

**Revision 10
October 2003**

Addendum to Annex

**To the MEMORANDUM OF AGREEMENT
between the
UNITED STATES COAST GUARD
and
DET NORSKE VERITAS
GOVERNING PARTICIPATION IN
THE ALTERNATE COMPLIANCE PROGRAM
AND THE DELEGATION OF CERTAIN SURVEY
AND CERTIFICATION SERVICES
FOR UNITED STATES OF AMERICA FLAGGED VESSELS**

SUPPLEMENTAL REQUIREMENTS

USCG approved 10 October 2003

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1. Introduction

The supplemental requirements given in this document (the “DNV Supplement”) are those of the United States Coast Guard applicable for issuance of a Certificate of Inspection (COI) which are contained in the Code of Federal Regulations but not adequately covered by Det Norske Veritas Rules for the Classification of Ships or International Convention Requirements.

This Supplement also contains Statutory Vessel Design, Construction and Equipment Requirements from 46 USC, and U.S. Interpretations related to international convention requirements where not covered by Det Norske Veritas Rules. In addition the document provides additional requirements related to MARPOL 73/78, diving support systems, stability of large Passenger Vessels, accommodation, navigational safety, as well as to the IBC and IGC Codes.

This DNV/U.S. Supplement is applicable to U.S. Flag newbuildings or existing vessels that are enrolled in the Alternate Compliance Program classed by DNV, issued with, or intended to be issued with, ILCC, MARPOL and SOLAS Certificates and to be issued a COI under 46 CFR Chapter I, Subchapter D “Tank Vessels”, Subchapter H “Passenger Vessels”, or Subchapter I “Cargo and Miscellaneous Vessels”. The requirements for U.S. Flag vessels can be expressed as the sum of:

DNV Rules for Classification of Ships + International Conventions (SOLAS, Load Lines, MARPOL, etc.) + the DNV U.S. Supplement (this Document).

Updated information on current DNV Supplements and Authorizations, as well as interim changes, additions and subtractions to the most recent Supplement (the Holding File) are posted on the USCG ACP web site, specifically <http://www.uscg.mil/hq/g-m/mse/acp/dnv.htm>. The content of the Holding File is a mandatory part of the DNV Supplement at any time, and the user should check this file for updates.

The process used to arrive at this DNV Supplement has been a consideration of the Critical Ship Safety Systems (as given in the Federal Register 63, issued 13 February 1998, p. 7495-7499), plus other references to the Code of Federal Regulations, and reviews by the USCG and DNV. Use of the three sets of documents mentioned above is generally sufficient reference for a commercial vessel to meet U.S. requirements.

The procedures for class society participation and vessel enrollment in the Alternate Compliance Program (ACP) are described in the USCG Navigation and Vessel Inspection Circular (NVIC) 2-95 Change-1. For all situations when an owner wants to enroll his vessel in ACP with DNV, a meeting should be arranged between owner, USCG and DNV, possibly also yard or technical consultant. The process for enrolment into ACP is given in USCG Marine Safety Manual, Vol. II, Section B, Chapter 9.

Newbuildings: At the same time as the yard submits “Request for Classification”, an application (Form CG-3752) should be sent to DNV and the cognizant USCG Officer in Charge, Marine Inspection (OCMI) stating that there is a desire for the vessel to be enrolled in the ACP. Both the yard and the owner are to send such applications, or an application signed by both parties will be acceptable.

Ships in operation: The owner or operator is to submit an application (CG 3752) to the USCG (OCMI), to have the vessel enrolled in the ACP with DNV. The USCG will subsequently authorize

the DNV Program Manager and the local DNV marine survey office to commence with the ACP process. A “Hand over Survey” described in NVIC 2-95 (current version) must be conducted.

Re-flagging: As for ships in operation, the owner or operator is to submit a letter/application (CG 3752) to DNV and the OCMI. Any re-flagging project should include meeting between the owner (consultant), the USCG and DNV, in order to discuss the process and the required Vessel Deficiency Report (“Gap-Analysis”). NVIC 10-81 (Current Version) is the guiding document for re-flagging. The USCG accepted Gap Analysis augments the definition of the standards applied to the specific vessel. Please note the requirement of existing ships transferring to U.S. Flag to meet the probabilistic dry cargo ship damage stability requirements, see item 2.3.2.

Withdrawal from ACP: The owner is to inform the USCG in writing, with copy to DNV. Applicable data from the time the vessel was enrolled in ACP will be transferred from DNV to the USCG, and entered into the USCG database. The owner may request subsequent statutory surveys and issuance of certificates directly to the USCG. Even after withdrawal from ACP the owner has the option of requesting DNV to survey and issue individual certificates on behalf of the USCG, however, the level of oversight may be different compared to that under an ACP scheme.

Reports of Damages: The vessel’s Master is to report marine damages, see 46 CFR 4.03, to the USCG OCMI. In accordance with DNV Rules, the Master is also to report any damages affecting class or statutory matters to DNV. DNV will take appropriate action, including surveys, and will also coordinate any such activity with the OCMI.

Any reportable accident or casualty (defined in the following) involving any U.S. Flag ship is to be reported to the USCG in accordance with 46 CFR 4.05-1 “Notice of Marine Casualty”, cite:

Immediately after the addressing of resultant safety concerns, the owner, agent, master, operator, or person in charge, shall notify the nearest Marine Safety Office, Marine Inspection Office or Coast Guard Group Office whenever a vessel is involved in a marine casualty consisting of:

- 1) An unintended grounding, or an unintended strike of (collision with) a bridge;
- 2) An intended grounding, or an intended strike of a bridge, that creates a hazard to navigation, the environment, or the safety of a vessel, or that meets any criterion of paragraphs (3) through (7);
- 3) A loss of main propulsion, primary steering, or any associated component or control system that reduces the maneuverability of the vessel;
- 4) An occurrence materially and adversely affecting the vessel's seaworthiness or fitness for service or route, including but not limited to fire, flooding, or failure of or damage to fixed fire-extinguishing systems, lifesaving equipment, auxiliary power-generating equipment, or bilge-pumping systems;
- 5) A loss of life;
- 6) An injury that requires professional medical treatment (treatment beyond first aid) and, if the person is engaged or employed on board a vessel in commercial service, that renders the individual unfit to perform his or her routine duties; or
- 7) An occurrence causing property-damage in excess of \$25,000, this damage including the cost of labor and material to restore the property to its condition before the occurrence, but not including the cost of salvage, cleaning, gas-freeing, drydocking, or demurrage.

DNV Conditions of Class, and USCG Form CG-835: Normally, all outstanding deficiencies (class and statutory) will be issued as a Condition of Class (CC) by DNV, and subsequently surveyed/deleted

by DNV. The USCG has access to the DNV system for recording such CCs, and will at any time know the status of the CC. The USCG may also issue outstandings or deficiencies on USCG Form CG-835, with required action and time limit. DNV will be copied and the contents of CG-835 will be included in the DNV survey database. DNV may survey the rectification of the deficiencies and, if found satisfactory, forward a report to the USCG, recommending that the 835 be deleted. The deletion is to be done by the USCG, not DNV.

Extent of authorization: DNV is authorized to approve drawings, survey, and issue the following statutory certificates on behalf of the USCG (“delegated authorizations”) for:

- International Load Line
- International (and U.S. Regulatory) Tonnage
- SOLAS Cargo Ship Safety Construction
- SOLAS Cargo Ship Safety Equipment
- SOLAS Certificate of Fitness for the Carriage of Dangerous Chemicals in Bulk
- SOLAS Certificate of Fitness for the Carriage of Liquefied Gases in Bulk
- MARPOL 73/78 Annex I (IOPP)
- MARPOL 73/78 Annex II (NLS)
- MARPOL 73/78 Annex III and Annex V (for vessels enrolled in ACP only)
- ISM (SMC and DOC)

In addition, DNV is authorized to approve Cargo Securing Manuals and the Document of Compliance for Carriage of Dangerous Goods on behalf of the USCG.

Certification, COI, exemptions: Based on the reports and certificates issued by DNV and vessel compliance with other mandatory drills and inspections as mentioned in NVIC 2-95, the USCG will issue the final Certificate of Inspection (COI). It is to be emphasized that the endorsement or issuance of a COI is **not delegated** to DNV.

NVIC 2-95 (Current Version) describes the various processes to be followed by DNV for vessels enrolled or to be enrolled in the ACP. Some functions are not delegated to DNV, such as extension of dry-docking intervals, decisions on underwater surveys in lieu of dry-docking (UWILDs), exemptions or equivalencies from statutory requirements, etc.

Oversight: DNV has a quality system certified according to ISO 9001, which is an important element in the USCG oversight. While DNV is fully authorized to act on behalf of the USCG as delegated, the USCG conducts oversight of approval and surveys as found appropriate. Procedures for plan review oversight are found in Marine Safety Center Technical Note 04-03. The USCG will conduct boarding of vessels according to USCG Marine Safety Manual, Vol. II, Sect. B, Ch. 9. For Newbuildings, the on-site oversight (inspections) will be described in the specific Project Quality Manual.

2. Supplemental Requirements

2.1 Tonnage Measurements

Supplemental requirements that are set forth in the current version of Marine Safety Center Technical Notes 01-98, “Tonnage Administrative Policy”, and 01-99, “Tonnage Technical Policy”, shall be complied with.

2.2 Load Line

The following U.S. Interpretation for ICLL, Reg. 10 is to be adhered to:

Information to be supplied to the master means a loading and stability manual developed in accordance with MSC/Circ.920 “Model Loading and Stability Manuals”. To be considered as approved stability information, the vessel shall comply with the requirements and recommendations of the Code of Intact Stability.

2.3 SOLAS

The following supplemental requirements relevant to the issue of all pertaining certificates under SOLAS by DNV are given using the appropriate Code of Federal Regulations (CFR) cites. Additional USCG interpretations of the SOLAS requirements not contained in the DNV Rules or given in IMO Resolutions are included in subpart 2.3.5.

2.3.1 Critical Ship Safety Systems

GENERAL, EQUIPMENT APPROVALS

For U.S. flag vessels, specific and type approvals for fire suppression equipment, structural fire protection materials and life-saving appliances are performed by the USCG as mandated by SOLAS 1974, generally through independent laboratory testing and inspection. Provisions within the 1996 USCG Authorization Act also allow the use of equipment approved by or on behalf of other governments under certain circumstances. In the case of life-saving appliances, there must be a reciprocal agreement in place before equipment approved by that country could be used on a U.S. vessel. ACP does not change the requirements to use USCG approved materials and equipment. Therefore, class society approvals cannot be used to fulfill the obligations of the USCG, as an Administration, where type approval is required by regulations.

The USCG approves applicable “SOLAS” life-saving equipment using the IMO LSA Code. For fire protection items, the USCG approves “SOLAS” materials using the IMO Fire Test Procedures Code and the IMO Fire Safety Systems Code.

When a Mutual Recognition Agreement (MRA) between the U.S. and the European Community comes into effect, it will address a limited number of items of fire protection, life-saving and navigation equipment. The MRA will make it possible for a manufacturer with a European Approval (MED/wheelmark) to obtain USCG approval for certain equipment covered by the MRA. This will be accomplished by permitting the “Notified Bodies” responsible for issuing approvals in Europe to issue USCG approval. Likewise, the USCG will be able to issue the European Approval (MED/wheelmark) for manufacturers having a USCG approval if the item is included within the scope of the MRA. It is important to note that this MRA does not change the requirement for using USCG approved equipment

and materials on U.S. Flag vessels. It allows an alternative means for obtaining USCG approval. The European Marine Equipment Directive (MED) “wheelmark” will not be accepted in lieu of USCG approval.

Fire Equipment and Arrangements

USCG type-approved materials and equipment from both U.S. and foreign sources approved in accordance with the procedures contained in 46 CFR 159 will continue to be acceptable, and those items manufactured in a country with which the United States has a Mutual Recognition Agreement in force, or the USCG has found to have an equivalent approval program, will also be acceptable.

As mentioned above in the “General” section, the 1996 USCG Authorization Act allows the use of materials approved by or on behalf of other governments under certain circumstances. Because reciprocity is not required for structural fire protection materials, the USCG will accept structural fire protection materials that are approved by a foreign administration once the USCG has determined that a country’s approval process is acceptable. There are two countries (Canada and Japan) that produce and approve structural fire protection materials that would be acceptable to the USCG. A key point is that the product must be manufactured in the country and approved by, or on behalf of, that country’s administration. For example, a fire door manufactured in Korea and approved by Japan would not be acceptable.

As discussed above, the following structural fire protection materials approved by, or on behalf of, other governments (Canada and Japan) may be used in lieu of USCG type approved materials for ACP vessels.

Item	USCG Approval Category
Deck assembly	164.105
Primary deck covering	164.106
Structural insulation (“A” and “B” class)	164.107
Bulkhead panels (“B” class)	164.108
Non-combustible material	164.109
Structural ceiling	164.110
Draperies, curtains and other suspended textiles	164.111
Interior finish	164.112
Floor coverings	164.117
Fire doors (“A” and “B” class) limited to doors without windows or with total window area no more than 645 cm ² in each door leaf. Approval limited to maximum door size tested. Doors must be used with a fire tested frame design.	164.136
Windows* (see note below)	164.137
Penetration seals (fire stops)	164.138
Dampers	164.139
Bedding components	164.142
Upholstered furniture	164.144
Fire door control system	164.146

*Note: The following table must be used to determine when the applicable hose stream and thermal radiation test are required for “A” and “B” class windows.

Window Dimension	Classification	Hose Stream Test Required?	Heat Flux Test Required?
≤ 645 cm ²	A-class	No	No
> 645 cm ²	A-class	Yes	Yes
> 645 cm ²	A-0	Yes	No
≤ 645 cm ²	B-15	No	No
> 645 cm ²	B-15	No	Yes
Any dimension	B-0	No	No

Evaluation, Testing and Approval of Life-Saving Appliances and Arrangements (Cite: SOLAS III/4)

Life-saving appliances must be approved to the appropriate CFR, SOLAS or IMO standard. USCG approved products and systems are accepted regardless of country of manufacture. The USCG recognizes that with the Life-saving Appliances Code (LSA Code) there exists an acceptable IMO standard for approval.

As mentioned above in the “General” section, the 1996 USCG Authorization Act allows the use of materials approved by or on behalf of other governments under certain limited circumstances. In the case of life-saving appliances, there must be a reciprocal agreement in place with another country before equipment approved by that country can be used on a U.S. vessel. Pending finalization of the US-EU MRA, interim reciprocal acceptance agreements have been established with Germany (free-fall lifeboats and associated launching appliances only) and Norway (all lifesaving equipment). These agreements require that the equipment be manufactured within the country that approved it. A copy of the USCG acceptance letter must be provided with each piece of equipment supplied to a U.S. flag ship under these interim agreements.

The following approval series indicate approval to the SOLAS requirements:

- 160.017 Embarkation-Debarkation Ladders (only if marked "SOLAS 74/83")
- 160.040 Line-throwing appliances
- 160.115 Winches
- 160.117 Embarkation-Debarkation Ladders
- 160.118 Rigid liferafts***
- 160.121 Hand red flares
- 160.122 Floating orange smoke signals
- 160.132 Davits
- 160.135 Lifeboats
- 160.136 Rocket parachute flares
- 160.150 Ring life buoys
- 160.151 Inflatable liferafts***
- 160.155 Lifejackets
- 160.156 Rescue boats***
- 160.157 Self-activating smoke signals
- 160.162 Hydrostatic release units

160.163 Liferaft launching appliances
160.170 Liferaft automatic disengaging apparatus
160.171 Immersion suits
160.174 Thermal protective aids
160.175 Marine Evaluation Systems ***
160.176 Inflatable Lifejackets (SOLAS)
161.110 Floating electric water lights
161.112 Lifejacket lights

Those items without an asterisk (*) are to be forwarded directly to the USCG for their approval.

* indicates those items for which DNV possesses USCG acceptance to conduct approval (design review and testing) work on behalf of the USCG.

** indicates items which come under the U.S. District Court Order of 31 May 1983, which declares invalid any inspection or test not conducted by or in the presence of a USCG Marine Inspector. The Order does not address pre-approved reviews. This Order remains in effect until such time as the USCG publishes a final regulation in the Federal Register removing the requirement for a USCG Marine Inspector to witness the inspections or test.

*** indicates that the USCG reserves the right to attend prototype testing of this equipment as a condition of approval. This option will normally be exercised in the case of a manufacturer seeking approval of this equipment for the first time, or for a substantially new or innovative design.

Where a particular life-saving appliance or arrangement is required, the Commandant, USCG, may accept any other appliance or arrangement that is at least as effective as that specified. If necessary, the Commandant, USCG, may require engineering evaluations and tests to demonstrate the equivalence of the substitute appliance or arrangement.

Life-saving appliances carried on board the ship in addition to equipment of the type required under this part must be approved equipment or be acceptable to the cognizant USCG Officer in Charge of Marine Inspection (OCMI) for use on the ship.

46 CFR SUBCHAPTER D - TANK VESSELS

Lifesaving and fire safety equipment type approval requirements are given in General Part on Type Approval (on page 6).

Cite: 46 CFR 31.36 – 1 Lifesaving Appliances and Arrangements

Reference is given to 46 CFR, Subchapter W, Part 199 on “Lifesaving appliances and arrangements”, where Subparts A to D are valid for vessels subject to SOLAS. These subparts are based on Chapter III of SOLAS. For U.S. interpretations to SOLAS, see part 2.3.5.

The following CFR-items are additional:

46 CFR 199.70 - (a) (1) (iii)

Each lifebuoy stowage position must be marked with either the words “LIFEBUOY” or “LIFE BUOY”, or with the appropriate symbol from IMO Resolution A. 760(18).

46 CFR 199.70 - (b)

If the vessel carries inflatable lifejackets, they must be of the same or similar design and have the same method of operation.

46 CFR 199.70 - (c) (2)

Stowage. Each immersion suit or anti-exposure suit must be stowed so they are readily accessible. The stowage positions must be marked with either the words “IMMERSION SUITS” or “ANTI-EXPOSURE SUITS” as appropriate, or with the appropriate symbol from IMO Resolution A.760 (18).

46 CFR 199.70 - (c) (3)

Markings. Each immersion suit or anti-exposure suit must be marked in such a way as to identify the person or vessel to which it belongs.

46 CFR 199.110 - (h)

Lifeboats and rescue boats must be arranged to allow safe disembarkation onto the vessel after a drill.

46 CFR 199.130 - (a) (7)

Each survival craft must be stowed so as not to require lifting from its stowed position in order to launch, except that -

- (i) A davit-launched liferaft may be lifted by a manually powered winch from its stowed position to its embarkation position; or
- (ii) A survival craft that weighs 185 kilograms or less may be lifted not more than 300 millimeters in order to launch.

46 CFR 199.150 - (f) (2)

Each launching appliance must be arranged so that it remains effective under conditions of icing.

46 CFR 199.153 - (f)

The winch drum requirements must be met for all survival craft winches, including multiple drum winches.

46 CFR 199.153 - (i)

The lowering speed for a survival craft loaded with all of its equipment must be not less than 70 percent of the calculated required speed.

46 CFR 199.153 - (l) (2)

The brake pads must, where necessary, be protected from water and oil.

46 CFR 199.175 - (b) (14)

Heaving line. The heaving line must be buoyant, must be at least 30 meters (99 feet) long, must have a buoyant rescue quoits attached to one end and should be at least 8 millimeters (5/16 inches) in diameter.

46 CFR 199.175 - (b) (20)

Oars and paddles. Each oar or paddle should have the vessel's name marked in block letters.

46 CFR 199.175 - (b) (28)

Searchlight. The boat must carry two spare bulbs.

46 CFR 199.178

Marking of stowage locations.

- a) Containers, brackets, racks and similar stowage locations for lifesaving equipment must be marked with symbols in accordance with IMO Resolution A.760 (18) indicating the device stowed in that position.
- b) If more than one device is stowed in a location, the number of devices stowed must be indicated.
- c) Survival craft should be numbered consecutively starting from the vessel's bow. Survival craft on the starboard side should be numbered with odd numerals and survival craft on the port side should be numbered with even numerals.
- d) Each liferaft stowage location should be marked with the capacity of the liferaft stowed there.

46 CFR 32 Special Requirements, Machinery and Hull

Cite: 46 CFR 32.20 - 5

The pressure vacuum relief valve shall be of a type and size approved by the Commandant for the purpose intended. For specifications and procedures re approval, see Subpart 162.017.

Cite: 46 CFR 32.50 - 30

Cargo hose carried on tank vessels must be suitable for oil service and designed to withstand the pressure of the shutoff head of the cargo pump or the pump relief valve setting, less static head, but in no case less than 150 pounds per square inch.

Cite: 46 CFR 32.52 – 5 (c)

Means shall be provided for controlling the cargo or pump room bilge pumps and their suctions or discharges in order that a flooded pump room may be pumped out. Suitable portable or manually operated pumps may be accepted as complying with this provision, or alternatively, the pump controls shall be arranged so that they are operable from inside the pump room and either from an accessible position outside the pump room, or from the pump room casing above the freeboard deck.

Cite: 46 CFR 32.53 – 10 (b) (1)

Acceptable types of water seals include the wet and semi-wet type. Other types of seals may be accepted on a case-by-case basis if approval is given by the Coast Guard Marine Safety Center.

46 CFR 34 Fire Fighting Equipment

Cite: 46 CFR 34.10 – 15 (c)

Fire main marking system marking. Isolation valves between fire pumps and emergency fire pump are required to be marked.

Cite: 46 CFR 34.15 – 10(c)

One of the stations controlling the system for the main machinery space shall be located as convenient as practicable to one of the main escapes from the space.

Cite: 46 CFR 34.15 - 10(e)

Where provisions are made for the simultaneous release of a given amount of carbon dioxide by operation of a remote control, provisions shall also be made for manual control at the cylinders.

Where gas pressure from pilot cylinders is used as a means for releasing the remaining cylinders, not less than two pilot cylinders shall be used for systems consisting of more than two cylinders. Each of the pilot cylinders shall be capable of manual control at the cylinder, but the remaining cylinders need not be capable of individual manual control.

Cite: 46 CFR 34.15 – 10 (f)

The delayed discharge and alarm can be omitted only for spaces of 170 cubic meters or less which have a suitable horizontal escape.

Cite: 46 CFR 34.15 – 10 (g)

All distribution valves and controls shall be of an approved type.

Cite: 46 CFR 34.15 – 20 (i)

All CO₂ storage cylinders shall be U.S. DOT approved

Cite: 46 CFR 34.15 – 35 (a)

Except for cargo spaces, the operation of the carbon dioxide system shall automatically shut down any mechanical ventilation to that space. This will not be required where the carbon dioxide system is a secondary system in addition to another approved primary system protecting the space.

Cite: 46 CFR 34.15 – 40

Where necessary, relatively tight compartments such as refrigeration spaces, paint lockers, etc., shall be provided with suitable means for relieving excessive pressure accumulating within the compartment when the carbon dioxide is injected.

Cite: 46 CFR 34.25 – 15 (b)

Distribution piping shall be of materials resistant to corrosion, except that steel or iron may be used if inside and outside corrosion resistant coatings which will not flake off and clog the nozzles are applied. Materials readily rendered ineffective by heat of a fire shall not be used. The piping shall be subject to approval for each installation.

Cite: 46 CFR 35.30 - 20(c) (1)

Each self-contained breathing apparatus must be approved by the Mine Safety and Health Administration (MSHA) and by the National Institute for Occupational Safety and Health (NIOSH).

Cite: 46 CFR 35.40 - 7

Adjacent to all carbon dioxide fire extinguishing alarms there shall be conspicuously marked: "WHEN ALARM SOUNDS VACATE AT ONCE. CARBON DIOXIDE BEING RELEASED."

Cite: 46 CFR 35.40 - 10

Foam or CO₂ room shall be marked: "FOAM FIRE APPARATUS" or "CO₂ FIRE APPARATUS" as appropriate, in not less than 50 mm (2 in.) red letters.

Cite: 46 CFR 38.10 - 15

Safety relief valves for liquefied compressed gas service must be USCG approved equipment.

46 CFR SUBCHAPTER F - MARINE ENGINEERING

Cite: 46 CFR 52.01 - 2

Boilers, pressure vessels and heat exchangers are to comply with the requirements in Part 4, Ch. 3 of the DNV Rules or the ASME Code, with additional requirements as given below. Other recognized international standards will be evaluated on a case by case basis.

Cite: 46 CFR 52.01 – 50

For water tube boilers with working pressure less than 30 psig and other boilers having a steam temperature less than 425° F (218° C) it is required to have fusion plugs.

Cite: 46 CFR 52.01 - 120(a) (7)

On new installations the safety valve nominal size for propulsion boilers and superheaters must not be less than 38 mm (1 1/2 in.) nor more than 102 mm (4 in.). Safety valves 38 mm to 114 mm (4 1/2 in.) may be used for replacements on existing boilers. The safety valve size for auxiliary boilers must be between 19 mm (3/4 in.) and 102 mm. Cast iron seats and disks are not permitted.

Cite: 46 CFR 53.01 - 3

Heating boilers for applications below 95° C and steam boilers with pressure less than 3.5 bar not covered by DNV Rules, are to be designed, constructed, inspected and tested in accordance with relevant requirements of Section IV of the ASME Code, with limitations and modifications as given in CFR Table 53.01 - 1(A).

Cite: 46 CFR 53.05

Pressure relieving devices. Cast iron seats and disks are not permitted.

Cite: 46 CFR 54.01 – 2

Pressure vessels are to be built in accordance with Div. 1, Section VIII of the ASME Code as modified by CFR 54.01 – 2, specified in Table 54.01 - 1(A). Other recognized international standards will be evaluated by the U.S. Coast Guard on a case by case basis.

Cite: 46 CFR 54.10 – 10

Pressure vessels with a design temperature greater than (>) 650 deg. F (343 deg. C) must be tested in accordance with 46 CFR 54.10 – 10 and Div. 1, Section VIII of ASME Code respectively.

Cite: 46 CFR 54.10- -15

Pneumatic tests of welded pressure vessels are allowed only for those units which are so designed and/or supported that they cannot be safely filled with water or for those units which cannot be dried and are to be used in a service where traces of the testing medium cannot be tolerated. Pneumatic testing is not normally allowed by DNV, and will thus be considered in each case.

Cite: 46 CFR 54.15

Pressure vessels: Pressure relief devices. Cast iron seats and disks are not permitted.

Cite: 46 CFR 56.15

In Pt. 4 Ch. 1 Sec.7 A 102 gas welding is not to be used for pipes with outer diameter greater than 76.1 mm. In Pt. 4 Ch. 1 Sec. 7 A 500, fittings 76.1 mm and below, 1 fitting from lot of 100 or fraction thereof must be flattened cold until the opposite walls meet without developing any cracks.

Cite: 46 CFR 56.20 -15

Valves in which the closure is accomplished by resilient non-metallic materials instead of metal to metal seating are to comply with the performance criteria and categories of valves specified in this regulation. Valves employing resilient material shall be divided into three categories; Positive shutoff, Category A and Category B and shall be tested and used as follows:

- Positive Shutoff Valves – The closed valve must pass less than 10 ml/hr (0.34fluid oz/hr) of liquid or 3 liters/hr (0.11 ft³/hr) of gas per inch nominal pipe size through the line after removal of all resilient material and testing at full rated pressure. Packing material must be fire resistant. Piping subject to internal head pressure from a tank containing oil (fuel, lube and cargo) must be fitted with a positive shutoff valve at the tank. See 4/6.45.5 of the Rules for additional requirements for such valves. Positive shutoff valves may also be used in any location in lieu of a required Category A or Category B valve.
- Category A Valves – The closed valve must pass less than the greater of 5% of its fully open flow rate or 15% / $(NPS)^{1/2}$ of its fully open flow rate through the line after removal of all resilient material and testing at full rated pressure. Category A valves may be used in any piping system except where positive shutoff valves are required. Category A valves are required in the following locations:
 - Valves at vital piping system manifolds;
 - Isolation valves in cross-connects between two piping systems, at least one of which is a vital system, where failure of the valve in a fire would prevent the vital system(s) from functioning as designed;
 - Valves providing closure for any opening in the shell of the vessel.
- Category B Valves – The closed valve will not provide effective closure of the line or will permit appreciable leakage from the valve after the resilient material is damaged or destroyed. Category B valves are not required to be tested and may be used in any location except where a Category A or Positive shutoff valve is required.

If a valve designer elects to use either calculations or actual fire testing in lieu of material removal and pressure testing, the proposed calculation method or test plan must be accepted by the Commandant.

Alternative arrangements for acceptance of resilient seated valves are outlined by Federal Register, March 4, 1998 (63 FR 10547).

Cite: 46 CFR 56.25 - 15

Gaskets in fire main systems are required to meet the criteria for flexible pipes contained in IACS Unified Requirement F 42 or equivalent.

Cite: 46 CFR 56.50 – 55

Bilge pumps. Multi-hulled vessels require two means for pumping in each hull.

Cite: 46 CFR 56.50 - 65(b) (1)

All vessels having oil fired boilers must have at least two fuel service pumps, each of sufficient capacity to supply all the boilers at full power, and arranged so that one may be overhauled while the other is in service. At least two fuel oil heaters of approximately equal capacity must be installed and so arranged that any heater may be overhauled while the other(s) is (are) in service. Suction and discharge strainers must be of the duplex or other type capable of being cleaned without interrupting the oil supply.

Cite: 46 CFR 56.50 – 85

Tank vent air pipes for fuel oil tanks must not be less than 2 ½ in. (63.5 mm).

Cite: 46 CFR 56.60 – 25

Nonmetallic piping must be USCG approved and comply with 46 CFR 56.60 – 25.

Cite: 46 CFR 56.70

Welding

Welding procedures are to be in accordance with the details found in 46 CFR 56.70 and ASME Section IX (alternatively EN 288), respectively.

Cite: 46 CFR 56.97

Pressure testing may not be waived for small bore pipes as specified in Pt. 4 Ch. 1 Sec. 7 E 102. Pipes must be hydrostatically tested regardless of radiographic examination as specified in Pt. 4 Ch. 1 Sec. 7 E 202. Pressure testing of non-standard piping system components shall meet 46 CFR 56.97 – 5.

Cite: 46 CFR 58.10 - 5

Gasoline engine installations.

- a) Engine design. All installations shall be of marine type engines suitable for the intended service, designed and constructed in conformance with the requirements of this subchapter.
- b) Carburetors. (1) Drip collectors shall be fitted under all carburetors, except the down-draft type, to prevent fuel leakage from reaching the bilges and so arranged as to permit ready removal of such fuel leakage. Drip collectors shall be covered with flame screens.

NOTE: It is recommended that drip collectors be drained by a device for automatic return of all drip to engine air intakes.

- 2) All gasoline engines must be equipped with an acceptable means of backfire flame control. Installations of backfire flame arresters bearing basic Approval Nos. 162.015 or 162.041 or engine air and fuel induction systems bearing basic Approval Nos. 162.015 or 162.042 may be continued in use as long as they are serviceable and in good condition. New installations or replacements must meet the applicable requirements of this section.
- 3) The following are acceptable means of backfire flame control for gasoline engines:
 - (i) A backfire flame arrester complying with SAE J-1928 or UL 1111 and marked accordingly. The flame arrester must be suitably secured to the air intake with a flamtight connection.
 - (ii) An engine air and fuel induction system which provides adequate protection from propagation of backfire flame to the atmosphere equivalent to that provided by an acceptable backfire flame arrester. A gasoline engine utilizing an air and fuel induction system, and operated without an approved backfire flame arrester, must either include a reed valve assembly or be installed in accordance with SAE J-1928.

- (iii) An arrangement of the carburetor or engine air induction system that will disperse any flames caused by engine backfire. The flames must be dispersed to the atmosphere outside the vessel in such a manner that the flames will not endanger the vessel, persons, on board, or nearby vessels and structures. Flame dispersion may be achieved by attachments to the carburetor or location of the engine air induction system. All attachments must be of metallic construction with flamtight connections and firmly secured to withstand vibration, shock, and engine backfire. Such installations do not require formal approval and labeling but must comply with this sub-part.
- c) Exhaust manifold. The exhaust manifold shall either be water-jacketed and cooled by discharge from a pump which operates whenever the engine is running, or woodwork within nine inches shall be protected by ¼ inch asbestos board covered with not less than No. 22 USSG (U.S. standard gage) galvanized sheet iron or non-ferrous metal. A dead air space of 1/4 -inch shall be left between the protecting asbestos and the wood, and a clearance of not less than two inches maintained between the manifold and the surface of such protection.
- d) Exhaust pipe. (1) Exhaust pipe installations shall conform to the requirements of the American Boat and Yacht Council Standard P-1 “Safe Installation for Exhaust Systems” and National Fire Protection Association Standard NFPA 302, part 1, section 23 and the following additional requirements:
 - (i) All exhaust installations with pressures in excess of 15 pounds per square inch gage or employing runs passing through living or working spaces shall meet the material requirements of part 56 of this subchapter.
 - (ii) Horizontal dry exhaust pipes are permitted only if they do not pass through living or berthing spaces, they terminate above the deepest load waterline and are so arranged as to prevent entry of cold water from rough or boarding seas, and they are constructed of corrosion resisting material “at the hull penetration.”

Cite: 46 CFR 58.10 – 15(f)

- f) Automatic shutdown. (1) The control system shall be designed for automatic shutdown of the engine with actuation of audible and visible alarms at shutdown. The visible malfunction indicator shall indicate what condition caused the shutdown and remain visible until reset. Automatic shutdown shall occur under the following conditions:
 - (i) Overspeed.
 - (ii) Low lubricating oil pressure. Consideration will be given providing alarm only (without shutdown) in those cases where suitable antifriction bearings are fitted.
 - (2) Audible or visible alarms shall also be provided for:
 - (i) Excessive gas temperature, measured at the turbine inlet, gas generator, interstage turbine or turbine exhaust.
 - (ii) Excessive lubricating oil temperature.
 - (iii) Excessive speed.
 - (iv) Reduced lubricating oil pressure.
 - (3) A remote, manually operated shutdown device shall be provided. Such device may be totally mechanical or may be electrical with a manually actuated switch.

Cite: 46 CFR 58.25 - 70

The main steering gear is to be provided with full follow up control in the pilothouse. Follow up control means a closed-loop (feedback) control that relates the position of the helm to a specific rudder angle by transmitting the helm-angle order to the power actuating system and, by means of feedback, automatically stopping the rudder when the angle selected by the helm is reached.

Cite: 46 CFR 61.05 - 10

Hydrostatic testing and survey of boilers is to be carried out with intervals and extent as given in this regulation.

Cite: 46 CFR 61.10 - 5

Hydrostatic testing and survey of pressure vessels is to be carried out with intervals and extent as given in this regulation.

Cite: 46 CFR 61.15 - 10

Liquefied petroleum gas piping for heating and cooking are to be tested as required in this regulation.

Cite: 46 CFR 61.15 - 12

Non-metallic expansion joints must be surveyed and replaced as required in this regulation.

Cite: 46 CFR 61.40

Design Verification and Periodic Testing of Vital System Automation

One copy of a qualitative failure analysis must be submitted for propulsion controls, microprocessor-based system hardware, safety controls, automated electric power management, automation required to be independent that is not physically separate and any other automation that in the judgment of the reviewing authority potentially constitutes a safety hazard to the vessel or personnel in case of failure.

The systems to which these requirements apply include

1. Any equipment or system that is automatically controlled or monitored
2. Any equipment or system that is remotely controlled or monitored
3. Any equipment or system that utilizes automation for the purposes of replacing specific personnel or reduce overall crew requirements, i.e. minimally or un-manned machinery spaces

Note: The qualitative failure analysis is intended to assist in evaluating the safety and reliability of the design. It should be conducted to a level of detail necessary to demonstrate compliance with applicable requirements and should follow standard qualitative analysis procedures. Assumptions, operating conditions considered, failures considered, cause and effect relationships, how failures are detected by the crew, alternatives available to the crew, and necessary design verification tests should be included. Questions regarding failure analysis should be referred to the reviewing authority at an early stage of design.

A Design Verification test is to be performed, immediately after the installation of the automated equipment or before issuance of the initial Certificate of Inspection, to verify that automated systems are designed, constructed and operate in accordance with applicable requirements. In addition, Periodic Safety tests must be conducted annually to demonstrate the proper operation of the primary and alternate controls, alarms, power sources, transfer override arrangements, interlocks and safety controls. Systems addressed must include fire detection and extinguishing, flooding safety, propulsion, maneuvering electric power generation and distribution and emergency internal communications. Synthetic signals or simulated test conditions can be allowed if test equipment maintained in good order and calibrated with appropriate documentation to the satisfaction of the attending surveyor.

Design Verification and Periodic Safety test procedures are to be submitted for approval and retained aboard the vessel. Test procedure documents must be in a step-by-step or checkoff list format. Each test instruction must specify equipment status, apparatus necessary to perform the tests, safety

precautions, safety control and alarm setpoints, the procedure to be followed, and the expected test result. Test techniques must not simulate monitored system conditions by maladjustments, artificial signals, improper wiring, tampering, or revision of the system unless the test would damage equipment or endanger personnel. The Design Verification and Periodic Safety Tests are to be witnessed by the Surveyor. Other test techniques are to be submitted to the USCG (G-MSE) for approval on a case-by-case basis.

Vessels with minimally attended or periodically unattended machinery plants must have a planned maintenance program to ensure continued safe operation of all vital systems. The program must include maintenance and repair manuals for work to be accomplished by maintenance personnel and checkoff lists for routine inspection and maintenance procedures.

The planned maintenance program must be functioning prior to the completion of the evaluation period for reduced manning.

Maintenance and repair manuals must include details as to what, when and how to troubleshoot, repair and test the installed equipment and what parts are necessary to accomplish the procedures. Schematic and logic diagrams must be included in this documentation. Manuals must clearly delineate information that is not applicable to the installed equipment.

Cite: 46 CFR 62.20 – 3 (a) (2)

A planned maintenance program for all vital systems. Covered for E0-class.

Cite: 46 CFR 62.25 – 20 (d) (4)

(4) Flooding safety, fire, loss of power and engineer's assistance-needed alarms extended from the machinery spaces to a remote location must not have a duty crewmember selector. Note: Other alarms may be provided with such a selector, provided there is no off position.

Cite: 46CFR 62.30 – 5 (b) (2)

Independent sensors are not required except that sensors for primary speed, pitch or direction of rotation control in closed loop propulsion control systems must be independent and physically separate from required safety control, alarm or instrumentation sensors.

Cite: 46 CFR 62.35 – 5 (e)

(e) Control system details. (1) Each operator control device must have a detent at the zero thrust position.

Cite: 46 CFR 62.35 – 15 (a)

All required fire pump remote control locations must include the controls necessary to charge the fire main and -

- (1) A firemain pressure indicator; or
- (2) A firemain low pressure alarm.

Cite: 46 CFR 62.50 - 20

Ships applying the USCG for minimally attended machinery plants in accordance with 46 CFR 65.50-20 shall satisfy the additional class notation ECO, Pt.6 Ch.3 Sec.4 with the following additions

(a) (1) Navigating bridge propulsion control must be provided

- (b) (1) A personnel alarm must be provided and must annunciate on the bridge if not routinely acknowledged neither at the centralized control station nor in the machinery spaces
- (b) (3) For minimally attended machinery plants (ECO) all required audible alarms must annunciate throughout the engineering control center and machinery spaces.
- (c) Fire detection and alarms. For minimally attended machinery plants (ECO) an approved automatic fire detection and alarm system must be provided to monitor all machinery spaces. The system must activate all alarms at the engineering control center, the navigating bridge, and throughout the machinery spaces and engineers' accommodations. The engineering control center and bridge alarms must visually indicate which machinery space is on fire, as applicable. Note: For purposes of this part, the specific location of fires that are not in machinery spaces need not be indicated.
- (d) Control of the fire pumps such:
 - (1) The centralized control station must include control of the main machinery space fire pumps.
 - (2) Remote control of a required fire pump must be provided from the navigating bridge. Where one or more fire pumps is required to be independent of the main machinery space, at least one such pump must be controlled from the navigating bridge
- (g) Electrical systems. For minimally attended machinery plants (ECO) the engineering control center must include the controls and instrumentation necessary to place the ship service and propulsion generators in service in 30 seconds. The main distribution and propulsion switchboards and generator controls must either be located at the engineering control center, if the engineering control center is within the boundaries of the main machinery space, or the controls and instrumentation must be duplicated at the engineering control center. Controls at the switchboard must be able to override those at the engineering control center, if separate.

Cite: 46 CFR 63.20 – 1

- (a) Primary safety control system. Following emergency safety trip control operation, the airflow to the boiler must not automatically increase. For this condition post-purge must be accomplished manually
- (c) Float chamber low water cut-off controls using stuffing boxes to transmit the motion of the float from the chamber to the external switches are prohibited.

46 CFR SUBCHAPTER H - PASSENGER VESSELS

Lifesaving and fire safety equipment type approval requirements are given in General Part on Type Approval (on page 6).

Cite: 46 CFR 70.28 – 1 Lifesaving Appliances and Arrangements

Reference is given to 46 CFR, Subchapter W, Part 199 on “Lifesaving appliances and arrangements”, where Subparts A to D are valid for vessels subject to SOLAS. These subparts are based on Chapter III of SOLAS. Additional items not covered by SOLAS are the same as given for tankers in 46 CFR 31.36 - 1 (on page 9). The following item under this Cite is additional for passenger vessels:

46 CFR 199.214

Passenger ships.

Immersion suits are not required for passenger vessels operating only on routes between 32 degrees north and 32 degrees south latitudes.

46 CFR 72 Construction and Arrangement

Cite: 46 CFR 72.15 - 10

Ventilation on vessels using fuel having a flash point of 110° F. (43° C) or lower.

- (a) Where liquid fuel having a flashpoint of 110 degrees F. or lower is used for main or auxiliary machinery or for starting purposes, the spaces containing such machinery or fuel tanks shall have natural supply and mechanical ventilation as required by this section.
- (b) The requirements for the mechanical exhaust system shall be such as to assure the air changes as noted in table 72.15–10 (b), depending upon the size of the space.

TABLE 72.15–10(B)

OverSize	of space in cubic feet	Not over	Minutes per air change
		500	2
500		1000	3
1000		1500	4
1500			5

- (c) Exhaust blower motors shall be outside of the ducts, and if mounted in any compartment required to be ventilated by this section, shall be of the explosion proof type. Blower blades shall be non-sparking with reference to their housings.
- (d) Exhaust blower switches shall be located outside of any space required to be ventilated by this section, and shall be of the type interlocked with the ignition switch so that the blowers are started before the engine ignition is switched on. A red warning sign at the switch shall state that the blowers shall be operated prior to starting the engines for a sufficient time to insure at least one complete change of air in the compartments.
- (e) The area of the ducts shall be such as to limit the air velocity to a maximum of 2,000 feet per minute. Ducts may be of any shape, provided that in no case shall 1 dimension exceed twice the other.
- (f) At least 2 inlet ducts shall be located at 1 end of the compartment and they shall extend to the lowest part of the compartment or bilge on each side. Similar exhaust ducts shall be led to the mechanical exhaust system from the lowest part of the compartment or bilge on each side of the compartment at the end opposite from that at which the inlet ducts are fitted.
- (g) All ducts shall be constructed of non-ferrous metal or galvanized ferrous metal not less than No. 22 USSG, intact and gas tight from end to end and shall be of substantial construction. The ducts shall lead as direct as possible and be properly fastened and supported. All supply ducts shall be provided with cowls or scoops having a free area not less than twice the required duct area. When the cowls or scoops are screened, the mouth area shall be in-creased to compensate for the area of the screen wire. Dampers shall not be fitted in the supply ducts. Cowls or scoops shall be kept open at all times except when the stress of weather is such as to endanger the vessel if the openings are not temporarily closed. Supply and exhaust openings shall not be located where the natural flow of air is unduly obstructed, or adjacent to possible sources of vapor ignition, nor shall they be so located that exhaust air may be taken into the supply vents.

Cite: 46 CFR 72.15 – 15 (c) (2)

Ventilation for closed spaces.

(2) The quantity of ventilating air shall be not less than 1 cubic foot per minute per square foot of deck area.

Cite: 46 CFR 72.15 - 20

Ventilation for crew quarters and passenger spaces.

- (a) All crew and passenger spaces shall be adequately ventilated in a manner suitable to the purpose of the space.
- (b) On vessels of 100 gross tons and over, except for such spaces as are so located that under all ordinary conditions of weather, windows, ports, sky-lights, etc., and doors to passageways can be kept open, all crew spaces shall be ventilated by a mechanical system, unless it can be shown that a natural system will provide adequate ventilation. However, vessels which trade regularly in the tropics shall, in general, be fitted with a mechanical ventilation

Cite: 46 CFR 72.40 - 10

Storm rails.

Suitable storm rails shall be installed in all passageways and at the deckhouse sides where passengers or crew might have normal access. Storm rails shall be installed on both sides of passageways which are 6 feet or more in width.

46 CFR 72 Fire Protection and Equipment

Cite: 46 CFR 76.05 - 20

Fixed fire extinguishing systems must be installed, as required by table 76.05 – 1 (a).

Cite: 46 CFR 76.10 – 10(a)

Cite: 46 CFR 76.15 – 10 (f)

The delayed discharge and alarm can be omitted only for spaces which have a suitable horizontal escape.

Cite: 46 CFR 76.15 – 10 (g)

All distribution valves and controls shall be of an approved type.

Cite: 46 CFR 76.15 – 20 (i)

All CO2 storage cylinders shall be U.S. DOT approved.

Cite: 46 CFR 76.23 – 20 (b)

All piping, valves and fittings of ferrous materials shall be protected inside and outside against corrosion unless specifically approved otherwise by the Commandant.

Cite: 46 CFR 76.27 – 15 (e)

All wiring and electrical circuits and equipment shall meet the applicable requirements of subchapter J.

Cite: 46 CFR 76.33 – 20 (e)
The smoke detection system shall be of an approved type.

Cite: 46 CFR 76.33 – 20 (f)
All wiring and electrical circuits shall meet the applicable requirements of subchapter J.

Cite: 46 CFR 76.35 – 15 (b)
The manual alarm system shall be of an approved type.

Cite: 46 CFR 76.35 – 15 (d)
All wiring and electrical circuits shall meet the applicable requirements of subchapter J.

Cite: 46 CFR 78.47 - 13
The fire detecting and manual alarm, automatic sprinkler, and smoke detecting alarm bells in the engine room shall be identified by at least 25 mm (1 in.) red lettering “FIRE ALARM”, “SPRINKLER ALARM”, or “SMOKE DETECTING ALARM” as appropriate.

Cite: 46 CFR 78.47 - 17
The control cabinets or spaces containing valves or manifolds for the various fire extinguishing systems shall be distinctly marked in conspicuous red letters at least 50 mm (2 in.) high “FOAM FIRE APPARATUS” or “AUTOMATIC SPRINKLING SYSTEM”, as the case may be.

46 CFR SUBCHAPTER I - CARGO AND MISCELLANEOUS VESSELS

Lifesaving and fire safety equipment type approval requirements are given in General Part on Type Approval (on page 6).

Cite: 46 CFR 90.27 – 1 **Lifesaving Appliances and Arrangements**

Reference is given to 46 CFR, Subchapter W, Part 199 on “Lifesaving appliances and arrangements”, where Subparts A to D are valid for vessels subject to SOLAS. These subparts are based on Chapter III of SOLAS. Additional items not covered by SOLAS are the same as given for tankers in 46 CFR 31.36 - 1 (on page 9).

46 CFR 92 Construction and arrangement

Cite: 46 CFR 92.07 – 1 (c)

The CFR-text accepts only the SOLAS method 1C, as adopted in the DNV Rules.

Cite: 46 CFR 92.15 - 5 and 15

5. Ventilation for vessels using fuel having a flashpoint of 110° F. (43° C) or lower.

- (a) Where liquid fuel having a flashpoint of 110 degrees F. or lower is used for main or auxiliary machinery or for starting purposes, the spaces containing such machinery or fuel tanks shall have ventilation as required by this section.
 - (1) At least 2 ventilators fitted with cowls or their equivalent for the purpose of properly and effectively ventilating the bilges of every engine and fuel-tank compartment in order to remove any flammable or explosive gases.

- (2) Vessels constructed so that the greater portions of the bilges under the engine and fuel tanks are open or exposed to the natural atmosphere at all times are not required to be fitted with ventilators.

15. Ventilation for crew quarters and, where provided, passenger spaces.

- (a) All living spaces shall be adequately ventilated in a manner suitable to the purpose of the space.
(b) On vessels of 100 gross tons and over, except for such spaces as are so located that under all ordinary conditions of weather, windows, ports, sky-lights, etc., and doors to passageways can be kept open, all crew spaces shall be ventilated by a mechanical system, unless it can be shown that a natural system will provide adequate ventilation. However, vessels which trade regularly in the tropics shall, in general, be fitted with a mechanical ventilation system.

Cite: 46 CFR 92.25 – 10 (a)

Storm rails.

- (a) On vessels in ocean and coastwise service, suitable storm rails shall be installed in all passageways and at deckhouse sides where persons on board might have normal access. Storm rails shall be installed on both sides of passageways which are 6 feet or more in width.

46 CFR 95 Fire Protection Equipment

Cite: 46 CFR 95.10 - 10(a)

Fire hose, hydrants and nozzles.

The size of fire hydrants, hose, and nozzles and the length of hose required shall be as noted in Table 95.10 – 5(a).

With respect to this Supplement, the requirement for hydrant and hose size on passenger and cargo vessels of 1500 gross tons and over is relevant. In said table, the minimum size is given as 2-1/2 inch (63.5 mm) for a hose length of 50 feet.

The hydrants in interior locations may, however, have siamese connections for 1-1/2 inch (38 mm). In these cases, the hose shall be 75 feet in length, and only one hose will be required at each fire station. However, if all such stations can be satisfactorily served with 50 foot lengths, 50 foot hose may be used.

For hydrants in exterior locations on vessels in other than ocean or coastwise service, 50 feet of 1-1/2 inch (38 mm) hose may be used.

Cite: 46 CFR 95.10 - 15(b)

Fire main system marking.

Isolation valves between fire pumps and emergency fire pump are required to be marked.

Cite: 46 CFR 95.10 – 15 (b)

Fire main system marking. Isolation valves between fire pumps and emergency fire pump are required to be marked.

Cite: 46 CFR 95.15 – 10 (f)

The delayed discharge and alarm can be omitted only for spaces which have a suitable horizontal escape.

Cite: 46 CFR 95.15 – 10 (g)

All distribution valves and controls shall be of an USCG approved type.

Cite: 46 CFR 95.15 – 20 (i)

All CO₂ storage cylinders shall be of an approved type.

Cite: 46 CFR 95.15 - 30(a)

The USCG approved audible alarm in spaces required to have a delayed discharge and are protected by a carbon dioxide extinguishing system and are normally accessible to persons on board while the vessel is being navigated, shall depend on no source of power other than the carbon dioxide.

46 CFR 98 Special Construction, Arrangement and other Provisions for Certain Dangerous Cargoes in Bulk

Cite: 46 CFR 98.25

CFR-text applicable to vessels other than those required to comply with Part 154 (Gas Carriers). DNV does not accept carriage of anhydrous ammonia in bulk on other vessels than gas carriers.

Cite: 45 CFR 98.30 – 3

CFR-text applicable for transfer of flammable, combustible and other hazardous materials to or from portable tanks on vessels. DNV does normally not accept transfer of above materials to or from portable tanks on vessels. Exemptions have been given for heli-fuel and offshore supply vessels. Portable tanks required to be IMDG certified. This covers CFR-text except for annual inspection of pressure/vacuum devices.

46 CFR SUBCHAPTER J - ELECTRICAL ENGINEERING

Cite: 46 CFR 111.12 – 1 (c)

Each prime mover must shut down automatically upon loss of lubricating pressure to the generator bearings if the generator is directly coupled to the engine. If the generator is operating from a power take-off, such as a shaft driven generator on a main propulsion engine, the generator must automatically declutch (disconnect) from the prime mover upon loss of lubricating pressure to generator bearings.

Cite: 46 CFR 111.12 – 9 (a)

The current-carrying capacity of generator cables must not be:

- 1) Less than 115 percent of the continuous generator rating; or
- 2) Less than 115 percent of the over load for a machine with a 2 hour or greater overload rating.

Cite: 46 CFR 111.30 - 29(g) (5)

Each emergency switchboard must have an exciter field rheostat.

Cite: 46 CFR 111.60 – 4 (a)

Each power and lighting cable conductor must be #14 AWG (2.10 mm²) or larger.

Cite: 46 CFR 111.60 – 7

Demand loads.

Generator, feeder and bus-tie cables must be selected on the basis of a computed load of not less than given in the following table:

Type of circuit	Demand load
Generator cables	115 percent of continuous generator rating
Switchboard bus-tie, except ship's service to emergency switchboard bus-tie	75 percent of generating capacity of the larger switchboard
Emergency switchboard bus-tie	115 percent of continuous rating of emergency switchboard
Motor feeders	Article 430, National Electric Code
Galley equipment feeder	100 percent of either the first 50 KW or one-half the connected load, whichever is the larger, plus 65 percent of the remaining connected load, plus 50 percent of the rating of the spare switches or circuit breakers in the distribution panel.
Lighting feeder	100 percent of the load plus the average active circuit load for the spare switches or circuit breakers on the distribution panels.
Grounded neutral of a dual voltage leader	100 percent of the capacity of the ungrounded conductors when grounded neutral is not protected by a circuit breaker overcurrent trip, or not less than 50 percent of the capacity of the ungrounded conductors when the grounded neutral is protected by a circuit breaker overcurrent trip or overcurrent alarm.

Cite: 46 CFR 111.60 – 19 (a)

A cable must not be spliced in a hazardous location, except in intrinsically safe systems.

Cite: 46 CFR 111.75 – 5 (b)

Connected load. The connected load on a lighting branch circuit must not be more than 80 percent of the rating of the overcurrent protective device, computed on the basis of the fixture ratings and in accordance with IEEE Std 45, section 21.6.

Cite: 46 CFR 111.75 - 17(d) (2)

Requirement for navigation light to be independently lab. tested to UL 1104 or an equivalent standard.

Cite: 46 CFR 111.95

Electric Power-Operated Boat Winches

§ 111.95 – 1 Applicability.

- (a) The electric installation of each electric power-operated boat winch must meet the requirements in this subpart, except that limit switches must be adapted to the installation if there are no gravity davits.

- (b) The provisions of this subpart supplement the requirements for boat winches in other parts of this chapter under which vessels are certified and in the general part on Equipment Approval (page 10).

§ 111.95 – 3 General requirements.

- (c) Each main line emergency disconnecting switch, if accessible to an unauthorized person, must have a means to lock the switch in the open-circuit position with a padlock or its equivalent. The switch must not lock in the closed-circuit position.

§ 111.95 – 7 Wiring of boat winch components.

- (a) If the motor controller of a boat winch power unit is next to the winch, the main line emergency switch must disconnect all parts of the boat winch power unit, including the motor controller and limit switches, from all sources of potential. Other power circuit switches must be connected in series with the main line emergency switch and must be ahead of the motor controller. The main line emergency switch must be the motor and controller disconnect required by Subpart 111.70 and must have a horsepower rating of at least that of the winch motor.
- (b) If the motor controller of a boat winch power unit is remote from the winch, there must be a switch at the controller that can disconnect the entire winch electric installation from all sources of potential. The switch must be in series with and on the supply side of the main line emergency switch.
- (c) Each davit arm limit switch, whether connected in the power circuit or in the control circuit, must disconnect all ungrounded conductors of the circuit controlled.
- (d) If one motor is used with two winches, there must be a main line emergency switch, a clutch interlock switch, and a master switch for each winch, except that a single main line emergency switch located as required by paragraph (e) of this section may be used for both winches. The main line emergency switches must be connected, in series, ahead of the motor controller. The master switches must be connected in parallel and each, in series, with the corresponding clutch interlock switch for that winch. Each clutch interlock switch must open the circuit to its master switch, except when the power unit is clutched to the associated winch. There must be a means to prevent the power unit from being clutched to both winches simultaneously.
- (e) The main line emergency disconnecting switch must be adjacent to the master switch, within reach of the winch operator, accessible to the person in charge of the boat stowage, and for gravity davit installations, in a position from which the movement of boat davit arms can be observed as they approach the final stowed position.

Cite: 46 CFR 111.105 – 29

Combustible Liquid Cargo Carriers

Each vessel that carries combustible liquid cargo with a closed- cup flashpoint of 60 degrees C (140 degrees F) or higher is to have:

- (1) Only intrinsically safe electric systems in cargo tanks; and
- (2) No storage battery in any cargo handling room.

If a submerged cargo pump motor is in a cargo tank, it is to comply with the following requirements:

- (1) Low liquid level, motor current, or pump discharge pressure must automatically shutdown power to the motor if the pump loses suction;
- (2) An audible and visual alarm must be actuated by the shutdown of the motor; and
- (3) There must be a lockable circuit breaker or lockable switch that disconnects power to the motor.

Where the cargo is heated to within 15 deg.C of its flashpoint, the cargo pumproom is to comply with the following requirements:

Cargo handling rooms. A cargo handling room must not have any electric cable or other electric equipment, except:

- (1) Intrinsically safe equipment;
- (2) Explosion proof lighting fixtures;
- (3) Cables supplying intrinsically safe equipment in the cargo handling room; and
- (4) Marine shipboard cables that supply explosion proof lighting fixtures that are in the cargo handling room. Weather locations are to comply with the following. The following locations in the weather are Class I, Division 1 (Zone 1) locations (except the open deck area on an inorganic acid carrier which is considered a non-hazardous location) and may have only approved intrinsically safe, explosion proof, or purged and pressurized electrical equipment, and through runs of marine shipboard cable if the location is—
 - (1) Within 10 feet (3 m) of:
 - (i) A cargo tank vent outlet;
 - (ii) A cargo tank ullage opening;
 - (iii) A cargo pipe flange;
 - (iv) A cargo valve;
 - (v) A cargo handling room entrance; or
 - (vi) A cargo handling room ventilation opening; or
 - (2) On a tankship and on the open deck over the cargo area and 10 feet (3 m) forward and aft of the cargo area on the open deck and up to 8 feet (2.4 m) above the deck.
 - (3) Within 5 meters (16 ft) of cargo pressure/vacuum valves with an unlimited height; or
 - (4) Within 10 meters (33 ft) of vent outlets for free flow of vapor mixtures and high velocity vent outlets for the passage of large amounts of vapor, air or inert gas mixtures during cargo loading and ballasting or during discharging.

Cite: 46 CFR 111.105 – 31

Ships carrying carbon disulfide shall have only intrinsically safe equipment in the following locations:

- Cargo tanks,
- Cargo handling rooms,
- Enclosed spaces,
- Cargo hose storage spaces,
- Spaces containing cargo piping and hazardous locations in the weather.

Cite: 46 CFR 112.05 – 3

Main emergency bus-tie.

Each bus-tie between a main switchboard and an emergency switchboard must:

- (a) Disconnect automatically upon loss of potential at the emergency switchboard;
- (b) Be arranged to prevent parallel operation of an emergency power source with any other source of electric power, except for interlock systems for momentary transfer of loads; and
- (c) If arranged for feedback operation, open automatically upon overload of the emergency power source before the emergency power source is tripped off the line from the overload.

Cite: 46 CFR 112.05 – 5 (b)

A stop control for an emergency generator must be only in the space that has the emergency generator, except a remote mechanical reach rod is permitted for the fuel oil shut-off valve to an independent fuel oil tank located in the space.

Cite: 46 CFR 112.15 - 1 & 5

Final (including temporary) emergency loads.

On vessels required to have final emergency power sources, the following emergency lighting and power loads must be arranged so that they can be energized from the final emergency power source:

- 1 (e) Illumination to allow safe operation of each power operated watertight door.
 - (f) At least one light in each space where a person may be maintaining, repairing or operating equipment, stowing or drawing stores or equipment, or transiting, such as public spaces, work spaces, machinery spaces, workshops, galleys, bow thruster rooms, storage areas, underdeck passageways in cargo areas, windlass rooms, accessible duct keels with valve operators, cargo handling rooms and holds of roll on/roll-off vessels.
 - (q) All lighting relative to helicopter operations and landing if installed, unless provided by another source power (such as independent batteries separately charged by solar cells).
 - (r) Each general emergency alarm system required by SOLAS 74.
-
- 5 (c) Each charging panel for:
 - (1) Temporary emergency batteries;
 - (2) Starting batteries for diesel engines or gas turbines that drive emergency generators; and
 - (3) General alarm batteries.
 - (g) If necessary, the lube oil pump for each propulsion turbine and reduction gear, propulsion diesel reduction gear, and ship's service generator turbine which needs external lubrication.
 - (h) Each rudder angle indicator.
 - (l) Each general emergency flashing light required.
 - (m) Each blow-out-preventer control system.
 - (n) Any permanently installed diving equipment that is dependent upon the vessel's power.
 - (o) Each emergency generator starting compressor.
 - (r) Each vital system automation load required.
 - (s) Motor-operated valves for each cargo oil and fuel oil system, if the emergency power source is the source of power.
 - (t) Each ship's stabilizer wing, unless a separate source of emergency power is supplied.
 - (u) Each indicator that shows the position of the stabilizer wings.
 - (v) Each smoke extraction fan (not including smoke detector sampling).

Cite: 46 CFR 112.20 – 5

- (a) On vessels which are required to install a transitional source of power, see Pt.4 Ch.8 Sec.2 C200, the consumers required in table shall if there is a reduction of potential of the normal or emergency source by 15 to 40 percent, be automatically supplied from the temporary emergency power source.
- (b) For systems in which a reduction of frequency of the normal source or final emergency power source adversely affects the emergency system and emergency loads, there must be means to transfer the consumer loads required under (a) to the temporary emergency power source upon a reduction in the frequency of the normal source or final emergency power source.

Cite: 46 CFR 112.20 – 15

Transfer of emergency loads.

- (a) When the potential of the final emergency power source reaches 85 to 95 percent of normal value, the emergency loads under 112.15 - 5 must transfer automatically to the final emergency power

source and, on a passenger vessel, this transfer must be accomplished in no more than 45 seconds after failure of the normal source of power.

- (b) When the potential from the normal source has been restored, the emergency loads must be manually or automatically transferred to the normal source, and the final emergency power source must be manually or automatically stopped.
- (c) If the potential of the final emergency power source is less than 75 to 85 percent of normal value while supplying the emergency loads, the temporary emergency loads under 112.15 – 1 must transfer automatically to the temporary emergency power source.

Cite: 46 CFR 112.50 – 1 (g)

The generator set must shut down automatically upon loss of lubricating oil pressure, over-speed, or operation of a fixed fire extinguishing system in the emergency generator room (see § 111.12–1(b) for detailed overspeed trip requirements).

Cite: 46 CFR 112.55 - 5

When supplying emergency lighting loads, the storage battery initial voltage must not exceed the standard system voltage by more than 5 percent.

Cite: 46 CFR 112.55 – 10 (d)

Storage battery charging.

There must be instruments to show the rate of charge.

Cite: 46 CFR 113.30 – 5 (g)

Lookout.

Each vessel must have a means of communication between the navigating bridge and the bow or forward lookout station unless direct voice communication is possible.

Cite: 46 CFR 113.35 – 3

The engine room telegraph required in Pt.4 Ch.12 Sec.2 B102 is to comply with the following:

- a separate engine room telegraph is to be provided for each engine
- on a double-ended vessel that has two navigating bridges, this system is to be between the engine room and each navigating bridge.

Cite: 46 CFR 113.35 – 5

Electric engine order telegraph systems.

- (a) Each electric engine order telegraph system must have transmitters and indicators that are electrically connected to each other.
- (b) Each engine room indicator must be capable of acknowledgement of orders.
- (c) There must be an audible signal at each instrument. The signal at both locations must sound continuously when the transmitter and the indicator do not show the same order.
- (d) Each telegraph instrument must meet the protection requirements in Pt.4 Ch.9 Sec.5.
- (e) Each system must have an alarm which—
 - (1) Automatically sounds and visually signals a loss of power to the system
 - (2) Is on the navigating bridge; and
 - (3) Has a means to reduce the audible signal from 100 percent to not less than 50 percent.

Cite: 46 CFR 113.35 – 7

Electric engine order telegraph systems; operation.

- (a) Where two or more transmitters, located on or on top of, or on the wings of, the navigating bridge operate a common indicator in the engine room, the transmitters must:

- (1) Operate in synchronism as required in paragraph (b) of this section; or
- (2) Operate under the control of a transmitter transfer control in accordance with paragraph (c) of this section.
- (b) All transmitter handles and pointers must operate in synchronism. Where the transmitters are mechanically interlocked to effect synchronous operation, the requirements of Sec. 113.35 – 13 must be met.
- (c) Except for a transmitter in an unattended navigating bridge on a double-ended vessel, each transmitter must operate under the control of a transmitter transfer control so that movement of any one transmitter handle automatically connects that transmitter electrically to the engine room indicator and simultaneously disconnects electrically all other transmitters. The reply pointers of all transmitters must operate in synchronism at all times.
- (d) On a double-ended vessel that has two navigating bridges, a manually operated transfer switch which will disconnect the system in the unattended navigating bridge must be provided.

Cite: 46 CFR 113.35 – 9

Mechanical engine order telegraph systems.

- (a) Each mechanical engine order telegraph system is to consist of transmitters and indicators mechanically connected to each other, as by means of chains and wires.
- (b) Each transmitter and each indicator is to have an audible signal device to indicate, in the case of an indicator, the receipt of an order, and in the case of a transmitter, the acknowledgement of an order. The audible signal device is to not be dependent upon any source of power for operation other than that of the movement of the transmitter or indicator handle.

Cite: 46 CFR 113.35 – 13

Mechanical engine order telegraph systems; operation. If more than one transmitter operates a common indicator in the engine room, all the transmitters is to be mechanically interlocked and operate in synchronism. A failure of the transmission wire or chain at any transmitter is to not interrupt or disable any other transmitter

Cite: 46 CFR 113.35 – 15

If a mechanical engine order telegraph system is installed on any vessel to provide the communication required by this subpart, the length of cables or other mechanical limitations is to not prevent the efficient operation of the system.

Cite: 46 CFR 113.35 – 17

Where ships are arranged with Bridge control of propulsion machinery in accordance with Pt.4 Ch.1 Sec.4 A400, each telegraph transmitter that prevents movement to the “Navigating Bridge Control” position without positive action by the operator.

Cite: 46 CFR 113.43 - 1, 3, 5

- 1) This subpart applies to each vessel of 1600 gross tons and over that has power driven main or auxiliary steering gear.
- 3 (a). Each vessel must have steering failure alarm system that actuates an audible and visible alarm in the pilothouse when the actual position of the rudder differs by more than 5 degrees from the rudder position ordered by the follow-up control systems, for more than:
 - (1) 30 seconds for ordered rudder position changes of 70 degrees;
 - (2) 6.5 seconds for ordered rudder position changes of 5 degrees; and

- (3) The time period calculated by the following formula for ordered rudder position changes between 5 degrees and 70 degrees:

$$t = (R / 2.76) + 4.64$$

Where t = maximum time delay in seconds and R = ordered rudder change in degrees.

5. Each steering failure system must be supplied by a circuit that is independent of other steering gear alarm circuits.

2.3.2 Stability

Cite: 46 CFR 171 Subpart C

For passenger vessels not using Res. A.265(VIII) as an equivalent to Part B, the stability of passenger ships in the damaged condition shall comply with the requirements of 46 CFR 171.080 in association with subdivision requirements given in 46 CFR Part 171.

Cite: 46 CFR 174 Subpart J - Special Rules Pertaining to Dry Cargo Ships

Requirements for application of SOLAS 1974, as amended, Ch. II-1, Pt. B-1 for dry cargo ships being reflagged, as given in 174.350/355/360.

2.3.3 Structures

There are no supplemental requirements.

2.3.4 Statutory Vessel Design, Construction and Equipment – Requirements from 46 USC

Cite: 3503 (a)

46 CFR 72.05 – 20 Stairways, ladders and elevators. In addition to the requirements given in Pt. 5 Ch. 2 Sec. 3 E 900 - 1000, reference is given to IMO Res. A. 757(18) and to interpretations given in MSC/Sirc.847.

Cite: 3703 (a)

33 CFR 157.10d Tank vessel construction standard. Tank vessels of less than 5,000 DWT are to have both a double side and a double bottom as protection as specified in 201 for tanks within the cargo tank length that carry oil.

Cite: 3719

Reduction of spills from single hull non-self-propelled tank vessels by:

- 1) A crew member and an operable anchor equipment.
- 2) Carrying an emergency tow wire or tow line rigged and ready for use.
- 3) The emergency tow wire or tow line to have the same towing characteristics as the primary tow wire or tow line.

Additional Items covering 46 CFR Subchapter O – *Bulk Dangerous Cargoes*

I. Bulk Liquid Chemicals – Specific Cargo Restrictions

There are a small number of cargoes with additional U.S. requirements that exceed the IMO Chemical Codes.

- a. The following high vapor pressure cargoes (vapor pressure > 100 kPa at 37.8° C) may be carried if they are listed on the IMO COF and the vessel carries onboard a statement from the flag administration or classification society that the requirements of 46 CFR 153.370, 153.371 and 153.438 are met. If the tanks carrying these cargoes are not refrigerated, the tanks must be designed for no less than the relief valve settings shown (these are approximate cargo vapor pressures at 46° C or 115° F):
 1. Ammonium sulfide solution (46 % or less) (vapor pressure at 46° C for the particular mixture)
 2. Diethyl Ether (57 kPa gauge, 8.3 psig, 0.57 bar gauge)
 3. Dimethylamine, aqueous (greater than 55 % but less than 65 %) (vapor pressure at 46° C for the particular mixture)
 4. Ethylamine solution (72 % or less) (vapor pressure at 46° C for the particular mixture)
 5. Isoprene (57 kPa gauge, 8.3 psig, 0.57 bar gauge)
 6. Isopropylamine (58 kPa gauge, 8.4 psig, 0.58 bar gauge)
 7. Methyl Formate (66 kPa gauge, 9.6 psig, 0.66 bar gauge)
 8. Propylene Oxide (49 kPa gauge, 7.1 psig, 0.49 bar gauge)
 9. Sodium Hydrosulfide Ammonium Sulfide Solution (vapor pressure at 46° C for the particular mixture)
 10. Vinyl Ethyl Ether (42 kPa gauge, 6.1 psig, 0.42 bar gauge)
 11. Vinylidene Chloride (64 kPa gauge, 9.3 psig, 0.64 bar gauge)

- b. Alkylene oxides (propylene oxide; ethylene oxide/propylene oxide mixtures (maximum of 30 % ethylene oxide); and 1,2-butylene oxide) may be carried if they are:
 1. Listed on the IMO COF; and
 2. The vessel carries on board a statement from the classification society or flag state that the cargo piping is separated as specified by paragraph 4.7.17 of the IMO BCH Code (paragraph 15.8.25.3 of the IBC Code) and that the vessel meets 46 CFR 153.530(b), (d) and (p)(1).

II. Ships Carrying Liquefied Gases

1. Allowable Stress Levels for Independent Tank Types B and C

The stress factors for use in designing independent Type B tanks are shown in Table 2. Stress factors A and B also apply when designing Type C tanks. Certification of this item should be indicated in the Certificate of Fitness. (For a vessel to be accepted as Type II PG, the minimum design MARVS of 686 kPa (7 kp/cm²) must be based on these stress factors).

Table 2 - Values of Stress Factors

Stress factors	Nickel steel and carbon manganese steel values	Austenitic Steel values	Aluminum alloy values
A	4.0	4.0	4.0
B	2.0	1.6	1.5
C	3.0	3.0	3.0
D	1.5	1.5	1.5

2. Crack Arresting Steels

The following grades of steel, or their equivalents, must be used along the length of the cargo area in the following locations as required by Section 154.70:

deck stringer:	Grade E
sheer strake:	Grade E
turn of the bilge:	Grade D or E

Certification of this item may be made in the Certificate of Fitness or on a separate certificate issued by the classification society or administration.

3. Design Ambient Temperatures

Lower ambient temperatures for calculation of hull steel (see 154.174, 154.176, 154.466):

For Continental U.S. and Hawaii:

air (at 5 knots)	- 18 degrees C (0 degrees F)
seawater	0 degrees C (32 degrees F)

For Alaska:

air (at 5 knots)	- 29 degrees C (- 20 degrees F)
seawater	- 2 degrees C (28 degrees F)

Certification of this item should be indicated on the Certificate of Fitness. (For gas ships with independent tanks Type C, it is sufficient to use the design ambient temperatures from the IMO Gas Carrier Code and International Gas Carrier Code).

4. Cargo Pressure/Temperature Control

Except for the carriage of methane, the cargo containment system must be designed to maintain the cargo indefinitely without venting to the atmosphere at the upper design ambients of 45 degrees C for air and 32 degrees C for seawater. For methane, the cargo containment system must be designed to maintain the cargo without venting to the atmosphere for a minimum period of 21 days while a vessel is in port and under ambient conditions of 45 degrees C for air and 32 degrees C for seawater. Certification of this item may be handled in the same manner as for item 2.

5.

Cite: 46 CFR 154.1755

Nitrogen.

Except for deck tanks and their piping systems, cargo containment systems and piping systems carrying nitrogen must be specially approved by the Commandant (G-MSO).

Cite: 46 CFR 154 Table 4 “Summary of Minimum Requirements”

Chlorine or a cargo not included in DNV Rules Pt.5 Ch.5 Appendix A can only be carried by prior approval of the USCG.

III. Ships Carrying Compressed Natural Gas

Part 5, Chapter 15 “Compressed Natural Gas Carriers” of the DNV Rules for Classification of Ships has not been accepted by the USCG.

2.3.5 U.S. Interpretations Related to the SOLAS Cargo Ship Safety Construction Certificate

A. Construction – Subdivision and Stability, Machinery and Electrical Installations

Cite: II-1/11.2

For collision bulkheads located at a distance of less than 5 % or more than 8 % of the length of the ship from the forward perpendicular, approval by the Commandant is to be obtained.

Cite: II-1/43 Emergency Source of Electrical Power in Cargo Ships

There must be visible indicators in the machinery space to show when the automatically controlled emergency power source is supplying the emergency loads.

B. Construction – Fire Protection, Fire Detection and Fire Extinction

Cite: II-2/3.1 Definitions – Accommodation Spaces

"A pantry containing no cooking appliances" is one which contains only low heat warming equipment, has steel furnishings and is not used as a storeroom for cleaning gear, linen supplies or any other combustible material. A dining room containing such appliances shall not be regarded as a pantry.

Cite: II-2/10.2.1.5 Fire Pumps, Fire Mains, Hydrants and Hoses – Number and Position of Hydrants

At each fire hose valve there shall be marked in not less than 50 mm (2 in) red letters and figure: "FIRE STATION."

Cite: II-2/10.2.3.1.1 Fire Pumps, Fire Mains, Hydrants and Hoses – Fire Hoses

Each section of fire hose shall be lined commercial fire hose that conforms to Underwriters' Laboratories, Inc. Standard 19 or Federal Specification ZZ-H-451E.

Cite: II-2/10.2.3.2.1 Fire Pumps, Fire Mains, Hydrants and Hoses – Fire Hoses

The minimum hydrant and hose size shall be 40 mm (1.5 in.).

On passenger and cargo ships over 1500 gross tons, the minimum hydrant and hose size for interior and exterior locations is 65 mm (2.5 in.). For interior locations, where 65 mm (2.5 inch) hydrants and hose are required, two 40 mm (1.5 inch) outlets with two 40 mm, (1.5 inch) hoses supplied through a siamese connection may be substituted. On tankships over 125 m (400 ft) (L.O.A.), the minimum hydrant and hose size for exterior locations is 65 mm (2.5 in.). Where 65 mm (2.5 inch) hydrants and hose are required, two 40 mm (1.5 inch) outlets with two 40 mm, (1.5 inch) hoses supplied through a siamese connection may be substituted.. Please note that two hoses are required at exterior fire stations equipped with Siamese fittings. Where two 40 mm (1.5 inch) hydrants and hoses are permitted in lieu of one 65 mm (2.5 inch) hydrant and hose, both of the outlets operating simultaneously are to be considered as a single outlet for the purpose of complying with the minimum number of jets criteria for fire pump capacity.

Cite: II-2/10.2.3.3 Fire Pumps, Fire Mains, Hydrants and Hoses – Nozzles

Nozzles must be USCG approved equipment.

Cite: II-2/10.4 & Fixed Gas Fire-Extinguishing Systems – General. FSS Code Chapter 5

Fixed gas fire extinguishing systems must be USCG approved equipment.

**Cite: II-2/10.4 & Fixed Gas Fire-Extinguishing Systems – Carbon Dioxide Systems.
FSS Code Chapter 5.2.2**

The fixed carbon dioxide system must comply with the manufacturer's approved Design, Installation, Operation and Maintenance Manual that meets Chapter II-2, Regulation 10.4 of SOLAS 2000 Amendments and the following supplemental requirements:

Quantity, Pipe Sizes and Discharge Rate

In dry cargo spaces, the number of kilograms of carbon dioxide required for each space shall be equal to the gross volume of the space in cubic meters divided by 1.873. The gross volume includes trunks extending from the space; however, tonnage openings may be considered sealed. Branch lines to various cargo holds and 'tween decks shall be sized as to ensure a uniform distribution over the space protected. For CO₂ systems installed for enclosed ventilation systems of rotating electrical propulsion equipment, the number of kilograms of carbon dioxide required for the initial charge shall be equal to the gross volume of the system divided by 0.624 for systems having a volume of less than 57 cubic meters, and divided by 0.749 for systems having a volume of 57 cubic meters or more.

For CO₂ systems installed for enclosed ventilation systems of rotating equipment, in addition to the above there shall be sufficient carbon dioxide available to permit delayed discharges of such quantity as to maintain at least a 25% concentration until the equipment can be stopped. If the initial discharge is such as to achieve this concentration until the equipment is stopped, no delayed discharge need be provided. For machinery spaces, tanks, pumprooms, paint lockers and similar spaces, any fixed gas fire extinguishing system used to protect these spaces must comply with the requirements of SOLAS Chapter II-2, Regulation 10.4.1.1.1. For spaces specially suitable for vehicles, any fixed gas fire

extinguishing system used to protect these spaces must comply with the requirements of SOLAS Chapter II-2, Regulation 20.6.1.1

Controls

If the same cylinders are used to protect more than one space, a manifold with normally closed stop valves shall be used to direct the carbon dioxide into the proper space. If the cylinders are used to protect only one space, a normally closed stop valve shall be installed between the cylinders and the space except for systems for protection of machinery spaces, pumprooms, paint lockers and similar space which contain not more than 130 kilograms of carbon dioxide.

Distribution piping to dry cargo spaces shall be controlled from not more than two stations. One of the stations controlling the system for the main machinery space shall be located as convenient as practicable to one of the main escapes from the space. All control stations and the individual valves and controls shall be distinctly marked to indicate the compartments or parts of the vessel to which they lead.

Systems for protection of machinery spaces, pumprooms, paint lockers and similar spaces shall be actuated at each station by one control operating the valve to the space and a separate control releasing at least the required amount of carbon dioxide. These two controls shall be located in a box or other enclosure clearly identified for the particular space. Systems installed without a stop valve shall be operated by one control releasing at least the required amount of carbon dioxide. Where provisions are made for the simultaneous release of a given amount of carbon dioxide by operation of a remote control, provisions shall also be made for manual control at the cylinders. Where gas pressure from pilot cylinders is used as a means for releasing the remaining cylinders, not less than two pilot cylinders shall be used for systems consisting of more than two cylinders. Each of the pilot cylinders shall be capable of manual control at the cylinder, but the remaining cylinders need not be capable of individual manual control.

Systems for machinery spaces, pumprooms and similar type spaces, which are of more than 130 kilograms of carbon dioxide shall be fitted with an approved delayed discharge so arranged that an approved audible alarm will be automatically sounded for at least 20 seconds before the carbon dioxide is released into the space. Such systems of not more than 130 kilograms of carbon dioxide shall also have a similar delayed discharge, except for spaces which have a suitable horizontal escape. The alarm shall depend on no source of power other than the carbon dioxide. In systems where an alarm is required, the alarm shall be conspicuously and centrally located. Adjacent to all carbon dioxide extinguishing alarms there shall be conspicuously marked: "WHEN ALARM SOUNDS VACATE AT ONCE. CARBON DIOXIDE BEING RELEASED."

All distribution valves and controls shall be approved equipment. All controls shall be suitably protected.

On systems in which the CO₂ cylinders are not within the protected space the instructions shall also include a schematic diagram of the system and instructions detailing alternate methods of discharging the system should the manual release or stop valve fail to operate. Each control valve to a branch line shall be marked to indicate the space served. If the space or enclosure containing the CO₂ supply or controls is to be locked, a key to the space or enclosure shall be in a break-glass type box conspicuously located adjacent to the opening.

Piping

The piping, valves and fittings shall have a bursting pressure of not less than 41 N/mm² (6000 psi). All piping, valves and fittings of ferrous materials shall be protected inside and outside against corrosion unless specifically approved otherwise.

Installation test requirements are as follows:

Upon completion of the piping installation, and before the cylinders are connected, a pressure test in accordance with the manufacturer's Design, Installation, Operation, and Maintenance Manual shall be conducted. Only CO₂ or other inert gas shall be used for this test.

Carbon Dioxide Storage

All cylinders used for storing carbon dioxide must be fabricated, tested, and marked in accordance with 46 CFR 147.60 and 46 CFR 147.65

Discharge Outlets

Discharge outlets shall be listed or approved by an independent testing laboratory.

Enclosure Openings

In all spaces protected by a carbon dioxide system, except cargo spaces, stopping of the ventilating fans is to be automatically actuated upon operation of the carbon dioxide system. This will not be required where the carbon dioxide system is a secondary system in addition to another approved primary system protecting the space.

Pressure Relief

Where necessary, relatively tight compartments such as refrigeration spaces, paint lockers, etc., shall be provided with suitable means for relieving excessive pressure accumulating within the compartment when the carbon dioxide is injected.

Markings

CO₂ fire smothering apparatus shall be marked "CO₂ FIRE APPARATUS" in not less than 50 mm (2 in) red letters.

Cite: II-2/6 & Fire Extinguishers. FSS Code Chapter 4

Fire extinguishers must be USCG type - approved equipment.

Cite: II-2/10.5.4 Fire-Extinguishing Arrangements in Machinery Spaces – Incinerator Space

An enclosed space containing an incinerator shall be considered a machinery space of category A, and therefore, shall be provided with fire detection and fixed fire extinguishing systems in accordance with IMO Resolution MEPC.76(40), "Standard Specification for Shipboard Incinerators" for the incinerator and waste storage spaces.

**Cite: II-2/10.4.1.1.3, Fixed Pressure Water-Spraying Fire-Extinguishing Systems in
II-2/10.5 & Machinery Spaces
FSS Code Chapter 7**

A fixed pressure water-spraying, fire extinguishing system is not acceptable by the USCG except for lamp lockers, paint lockers and pump rooms. Where installed in these spaces, it shall comply with Chapter 7 of the FSS Code, and the following:

Capacity and Arrangement

The spacing of the spray nozzles shall be on the basis of the spray pattern provided by the lowest pressure at any spray nozzle in the system. In no instance shall a system be designed for any spray nozzle to be operated at a pressure less than that for which it was approved. The maximum permissible height of the spray nozzle above the protected area shall not exceed that specified in its approval. Whenever there are obstructions to coverage by the spray patterns, additional spray nozzles shall be installed to provide full coverage. If a fire pump is used to supply water to the water spray system it is to be sized to provide the quantity of water required for operation of the water spray system while simultaneously supplying the required water to the fire main system.

Controls

Complete, but simple instructions for the operation of the system shall be located in a conspicuous place at or near the controls.

Piping

All piping, valves and fittings shall meet the applicable requirements of the relevant section of the DNV Rules for Classification of Ships as modified by this supplement. Distribution piping shall be of materials resistant to corrosion, except that steel or iron pipe may be used if inside corrosion resistant coatings which will not flake off and clog the nozzles are applied. Materials readily rendered ineffective by heat of a fire shall not be used. All piping, valves, and fittings shall be securely supported, and where necessary, protected against injury. Drains, strainers and dirt traps shall be fitted where necessary to prevent the accumulation of dirt or moisture. Threaded joints shall be metal to metal, with no thread compound used. Distribution piping shall be used for no other purpose. All piping shall be thoroughly cleaned and flushed before installation of the water spray nozzles. Spray nozzles shall be of an approved type.

Markings

The control cabinets or spaces containing valves or manifolds shall be distinctly marked in conspicuous red letters at least 50 mm (2 in) high with "WATER SPRAY FIRE APPARATUS."

**Cite: II-2/10.6, Automatic Sprinkler, Fire Detection and Fire Alarm Systems
II-2/10.7 &
FSS Code Chapter 8**

Automatic sprinkler systems are also to comply with National Fire Protection Association (NFPA) Standard 13-1996. Where SOLAS Reg. II-2/10.6 and NFPA Std. 13 have similar requirements, the higher standard is to be satisfied. The following supplemental requirements:

The sprinkler heads, alarms, dry pipe valves, and actuating mechanisms shall be listed or approved by a recognized independent testing lab. All wiring and electrical circuits and equipment shall meet the applicable requirements of the relevant sections of the DNV Rules for Classification of Ships and this supplement. All piping, valves, fittings, pressure tanks, etc. must meet the applicable requirements of the relevant sections of the DNV Rules for Classification of Ships as modified by this supplement.

The fire detecting and manual alarm, automatic sprinkler, and smoke detecting alarm bells in the engine room shall be identified by at least 25 mm (1 in) red lettering "FIRE ALARM", "SPRINKLER ALARM", or "SMOKE DETECTING ALARM" as appropriate. Where such alarms on the bridge or in the fire control station do not form a part of an easily identifiable alarm cabinet, the bells shall be suitably identified as above. The control cabinets or spaces containing valves or manifolds shall be distinctly marked in conspicuous red letters at least 50 mm (2 in) high "AUTOMATIC SPRINKLING SYSTEM."

Cite: II-2/7.2 & Fixed Fire Detection and Fire Alarm Systems. FSS Code Chapter 9

Fire protection systems must be USCG approved equipment. A conductor must not be used as a common return from more than one zone. Each connection box that has conductors for more than one zone must be watertight. There must be at least two sources of power for the electrical equipment of each fire detecting and alarm system. The normal source must be the main power source. The other source must be the emergency power source or an automatically charged battery. Upon loss of power to the system from the normal source, the system must be automatically supplied from the other source.

The capacity of each branch circuit providing power to a fire detection or alarm system must not be less than 125 percent of the maximum load.

Each fire detecting zone must not include spaces on more than one deck, except:

- (a) Adjacent and communicating spaces on different decks in the ends of the vessel having a Combined ceiling area of not more than 279 m² (3000 square feet).
- (b) Isolated rooms or lockers in such spaces as mast houses, wheelhouse top, etc., which are Easily communicable with the area of the fire-detecting circuit to which they are Connected.
- (c) Systems with indicators for individual spaces.

The fire detecting zone must not contain more than 50 protected rooms or spaces. The system must visually indicate the zone in which the alarm originated. The detectors, the detecting cabinet and alarms must be of an approved type. The fire detecting system must be used for no other purpose, except it may be incorporated with the manual alarm system. A framed chart or diagram must be installed in the wheelhouse or control station adjacent to the detecting cabinet indicating the location of the detecting zones and giving operating instructions.

Cite: II-2/7.2 & Fixed Fire Detection and Fire Alarm Systems – Installation FSS Code Chapter 9.2.4 Requirements

A sufficient number of call points must be employed such that a person escaping from any space would find an alarm box convenient on the normal route of escape. The manual alarm system must be used for no other purpose, except it may be incorporated with the fire detecting system. Manual fire alarm boxes shall be clearly and permanently marked "IN CASE OF FIRE BREAK GLASS" in at least 12.5 mm (1/2 in) letters. Detector spacing shall be in accordance with the manufacturer's recommendation. Detector spacing in spaces with ceilings greater than 3 m (10 ft) must be corrected in accordance with NFPA 72E.

Cite: II-2/10.10.3 Fireman’s Outfit

Lockers or spaces where emergency equipment is stowed shall be marked: "EMERGENCY EQUIPMENT".

Cite: II-2/13 Miscellaneous Items

Small rooms or spaces having a secondary means of escape which is not obviously apparent shall have a suitable sign in red letters "EMERGENCY EXIT" directing attention to such escape.

Cite: II-2/9.2.3.3 Fire Integrity of Bulkheads and Deck

In accordance with 46 CFR 127.220, the space around the emergency source of power is required to be of —A-60 construction:

- (a) Except as provided in paragraph (b), when a compartment containing the emergency source of electric power, or vital components of that source, adjoins a space containing either the ship’s service generator or machinery necessary for the operation of the ship’s service generator, each common bulkhead and deck must be of —A-60“ Class construction.
- (b) The “A-60“ Class construction required by paragraph (a) is unnecessary if the emergency source of electrical power is in a ventilated battery locker that:
 - 1. Is located above the main deck;
 - 2. Is located in the open; and
 - 3. Has no boundaries contiguous with other decks or bulkheads

Cite: II-2/13 Means of Escape

The doors giving access to either of the two required means of escape shall not be lockable, except that crash doors or locking devices, capable of being easily forced in an emergency, may be employed provided that a permanent and conspicuous notice giving instructions on how to open the door or the lock is attached to both sides of the door. This paragraph shall not apply to outside doors to deckhouses where such doors are locked by key only, and such key is under control of one of the vessel's officers.

All public spaces having a deck area of over 28 sq. meters shall have at least two exits. Where practicable, the exits shall give egress to different corridors, spaces, or rooms to minimize the possibility of one incident blocking both means of escape. All interior stairways, other than those within the Machinery Spaces or Cargo Holds, shall have a minimum width of 0.71 meters. The angle of inclination with the horizontal of such stairways shall not exceed 50 degrees.

Cite: II-2/10.4 & Fixed Deck Foam Systems. FSS Code Chapter 14

The system must be USCG approved equipment and must comply with the manufacturer's approved Design, Installation, Operation and Maintenance Manual that meets Chapter II-2, Regulation 10.4 of SOLAS and the following supplemental requirements:

Controls

Complete, but simple instructions for the operation of the system shall be located in a conspicuous place at or near the controls. The deck foam system must be capable of being actuated, including introduction of foam to the foam main, within three minutes of notification of a fire.

Piping

All piping, valves, and fittings of ferrous materials shall be protected inside and outside against corrosion unless specifically approved otherwise. All piping, valves, and fittings shall be securely supported, and where necessary, protected against injury. Drains and dirt traps shall be fitted where necessary to prevent the accumulation of dirt or moisture. Piping shall not be used for any other purpose than firefighting, drills and testing.

Discharge Outlets

At least one mounted foam appliance shall be provided for each required foam station.

Markings

Foam apparatus, the control cabinets or spaces containing valves or manifolds for the various fire extinguishing systems shall be distinctly marked in conspicuous red letters at least 50 mm (2 in) high "FOAM FIRE APPARATUS".

C. *Life-Saving Appliances and Arrangements (This supplement entry is intended to add clarity to the various terms used but not clearly defined in SOLAS.)*

Cite: III/3 Definitions

"Accommodation" means a cabin or other covered or enclosed place intended to carry persons. Each place where passengers are carried is considered an accommodation, whether or not it is covered or enclosed. Accommodations include, but are not limited to halls, dining rooms, mess rooms, lounges, corridors, lavatories, cabins, offices, hospitals, cinemas, game and hobby rooms, and other similar spaces open to persons on board.

"Embarkation station" means the place where a survival craft is boarded.

"Fleet angle for a wire rope leading to a winch drum" means the angle included between an imaginary line from the lead sheave perpendicular to the axis of the drum and the line formed by the wire rope when led from the lead sheave to either extremity of the drum.

"Marine evacuation system" means an appliance designed to rapidly transfer large numbers of persons from an embarkation station by means of a passage to a floating platform for subsequent embarkation into associated survival craft, or directly into associated survival craft.

"Muster station" means the place where the crew and passengers assemble before boarding a survival craft.

"Seagoing condition" means the operating condition of the ship with the personnel, equipment, fluids and ballast necessary for safe operation on the waters where the ship operates. For bottom-bearing mobile offshore drilling units, the term also applies in the bottom-bearing mode, but the "lightest seagoing condition" is considered to be the highest anticipated operating condition.

"Survival craft" means a craft capable of sustaining the lives of persons in distress after abandoning the ship on which they were carried. The term includes lifeboats, liferafts, buoyant apparatus, and life floats, but does not include rescue boats.

"Toxic vapor or gas" means a product for which emergency escape respiratory protection is required under subchapter 17 of the International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (IBC Code), and in subchapter 19 of the International Code for the Construction and Equipment of Ships carrying Liquefied Gases in Bulk (IGC Code).

Cite: III/6 Communications

Each item of radio communications equipment must be type accepted by the Federal Communications Commission.

Cite: III/7 Personal Life-Saving Appliances

Each child-size lifejacket and immersion suit must be appropriately marked and stowed separately from adult or extended-size devices.

Each lifejacket and immersion suit must be marked with the vessel's name.

Inflatable lifejackets, if carried, must all be of the same or similar design.

Each lifejacket, immersion suit, and anti-exposure suit container must be marked in block capital letters and numbers with the quantity, identity, and size of the equipment stowed inside the container. The equipment may be identified in words or with the appropriate symbol from IMO Resolution A.760(18).

Cite: III/8 Muster List and Emergency Instructions

Instructions for passengers must include illustrated instructions on the method of donning lifejackets.

Cite: III/11 Survival Craft Muster and Embarkation Arrangements

If a davit-launched survival craft is not intended to be moved to the stowed position with persons on board, the craft must be provided with a means for bringing it against the side of the vessel and holding it alongside the vessel to allow persons to safely disembark after a drill.

Cite: III/13 Stowage of Survival Craft

Each life-raft must be arranged to permit it to drop into the water from the deck on which it is stowed. The liferaft stowage arrangement meets this requirement if it

- (i) is outboard of the rail or bulwark,
- (ii) is on stanchions or on a platform adjacent to the rail or bulwark, or
- (iii) has a gate or other suitable opening large enough to allow the liferaft to be pushed directly overboard and, if the liferaft is intended to be available for use on either side of the vessel, such gate or opening is provided on each side of the vessel.

Cite: III/18 Line-Throwing Appliances

In addition to the equipment approved and carried as part of the appliance, each line throwing appliance must also have an auxiliary line that:

- (1) if other than manila, has a breaking strength of at least 40 kN (9,000 lb);

- (2) if other than manila, is of a dark color or of a type certified to be resistant to deterioration from ultraviolet light; and
- (3) is at least 450 m (1,500 ft) long.

The line throwing appliance and its equipment must be readily accessible for use, stowed in its container carried within the pilothouse or on the navigating bridge or stowed in a portable magazine chest.

Cite: III/32.3 Personal Life-Saving Appliances – Immersion Suits and Thermal Protective Aids (Cargo Ships)

Immersion suits must be carried for each person on board on all cargo vessels except those operating between 32 degrees north and 32 degrees south latitude regardless of whether it has totally enclosed lifeboats.

Cite: III/33 Survival Craft Embarkation and Launching Arrangements

On a tank vessel certificated to carry cargoes that have a flashpoint less than 60 degrees C as determined under ASTM D93-94, each lifeboat or launching appliance of aluminum construction must be protected by a water spray system.

Cite: III/34 Launching Appliances Using Falls and a Winch LSA Code VI 6.1.2.9

The lowering speed for a fully loaded survival craft must be not more than 1.3 meters per second (256 feet per minute).

Cite: III/34 Launching Appliances Using Falls and a Winch LSA Code VI 6.1.2

Each unguarded fall must not pass near any operating position of the winch, such as hand cranks, pay out wheels, and brake levers.

Each fall, where exposed to damage or fouling, must have guards or equivalent protection. Each fall that leads along a deck must be covered with a guard which is not more than 300 millimeters (1 foot) above the deck.

Each winch drum must be arranged so the fall wire winds onto the drum in a level wrap.

D. Radiocommunications

Cite: IV/7.1.6 Radiocommunications – Application

The required EPIRB must be marked with the vessel's name.

E. Safety of Navigation

Cite: V/22 Navigation Bridge Visibility

In addition to the SOLAS implementation schedule, this regulation applies to all cargo and passenger vessels of 100 m or more in length and contracted for on or after September 7, 1990.

2.4 MARPOL 73/78

Requirements in Addition to the MARPOL Annexes

(In order to facilitate reference, the applicable CFR cite is given for each entry.)

MARPOL ANNEX I

Cite: 33 CFR 151.27 Shipboard Oil Pollution Emergency Plan

For the issue of a Certificate of Inspection, the Shipboard Oil Pollution Emergency Plan (Reg. 26) outlined in IMO Res. MEPC.86(44) can only be approved by the U.S. Coast Guard (G – MOR).

Cite: 33 CFR 155.205 Discharge Removal Equipment for Vessels 400 feet or greater in length

Oil carrying tank vessels with a length that is at least 400 ft. must carry discharge removal equipment for on-deck spills up to 12 bbl. The equipment must include: sorbents, non-sparking hand scoops, containers for the recovered spillage, emulsifiers for deck cleaning, protective clothing, one non-sparking portable pump with hoses, and scupper plugs.

Cite: 33 CFR 155.210 Discharge Removal Equipment for Vessels less than 400 feet in length

Oil carrying tank vessels with a length that is less than 400 ft. must carry discharge removal equipment for on-deck spills up to 7 bbl. The equipment must include: sorbents, non-sparking hand scoops, containers for the recovered spillage, emulsifiers for deck cleaning, protective clothing, one non-sparking portable pump with hoses, and scupper plugs.

Cite: 33 CFR 155.225 Internal Cargo Transfer Capability

Unless the vessel's cargo piping system can transfer cargo among all tanks within the cargo block, the vessel must be equipped with hoses and reducers which can enable the transfer of cargo from any tank to any other tank.

Cite: 33 CFR 155.310 Containment of Oil and Hazardous Material Cargo Discharge

Under hose connections there must be a fixed container or enclosed deck area with a mechanical means of closing the drain for that containment which has a capacity:

1/2 bbl for lines no more than 2"
1 bbl for lines more than 2" up to 4"
2 bbl for lines no less than 4" up to 6"
3 bbl for lines no less than 6" up to 12"
4 bbl for lines 12" or more

Cite: 33 CFR 155.320 Fuel Oil and Bulk Lubricating Oil Discharge Containment

Under fill connections and vents there must be a fixed container or enclosed deck area with a mechanical means of closing the drain for that containment which has a capacity:

1/2 bbl for vessels 300 g.t. or more but less than 1600 g.t.
1 bbl for vessels 1600 g.t. or more

Cite: 33 CFR 155.380 Oily-water Separating Equipment, Bilge Alarm and Bilge Monitor Approval Standards

Oily-water separating equipment and oil content meters for bilge alarms are to be USCG approved equipment.

Cite: 33 CFR 155.450 Placard

Each machinery space must have a sign indicating that the discharge of oil is prohibited.

Cite: 33 CFR 155.780 Emergency Shutdown

Tank vessel must have an emergency means of stopping transfers within a vessel.

Cite: 33 CFR 155.790 Deck Lighting

Tank vessels must have a means of illuminating the deck in transfer operation work areas – 1.0 foot candle measured 3 feet above the deck – and at transfer connections – 5.0 foot candle measured 3 feet above the deck.

Cite: 33 CFR 155.800 Transfer Hoses

Transfer hoses must have burst pressure of at least 600 psi and four times the MAWP, which must be at least 150 psi. Hose flanges must meet ANSI B16.5 or B16.24. The hoses must be marked with the MAWP, type of service, date of manufacture and the date of the last pressure test. The date of manufacture and the date of the last pressure test may be recorded in lieu of being marked on the hoses.

Cite: 33 CFR 155.1010 Response Plans – Purposes

Applies to tank vessels without regard to size. (Reg 26 applies to tank vessels greater than 150 g.t. and all vessels greater than 400 g.t.) Applies to discharges of oil. (Reg 26 applies to all discharges of oil.) Requires formal agreements for spill notification and cleanup. (Reg 26 requires only shipboard procedures and a shoreside contact.) Requires a geographic specific appendix for U.S. ports. (Reg 26 requires a world wide list.)

Cite: 33 CFR 157.03(n) Definition – Oil

Oil is not limited to petroleum and includes animal fats and other "oils." (MARPOL regulates animal fats and vegetable oils under Annex II.)

Cite: 33 CFR 157.10b Segregated Ballast Tanks, Dedicated Clean Ballast Tanks, and Special Ballast Arrangements for Tank Vessels Transporting Outer Continental Shelf Oil

Tank vessels servicing the OCS are permitted to carry ballast water in cargo tanks. (MARPOL makes no special allowances for these sorts of vessels.)

Cite: 33 CFR 157.10d Double Hulls on Tank Vessels

The dates for the requirement of double hull construction are approximately three (3) years earlier than given under MARPOL Annex I/13F(1).

U.S. double hull requirements have no minimum deadweight limit nor exemption to the requirement of double sides.

Specific requirements for the construction of double sides and double bottoms are contained in this regulation. Compliance dates for double hull construction of 46 U.S.C. 3703a(c) are set out in appendix G to 33 CFR Part 157.

Cite: 33 CFR 157.12 Cargo Monitor and Control System

The oil discharge monitoring and control system is to be USCG approved equipment. The ODMC system manual is also required to be approved.

Cite: 33 CFR 157.15 Slop Tanks in Tank Vessels

The oily/water detectors installed on slop tanks are to be USCG approved equipment.

Cite: 33 CFR 157.21 Subdivision and Stability

For US Flag vessels, MARPOL damage stability requirements are applicable to the following vessels:

- (a) New vessels delivered after 31 December 1977
- (b) New vessels contracted after 31 December 1974, and
- (c) New vessels whose keels were laid (or similar stage of construction) after 30 June 1975

New (defined in 157.03i) applies to vessels as under contract, constructed, or completed between 1975/1976/1979. (Reg 1(26) defines "new" as four (4) years later.)

Interpretation: MARPOL Reg 13 (5)

Segregated ballast tanks, dedicated clean ballast tanks and crude oil washing. Vessels less than 150 m in length: The U.S. has not adopted the requirements in Appendix 1 to Annex I which addresses

segregated ballast for vessels less than 150 m in length. Determination under this regulation must be made by the Commandant, USCG.

Interpretation: MARPOL Reg 13 F (4)

Prevention of oil pollution in the event of collision or stranding. Mid-deck tankers: The U.S. has not ratified that the mid-deck design is equivalent to a double hull.

Interpretation: MARPOL Reg 13 G

Prevention of oil pollution in the event of collision or stranding. Determinations by the Administration: The Commandant, USCG, makes determinations on behalf of the U.S.

Interpretation: MARPOL Reg 25(1) (c)

Subdivision and Stability. Stability for vessels under 100 m: The Commandant, USCG, makes determinations concerning the relaxation requirements for vessels less than 100 m if the standards for a vessel 150 m or longer would impair the operational qualities of the ship.

MARPOL ANNEX II

Cite: 33 CFR 151.27 Shipboard Oil Pollution Emergency Plan for NLS

For issuance of a Certificate of Inspection, the Shipboard Marine Pollution Emergency Plans for Noxious Liquid Substances (NLS) (Reg. 16) outlined in IMO Resolution MEPC.85(44) can only be approved by the U.S. Coast Guard (G-MOR).

Cite: Regulation 5 -- Discharge of noxious liquid substances

The discharge of Category D residues must be made below the waterline and through a discharge system that meets the same standards as a discharge used for category B or C discharges.

MARPOL ANNEX III (for vessels enrolled in the Alternate Compliance Program only)

There are no supplemental requirements for this authorization.

MARPOL ANNEX IV (NOT ADOPTED) COMPARISON OF USCG RULES TO MARPOL

Cite: 33 CFR 159 Marine Sanitation Devices (MSDs)

All vessels must be installed with either an operable MSD which controls the discharged fecal coliform bacteria count to 200 per 100 ml and the suspended solids to 150 mg/l, which is certified by the Commandant, USCG or with an operable MSD which retains the sewage on board.

MARPOL ANNEX V (for vessels enrolled in the Alternate Compliance Program only)

Cite: 33 CFR 151.51 Garbage Pollution – Applicability

The U.S. applies Annex V to U.S. public vessels after January 1, 1994. MARPOL does not generally apply to public vessels.

Cite: 33 CFR 151.55 Garbage Pollution – Record Keeping Requirements

U.S. ships over 40 ft. must keep records of garbage disposal.

Cite: 33 CFR 151.57 Garbage Pollution – Waste Management Plans

U.S. ships over 40 ft. with galleys must have a waste management plan.

Cite: 33 CFR 151.59 Garbage Pollution – Placards

U.S. ships over 26 ft. must have placards describing prohibited waste discharges.

2.5 Diving Support Systems

Diving support systems must meet the following requirements:

- (a) Piping for diving installations which is permanently installed on the vessel must meet the requirements of subpart B (Commercial Diving Operations) of 46 CFR part 197.
- (b) Piping internal to a pressure vessel for human occupancy (PVHO) must meet the requirements of subpart B of 46 CFR part 197.

2.6 Accommodations for Officers and Crew

1. Application

- (a) The provisions of this section, with the exception of paragraph 13, shall apply to all vessels other than tankships of 100 gross tons and over contracted for on or after November 19, 1952. Vessels other than tankships of 100 gross tons and over contracted for prior to November 19, 1952, shall meet the requirements of paragraph 13.
- (b) Vessels other than tankships of less than 100 gross tons shall meet the applicable requirements of this section insofar as is reasonable and practicable.
- (c) The provisions of this section, with the exception of paragraphs 14 and 15, apply to all tankships of 100 gross tons and over constructed on or after June 15, 1987.
- (d) Tankships of less than 100 gross tons and manned tank barges must meet the requirements of paragraph 14.

- (e) Tankships of 100 gross tons and over constructed prior to June 15, 1987, must meet the requirements of paragraph 15.

2. Intent

- (a) It is the intent of this section that the accommodations provided for officers and crew on all vessels shall be securely constructed, properly lighted, heated, drained, ventilated, equipped, located, arranged, and, where practicable, shall be insulated from undue noise and effluvia.
- (b) The crew referred to herein includes all persons, except the licensed officers, regularly employed on board any vessel. Where the requirements for the accommodation of licensed officers are not otherwise specified, they shall be of at least equivalent to that indicated herein for the crew.
- (c) For the purpose of this subpart, the term "crew spaces" shall include sleeping rooms, messrooms, recreational rooms, toilet and shower spaces, etc., which are intended for the exclusive use of the crew.

3. Location of Crew Spaces

- (a) Crew spaces shall be located, where practicable, so that the maximum amount of fresh air and light are obtainable, having due regard to the service of the vessel and the requirements of other space users.
- (b) Crew quarters shall not be located farther forward in a vessel than a vertical plane located at 5 percent of the vessel's length abaft the forward side of the stem at the designed summer load waterline. However, for vessels in other than ocean or coastwise service, this distance need not exceed 28 ft. For the purpose of this paragraph, the length shall be as defined in CFR 42.13-15 of subchapter E (Load Lines). No section of the deck of the crew spaces shall be below the deepest load line, except that in special cases, on vessels other than tankships, such an arrangement may be approved provided that in no case shall the deck head of the crew space be below the deepest load line.
- (c) Hawse pipes or chain pipes shall not pass through crew spaces.
- (d) There shall be no direct communication, except through solid, close fitted doors or hatches between crew spaces and chain lockers, cargo, stowage or machinery spaces.
- (e) There shall be no access, vents, or sounding tubes from fuel or cargo oil tanks opening into crew spaces, except that sounding tubes and access openings may be located in corridors.
- (f) Where practicable, crew spaces shall be located entirely separate and independent of spaces allotted to passengers or licensed officers.

4. Construction

- (a) All crew spaces are to be constructed in a manner suitable to the purpose for which they are intended. The bulkheads separating the crew space from cargo and machinery spaces, lamp and paint rooms, storerooms, drying rooms, washrooms, and toilet spaces shall be made odorproof.
- (b) Toilet spaces, except when provided as private or semiprivate facilities, shall be so built, fitted, and situated, that no odor from them will readily enter other crew spaces.
- (c) Where the shell or unsheathed weather decks form boundaries of crew spaces, suitable protective coverings shall be applied to prevent formation or accumulation of moisture.
- (d) Where crew spaces adjoin or are immediately above spaces such as galleys machinery spaces or casings, donkey boilerrooms, etc., they shall be suitably protected from the heat and noise.
- (e) The interior sides and deckheads of crew spaces shall be covered with enamel, paint, or other material light in color.
- (f) Crew spaces shall be properly drained where considered necessary.
- (g) All washrooms and toilet rooms shall be properly drained and so constructed and arranged that they can be kept in a clean, workable, and sanitary condition. The scuppers shall be located in the lowest part of the space, due consideration being given to the average trim of the vessel.

5. Sleeping Accommodations

- (a) Arrangements
 - (1) Separate sleeping accommodations are to be provided for the deck, engine, and steward groups of the crew.
 - (2) Each watch of seamen, firemen or similar ratings on duty in watches is to be provided with separate sleeping room or rooms, unless the total space for accommodations makes this impracticable.
 - (3) Where practicable, each licensed officer shall be provided with a separate stateroom.
- (b) Size
 - (1) Sleeping accommodations for the crew shall be divided into rooms, no one of which shall berth more than four persons. Except on passenger ships requiring a large number of personnel in the steward's department, rooms may be arranged to accommodate not more than 10 such persons.
 - (2) Each room shall be of such size that there are at least 30 square feet of deck area and a volume of at least 210 cubic feet for each person accommodated. The clear headroom shall be not less than 6 ft 3 in. In measuring sleeping quarters allocated to crews of

vessels, any equipment contained therein for the use of the occupants is not to be deducted from the total volume or from the deck area.

(c) Equipment

- (1) Each person shall have a separate berth and not more than one berth shall be placed above another. The berths shall have a framework of metal or other hard, smooth material not likely to corrode or harbor vermin, and shall be so arranged that they provide ample room for easy occupancy. The overall size of a berth shall not be less than 30 inches wide by 76 inches long, except by special permission of the Commandant, USCG. Where berths adjoin, they shall be divided by a partition not less than 18 inches in height. Where two tiers of berths are fitted, the bottom of the lower must not be less than 12 inches above the deck, and the bottom of the upper must not be less than 2 ft 6 in both from the bottom of the lower and from the deck overhead. The berths shall not be obstructed by pipes, ventilating ducts, or other installations.
- (2) A locker of metal or other hard, smooth material shall be provided for each person accommodated in a room. Each locker shall be not less than 300 square inches in cross section area and 60 inches high. It shall be so placed as to be readily accessible. The interior of the locker shall be so arranged as to facilitate the proper stowage of clothes.

6. Wash spaces; Toilet Spaces; and Shower Spaces

(a) For the purposes of this section

- (1) Private facility means a toilet, washing, or shower space that is accessible only from one single or double occupancy sleeping space;
- (2) Semiprivate facility means a toilet, washing, or shower space that is accessible from one or two one-to-four person occupancy sleeping spaces; and
- (3) Public facility means a toilet, washing, or shower space that is not private or semiprivate.

(b) Each private facility must have one toilet, one shower, and one washbasin, all of which may be in a single space.

(c) Each semiprivate facility must have at least one toilet and one shower, which may be in a single space.

(d) Each room adjoining a semiprivate facility must have a washbasin if a washbasin is not installed in the semiprivate facility.

(e) Each tankship must have enough public facilities to provide at least one toilet, one shower, and one washbasin for each eight persons without private facilities.

(f) Urinals may be installed in toilet rooms, but no toilet required in this section may be replaced by a urinal.

- (g) Each public toilet space and washing space must be convenient to the sleeping space that it serves.
- (h) No public facility may open into any sleeping space.
- (i) Each washbasin, shower, and bathtub must have hot and cold running water.
- (j) Adjacent toilets must be separated by a partition that is open at the top and bottom for ventilation and cleaning.
- (k) Public toilet facilities and shower facilities must be separated.
- (l) Each public facility that is a toilet space must have at least one washbasin unless the only access to the toilet space is through a washing space.
- (m) Each toilet must have an open front seat.
- (n) Each washing space and toilet space must be so constructed and arranged that it can be kept in a clean and sanitary condition and the plumbing and mechanical appliances kept in good working order.
- (o) Washbasins may be located in sleeping spaces.

7. Messrooms

- (a) Messrooms shall be located as near to the galley or suitably equipped serving pantry as is practicable, except where messroom is equipped with a steam table.

The messrooms shall be of such size as to seat the number of persons normally scheduled to be eating at one time.

- (b) Messrooms shall be properly equipped with tables, seats, and other necessary equipment and shall be so arranged as to permit access to each seat

8. Hospital Space

- (a) Except as specifically modified by paragraph (f) of this section, each vessel, which in the ordinary course of its trade makes voyages of more than 3 days duration between ports and which carries a crew of 12 or more, shall be provided with a hospital space. This space shall be situated with due regard to the comfort of the sick so that they may receive proper attention in all weathers.
- (b) The hospital shall be suitably separated from other spaces and shall be used for the care of the sick and for no other purpose.
- (c) The entrance shall be of such width and in such a position as to admit a stretcher case readily. Berths shall be of metal and may be in double tier, provided the upper berth is hinged and arranged to be secured clear of the lower berth when not in use. At least one berth shall be so arranged that it can be made accessible from both sides when necessary.

- (d) The hospital shall be fitted with berths in the ratio of one berth to every twelve members of the crew or portion thereof who are not berthed in single occupancy rooms, but the number of berths need not exceed six.
- (e) The hospital shall have a toilet, washbasin, and bath tub or shower conveniently situated. Other necessary suitable equipment of such character as clothes locker, table, seat, etc., shall be provided.
- (f) On vessels in which the crew is berthed in single occupancy rooms a hospital space will not be required: *Provided*, that one room shall be designated and fitted for use as a treatment and/or isolation room. Such room shall meet the following standards:
 - (1) The room must be available for immediate medical use;
 - (2) The room must be accessible to stretcher cases;
 - (3) The room must have a single berth or examination table so arranged that it can be made accessible from both sides when necessary; and,
 - (4) A washbasin with hot and cold running water must be installed either in or immediately adjacent to the space and other required sanitary facilities must be conveniently located.

9. Other Spaces

- (a) Sufficient facilities, depending upon the number of the crew, shall be provided where the crew may wash their own clothes. There shall be at least one tub or sink fitted with the necessary plumbing, including hot and cold running water.
- (b) Clothes drying facilities or space shall be provided for the needs of the crew.
- (c) Recreation accommodations shall be provided. Where messrooms are used for this purpose, they shall be suitably planned.
- (d) A space or spaces of adequate size shall be available on an open deck to which the crew has access when off duty.

10. Lighting

- (a) All crew spaces shall be adequately lighted.
- (b) Berth lights shall be provided for each member of the crew.

11. Heating

- (a) All crew spaces shall be adequately heated in a manner suitable to the purpose of the space.

- (b) The heating system will be considered satisfactory if it is capable of maintaining a minimum temperature of 70°F. under normal operating conditions without undue curtailment of the ventilation.
- (c) Radiators and other heating apparatus shall be so placed, and where necessary shielded, as to avoid risk of fire, danger or discomfort to the occupants. Pipes leading to radiators or heating apparatus shall be insulated where those pipes create a hazard to persons occupying the space.

12. Insect Screens

- (a) Except in such areas as are considered to be insect free, provisions shall be made to protect the crew quarters against the admission of insects. This may be accomplished by the fitting of suitable screens to ventilating skylights, air ports, ventilators, and doors to unscreened spaces and the open deck or by other methods. Insect screens are not required in air conditioned crew quarters for windows, air ports, and doors that are normally kept closed.

13. For all vessels other than tankships contracted for prior to November 19, 1952.

- (a) Vessels of less than 100 gross tons, contracted for prior to November 19, 1952, shall meet the general intent of paragraph and in addition shall meet the following requirements:
 - (1) Existing structure, arrangements, materials, and facilities, previously accepted or approved will be considered satisfactory so long as they are maintained in a suitable condition to the satisfaction of the Surveyor. Minor repairs and alterations may be made to the same standard as the original construction.
- (b) Vessels of 100 gross tons and over, contracted for prior to March 4, 1915, shall meet the requirements of this paragraph.
 - (1) Existing structure, arrangements, materials, and facilities, previously approved will be considered satisfactory so long as they are maintained in good condition to the satisfaction of the Surveyor. Minor repairs and alterations may be made to the same standard as the original construction: *Provided*, that in no case will a greater departure from the standards of paragraphs 2 through 12 be permitted than presently exists.
- (c) Vessels of 100 gross tons and over, contracted for on or after March 4, 1915, but prior to January 1, 1941, shall meet the requirements of this paragraph.
 - (1) Existing structure, arrangements, materials, and facilities, previously approved will be considered satisfactory so long as they are maintained in a suitable condition to the satisfaction of the Surveyor. Minor repairs and alterations may be made to the same standard as the original construction.
 - (2) Where reasonable and practicable, a minimum of one toilet, shower, and washbasin shall be provided for each 10 members of the crew or fraction thereof.
 - (3) Crew spaces shall have a volume of at least 120 cubic feet and a deck area of at least 16 square feet for each person accommodated.

- (4) Each crewmember shall have a separate berth, and berths may not be placed more than two high.
 - (5) Each vessel, which in the ordinary course of its trade makes a voyage of more than three days' duration between ports and which carries a crew of 12 or more persons, shall be provided with a suitable hospital space for the exclusive use of the sick or injured. Berths shall be provided in the ratio of one berth for each twelve members of the crew or fraction thereof, but the number of berths need not exceed six.
 - (6) The crew spaces shall be securely constructed, properly lighted, heated, drained, ventilated, equipped, located, and arranged, and where practicable, shall be insulated from undue noise and effluvia.
- (d) Vessels of 100 gross tons and over, contracted for on or after January 1, 1941, but prior to November 19, 1952, shall meet the requirements of this paragraph.
- (1) Existing structure, arrangements, materials, and facilities, previously approved will be considered satisfactory so long as they are maintained in a suitable condition to the satisfaction of the Surveyor. Minor repairs and alterations may be made to the same standard as the original construction.
 - (2) Washrooms and Toilet Rooms:
 - (i) There shall be a minimum of one toilet, shower, and washbasin for each 8 members of the crew or fraction thereof who are not accommodated in rooms having attached private or semiprivate facilities.
 - (ii) Separate facilities shall be provided for the engine room, deck, or stewards department when the number of crew in that department, exclusive of officers, exceeds 8.
 - (iii) Toilet rooms shall be separate from the wash rooms. At least one washbasin shall be installed in each toilet room.
 - (iv) Toilets shall be provided with seats of the open front type. Urinals may be fitted in toilet rooms, if desired, but no reduction will be made in the required number of toilets.
 - (v) Washbasins, showers, and bath tubs if substituted for showers, shall be equipped with proper plumbing including hot and cold running water.
 - (3) Crew spaces shall have a volume of at least 120 cubic feet and a deck area of at least 16 square feet for each person accommodated.
 - (4) Each crewmember shall have a separate berth, and berths may not be placed more than two high.
 - (5) Each vessel, which in the ordinary course of its trade makes a voyage of more than three days duration between ports and which carries a crew of 12 or more persons, shall

be provided with a suitable hospital space for the exclusive use of the sick or injured. Berths shall be provided in the ratio of one berth for each 12 members of the crew or fraction thereof, but the number of berths need not exceed six.

- (6) The crew spaces shall be securely constructed, properly lighted, heated, drained, ventilated, equipped, located, and arranged, and where practicable, shall be insulated from undue noise and effluvia.

14. Crew accommodations on tankships of less than 100 gross tons and manned tank barges

- (a) The crew accommodations on all tankships of less than 100 gross tons and all manned tank barges must have sufficient size and equipment, and be adequately constructed to provide for the protection of the crew in a manner practicable for the size, facilities, and service of the tank vessel.
- (b) The crew accommodations must be consistent with the principles underlying the requirements for crew accommodations on tankships of 100 gross tons or more.

15. Crew accommodations on tankships constructed before June 15, 1987

All tankships of 100 gross tons and over constructed before June 15, 1987 may retain previously accepted or approved installations and arrangements so long as they are maintained in good condition to the satisfaction of the Surveyor.

2.7 Navigation Safety Requirements

This section applies to all self propelled vessels over 1600 G. T. when operating in the navigable waters of the United States, except the St. Lawrence Seaway.)

Cite: 33 CFR 164.35(g) Navigational Equipment

1. Application
 - (a) The provisions of this section apply to all self propelled vessels over 1600 G.T. when operating in the navigable waters of the United States, except the St. Lawrence Seaway.
2. Maneuvering Information
 - (a) Maneuvering characteristics must be posted prominently on a fact sheet in the wheel house. The requirements for posting maneuvering information are found in 33 CFR 164.35. The maneuvering characteristics are to be representative of both normal load, normal ballast conditions, calm weather (wind 10 kts or less), no current, deep water (at least twice the vessel's draft), and clean hull. At the bottom of the fact sheet the following statement shall be provided: "WARNING" The response of the (name of vessel) may be different from that listed above if any of the following conditions , upon which the maneuvering information is based, are varied:
 1. Calm weather – wind 10 knots or less, calm sea;

2. No current;
3. Water depth twice the vessel's draft or greater;
4. Clean hull; and
5. Intermediate drafts or unusual trim.

(b) The posted characteristics shall consist of the following maneuvers:

- Turning Circle Diagram to both port and starboard.
 - Time, distance, advance, transfer to alter course 90 deg with maximum power settings for either full or half speeds, or full and slow speeds.
- Vessels which have essentially the same turning characteristics to both port, and starboard may substitute a turning circle in one direction only, with a note stating the other direction to be essentially the same.
 - Time and Distance to Stop the vessel from either full and half speeds while maintaining initial heading, and minimum rudder application.
 - Table of Shaft RPM for a representative range of speeds should be provided for a vessel with a fixed pitch propeller.
 - Table of Control Settings for a representative range of speeds for a vessel with a controllable pitch propeller.
 - Table of Effective Speeds for auxiliary maneuvering devices such as bow thrusters. This table should show the range of speeds for which the unit can be used effectively.

(c) Navigation and Vessel Inspection Circular (NVIC) 7-89 calls attention to IMO Resolution A.601(15) "Provision and Display of Maneuvering Information Onboard Ships", adopted 19 November 1987, and MSC/Circ. 389, "Interim Guidelines for Estimating Maneuvering Performance in Ship Design," adopted 10 January 1985. These provide guidance to the owner and operator concerning maneuvering performance estimation and a standardized format for presentation of ship maneuvering information to operating personnel, including pilots.

**Cite: 33 CFR 164.33(2)(i) & Charts and Publications
33 CFR 164.33(3)(ii)**

1. Application

(a) The provisions of this section apply to all self propelled vessels over 1600 G.T. when operating in the navigable waters of the United States, except the St. Lawrence Seaway.

2. Requirements

(a) In addition to the requirements of SOLAS, a vessel must have a current copy of the "U.S. Coast Pilot", and "Tidal Current Tables", published by the National Oceanographic Service. Further detail is provided in 33 CFR 164.33.

Cite: 33 CFR 164.41 Electronic Position Fixing Devices

See Federal Register Vol. 59, No. 56, dated March 23, 1994, page 13757 for additional guidance.

1. Application

- (a) The provisions of this section apply to all self propelled vessels over 1600 G.T. and calling at a port in the United States, including Alaska south of Cape Prince of Wales. Each vessel operated, owned, or bareboat chartered by the United States, State, or Political Subdivision, by a foreign nation, and not engaged in commerce is exempt from this requirement. Requirements for electronic position fixing devices are found in 33 CFR 164.41.

2. Devices

- (a) A Type I or Type II Loran C Receiver meeting Part 2 (Minimum Performance Standards of the Radio Technical Commission for Marine Services (RTCM) Paper 12-78/DOD100. Each receiver installed on or after June 1, 1982 must have a label showing the name and address of the manufacturer, including the following statement: "This receiver was designed and manufactured to meet Part 2 (Minimum Performance Standards) of the RTCM MPS for Loran-C Receiving Equipment."
- (b) A Satellite Navigation Receiver with automatic acquisition of satellite signals, and position updates derived from satellite information.
- (c) A system considered to meet the intent for availability, accuracy, and coverage for the U.S. Confluence Zone (CCZ) contained in U.S. "Federal Radio Navigation Plan" (Report No. DOD-No 4650.4-D or No. DOT-TSC-RSPA-80-16I)

2.8 U.S. Interpretations and Guidance related to the IBC Code

Unless otherwise noted below, DNV is permitted to interpret the expressions “*left to the satisfaction of the Administration,*” or similar expressions given in the Code.

Chapter 1 - General

- 1.1.3 USCG will handle matters relating to carriage conditions of cargoes not listed in the IBC Code.
- 1.3.13 Approved closed cup tests uses the Tagliabu tester.
- 1.4 Generally, USCG acts as the administration for findings of equivalency.
- 1.5 Under this section, Administration means the USCG.

Chapter 2 - Ship survival capability and location of cargo tanks

- 2.2.2 Intact stability shall meet 46 CFR Subchapter S for gas carriers, as given in § 172.165.

- 2.2.3 An Acceptable method for determining free surface effect is contained in the Code on Intact Stability (IMO Res. A.749(18) as amended).
- 2.3.3 The valve shall be to DNV rules.
- 2.8.2 No dispensation for smaller ships will be allowed.
- 2.9.2.3 Residual stability shall not be less than as allowed in 2.9.3.

Chapter 3 - Ship Arrangements

- 3.4.4 Smaller dimensions are not permitted unless authorized by the USCG. Acceptable openings must permit entry with breathing apparatus.
- 3.7.2 Toxic cargoes cannot be unloaded bow or stern unless authorized by the USCG.
- 3.7.3.5 Alternative arrangements must be authorized by the USCG.
- 3.7.4 USCG must authorize relaxations.

Chapter 4 - Cargo containment

- 4.1.3 IACS unified requirements, as implemented in DNV Rules, apply for tank testing.
- 4.1.4 ASME Code Section VIII, Division I and II, applies for pressure vessel design.

Chapter 5 - Cargo transfer

- 5.1.1 Piping standards are listed in 46 CFR 56.60, tables 56.60 - 1(A), 1(B) and 2(A).
- 5.1.3 Flanges, valves and fittings should meet applicable standards of the ASME Code.
- 5.2.1 Relaxations should be authorized by the USCG.
- 5.2.2 Exceptional cases should be authorized by the USCG.
- 5.2.3 See 5.1.1.
- 5.2.4 See 5.1.1.
- 5.2.5 See 5.1.1.
- 5.4 Relaxations should be authorized by the USCG.

Chapter 6 - Materials of construction

6.1.1 Materials must meet IACS Unified Requirements.

Chapter 7 - Cargo temperature control

7.1.1 IACS Unified Requirements apply.

Chapter 8 - Cargo tank vent systems

8.3.4 High velocity vents must be approved in accordance with 46 CFR 162.017 - 6.

8.3.5 Flame arrestors installed on tanks should meet ASTM F - 1273.

Chapter 10 - Electrical installations

- 10.1.5 a. Hazardous location identification and types of equipment and wiring shall be in accordance with chapter 10 of the IBC Code.
 - b. Flammable atmosphere information contained in chapter 17 of the IBC Code shall be used.
 - c. Items requiring certification per chapter 10 of the IBC Code shall be in accordance with either IEC 79 series or UL standards (ref. to 46 CFR 111.105 for specific standards).
- 10.2.3.5 Only intrinsic safe-category a (“ia”), pressurized (“p”), or flameproof (“d”) equipment is allowed.

Chapter 11 - Fire protection and fire extinction

- 11.2.2 Tankers carrying a restricted number of cargoes should not receive relaxations from the general requirements.
- 11.3.2 Note that dry chemical extinguishing agents are not acceptable to the USCG for IBC Code cargo.
- 11.3.7 Reduced monitor capacities for ships less than 4,000 DWT should be referred to USCG.

Chapter 13 - Instrumentation

13.2.3 Exemptions from toxic-vapor detection are only to be authorized by USCG.

Chapter 14 - Personnel protection

14.1.2 Interpretation of the expression “adequate segregation” is left to DNV, subject to USCG oversight.

Chapter 15 - Special requirements

- 15.2.3 With regard to this provision, the USCG retains authority as Administration. This authority is not delegated to any recognized organizations.
- 15.6.3 Only USCG authorizes entry into tanks which have contained MFAK compounds.
- 15.7 USCG only authorizes carriage of molten phosphorous.
- 15.8.11 The U.S. will not consider requests for use of materials listed in this paragraph.
- 15.8.22.2 The refrigeration requirements may not be waived.
- 15.8.25.2 Cargo handling plans are left to DNV, subject to USCG oversight.
- 15.8.26.3 Cargo tank filling limits are left to DNV, subject to USCG oversight.
- 15.8.29 The waterspray to operate automatically in a fire involving the cargo containment system, to have at least two manual actuators, and to have an application rate of 10.5 l/m²/min.
- 15.12.1.4 High velocity vents must be approved in accordance with 46 CFR 162.017 - 6.
- 15.14.3 No waivers on refrigeration system will be granted for restricted operation.
- 15.19.7 DNV acts as the administration.

Chapter 16 - Operational requirements

- 16.2.2 USCG will review all cargoes which are mixtures.
- 16.5.1 Samples must be stored in the cargo area.

Chapter 19 - Requirements for ships engaged in the incineration at sea of liquid chemical waste

The provisions of this section do not apply. No vessels will be certificated for incineration at sea.

Chapter 20 - Transportation of Liquid Chemical Wastes

Transportation of liquid chemical wastes, although not generally permitted, requires USCG authorization in concert with the US EPA.

2.9 U.S. Interpretations and Guidance related to the IGC Code

Unless otherwise noted below, DNV is permitted to interpret the expressions “*left to the satisfaction of the Administration*” or similar terms given in the Code.

Chapter 1 - General

- 1.1.6 USCG acts only as a port Administration for this requirement.
- 1.4 USCG acts as Administration for this section.
- 1.5 USCG acts as Administration for this section.

Chapter 2 - Ship survival capacity and location of cargo tanks

- 2.2.2 Intact stability shall meet 46 CFR subchapter S, as given in CFR 172.165.
- 2.2.3 An acceptable method for determining free surface effect is contained in the Code on Intact Stability (IMO Res. A.749(18) as amended).
- 2.9.1.3 Residual stability should not be less than the requirement in 2.9.2.1.

Chapter 3 - Ship arrangements

- 3.1.1 Machinery spaces forward of the cargo area are not normally permitted.
- 3.3.1.1 Relaxation of the pump or compressor room location requirement is not permitted.
- 3.5.3.2 Relaxation of the access dimensions is not permitted.
- 3.8.1.1 Bow and stern loading is not permitted for toxic products.
- 3.8.4 Relaxation of this section’s requirements is not permitted.

Chapter 4 - Cargo containment

- 4.1 Cargo containment systems not previously accepted by the USCG will require USCG review.
- 4.2.2.3 See 4.1.
- 4.2.4.2 Recognized standards are DNV rules. (*Sec. 1 D 501 and Sec. 5 E 100-300*)
- 4.2.4.4 Type C tanks may only be allocated to type B.
- 4.2.5.4 Internal insulation tanks shall not have a design vapor pressure greater than 0.7 bar.

- 4.2.6.4 Higher vapor pressures in port are not allowed.
- 4.2.7 Provisions to cover lower temperature prevention are covered in Chapter 13.
- 4.3.2.1 Equivalent calculation procedures must be submitted to USCG.
- 4.3.4.3 Simplified loading spectra shall not be used.
- 4.3.4.5 No special consideration shall be given for restricted service.
- 4.4.1 Integral tanks are to meet DNV rule requirements. *(Sec. 5 B)*
- 4.4.2.5 The DNV Nauticus programs shall be used for structural analysis, and the DNV rule requirements for recognized standards. *(Sec. 5 C.)*
- 4.4.4.1 DNV rules will be used for recognized standard. *(Sec. 5 E)*
- 4.4.4.2 DNV rules will be used for recognized standard. *(Sec. 5 E)*
- 4.4.5.5 Model tests will normally be required.
- 4.4.6 ASME Boiler and Pressure Vessel Code will be used as the acceptable standard, except as required otherwise.
- 4.4.7.2.1 Nauticus will be used for structural analysis. *(Sec. 5 J)*
- 4.4.7.2.3 DNV rules are the recognized standards. *(Sec. 5 J 203)*
- 4.4.7.3 See 4.1.
- 4.5.1.1 DNV rules are recognized standards. *(Sec. 5 B)*
- 4.5.1.3 Acceptable stresses are those which agree with DNV rules. *(Sec. 5 E 100-300)*
- 4.5.1.4 The value of “A” shall be 4.0 for all materials.
- 4.5.1.7.2 Special consideration of improved tensile and yield properties must be demonstrated to the USCG.
- 4.5.1.10 Unspecified materials must be reviewed by USCG.
- 4.5.2.1 Corrosion allowances will be required for tanks that are not surrounded by inert gas or dry air or for corrosive cargoes. The USCG will provide the values for these allowances upon request.
- 4.7.3 Semi-membrane tanks shall have a full secondary barrier.
- 4.7.7 Either a pressure/vacuum test or a visual test shall be specified.

- 4.8.1 For vessels that intend to trade to Alaska, lower ambients are required, as given in 46 CFR 154.176.
- 4.8.4.4 In general, hull heating systems are not acceptable.
- 4.9.1 Recognized standards are DNV rules, but vessels trading to the US should have crack arresting steels specified by USCG.
- 4.9.8 Quality control of insulation is delegated, subject to USCG oversight.
- 4.10.1.2.1 Alternative edge penetrations are generally not permitted.
- 4.10.1.2.2 The ASME Code is the acceptable standard, other standards require USCG approval.
- 4.10.2 USCG should be contacted regarding workmanship. In general tolerances should be half of the ASME Code.
- 4.10.5.2 Sampling tests shall be according to DNV rules. *(Sec. 5 L)*
- 4.10.6 Testing of integral tanks shall be according to DNV rules. *(Sec.5 N 100)*
- 4.10.8.1 Recognized standards are the DNV rules. *(Sec.5 N 400)*
- 4.10.8.2 Recognized standards are the DNV rules. *(Sec.5 N 402)*
- 4.10.8.3 DNV tank testing rules are satisfactory to USCG. *(Sec.5 N 403)*
- 4.10.9 ASME Code is the standard acceptable.
- 4.10.10.3.4 Hydropneumatic testing is not acceptable.
- 4.10.10.3.5 Higher stresses are not acceptable.
- 4.10.12 See note concerning 4.7.7.
- 4.10.13 Tanks constructed to the ASME Code do not need stress level confirmation.
- 4.11.1 Soaking should be according to the ASME Code.
- 4.11.2 Stress relief shall comply with the ASME Code.
- 4.11.2.14 Mechanical stress relief methods must be approved beforehand by USCG.

Chapter 5 - Process pressure vessels and liquid, vapor, and pressure piping systems

- 5.1.2 Process pressure vessels shall meet the ASME Code.
- 5.2.2.1 The piping standard shall be as required by 46 CFR Chapter I, Subchapter F.

- 5.3.2.1 No higher or lower temperature may be specified.
- 5.3.2.2 As 5.3.2.1.
- 5.2.4.4 No lower design pressure may be accepted.
- 5.2.4.5 Flanges not complying with a standard must comply with ASME B16.5.
- 5.2.5 Stress analysis is delegated to DNV, subject to oversight by USCG.
- 5.3.2.2.2 In general, pressure tests need not be performed at the design temperature.
- 5.3.2.2.5 Performance of tests may not be waived.
- 5.4.2.3 Screwed couplings are also to comply with 46 CFR 56.30 - 20, as applicable.
- 5.4.3.2 Flanges must comply with ASME B16.5.
- 5.4.4 Alternative piping arrangements require USCG approval.
- 5.4.6.2 Thermal stress relieving may not be waived.
- 5.4.6.3.1 Radiography may not be reduced.
- 5.5.1 No relaxations are permitted.
- 5.5.2 Alternative fluids must be liquids that have a flashpoint greater than 125 °F.

Chapter 6 - Materials of construction

- 6.1.3 Recognized standards are DNV rules. *(Sec. 2 with due reference to Part 2)*
- 6.1.4.1 A Charpy V-Notch test is required.
- 6.1.4.2 Other tests may not be substituted for the Charpy V-Notch test.
- 6.1.5 Material properties must meet DNV rules. *(Sec. 2 with due reference to Part 2)*
- 6.1.7 Alternative chemical properties are not acceptable.
- Table 6.1 (Footnotes) No special approval is permitted.
- Table 6.2 (Footnotes) No special agreement or approval is permitted.
- Table 6.3 (Footnotes) No special approval is permitted.
- Table 6.4 (Footnotes) No special approval is permitted.

- 6.3.1 Testing may not be omitted.
- 6.3.2 Welding consumables shall meet DNV rules for type A tanks. DNV approval of welding consumables may be applied for type B tanks. However, for type B tanks, welding consumables may be stipulated by the USCG as part of the USCG concept review for type B tanks. ASME Code requirements will be applied for type C tank welding consumables. Welding tests may not be waived.
 - 6.3.3.1 Radiography is required.
 - 6.3.3.2.2 Transverse bend tests are at the discretion of DNV.
 - 6.3.3.2.4 Requirements for these tests are left to the discretion of DNV.
 - 6.3.4.2 No special agreement is permitted.
 - 6.3.4.3 Recognized standards for this section will be individually reviewed.
- 6.3.5 Test requirements should be in accordance with 6.3.4.
 - 6.3.6.1 A reduction in test for secondary barrier is not acceptable.
 - 6.3.6.2.2 USCG will consider alternatives to the energy requirements on a case by case basis.
 - 6.3.6.3 USCG will consider alternatives to the energy requirements on a case by case basis.
 - 6.3.6.4 Integral and membrane tests must be inspected according to USCG approved standards from the manufacturer.
 - 6.3.7.1.2 Tank examination will be as approved by USCG for the tank designed.
 - 6.3.7.1.3 DNV rules shall be the recognized standards, except that for membrane tanks the USCG accepted manufacturer's procedures shall be used.
 - 6.3.7.3 See note for 6.3.7.1.3.

Chapter 7 - Cargo pressure/temperature control

- 7.1.1 Design of cargo pressure and temperature control must contain cargo for 21 days, and cargo venting cannot be used to control tank pressure while in US ports.
- 7.1.2 Special design ambient temperatures apply for Alaskan waters, as given in 46 CFR 154.176.

Chapter 8 - Cargo tank vent systems

- 8.2.2 Pressure/vacuum relief is delegated to DNV, subject to USCG oversight.

- 8.2.5 DNV is an acceptable authority.
- 8.2.7 Changing of relief valve settings will be overseen by an agent of DNV.
- 8.2.10 No relaxation of this requirement is accepted for ships less than 90 m.
- 8.4.2.3 Other vacuum relief systems must be accepted by USCG.
- 8.5.2 Approval for $F = 0.5$ is delegated to DNV, subject to USCG oversight.

Chapter 9 - Environmental control

- 9.5.2 A check valve is an acceptable means.

Chapter 10 - Electrical installations

The National Electric Code, NFPA 70, shall be applied.

Chapter 11 - Fire protection and fire extinction

- 11.3.4 When the fire pumps are used to supply the water spray system, the fire main must still be able to operate at full capacity.
- 11.4.3 DNV is delegated to accept standards for ships with capacity less than 1,000 m³.
- 11.4.4 Suitable alternatives will be considered by USCG.
- 11.5.2 Relaxations are not permitted for ships carrying a restricted number of cargoes.

Chapter 13 - Instrumentation (gauging , gas detection)

- 13.1.4 Testing intervals are delegated to DNV, subject to USCG oversight. Vessels in US ports should be able to demonstrate that the instruments function, and in the case of gas detection that they are properly calibrated.
- 13.2.4 Gauge glasses need USCG approval, but are generally not acceptable.
- 13.3.1 Sensors required for automatic closing of the shut-off valve for overflow controls as specified by 13.2.1, must be independent of each other, however, the sensors may send signals to the same actuator. USCG should be contacted in the case that it is the port authority.
- 13.5.4 Temperature sensors should be at the bottom of the tank and near the top of the tank, below the maximum filling level.
- 13.6.1 Gas detection is delegated to DNV, subject to USCG oversight.

- 13.6.11 Other limits are not acceptable.
- 13.6.13 Portable gas detectors should meet the thresholds specified by OSHA.

Chapter 14 - Personnel protection

- 14.2.4 The provisions of this paragraph are not acceptable.
- 14.4.5 This requirement is delegated to DNV, subject to USCG oversight.

Chapter 15 - Filling limits for cargo tanks

- 15.1.3 Higher filling limits are permitted.
- 15.2 The approval of this list is delegated without restriction.

Chapter 16 - Use of cargo as fuel

- 16.5.2 This requirement is delegated to DNV, subject to USCG oversight.
- 16.5.6 This requirement is delegated to DNV, subject to USCG oversight.
- 16.6 This requirement is delegated to DNV, subject to USCG oversight.

Chapter 17 - Special requirements

- 17.14 Chlorine may not be carried in US waters.
- 17.18.3 Other compositions require USCG approval.
- 17.19 Nitrogen cargo carriage requires special USCG approval.
- 17.20.3.1 Only steel or stainless steel are acceptable.
- 17.20.13.2 The approval of handling plans is delegated to DNV.
- 17.20.14 The approval of filling limits is delegated to DNV.

3. Issuance of Certificates

Details of the procedural arrangements are given in the DNV Survey Procedures Manual. DNV will issue certificates as authorized, on a format which has been reviewed and approved by the USCG.

4. Maintenance of Records

Copies of all approved plans and documents, survey reports and associated records, together with copies of certificates issued in relation to the tonnage, load line, SOLAS and oil pollution prevention aspects of United States registered ships are to be forwarded to the DNV Regional Office (Maritime Industries) in the United States.