificate may be issued. The CAC should be issued listing a representative vessel name and class with an addendum listing all other vessels in the class. The vessel owner is responsible for posting certified copies of the certificate on the bridge of each vessel.
 - c. Typical Vessel Types.
 - (1) Offshore Supply Vessels (OSVs). The majority of CACs have been issued to OSVs where full compliance would have required placement of the after masthead light on the centerline between the midpoint of the vessel and the stern. This would severely interfere with the vessel's purpose.
 - (2) Tugboats, Workboats, And Fishing Vessels. The forward mast (or only mast) of smaller workboats (i.e., tugs and fishing vessels) is often required to be located behind the deckhouse due to the special nature of the vessel. Full compliance would require placing sidelights aft of the foremast. This may present "glare" problems or otherwise interfere with the special nature of the vessel. A CAC may be issued when the vessel owner adequately demonstrates that sidelights are in the closest possible compliance without interfering with visibility or the purpose of the vessel.
 - (3) Other Vessel Types. Other vessel types warranting alternative compliance may include a ferry with an off-center deckhouse, an aircraft carrier, or certain mobile offshore drilling units (MODUs).

10. Compliance Responsibility 72 COLREGS (as well as Inland Rules) compliance is the responsibility of the vessel operator/owner. Under international treaty, each signatory nation is responsible for enforcing the Rules consistently. Therefore, the Coast Guard will take corrective action whenever discrepancies are noted.

11. Inspection Enforcement Action Special inspections to determine compliance are not required and Coast Guard resources are generally insufficient to conduct special examinations solely for Rules verification. However, when Rules discrepancies are noted or reported, they shall be further investigated. During routine inspections (annual or COI), inspectors should include Rules requirements in the inspection scope and assess compliance by interviewing the master/vessel representative and by visual/audible verification.

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12. Compliance Verification Individual testing of sound and light appliances, as installed, is the best means of verifying compliance. Obviously, this is not practical in all situations nor possible without sophisticated measuring equipment and/or extensive surveys. For example, bells or gongs may comply with the Annex III requirements at the time of manufacture, but placement, mounting, and painting all affect final sound emissions. Therefore, demonstration of compliance will be the owner's responsibility when compliance is in question. The following guidelines for compliance acceptance/examination apply:

- Foreign Vessels a. Foreign Vessels. Foreign vessels holding valid SOLAS Safety Equipment Certificates (SECs) will be considered in compliance with the 72 COLREGS, unless obvious discrepancies are noted.
- Existing U.S. Vessels b. Existing U.S. Vessels. Existing U.S. vessels will be considered to comply unless obvious discrepancies are noted. Rules inspections will be conducted as a part of regularly scheduled inspections. Special plan review or equipment affidavits will not normally be required for existing vessels.
- New U.S. Vessels c. New U.S. Vessels. Plan review for new U.S. vessels will include navigation light placement and equipment approvals. Review or approval by ABS is considered acceptable evidence of compliance.

13. Non-Compliance Actions Vessels not in compliance should be issued deficiency notifications. Appropriate entries must be made in the Marine Safety Information System (MSIS). Deficiencies for foreign vessels and U.S. vessels should be issued via a violation report (MSIS Marine Violation Report Recommendation (MVR) Product). In general, the unit may issue a letter of warning within the first year of the violation if corrective action is already scheduled. Stronger action may be warranted based on the operator's prior deficiency record, prior notice of the Rule requirements, and/or no planned corrective action. Unless the violation is considered a safety hazard, a reasonable time should be allowed for corrective action (i.e., next drydocking or yard period) before imposing operating restrictions.

14. Approved Equipment Listings of approved navigation light fixtures and sound devices, for vessels over 20 meters in length, may be obtained from Commandant (G-MSE).

NOTE: Some approved "white" lights utilize a grayish tint lens to help prevent excess spillover and glare.

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K. MARINE SANITATION DEVICES (MSDs)

1. Introduction Section 312 of the Federal Water Pollution Control Act (FWPCA), as amended (33 U.S.C. 1322), requires MSDs to prevent the discharge of untreated or inadequately treated sewage into U.S. waters. It requires a certified operable marine sanitation device (MSD) on every vessel with an installed toilet. Installed toilets that are not equipped with an MSD, and that discharge raw sewage directly over the side, are illegal. Section 312(g)(2) of the FWPCA directs the Coast Guard to certify MSDs and 33 CFR 159 sets out equipment construction and operation requirements. In addition, the MSD must be in operable condition to the satisfaction of the USCG boarding officer. A vessel with no installed toilet is not subject to the provisions of section 312. Marine Sanitation Devices are "certified," not "approved," for two reasons. First, MSDs are required on all vessels, not only USCG inspected vessels. Second, MSDs are tested for compliance with the Environmental Protection Agency (EPA) effluent regulations and standards as required by the FWPCA, and do not always meet the USCG marine and electrical engineering regulations of 46 CFR Subchapters F and J. MSD certifications will note whether the MSD is certified for inspected vessels or uninspected vessels.

2. Classification The USCG recognizes three MSD equipment classes. It is vital to recognize that an MSD type is based on the equipment installation. For example, a malfunctioning flow-through discharge device that has a closed overboard discharge valve is NOT a no-discharge device. It is a broken machine.

- Type I
 - a. Type I. A flow-through discharge device that, under the test conditions described in 33 CFR 159.121, produces effluent having a fecal coliform bacteria count no greater than 1000/100 milliliters, and no visible floating solids. A Type I MSD is commonly a physical/chemical type (macerator/chlorinator).
- Type II
 - b. Type II. A flow-through discharge device that, under the test conditions described in 33 CFR 159.121, produces effluent having a fecal coliform bacteria count no greater than 200/100 milliliters, and suspended solids no greater than 150 milligrams/liter. A Type II MSD is commonly a biological (aerobic digestion) plant, but several physical/chemical plants are certified as Type II MSDs.
- Type III
 - c. Type III. A device designed to prevent the overboard discharge of treated or untreated sewage, or any waste derived from sewage. Most Type IIIs are holding tanks, but there are also vacuum collection systems, incineration systems, recirculation systems, and a composting system.

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3. Applicability

Vessels with installed toilets must install an operable, certified MSD, as follows:

- | | |
|-----------------------------|---|
| Vessels 65ft in Length | a. Vessels 65 feet in length and under must have a Type I, II, or III device (Type I MSDs are still permitted on new installations because of a USCG waiver issued by Federal Register notice of Monday, 10 July 1978.); and |
| Vessels over 65ft in Length | b. Vessels over 65 feet in length must have a Type II or III device. Type I devices are permitted only if: <ol style="list-style-type: none"> (1) The construction of the vessel was begun on or after 30 January 1975 and the MSD was installed prior to 31 January 1980; or (2) The construction of the vessel was begun before 30 January 1975 and the MSD was installed before 31 January 1979 (extended from 1978 to 1979 because of a USCG waiver issued by Federal Register notice of Monday, 28 November 1977). |

4. U.S. Coast Guard Certification

Certification questions should be directed to Commandant (G-MOC). All modifications to certified MSDs must be reviewed and accepted by Commandant (G-MOC). Initial certification is accomplished in accordance with 33 CFR 159, by one of three methods:

- | | |
|---------------------|--|
| Lable Certification | a. MSDs manufactured after 30 January 1976 have been process tested by the USCG and have a label that identifies the certification number (as in "Certification No. 159.15/xxxx/xx/[I, II, III]"). This label will indicate whether the MSD is certified for use aboard inspected or uninspected vessels. "Equipment Lists," COMDTINST M16714.3, identifies label-certified devices. |
|---------------------|--|

NOTE: As of January 4, 1990, the MSD certification information has been incorporated into the Marine Safety Information System (MSIS) computer data base. This means that new certification numbers had to be assigned in the same format as Coast Guard approval numbers (e.g., 159.15/1005/4/II is now 159.015/504/0 and 159.15/1105/4/II is now 159.015/584/0; see figure 18-1). Model names have not changed and formerly assigned numbers are still acceptable for use.

- | | |
|---|---|
| Letter Certification
(33 CFR 159.12) | b. MSDs made on or before 30 January 1976 were not process tested to the FWPCA requirements. These older plants, and some custom-built systems, may be certified under 33 CFR 159.12(c), by Coast Guard letter to the manufacturer or vessel owner. A copy of the letter should be kept aboard the vessel as evidence of compliance. These MSDs can not be labeled under 33 CFR 159.15. |
|---|---|

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FIGURE C2-1: MSD CERTIFICATION NUMBER

CONVERSION SYSTEM

For certification numbers for 159.15 / 1001 / - / - to 159.015 / 1099 / - / - :

Old certification #: 159.15 / 1005 / 4 / II

(delete): : : : : x x : : : x x

(add): : : : 0 : : : : 0 : 0

New certification #: 159.015 / (0)504 / 0 = 159.015 / 504 / 0

or certification numbers for 159.15 / 1100 / - / - to 159.15 / 1199 / - / - :

Old certification #: 159.15 / 1105 / 4 / I I

(delete): : : : : x x : : : x x

(add): : : : 0 : : : : 8 0 0

New certification #: 159.015 / (0)584 / 0 = 159.015 / 584 / 0

Certification by
Regulation
(33 CFR 159.12a)

- c. Type III MSDs that store only sewage and flushwater at ambient air pressure and temperature are certified by definition. There will be neither a label nor a letter, so the inspector should verify that the installation is as it is claimed. (Section 18.K.8 addresses precautions for inspecting holding tanks.) The tanks should be adequate to retain the wastewater generated while the vessel is within U.S. waters. Gray waters and galley wastes should not be directed to such a system, because the rotting food can cause the tank contents to putrefy, worsening the situation. The following are not acceptable as being a Type III MSD: (1) use of piping as a holding tank or (2) securing the direct overboard discharge piping from the head with a valve.

NOTE: Type III systems installed on a vessel before 30 January 1975 are certified under 33 CFR 159.12(b). These devices were not reviewed; no certification letter or label is necessary.

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5. IMO Certificate of Type Test A foreign flag vessel that has a "Certificate of Type Test" under MARPOL Annex IV indicating that its sewage treatment plant meets the test requirements of Resolution MEPC.2(VI) of the International Maritime Organization (IMO) will be accepted by the Coast Guard as being in compliance with 33 CFR 159.7(b) or (c). Such a plant will be considered as fully equivalent to a Coast Guard certified Type II MSD (NVIC 9-82, CH-1, dated 8 October 1988) as long as the unit is in operable condition. U.S. registered vessels will continue to be required to have Coast Guard certified MSDs per 33 CFR 159.

6. Pre-construction Technical Review

Label-Certified MSD a. **Label-Certified MSD.** If the label indicates certification for installation on inspected vessels, no further review of the unit itself is required, but any surge tanks or transfer station components should be examined prior to installation. If the label indicates that the MSD was certified initially for installation aboard uninspected vessels only, it must undergo plan review by the Marine Safety Center (MSC), the office responsible for the plan review of the particular vessel.

Capacity of the MSD b. **Capacity of the MSD.** The regulations let the manufacturer determine how MSD capacity is stated. As a result, MSD manufacturers have used widely varying per capita sewage estimates in calculating the capacity of their equipment, from 35 liters per day to 35 gallons per day. In a proposed new installation, verify that the unit is large enough, based on hydraulics and waste load, not numbers of people, to process the wastewater expected to be generated on board the vessel. Installing too small an MSD will allow the discharge of partially treated sewage, which violates the FWPCA.

Modifications c. **Modifications.** All modifications to fixed sanitary plumbing or the MSD system must be accepted by the cognizant OCMI.

Jurisdiction for Review d. **Jurisdiction for Review.** The vessel owner is responsible for complying with other agencies that may have jurisdiction. The Public Health Service (Interstate Transportation Sanitation Service) also conducts preconstruction reviews on U.S. vessels.

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7. Inspection of Installed MSDs

Marine inspectors should accept certified, operable MSDs that meet the requirements of 33 CFR 159. Ensure that all MSDs on the vessel are included in the inspection. Large vessels may have several MSDs, both holding tanks and flow-through MSDs.

- | | |
|---------------------------------|---|
| Certification | <ul style="list-style-type: none"> a. Verify that a device is certified by checking labels, letters, manuals, etc. A copy of the certification letter for an "existing" MSD should be kept on the vessel for review by a boarding officer. This system is imperfect at best. A foreign flag vessel should keep a copy of the IMO Certificate of Type Test aboard (see section 18.K.5). If a letter or IMO Certificate of Type Test is not available, contact G-MOC-3. They may be able to identify the MSD as one that has been letter certified or listed with IMO. |
| Operation of Type I or II MSD's | <ul style="list-style-type: none"> b. Verify that an MSD is operable. <ul style="list-style-type: none"> (1) Flow-Through Discharge MSDs (Type I or Type II). Verify the following: <ul style="list-style-type: none"> (a) Instruction manuals should be on board and available to the operating crew. (b) Disinfectant chemicals or other consumable supplies needed to operate the device are stocked on the vessel. "Hazardous substances" (46 CFR 147) used to process sewage must be labeled and handled as such. (c) All components are in good operating condition. Some ships may install the treatment tank in a separate compartment from the pumps and aerators, due to space constraints. (d) Capacity is adequate for the vessel's wastewater load. (e) The MSD receives only drains that it can handle. MSDs are tested only with sewage. Gray water drained to the plant can displace partially treated sewage. (f) No suspicious accumulations of liquid or leaks are around the treatment plant. (g) Any disinfectant dosing openings are accessible and can be easily opened. (h) Vents from the MSD do not cross-connect with other vents. |

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Operation of Type III MSD's

- (2) Holding Tanks (Type III). Verify the following:
- (a) Capacity is adequate for the time the vessel will have to retain sewage and flushwater.
 - (b) Tank is used solely to store sewage and flushwater. In older ships, toilet drains may be combined with deck, sink and shower drains, to help flush the overboard drains. This installation was never intended to store sewage and may not be plumbed to prevent the back-venting of fumes from a holding tank.
 - (c) Tank does not receive gray waters or galley wastes. Adding these wastes can greatly increase the hazards of putrefied material accumulating in the tank.
 - (d) Tank operates at ambient pressure. Vacuum collection systems therefore cannot be certified under 159.12(a) and must be submitted for engineering review.
 - (e) Tank operates at ambient temperature.
 - (f) Vents from the MSD do not cross-connect with other vents.
 - (g) The overboard discharge valve ("Y" valve) for the tank is adequately secured to prevent the discharge of raw sewage while the vessel is in U.S. waters.

MSD Capacities

- d. Check that the MSD can successfully operate in the installation. These calculations shall be used as guidelines, as 33 CFR 159 does not mandate capacities. Each MSD should be evaluated in terms of the vessel's size, route, service, and particular circumstances. These capacities consider only "black-water" toilet drains. (on the average, each person will produce 1.5 liters of waste per day).

Flush Rate

- Figure 18-2 estimates the water used per flush by different toilet systems.

Wastewater Produced

- Figure 18-3 estimates the liters of wastewater produced per person per day, based on the plumbing type, and the way the boat operates.

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Gray Water

- Figure 18-4 estimates the liters of "gray water" from galleys, showers and sinks produced per day, based on the way the boat operates. Gray water discharge is prohibited only in the Great Lakes. Gray water is NOT sewage and may be discharged overboard without passage through an MSD or a holding tank. In fact, draining galley wastes into the MSD is not recommended, because food waste is much more difficult to decompose than the human sewage which the marine sanitation device is intended to handle. If retained, gray water must be included in the waste retention capacity for the vessel.

Operation in Excess of Certified Rating

- e. A flow-through (Type I or II) system may be overloaded. This "short circuits" the MSD and wastewater flows through the unit too fast to be treated, allowing the direct overboard discharge of untreated sewage through the MSD.

FIGURE C2-2

APPROXIMATE FLUSH CAPACITIES FOR VESSEL TOILETS DRAINING TO MARINE SANITATION DEVICES (MSDs)	
System Type	Liters per flush
Conventional (Flushometer)	18.9
Recirculating	0.38
Vacuum	1.1
Hand Pump	1.9
Electric Pump	3.8

FIGURE C2-3

LITERS OF WASTEWATER PER PERSON / PER DAY BASED ON PLUMBING TYPE						
Trip Length	LONG¹		MEDIUM²		SHORT³	
User	Crew	Passenger	Crew	Passenger	Crew	Passenger
Plumbing System Type						
• Conventional	96.10	96.10	96.10	31.40	48.10	24.00
• Recirculating	1.90	1.90	1.90	0.64	0.95	0.95
• Vacuum	7.20	7.20	7.20	7.20	3.60	1.90
• Hand Pump	11.00	11.00	11.00	3.80	7.40	2.70
• Electric	20.40	20.40	20.40	6.80	10.20	5.10

Note 1: Crew and passengers aboard 24-hour/day.
 Note 2: Crew aboard 24-hour/day; 2 groups of passengers aboard for 4 hours each (2 trips/day), each passenger using facilities once.
 Note 3: All crew aboard 12 hr/day; 6 groups of passengers aboard for 2 hours (6 trips per day), one fourth of passengers using facilities once.

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FIGURE C2-4

LITERS OF GRAY WATER PER DAY						
Duration	LONG ¹		MEDIUM ²		SHORT ³	
User	Crew	Passenger	Crew	Passenger	Crew	Passenger
Gray Water	113.6	113.6	113.6	56.8	11.4	5.7
<p>Note 1: All crew and passengers aboard 24-hour/day.</p> <p>Note 2: All crew aboard 24-hour/day; 2 groups of passengers aboard for 4 hours each (2 trips per day), each passenger using facilities once.</p> <p>Note 3: All crew aboard 12 hr/day; 6 groups of passengers aboard for 2 hours (6 trips per day), one fourth of passengers using facilities once.</p>						

Stability of Small Passenger Vessels

- e. Stability of Small Passenger Vessels. Vessel stability must be considered in MSD installation aboard a small passenger vessel. This is especially important for vessels fitted with holding tanks, which, when partially full, may add significant free-surface effect. The OCMI should ensure that the requirements of Subchapter T are met.

Vessel Operations

- f. Vessel Operations

Time Within U.S. Waters

- (1) Time Within U.S. Waters. The MSD is required while the vessel is within the three mile limit. A Type III MSD can have a through hull "Y" valve, but it must be opened only when the vessel is beyond U.S. waters. The valve must be adequately secured in all U.S. waters to prevent all discharges of raw sewage. Use of a padlock, non-releasable wire-tie, or removal of the valve handle would be considered adequate securing of the device. The method chosen must be one that presents a physical barrier to the use of the valve.

No Discharge Zone

- (2) No Discharge Zone. Operation in EPA designated No Discharge Zones affects the MSD installation on every vessel that enters or stays in those waters. Flow-through devices are permitted if adequately secured to prevent discharges of any sewage, treated or untreated. Closing the seacock and padlocking, using a non-releasable wire-tie, removing the seacock handle would be sufficient means of securing. Locking the door to the head with a padlock or a door handle key lock is another acceptable method of securing the MSD while in a No Discharge Zone. However, Type III MSDs are recommended for long-term operation in a No Discharge Zone. Owner/operators should determine whether the intended area of operation is a No Discharge Zone.

SECTION C: INSPECTION OF ENGINEERING SYSTEMS, EQUIPMENT, AND MATERIALS

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- Plumbing System Leakage (3) Plumbing System Leakage. A greater capacity MSD may be necessary to accommodate the water from leaky toilet valves. Fixing the plumbing is often easier.
- Effluent Sampling g. Effluent Sampling. Under the law, it may be necessary to take a sample of the MSD effluent if the marine inspector suspects that the MSD is no longer operable. If this becomes necessary, the marine inspector should instruct the vessel owner to have the effluent sample taken by a qualified wastewater laboratory, with the results reported to the USCG. These analysis results may form the basis of an enforcement action resulting in a civil penalty, so only qualified personnel should take, transport, or analyze the MSD effluent. The USCG can use any wastewater lab that is state-certified.
- Jurisdiction h. Jurisdiction. The vessel owner/operator is responsible for complying with other agencies that may have jurisdiction. For example, foreign passenger vessels calling at U.S. ports are subject to USCG quarterly control verification boardings. The Public Health Service (Centers for Disease Control) also inspects the sanitation of passenger vessels calling at U.S. ports.

8. Precautions for Inspections of MSDs

SAFETY WARNING!

- **Exercise Confined Space Entry precautions when working around an open or suspected damaged MSD.**
- **If samples must be taken by a boarding officer, the boarding officer should wear disposable gloves to protect from possible contamination from the effluent.**
- **Use “Not Safe For Hot Work” precautions around MSD/Holding Tank.**

- Use confined space entry precautions if it is necessary to open a holding tank or MSD. An MSD that has broken while containing sewage can be a hazard to all involved in its repair or inspection. Both methane and hydrogen sulfide can be generated in a treatment plant once aeration is lost.
- A properly operating aerobic digestion MSD does not have a bad smell. A bad smell indicates that part of the system is leaking or septic.
- Be alert for discolored metal fixtures. Hydrogen sulfide gas will blacken brass or other metal, even where it is seeping from the MSD at extremely low (not lethal) concentrations.
- Inspectors are not expected to risk their health to check the MSD. If the MSD is too filthy at the time of inspection, get somebody else to clean it up before you proceed with the inspection.

SECTION C: INSPECTION OF ENGINEERING SYSTEMS, EQUIPMENT, AND MATERIALS

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- Effluent sampling should be done only by personnel who are trained in collecting and handling the water samples. If effluent sampling is advised, inspectors should require the vessel operator to have samples taken by personnel from a qualified water quality laboratory.

9. Portable Toilets

Introduction

- a. Introduction. Portable toilets or "porta-potties" use no installed water, power, etc. Portable toilets are not considered installed toilets and are not subject to the MSD regulations. But they are subject to disposal regulations which prohibit the disposal of raw sewage within territorial waters (3 mile limit), the Great Lakes, or navigable rivers. Their use in combination with a direct discharge toilet will not bring a vessel into compliance. Vessel owners may remove the vessel's installed toilets, and use portable toilets instead. If a vessel is fitted with and is using a portable toilet, any fixed toilets aboard that do not comply with 33 CFR 159 must be made permanently inoperable. Only when total removal of the system would be impractical or unsafe may the toilet be rendered "permanently inoperable," meaning that all parts of the toilet are removed (unless removal of a particular part would be impractical or unsafe).

Temporary MSDs

- b. Temporary MSDs. The MSD requirement is intended to remove all uncertified toilet installations aboard vessels. This policy must not be construed to permit installing a spectacle flange on discharge valves, or blanking off discharge lines on direct discharge toilets. These are temporary means of preventing overboard discharge that do not render the system permanently inoperable. They do not change the installed system, and the reasonable conclusion is that the vessel owner intends to use the uncertified, installed system later.

Installation

- c. Portable systems, if used on inspected vessels, must meet the following criteria:
- (1) The device must be manufactured of a durable material, such as molded plastic, aluminum, etc., that facilitates its removal ashore. Collapsible units with disposable bags are not acceptable, because the bag can tear and release sewage into the vessel or into the water.
 - (2) The vessel operator must follow the manufacturer's instructions for waste disposal, chemical additives use, etc.
 - (3) The device must be securely fastened to the vessel with straps, wooden framing, or similar materials.

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- 10. Waiver of MSD Requirement** Some unique vessels may be granted a waiver of the MSD requirement. Such waivers are limited and are granted only by Commandant (G-MOC-2). Requests for waivers will be considered only on the basis of space or power constraints that prevent the installation of any commercially available MSD. A lack of pump-out facilities in the vessel's immediate area of operation is not sufficient grounds for a waiver, unless the vessel regularly travels outside U.S. territorial waters, where overboard discharge of raw sewage is permitted. Portable toilets may then be substituted.
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CHAPTER 2: INSPECTIONS OF VESSEL EQUIPMENT AND MATERIALS

L. UNIQUE VESSEL EQUIPMENT AND MATERIALS

1. Introduction Modern technology and automation are markedly changing shipbuilding practices. Virtually every new vessel contains some novel feature that requires attention at certain intervals after the initial certification. Such items include:

- a. Reheat boilers;
- b. High expansion foam systems;
- c. Carbon monoxide analyzers;
- d. Special steels; and
- e. Certain automated systems.

This situation is also true in the case of existing vessels that have been rebuilt, converted, or modernized to a limited extent by periodic alterations. The inspector must have access to the information concerning such features, as well as proper inspection and testing data.

2. Records A description of any unique equipment or materials shall be listed in MSIS. For each piece of equipment or material, an appropriate entry should indicate where information on proper inspection and testing procedures is located. The entries shall be made when the equipment is installed, on the occasion of a new vessel's initial inspection for certification, or whenever necessary.

CHAPTER 2: INSPECTIONS OF VESSEL EQUIPMENT AND MATERIALS

M. POWER-DRIVEN FASTENERS

1. Introduction Power-driven fasteners are used frequently aboard commercial vessels to attach nonstructural items such as cables, cable trays, electrical fixtures, and pipe hangers to stiffeners, beams, frames, and nontight structural bulkheads. They are, basically, small-arms projectiles with stud threads on one end. These projectiles are "shot" into steel members to provide mountings similar to welded studs. Since they pierce the steel members, they may lead to crack-initiation sites, areas of localized corrosion, or sources of leaks. The possibility of loosening the fastener also exists, since the bond between the fastener and the structure is mechanical, not cohesive. Power-driven fasteners must not be used in areas that are sensitive to stress patterns or corrosion. The only practical way to control their use is to grant specific approval for their use on a case-by-case basis. This is best done when construction plans for new vessels, or revised plans for existing vessels, are submitted for approval. When used, power-driven fasteners shall be attached at least 1 inch from the edge of any member.

2. Acceptable Uses (Subject To Approval)

- a. Within Machinery Spaces.
 - (1) On main girder webs, other than primary longitudinals;
 - (2) On webs of watertight bulkhead primary stiffeners;
 - (3) On flanges and webs of beams on flats;
 - (4) On pillars; and
 - (5) On plating on flats.
- b. Outside Machinery Spaces.
 - (1) On nontight bulkheads; and
 - (2) On decks other than weather decks.

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**3. Unacceptable
Uses**

- a. In side shells;
 - b. In strength decks or primary stiffeners;
 - c. In tank tops;
 - d. In tight bulkheads (W.T., O.T., etc.);
 - e. In flanges of primary structural members;
 - f. In any weather location;
 - g. In webs of primary longitudinals;
 - h. In pipe hangers for systems where thermal stresses are significant and hanger placement is important (e.g., high temperature);
 - i. In any member in which failure would create a personnel hazard, such as a handrail or ladder;
 - j. On members less than 0.25 inches thick;
 - k. On members whose operating temperature is normally below 1C;
 - l. On materials other than mild steel;
 - m. As grounding devices; and
 - n. To fabricate composite beams.
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