ADDENDUM TO ANNEX

To the

Memorandum of Agreement

between the
United States Coast Guard
and
Germanischer Lloyd, AG

SUPPLEMENTAL REQUIREMENTS

CONTENTS **PAGE**

1. Introduction

The supplemental requirements given in this document are those of the United States Coast Guard (USCG) which are contained in Title 46 of the Code of Federal Regulations but not covered by applicable Germanischer Lloyd‘s Rules and Guidelines for the Classification and Construction of Seagoing Ships or international conventions.

This supplement is applicable to U.S. Flag newbuildings or existing vessels that are enrolled in the ACP, classed by GL, issued with or intended to be issued with the following international certificates:

- International Tonnage certificate
- International Load Line certificate
- Cargo Ship Safety Construction Certificate
- Cargo Ship Safety Equipment Certificate
- International Oil Pollution Prevention (IOPP) Certificate
- ISM Code: Safety Management Certificate (SMC) and Document of Compliance (DOC)

Germanischer Lloyd may also issue the Document of Compliance for ships carrying dangerous goods enrolled in Safety of Life at Sea, 1974, as amended, regulation II-1/19, to vessels to which it is applicable.

Compliance with these requirements, as applicable to ship type and size, is to be verified during plan review and survey of GL classed ships registered or intended to be registered in the United States of America. The requirements for U.S. Flag vessels under the ACP are the sum of International Convention associated with the certificates listed above + this Addendum as applicable + Germanischer Lloyd's Rules and Guidelines for the Classification and Construction of Seagoing Ships as listed below:

I - Ship Technology, Part 0 - Classification and Surveys, 2007

I - Ship Technology, Part 1:

- Chapter 1 - Hull Structures, 2007
- Chapter 2 - Machinery Installations, 2006
- Chapter 3 - Electrical Installations, 2007
- Chapter 4 - Automation, 2007
- Chapter 21 - Ventilation, 2005

II - Materials and Welding:

Part 1 - Metallic Materials:

- Chapter 1 - Principles and Test Procedures, 2005
- Chapter 2 - Steel and Iron Materials, 2005

Part 3 - Welding:

- Chapter 1 - General requirements, Proof of Qualifications, Approvals, 2000
- Chapter 2 - Design, Fabrication and Inspection of Welded Joints, 2000
- Chapter 3 - Welding in the Various Fields of Application, 2000

V - Analysis Techniques, Part 1 - Strength and Stability:

• Chapter 1 - Guidelines for Strength Analyses of Ship Structures with the Finite Element Method, 2001

• Chapter 2 - Guidelines for Fatigue Strength Analyses of Ship Structures, 2004

• Chapter 3 - Guidelines for the Preparation of Damage Stability Calculations and Damage Control Documentation on Board, 2003

IACS Common Structural Rules and Complementary Rules of Germanischer Lloyd:

Bulk Carriers:

• IACS Common Structural Rules, January 2006

• IACS Corrigenda 1, May 2006

• IACS Corrigenda 2, January 2007

• GL Complementary Rules, 2007

Double Hull Oil Tankers:

• IACS Common Structural Rules, January 2006

• IACS Corrigenda 1, April 2006

• IACS Corrigenda 2, July 2006

• IACS Rule Change Notice No. 1, September 2006

• GL Complementary Rules, 2007

Based on GL's reports of inspections that a vessel complies with the applicable requirements, a U.S. Coast Guard Officer in Charge, Marine Inspection (OCMI) may issue a Certificate of Inspection (COI) under 46 CFR Chapter I, Subchapter D (Tank Vessels), Subchapter H (Passenger Vessels) or Subchapter I (Cargo and Miscellaneous Vessels), as appropriate.

The Process for enrollment of a vessel into ACP is given in the USCG Navigation and Vessel Inspection Circular (NVIC) NO. 2-95 Change-2 of May 05, 2006. If an owner wants to enroll his vessel in the ACP a meeting should be arranged between owner representative, GL, USCG and possibly also shipyard. The vessel owner MUST provide a list of vessel plans to the Marine Safety Center PRIOR to ACP enrollment.

Where access to the U.S. Code of Federal Regulations (CFR) is needed, the following internet URL may be used: *http://www.gpoaccess.gov/cfr/index.html*.

2. Supplemental Requirements

2.1 Tonnage

There are no supplemental requirements.

2.2 Load Line

In reference to regulation 10, 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 must comply with the requirements and recommendations of the Code on Intact Stability.

The following documents set forth specific USCG policies and practices where the ICLL leaves certain details to the satisfaction of the Administration:

(1) "Load Line Technical Manual"
(posted on the USCG website at http://www.uscg.mil/hq/g-m/mse/mse2-LLTM.htm)
The *Load Line Technical Manual* integrates USCG load line regulations and policies, ABS and IACS interpretations, IMO circulars, and the ICLL into a single reference document, published in 1990.

(2) "Load Line Policy Notes"
(posted on USCG website at http://www.uscg.mil/hq/g-m/mse/mse2-LLPN.htm)
The *Load Line Policy Notes* supplement the *LL Technical Manual* by updating all load line interpretations and policies implemented since 1990.

Please observe that USCG requires the more stringent ISO Standard 16155 – see table below.

Hull Form Dependent	MSC.1/Circ. 1229	ISO Standard 16155
Displacement	2%	0.35%
LCB, from AP	1% / 5cm max	0.2% / 5cm max
Transverse metacentric height	1% / 5cm max	0.2% / 5cm max

2.3 SOLAS - Safety Construction

The following supplemental requirements are relevant to the issue of a Cargo Ship Safety Construction Certificate by GL are given using the appropriate Code of Federal Regulations citation (46CFR ...).

46CFR ...	**Supplemental Requirement**
SUBCHAPTER D – TANK VESSELS	
32.20-5	Pressure vacuum relief valves shall be of a type approved by the USCG under 46CFR162.017. Pressure vacuum relief valves, determined by GL to be equivalent to a valve designed to meet the requirements of 46CFR162.017, may be submitted to the Coast Guard for acceptance on a case by case basis. Pressure-vacuum relief valves designed to the requirements of ISO 15364 are considered to meet the requirements of 46 CFR 162.017, and may also be submitted for acceptance.
32.50-3	The use of compressed air as the primary means of discharging cargo from gravity type cargo tanks vented at gauge pressures of 4 pounds per square inch or less is prohibited.
32.50-30	Cargo hoses on tank vessels must be suitable for oil service and designed to withstand the pressure of the shutoff head of the cargo pump or pump relief valve setting, less static head, but in no case less than 150 pounds per square inch.
32.55-15	Hold spaces containing independent cargo tanks shall be considered to be equivalent to cargo pump rooms and shall be ventilated and safeguarded as such.
32.55-20	The diameter of a vent shall not be less than 2 1/2 inches.
32.55-25	The diameter of a vent shall be not less than 2 1/2 inches.
32.55-45	Cofferdams and void spaces shall be provided with gooseneck vents fitted with a flame screen or pressure-vacuum relief valves. The diameter of a vent shall be not less than 2 1 /2 inches.

46CFR ...	Supplemental Requirement
SUBCHAPTER F – MARINE ENGINEERING	
52.01-2	Main power boilers and auxiliary boilers shall be designed, constructed, inspected, tested and stamped in accordance with section I of the ASME (American Society of Mechanical Engineers) Code, as limited, modified, or replaced by specific requirements in the 46 CFR.
52.01-10	(a) Each main boiler must meet the special requirements for automatic safety controls in Sec. 62.35-20(a)(1) of this chapter. (b) Each automatically controlled auxiliary boiler having a heat input rating of less than 12,500,000 BTU/hr (3.66 megawatts) must meet the requirements of 46 CFR part 63. (c) Each automatically controlled auxiliary boiler having a heat input rating of 12,500,000 BTU/hr (3.66 megawatts) or above must meet the requirements of 46 CFR part 62.
52.01-50	All shell type steam boilers with a maximum allowable working pressure exceeding 2.06 bar, if fired with solid fuels not in suspension or if not equipped for unattended waterbed operation, have to be equipped with fusible plugs in accordance with this regulation, modifying ASME Code, Section I, Appendices A19 through A21. All boilers, except watertube boilers, with a maximum allowable working pressure exceeding 2.06 bar, if fired with solid fuels not in suspension or if not equipped for unattended waterbed operation, have to be equipped with fusible plugs in accordance with this regulation, modifying ASME Code, Section I, Appendices A19 through A21.
52.01-120	Boiler safety valves must be as indicated in PG-67 through PG-73 of the ASME Code except as noted otherwise in this section. Safety valves must have full-lift characteristic. For propulsion boilers and superheaters the nominal diameter of safety valve inlet opening has to be between 38 mm and 102 mm (up to 114 mm for replacement on existing boilers only). For auxiliary boilers the nominal diameter of safety valve inlet opening has to be between 19 mm and 102 mm. Safety valves must not have threaded inlets larger than 51 mm in diameter. Safety valves must be capable of being operated from the boiler room or engine room floor via a lifting gear.
53.01-3	Heating boilers are to be designed, constructed, inspected, tested and stamped in accordance with section IV of the ASME Code except as noted otherwise in this part.
53.05	For pressure relieving devices of heating boilers ASME Code, Section IV, HG-400 and HG-401 are to be applied except as noted otherwise in 46CFR53.01-1 through 53.05-5.
54.01-2	Pressure vessels are to be designed, constructed, and inspected in accordance

	with Division 1 of Section VIII of the ASME Code except as noted otherwise in 46 CFR Part 54.01-2. Pressure vessels, determined by GL to be equivalent to those designed to meet the requirements of 46 CFR 54.01-2, may be submitted to the Coast Guard for acceptance on a case by case basis.
54.10-10	The hydrostatic test pressure shall be at least one and three –tenths (1.30) times the maximum allowable working pressure stamped on the pressure vessel, multiplied by the ratio of the stress value at the test temperature to the stress value at the design temperature for the materials of which the vessel is constructed.
54.10-15	The pneumatic test pressure shall be at least one and one-tenth (1.10) times the maximum allowable working pressure to be stamped on the vessel multiplied by the lowest ratio (for the materials of which the vessel is constructed) of the stress value for the test temperature of the vessel to the stress value at the design temperature.
54.15	All pressure vessels built in accordance with applicable requirements in Division 1 of section VIII of the ASME Code must be provided with protective devices as indicated in UG-125 through UG-136 except as noted otherwise in 46 CFR subpart 54.15.
56.50-50	The calculation of the internal diameter of bilge suction piping shall be in accordance with this regulation.
56.50-55	For Multi hull vessels 2 bilge pumps are required for each hull. The capacity of the independent bilge pumps shall be such to develop a suction velocity of not less that 400 feet per minute through a size of pipe required by 46 CFR 56.50-50(d)(1).
61.05	Inspections and tests of boilers are to be conducted in accordance with the requirements of 46 CFR Sections 61.05-1 through 61.05-20.
61.10-5	Each pressure vessel, other than one exempted by 46CFR61.10-5, must be subjected to a hydrostatic test at a pressure of 1¼ times the maximum allowable working pressure twice within any five-year period, except that no more than three years may elapse between any test and its immediate predecessor.
61.15-5	Steam pipes subject to pressure from main boilers are required to be hydrostatically pressure tested in accordance with this regulation.
61.15-10	Leak tests shall be performed as prescribed in this regulation.
61.15-12	(a) Non-metallic expansion joints are to be inspected as required by this regulation. (b) A nonmetallic expansion joint must be replaced 10 years after it has been placed into service if it is located in a system which penetrates the side of the vessel and both the penetration and the nonmetallic expansion joint are located below the deepest load waterline. The Officer in Charge, Marine Inspection may grant an extension of the ten year replacement to coincide with the vessel's next drydocking.
61.20-17(e)	(e) Tailshafts with oil lubricated bearings, including bearings lubricated with a substance considered to be equivalent to oil under the provisions of paragraph (a) of this section, need not be drawn for examination-- (1) If tailshaft bearing clearance readings are taken whenever the vessel

	undergoes a drydock examination or underwater survey; (2) If the inboard seal assemblies are examined whenever the vessel undergoes a drydock examination or underwater survey; (3) If an analysis of the tailshaft bearing lubricant is performed semiannually in accordance with the lubrication system manufacturer's recommendations to determine bearing material content or the presence of other contaminants; and (4) If; (i) For tailshafts with a taper, the propeller is removed and the taper and the keyway (if fitted) are nondestructively tested at intervals not to exceed 5 years; or (ii) For tailshafts with a propeller fitted to the shaft by means of a coupling flange, the propeller coupling bolts and flange radius are nondestructively tested whenever they are removed or made accessible in connection with overhaul or repairs.
61.20-18(c)	(c) On tailshafts with a propeller fitted to the shaft by means of a coupling flange, the flange, the fillet at the propeller end, and each coupling bolt must be nondestructively tested in addition to a visual inspection of the entire shaft.
61.40-3	Design Verification Testing of Vital System Automation (a) Tests must verify that automated vital systems are designed, constructed, and operate in accordance with all applicable requirements of part 62 of this subchapter. The tests must be based upon the failure analysis, if required by Sec. 62.20-3(b) of this subchapter, functional performance requirements, and the Periodic Safety tests of Sec. 61.40-6. (b) Tests must be performed immediately after the installation of the automated equipment or before the issuance of the initial Certificate of Inspection.
62.10-1	Boiler low-low water level is the minimum safe level in the boiler, in no case lower than that visible in the gage glass. Engineering Control Center (ECC) means the centralized engineering control, monitoring, and communications location. Failsafe means that upon failure or malfunction of a component, subsystem, or system, the output automatically reverts to a pre-determined design state of least critical consequence. Typical failsafe states are listed in Table 62.10-1(a). Table 62.10-1(a)--Typical Failsafe States --- **2.1 System or component** — **Preferred failsafe state** --- Cooling water valve — As is or open. Alarm system — Annunciate. Safety system — Shut down, limited, or as is & Alarm. Burner valve — Closed. Propulsion speed control — As is.

	Feedwater valve	As is or open.
	Controllable pitch propeller	As is.
	Propulsion safety trip	As is & alarm.
	Fuel tank valve	See 46CFR56.50-60(d).

62.20-1(a)(7)	Plans for approval. (a) The following plans must be submitted to the Coast Guard for approval in accordance with Sec. 50.20-5 and Sec. 50.20-10 of this chapter: (7) Design Verification and Periodic Safety test procedures described in subpart 61.40 of this chapter.	
62.20-3	(a) The following plans are to be submitted for evaluation of automated systems designed to reduce crew requirements: (1) Proposed manning, crew organization and utilization, including routine maintenance, all operational evolutions, and emergencies to be submitted. (2) A planned maintenance program for all vital systems. (b) One copy of a qualitative failure analysis must be submitted in accordance with Sec. 50.20-5 of this chapter for the following: (1) Propulsion controls. (2) Microprocessor-based system hardware. (3) Safety controls. (4) Automated electric power management. (5) Automation required to be independent that is not physically separate. (6) Any other automation that, in the judgment of the Commandant, potentially constitutes a safety hazard to the vessel or personnel in case of failure.	
62.25-20(d)	(d) (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.	
62.25-25	(c) If a microprocessor-based or computer-based system serves both vital and non-vital systems, hardware and software priorities must favor the vital systems. (d) At least one copy of all required manuals, records, and instructions for automatic or remote control or monitoring systems required to be aboard the vessel must not be stored in electronic or magnetic memory.	
62.30-1	(a) The failsafe state must be evaluated for each subsystem, system, or vessel to determine the least critical consequence. (b) All automatic control, remote control, safety control, and alarm systems must be failsafe.	
62.35-5(e)	Remote propulsion control systems (1) Each operator control device must have a detent at the zero thrust posi-	

	tion.
62.35-15(a)	(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.
62.35-20	(a) General. (1) All main boilers, regardless of intended mode of operation, must be provided with the automatic safety trip control system(s) of subparagraphs (h)(1), (h)(2)(i), (h)(2) (ii), and (i) of this paragraph to prevent unsafe conditions after light off. (2) Manual alternate control of boilers must be located at the boiler front. (3) A fully automatic main boiler must include-- (i) Automatic combustion control; (ii) Programming control; (iii) Automatic feedwater control; (iv) Safety controls; and (v) An alarm system. (4) Following system line-up and starting of auxiliaries, fully automatic main boilers must only require the operator to initiate the following sequences: (i) Boiler pre-purge. (ii) Trial for ignition of burners subsequent to successful initial burner light-off. (iii) Normal shutdown. (iv) Manual safety trip control operation. (v) Adjustment of primary control setpoints. (5) All requirements for programming control subsystems and safety control systems must be met when a boiler-- (i) Automatically sequences burners; (ii) Is operated from a location remote from the boiler front; or (iii) Is fully automatic. (6) Where light oil pilots are used, the programming control and burner safety trip controls must be provided for the light oil system. Trial for ignition must not exceed 15 seconds and the main burner trial for ignition must not proceed until the pilot flame is proven. (b) Feedwater control. Automatic feedwater control subsystems must sense, at a minimum, boiler water level and steam flow. (c) Combustion control. Automatic combustion control subsystems must provide-- (1) An air/fuel ratio which ensures complete combustion and stable flame with the fuel in use, under light off, steady state, and transient conditions; and (2) Stable boiler steam pressure and outlet temperatures under steady state and transient load conditions; and (3) A low fire interlock to prevent high firing rates and superheater damage during boiler warm up. (d) Programming control. The programming control must provide a programmed sequence of interlocks for the safe ignition and normal shut-

	down of the boiler burners. The programming control must prevent ignition if unsafe conditions exist and must include the following minimum sequence of events and interlocks: (1) Prepurge. Boilers must undergo a continuous purge of the combustion chamber and convecting spaces to make sure of a minimum of 5 changes of air. The purge must not be less than 15 seconds in duration, and must occur immediately prior to the trial for ignition of the initial burner of a boiler. All registers and dampers must be open and an airflow of at least 25 percent of the full load volumetric airflow must be proven before the purge period commences. The prepurge must be complete before trial for ignition of the initial burner. Note: A pre-purge is not required immediately after a complete post-purge. (2) Trial for ignition and ignition. (i) Only one burner per boiler is to be in trial for ignition at any time. (ii) Total boiler airflow during light off must be sufficient to prevent pocketing and explosive accumulations of combustible gases. (iii) The burner igniter must be in position and proven energized before admission of fuel to the boiler. The igniter must remain energized until the burner flame is established and stable, or until the trial for ignition period ends. (iv) The trial for ignition period must be as short as practical for the specific installation, but must not exceed 15 seconds. (v) Failure of the burner to ignite during a trial for ignition must automatically actuate the burner safety trip controls. (3) Post-purge. (i) Immediately after normal shutdown of the boiler, an automatic purge of the boiler equal to the volume and duration of the prepurge must occur. (ii) Following boiler safety trip control operation, the airflow to the boiler must not automatically increase. Post purge in such cases must be under manual control. (e) Burner fuel oil valves. Each burner must be provided with a valve that is-- (1) Automatically closed by the burner or boiler safety trip control system; and (2) Operated by the programming control or combustion control subsystems, as applicable. (f) Master fuel oil valves. Each boiler must be provided with a master fuel oil valve to stop fuel to the boiler automatically upon actuation by the boiler safety trip control system. (g) Valve closure time. The valves described in subparagraphs (e) and (f) of this paragraph must close within 4 seconds of automatic detection of unsafe trip conditions. (h) Burner safety trip control system. (1) Each burner must be provided with at least one flame detector. (2) The burner valve must automatically close when— (i) Loss of burner flame occurs; (ii) Actuated by the boiler safety trip control system;

	(iii) The burner is not properly seated or in place; or (iv) Trial for ignition fails, if a programming control is provided. (i) Boiler safety trip control system. (1) Each boiler must be provided with a safety trip control system that automatically closes the master and all burner fuel oil valves upon-- (i) Boiler low-low water level; (ii) Inadequate boiler air flow to support complete combustion; (iii) Loss of boiler control power; (iv) Manual safety trip operation; or (v) Loss of flame at all burners. (2) The low-low water level safety trip control must account for normal vessel motions and operating transients.
62.35-50(a)	(a) The minimum instrumentation, alarms and safety controls required for specific types of systems are listed in Table 62.35-50.
62.50-1(b)	(b) Coast Guard acceptance of automated systems to replace specific personnel or to reduce overall crew requirements is predicated upon-- (1) The capabilities of the automated systems; (2) The combination of the personnel, equipment, and systems necessary to ensure the safety of the vessel, personnel, and environment in all sailing conditions, including maneuvering; (3) The ability of the crew to perform all operational evolutions, including emergencies such as fire or control or monitoring system failure; (4) A planned maintenance program including routine maintenance, inspection, and testing to ensure the continued safe operation of the vessel; and (5) The automated system's demonstrated reliability during an initial trial period, and its continuing reliability. Note: The cognizant Officer in Charge, Marine Inspection, (OCMI) also determines the need for more or less equipment depending on the vessel characteristics, route, or trade.
62.50-30	(h) Fire control station. A control station for fire protection of the machinery spaces must be provided outside the machinery spaces. At least one access to this station must be independent of category A machinery spaces, and any boundary shared with these spaces must have an A-60 fire classification as defined in Sec. 72.05 of this chapter. Except where such an arrangement is not possible, control and monitoring cables and piping for the station must not adjoin or penetrate the boundaries of a category A machinery space, uptakes, or casings. The fire control station must include-- (1) Annunciation of which machinery space is on fire; (2) Control of a fire pump required by this chapter to be independent of the main machinery spaces; (3) Controls for machinery space fixed gas fire extinguishing systems; (4) Control of oil piping positive shutoff valves located in the machinery spaces and required by CFR 56.50-60(d); (5) Controls for machinery space fire door holding and release systems, skylights and similar openings; (6) The remote stopping systems for the machinery listed in CFR111.103 of this chapter; and

	(7) Voice communications with the bridge. (j) Maintenance program. The maintenance program of 46CFR62.50-20(h) must include a checkoff list to make sure that routine daily maintenance has been performed, fire and flooding hazards have been minimized, and plant status is suitable for unattended operation. Completion of this checkoff list must be logged before leaving the plant unattended. (k) Continuity of electrical power. The electrical plant must meet sections 41.75.1 and 41.75.3 of the American Bureau of Shipping's ``Rules for Building and Classing Steel Vessels'' and must-- (1) Not use the emergency generator for this purpose; (2) Restore power in not more than 30 seconds; and (3) Account for loads permitted by Sec. 111.70-3(f) of this chapter to automatically restart.

46CFR ...	Supplemental Requirement
SUBCHAPTER I – CARGO AND MISCELLANEOUS VESSELS	
92.07-1	Structural Fire Protection, Application (a) The provisions of this subpart, with the exception of Sec. 92.07-90, shall apply to all vessels of 4,000 gross tons and over contracted for on or after January 1, 1962. Such vessels contracted for prior to January 1, 1962, shall meet the requirements of Sec. 92.07-90(a). (b) The provisions of this subpart, with the exception of Sec. 92.07-90, shall apply to all industrial vessels of 300 gross tons and over but less than 4,000 gross tons, contracted for on or after July 1, 1968, which carry in excess of 12 industrial personnel. Such vessels contracted for prior to July 1, 1968, shall meet the requirements of Sec. 92.07-90(b). (c) SOLAS-certificated vessels complying with method IC, as described in SOLAS 74, regulation II-2/42, may be considered equivalent to the provisions of this subpart.
92.15-10	(a) Except as noted in subparagraph (c) of this paragraph, all enclosed spaces within the vessel shall be properly vented or ventilated. Means shall be provided to close off all vents and ventilators. (c) On unmanned cargo barges not fitted with a fixed bilge system, vents and ventilators may be omitted from void spaces.
92.15-15	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, skylights, 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.
98.30-3	Requirement applies to the transfer of flammable, combustible and other hazardous liquids to or from portable tanks on ships. GL does normally not accept such arrangements. However, exemptions have been granted, e.g. for helicopter fuel oil. In such cases portable tanks are required to be IMDG certified. This covers the CFR requirements except for annual inspection of pressure/ vacuum devices.

46CFR ...	Supplemental Requirement
SUBCHAPTER J – ELECTRICAL ENGINEERING	
111.12-1	(b) Each generator prime mover must have an overspeed device that is independent of the normal operating governor and adjusted so that the speed cannot exceed the maximum rated speed by more than 15 percent. (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.
111.12-7	A separate *(voltage)* regulator is to be supplied for each AC generator. *Shunt or Stabilized Shunt-wound (DC) Generator.* When the voltage has been set at full-load to its rated value, the removal of the load is not to cause a permanent increase of the voltage greater than 15% of the rated voltage. When the voltage has been set either at full-load or at no-load, the voltage obtained at any value of the load is not to exceed the no-load voltage. *Compound-wound (DC) Generator.* Compound-wound generators are to be so designed in relation to the governing characteristics of prime mover, that with the generator at full-load operating temperature and starting at 20% load with voltage within 1% of rated voltage, it gives at full-load a voltage within 1.5% of rated voltage. The average of ascending and descending voltage regulation curves between 20% load and full-load is not to vary more than 3% from rated voltage. *Automatic Voltage Regulators.* Ship's service *(DC)* generators which are of shunt type are to be provided with automatic voltage regulators. However, if the load fluctuation does not interfere with the operation of essential auxiliaries, shunt-wound generators without voltage regulators or stabilized shunt-wound machines may be used. Automatic voltage regulators will not be required for the ship's service generators of approximately flat-compounded type. Automatic voltage regulators are to be provided for all service generators driven by variable speed engines used also for propulsion purposes, whether these generators are of the shunt, stabilized shunt or compound-wound type. *Stability.* The *(DC)* generating sets are to be stable in operation at all loads from no-load to full-load. *Load Sharing.* For any load between 20% and 100% of the sum of the rated output (aggregate output) of all *(DC)* generators, the load on any generator is not to differ more than 12% of the rated output in kilowatt of the largest generator or 25% of the rated output in kilowatt of the individual generator in question, whichever is the less, from its proportionate share of the combined load for any steady state condition. The starting point for the determination of the foregoing load-distribution requirements is to be at 75% of the aggregate output with each generator carrying its proportionate share.

	Tripping of Circuit Breaker. D.C. generators which operate in parallel are to be provided with a switch which will trip the generator circuit breaker upon functioning of the overspeed device.
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 overload for a machine with a 2 hour or greater overload rating.
111.12-11(b)	Each ship's service generator and emergency generator must be protected by an individual, tripfree, air circuit breaker.
111.12-13	Electric-coupling control equipment is to be combined with the prime mover speed and reversing control and is to include a two-pole disconnect switch, short-circuit protection only, ammeter for reading coupling current, discharge resistor and interlocking to prevent energizing the coupling when the prime mover control levers are in an inappropriate position.
111.25-15	Each motor must be rated for continuous duty, except a motor for an application listed in Table 111.25-15 or a similar duty must meet the minimum short-time rating stated in the table. Table 111.25-15 --- Application of motor — Minimum short-time rating of motor, in hours --- Deck winch and direct acting capstan..... Half. Deck winch with hydraulic transmission.....Continuous at no load followed by \1/2\ hr. at full load. Direct acting windlass.....One fourth. Windlass with hydraulic transmission.....Half hour idle pump operation, followed by \1/4\ hr. full load operation. Steering gear, direct acting..... One. Steering gear, indirect drive..... Continuous operation at 15 pct. load followed by 1 hr. at full load. Watertight door operators.....\1/12\. Boat winches.....\1/12\.
111.50-3(d)	Parallel overcurrent protective devices. An overcurrent protective device must not be connected in parallel with another overcurrent protective device.
111.50-7	(a) Overcurrent devices shall be enclosed in cabinets. Enclosures for overcurrent devices shall be mounted in vertical position. (b) No enclosure may be exposed to the weather unless accepted by the Commandant.
111.54-1	(d) A circuit breaker must not:

	(1) Be dependent upon mechanical cooling to operate within its rating; or (2) Have a long-time-delay trip element set above the continuous current rating of the trip element or of the circuit breaker frame. (e) Each circuit breaker located in an engineroom, boilerroom, or machinery space must be calibrated for a 50 degree C ambient temperature. If the circuit breaker is located in an environmentally controlled machinery control room where provisions are made for ensuring an ambient temperature of 40 degree C or less, a circuit breaker must have at least the standard 40 degrees C ambient temperature calibration.
111.60-1	Cable must be constructed to IEC 60092-353, UL Std 1309 or IEEE Std 45, 1998.
111.60-7	Generator, feeder, and bus tie cables must be selected on the basis of a computed load of not less than the demand load given in Table 111.60-7. Table 111.60-7--Demand Loads --- 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 generator. Motor feeders..... — Article 430, National Electrical 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 on the distribution panel. Lighting feeder..... — 100 percent of the connected load plus the average active circuit load for the spare switches or circuit breakers on the distribution panels. Grounded neutral of a dual voltage — 100 percent of the capacity of feeder. 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. ----------
111.70-3(b)	(b) Low-voltage release. Each motor controller for a fire pump, elevator, steering gear, or auxiliary that is vital to the vessel's propulsion system, except a motor controller for a vital propulsion auxiliary which can be re-started from a central control station, must have low-voltage release if automatic restart after a voltage failure or its resumption to operation is not hazardous. If automatic restart is hazardous, the motor controller must have low-voltage protection. Motor controllers for other motors must not have low-voltage release unless the starting current and the short-time sustained current of the additional low-voltage release load is within the capacity of one ship's service generator. Automatic sequential starting of low-voltage release controllers is acceptable to meet this paragraph.
111.70-3(c)	(c) Low-voltage protection. Each motor controller must have low-voltage protection, except for the following motor controllers: (1) A motor controller that has low-voltage release under subparagraph (b) of this paragraph. (2) A motor controller for a motor of less than 2 horsepower (1.5 kW).
111.70-5(a)	If an enclosure for a motor, master switch, or other equipment has an electric heater inside the enclosure that is energized form a separate circuit, the heater circuit must be disconnected from its source of potential by a disconnect device independent of the enclosure containing the heater. The heater disconnecting device must be adjacent to the equipment disconnecting device. A fixed sign, warning the operator to open both devices, must be on the enclosure of the equipment disconnect device, except as in paragraph (b) of this section.
111.70-5(b)	If the location of the enclosure for a motor, master switch, or other equipment for deck machinery is remote from the motor and controller disconnect device, a sign must be fixed to the enclosure if the disconnect arrangement required by paragraph (a) of this section is not used. The sign must warn the operator of the presence of two sources of potential within the enclosure and show the location of the heater circuit disconnect device.
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.
111.75-17(d)(2)	Navigation Lights must be certified by an independent laboratory to the requirements of UL 1104 or an equivalent standard. Portable battery operated lights need only meet the requirements of the standard applicable to those lights.
111.95-1	(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 paragraph supplement the requirements for boat winches in other parts of this chapter under which vessels are certified and in subchapter Q, Equipment approvals.
111.95-3(b)	Each main line emergency disconnect 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	(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 46CFR111.70 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 subparagraph (e) of this paragraph 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 disconnect 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.
111.97-5	Electric and Hydraulic Power supply of Electric Power-Operated Watertight Door Systems (a) Each electric motor-driven door operating system must have the same source of power as the emergency lighting and power system. (b) The temporary emergency power source and the final emergency power source must each be capable of operating all doors simultaneously or sequen-

	tially as allowed by Sec. 170.270(c) of this chapter. (c) The power supply for each hydraulically operated watertight door system that uses a hydraulic system common to more than one watertight door must be an accumulator tank with enough capacity to open all doors once and to close all doors two times and be supplied by one or more motor-driven hydraulic pumps that can operate from the final source of the emergency lighting and power system. (d) The motor-driven hydraulic pumps must automatically maintain the accumulator tank pressure within the design limits, be above the uppermost continuous deck, and be controlled from above the uppermost continuous deck. (e) The accumulator tank capacity required in paragraph (c) of this section must be available when the accumulator tank pressure is at the automatic pump ``cut-in'' pressure. (f) The source of power for each hydraulically operated watertight door system using an independent hydraulic system for each door operator must meet paragraphs (a) and (b) of this section. (g) The power supply for other types of watertight door operators must be accepted by the Commandant.
111.97-7	Distribution (a) Each distribution panelboard for a watertight door system must be above the uppermost continuous deck and must have means for locking. (b) Each feeder supplying a watertight door operating system must be above the uppermost continuous deck. (c) Each watertight door operating system must have a separate branch circuit.
111.97-9	Overcurrent protection. Overcurrent devices must be arranged to isolate a fault with as little disruption of the system as possible. The relationship between the load and the rating or setting of overcurrent devices must meet the following: (a) The rating or setting of each feeder overcurrent device must be not less than 200 percent of its maximum load. (b) The rating or setting of a branch circuit overcurrent device must be not more than 25 percent of that of the feeder overcurrent device.
111.105-11	Intrinsically safe systems. (a) Each system required under this subpart to be intrinsically safe must use approved components meeting UL 913 or IEC 79-11(Ia). (b) Each electric cable of an intrinsically safe system must— (1) Be 50 mm (2 inches) or more from cable of non-intrinsically safe circuits, partitioned by a grounded metal barrier from other non-intrinsically safe electric cables, or a shielded or metallic armored cable; and (2) Not contain conductors for non-intrinsically safe systems. (c) As part of plan approval, the manufacturer must provide appropriate in-

	stallation instructions and restrictions on approved system components. Typical instructions and restrictions include information addressing-- (1) Voltage limitations; (2) Allowable cable parameters; (3) Maximum length of cable permitted; (4) Ability of system to accept passive devices; (5) Acceptability of interconnections with conductors or other equipment for other intrinsically safe circuits; and (6) Information regarding any instructions or restrictions which were a condition of approval of the system or its components. (d) Each intrinsically safe system must meet ISA RP 12.6, except Appendix A.1.
111.105-32(c)	Each submerged cargo pump motor design must receive concept approval by the Commandant (G– MSE) and its installation must receive plan approval by the Commanding Officer, Marine Safety Center.
111.105-35	(a) The following are Class II, Division 1, (Zone 10 or Z) locations on a vessel that carries coal: (1) The interior of each coal bin and hold. (2) Each compartment that has a coal transfer point where coal is transferred, dropped, or dumped. (3) Each open area within 3 meters (10 ft) of a coal transfer point where coal is dropped or dumped. (b) Each space that has a coal conveyer on a vessel that carries coal is a Class II, Division 2, (Zone 11 or Y) space. (c) A space that has a coal conveyer on a vessel that carries coal must have electrical equipment approved for Class II, Division 2, (Zone 11 or Y) hazardous locations, except watertight general emergency alarm signals.
111.105-41	Each electrical installation in a battery room must meet subpart 111.15 of this part.
111.105-45	(a) The following areas are Class II, Division 1, (Zone 10 or Z) locations on vessels carrying bulk agricultural products that may produce dust explosion hazards: (1) The interior of each cargo hold or bin. (2) Areas where cargo is transferred, dropped, or dumped and locations with-in 1 meter (3 feet) of the outer edge of these areas in all directions. (b) The following areas are Class II, Division 2, (Zone 11 or Y) locations on vessels carrying bulk agricultural products that may produce dust explosion hazards: All areas within 2 meters (6.5 feet) of a Division 1 (Zone 10 or Z) location in all directions except when there is an intervening barrier, such as a bulkhead or deck. NOTE TO § 111.105– 45: Information on the dust explosion hazards associated with the carriage of agricultural products is contained in Coast Guard Navigation and Vessel Inspection Circular 9– 84 (NVIC 9– 84) ‘‘ Electrical Installations in Agricultural Dust Locations.’’

112.05-5	The emergency power source must meet table 112.05-5(a) and have the capacity to supply all loads that are simultaneously connected to it, except a load on a bus-tie to the main switchboard or non-required loads that are connected in accordance with Section 112.05-1(c). Size of vessel and service Type of emergency power source or lighting Period of operation and minimum capacity of emergency power <u>Passenger vessels:</u> - Ocean, Great Lakes, or coastwise; or on an international voyage. Temporary emergency power source; and final emergency power source (automatically connected storage battery or an automatically started generator). 36 hours. \1\ \ 2\ - Other than Ocean, Great Lakes, or coastwise and not on an international voyage. Final emergency power source (automatically connected storage battery or an automatically started generator). 8 hours or twice the time of run, whichever is less. \2\ <u>Cargo vessels; miscellaneous self-propelled vessels; tankships; barges with sleeping accommodations for more than 6 persons; mobile offshore drilling units; and oceanographic vessels:</u> - Ocean, Great Lakes, or coastwise and 500 GT or more; on an international voyage and 500 GT or more; or all waters and 1600 GT or more. Final emergency power source (automatically connected storage battery or an automatically started generator). 18 hours. \1\ \ 2\ - Ocean, Great Lakes, or coastwise and less than 500 GT; or other than ocean, Great Lakes, or coastwise, 300 GT or more but less than 1600 GT, and not on an international voyage.. Emergency lighting provided by an automatically

	connected or manually controlled storage battery; automatically or manually started generator; or relay-controlled, battery- operated lanterns. \3\ \4\. 6 hours or twice the time of run, whichever is less. \1\ A 12-hour power supply may be especially considered for vessels engaged regularly in voyages of short duration. \2\ The capacity for the operation of the steering gear, as required by § 111.93, is for a period of 30 minutes continuous operation. \3\ The emergency lighting requirements of § 112.15–1 (b), (c), (f), and (g) must be met. \4\ Requirements of Subpart 112.39 must be met by the relay-controlled, battery-operated lanterns.
112.15-1	On vessels required by 112.05(a) to have a temporary emergency power source, the following emergency lighting and power loads must be arranged so that they can be energized form the temporary power source: (d) Illuminated signs with the word "EXIT" in red letters throughout a passenger vessel so the direction of escape to the open deck is obvious from any portion of the vessel usually accessible to the passengers or crew, except machinery spaces, and except stores and similar spaces where the crew are not normally employed. There must be sufficient signs so that the direction of escape is obvious, with all fire doors in stairway enclosures and main vertical zone bulkheads closed and all watertight doors closed. For the purpose of this paragraph, an individual stateroom or other similar small room is not required to have a sign, but the direction of escapee must be obvious to a person emerging from the room. (e) Illumination to allow safe operation of each power operated watertight door . …(i) Each power operated watertight door system (k) Each fire door holding and release system
112.43-7	(a) Except as allowed in paragraph (b) of this section, the following emergency lights must be supplied from a distribution panel on the navigating bridge: (1) Navigation lights not supplied by the navigation light indicator panel. (2) Lights for survival craft launching operations under Sec. 111.75-16, except as allowed in Sec. 112.43-5 (3) Signaling lights (4) Emergency lights; (i) On open decks; (ii) On the navigating bridge; (iii) In the chartroom;

	(iv) In the fire control room (v) For navigation equipment (a) On a mobile offshore drilling unit, the distribution panel required in (b) paragraph (a) of this section must be in the control room. (c) Each distribution panel required in paragraph (a) and (b) of this section must have fused switch or circuit breaker for each branch circuit.
112.45-1(a)	There must be visible indicators in the machinery space to show when an emergency battery is discharging.
112.50-1(g)	The generator set must shut down automatically upon loss of lubricating oil pressure, or operation of a fixed fire extinguishing system in the emergency generator room.
113.35-5(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.
113.35-7(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.
113.35-9(b)	Each transmitter and each indicator must 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 acknowledgment of an order. The audible signal device must not be dependent upon any source of power for operation other than that of the movement of the transmitter or indicator handle.
113.35-13	If more than one transmitter operates a common indicator in the engineroom, all the transmitters must be mechanically interlocked and operate in synchronism. A failure of the transmission wire or chain at any transmitter must not interrupt or disable any other transmitter.
113.35-17	Each vessel with navigating bridge throttle control must have a positive mechanical stop on each telegraph transmitter that prevents movement to the ``Navigating Bridge Control'' position without positive action by the operator.
113.43-1	46CFR113.43 applies to each vessel of 1600 gross tons and over that has power driven main or auxiliary steering gear.
113.43-3(a)	Each vessel must have a 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, required by 46CFR58.25 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 positions changes between 5 degrees and 70 degrees:

	t = (R/2.76)+4.64 Where t = maximum time delay in seconds R = ordered rudder change in degrees
113.43-3(b)	(b) The alarm system must be separate from, and independent of, each steering gear control system, except for input received from the steering wheel shaft.
113.43-5	Each steering failure alarm system must be supplied by a circuit that: (a) Is independent of other steering gear system and steering alarm circuits; (b) Is fed from the final emergency power source through the emergency distribution panel in the wheelhouse, if installed; and (c) Has no overcurrent protection except short-circuit protection by an instantaneous fuse or circuit breaker rated or set at 400 to 500 percent of: (1) The current-carrying capacity of the smallest alarm system interconnecting conductors; or (2) The normal load of the system.

Additional supplemental requirements apply:

Parts 61 and 62, Vital System Automation (Chapter I-1-4) Chapter 4, Section 2

AUT (Unattended 24-hrs = USCG Periodically unattended machinery plant operation)

AUT-nh (Unattended, less than 24 hours = USCG Periodically unattended machinery plant operation)

AUT-Z (One-man watch or Fully Manned, USCG Minimally attended machinery plant operation or Fully Manned)

46 CFR 62.50-20(e)(4)
A-16. Safe height above the floor plates. "Safe height" needs to be defined and should be equivalent to 46 CFR 62.50-20(e)(4). The location of the valve controls to operate sea inlet and discharge valves, required by 46 CFR 56.60-50(f) is an additional requirement for minimally attended and periodically unattended machinery plant operation.

46 CFR 62.50-20
C-1. Requires remote pilothouse control of the propulsion systems. There is no allowance for the use of central machinery control station for a ONE-MAN (minimally attended) watch machinery plant operation. The GL does not differentiate a one-man watch and a fully-manned machinery plant operation. See 46 CFR 62.50-20 for additional requirements for a one-man watch or minimally attended machinery plant operation.

46 CFR 62.35-5(d)
D-1.4.2. 46 CFR 62.35-5(d) allows control override of the bridge controls from the engineering control center (ECC); and control override of the ECC control from the local or manual alternate control station.

46 CFR 62.30-5(c).
A.13 and C.5. "Machinery alarm system" and "Safety systems" are required to be provided with two sources of power. One source must be from the emergency power source or a storage battery that meets the required period of operation of the emergency power source.

46 CFR 62.35-5(b)(2)
A-2.3 Manually operated safety trip controls (which stops the propelling machinery) are required in the navigating bridge, ECC, maneuvering platform, and manual alternate control location.

46 CFR 62.35-5(e)(2)
C-2.5, 2.10 and 2.11. 46 CFR 62.35-5(e)(2) prohibits an override of the required safety trip controls.

See 46 CFR 62.30-5(b)(2) and 113.37-10.
C-2.7 Shaft speed and direction of thrust indicators must be independent of the propulsion controls.

46 CFR 62.25-25(a)

Design verification tests are also required when the programmable control or alarm system logic are altered. Approval by the ACS is required prior to modifications or alteration of the programmable control or alarm system logic of vital system automation.

111.75-17(c) Navigation lights. Dual light sources.
Each self-propelled vessel must have duplicate light sources for the side, masthead and stern lights.

111.105-7, -9 and -11. Hazardous locations.
-7 Approved equipment.
When this subpart or the NEC states that an item of electrical equipment must be approved or when IEC 79–0 states that an item of electrical equipment must be tested or approved in order to comply with IEC 79 series publications, that item must be—
(a) Listed or certified by an independent laboratory as approved for use in the hazardous locations in which it is installed; or
(b) Purged and pressurized equipment that meets NFPA No. 496 or IEC 79–2.

-9 Explosionproof and flameproof equipment.
Each item of electrical equipment that is required in this subpart to be explosionproof under the NEC classification system must be approved as meeting UL 1203. Each item of electrical equipment that is required in this subpart to be flameproof must be approved as meeting IEC 79–1

-11 Intrinsically safe systems.
a) Each system required under this subpart to be intrinsically safe must use approved components meeting UL 913 or IEC 79–11(I_a).
(b) Each electric cable of an intrinsically safe system must—
(1) Be 50 mm (2 inches) or more from cable of non-intrinsically safe circuits, partitioned by a grounded metal barrier from other non-intrinsically safe electric cables, or a shielded or metallic armored cable; and
(2) Not contain conductors for non-intrinsically safe systems.

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.

2.4 SOLAS - Safety Equipment

Fire suppression equipment, structural fire protection materials and live-saving appliances on U.S. Flag vessels has to be approved by the USCG; approvals by class societies are not accepted. Due to the Mutual Recognition Agreement (MRA) between the U.S. and the European Community approvals are accepted on a reciprocal basis. This allows an alternative means for obtaining USCG approval for this equipment. The European "Wheel mark" will not be accepted in lieu of USCG approval.

The following table lists those fire protection equipment items covered by the MRA and provide the equivalent USCG Approval category for each:

MRA Category Description	USCG Approval Category	Council Directive 96/98/EC on Marine Equipment
Primary deck coverings	164.106	A.1/3.1
"A" and "B: Class division fire integrity	164.105** (deck assembly)	A.1/3.11
	164.107** (structural insulation)	A.1/3.11
	164.108** (bulkhead panels)	A.1/3.11
Structural ceiling	164.110** (structural ceiling)	A.1/3.11
Non-combustible material	164.109	A.1/3.13
Draperies, curtains & other suspended textiles	164.111	A.1/3.19
Surface materials and floor coverings with low flame-spread characteristics	164.112*** (interior finish)	A.1/3.18
	164.117 (floor coverings)	A.1/3.18
Fire doors	164.136*	A.1/3.16*
Penetrations through 'A' class divisions by electric cables, pipes, trunks, ducts etc.	164.138	A.1/3.26
Penetrations through 'B' class divisions by electric cables, pipes, trunks, ducts etc.	164.138	A.1/3.27
Dampers	164.139	A.1/3.22
Bedding components	164.142	A.1/3.21
Upholstered furniture	164.144	A.1/3.20
Fire door control systems	164.146	A.1/3.17

* Limited to fire doors without windows and doors with total window area of 645 cm^2,or less, in each door leaf. Approval limited to maximum door size tested. Doors must be used with a fire tested frame design.
** Does not include "A" or "B" class windows.
*** Limited to exposed surfaces of ceilings, walls, and floors. Does not apply to pipes, pipe coverings, or cables.

The following table must be used to determine when the applicable hose stream and thermal radiation test are required:

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

The following table lists those live-saving appliances covered by the MRA and provides the equivalent USCG Approval category for each:

MRA Category Description	USCG Approval Category	Council Directive 96/98/EC on Marine Equipment
Lifebouy Self Activating Smoke, 15-minute (pyrotechnics)	160.157*	A.1/1.3
Rocket parachute flare (pyrotechnics)	160.136*	A.1/1.8
Hand flares (pyrotechnics)	160.121*	A.1/1.9
Buoyant smoke signal, 3-minute (pyrotechnics)	160.122*	A.1/1.10
Line-throwing appliances (pyrotechnics)	160.040*	A.1/1.11
Rigid liferaft	160.118+	A.1/1.13
Automatically self-righting rigid liferaft	160.118+	A.1/1.14
Canopied reversible rigid liferafts	160.118+	A.1/1.15
FLOAT free (hydrostatic release units)	160.162	A.1/1.16
Release Mechanism for lifeboats, rescue boats, liferafts launched by a fall or falls.	160.133@	A.1/1/26
Marine Evacuation system	160.175	A.1/1.27

* Expiration date not to exceed 48 months after month of manufacturer.
+ The emergency pack is not covered by the MRA.
@ Limited to davit-launched liferaft automatic release hook.

The following supplemental requirements are relevant to the issue of a Cargo Ship Safety Equipment Certificate by GL are given using the appropriate Code of Federal Regulations citation (46CFR ...).

46CFR ...	**Supplemental Requirement**
SUBCHAPTER D – TANK VESSELS	
31.36-1	All lifesaving appliances and arrangements on tank vessels must be in accordance with subchapter W (Lifesaving Appliances and Arrangements) of this chapter.
32.53-10 (b2)	Each inert gas system must be designed, constructed and installed in accordance with the provisions of SOLAS II-2, regulation 4.5.5, with the following provisions: (2) If a vapor collection system required to meet part 39 of this subchapter is connected to the inert gas system, the instruction manual required by SOLAS II-2, regulation 15.2.3 must include procedures relating to vapor collection operations.
34.05-5 (a)	a) Approved fire extinguishing systems must be installed on all tankships in the following locations. Previously approved installations may be retained as long as they are maintained in good condition to the satisfaction of the Officer in Charge, Marine Inspection. (5) Boilerrooms. On tankships contracted for on or after November 19, 1952, a carbon dioxide or foam system shall be installed for the protection of all spaces containing oil fired boilers, either main or auxiliary, their fuel oil service pumps and/or such fuel oil units as the heaters, strainers, valves, manifolds, etc., that are subject to the discharge pressure of the fuel oil service pumps. (7) Internal combustion installations. Fire-extinguishing systems shall be provided for internal combustion installations in accordance with the following: (i) If a fire-extinguishing system is installed to protect an internal combustion installation, the system shall be of the carbon dioxide type. (ii) On vessels of 1,000 gross tons and over on an international voyage, the construction or conversion of which is contracted for on or after May 26, 1965, a fixed carbon dioxide system shall be installed in all spaces containing internal combustion or gas turbine main propulsion machinery, auxiliaries with an aggregate power of 1,000 b.h.p. or greater, or their fuel oil units, including purifiers, valves, and manifolds. (iii) On vessels of 1,000 gross tons and over, the construction, conversion or automation of which is contracted for on or after January 1, 1968, a fixed carbon dioxide system shall be installed in all spaces containing internal combustion or gas turbine main propulsion machinery, auxiliaries with an aggregate power of 1,000 b.h.p. or greater, or their fuel oil units, including purifiers, valves and manifolds.
34.10.-15(c)	Fire Main System, Piping (c) All distribution valves shall be marked as required by Sec. 35.40-10 of

	this subchapter. *(GL-comment: Isolation valves between fire pumps and emergency fire pump shall be marked)*
34.15-10	Carbon Dioxide Extinguishing Systems, Controls (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. (f) Systems of the type indicated in Sec. 34.15-5(d), which are of more than 300 pounds of carbon dioxide shall be fitted with an approved delayed discharge so arranged that the alarm will be sounded for at least 20 seconds before the carbon dioxide is released into the space. Such systems of not more than 300 pounds of carbon dioxide shall also have a similar delayed discharge, except for spaces which have a suitable horizontal escape.
34.15-10 (g)	(g) All distribution valves and controls shall be of an approved type. All controls shall be suitably protected.
34.15-15 (c)	(c) All piping, valves, and fittings of ferrous materials shall be protected inside and outside against corrosion unless specifically approved otherwise by the Commandant.
34.15-20 (i)	(i) All cylinders used for storing carbon dioxide must be fabricated, tested, and marked in accordance with Sec. Sec. 147.60 and 147.65 of this chapter. (DOT approved)
34.15-30 (a)	Carbon Dioxide Extinguishing Systems, Details (a) Spaces required to have a delayed discharge by Sec. 34.15-10(f) which are protected by a carbon dioxide extinguishing system and are normally accessible to persons on board while the vessel is being navigated, other than paint and lamp lockers and similar small spaces, shall be fitted with an approved audible alarm in such spaces which will be automatically sounded before the carbon dioxide is admitted to the space. The alarm shall be conspicuously and centrally located and shall be marked as required by Sec. 35.40-7 of this subchapter. Such alarms shall be so arranged as to sound during the 20-second delay period prior to the discharge of carbon dioxide into the space, and the alarm shall depend on no source of power other than the carbon dioxide.
34.15-35 (a)	Enclosure openings (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.
34.15-40	Pressure relief (a) 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.

34.20-10 (a)	Deck Foam System, Details (a) The foam agent, its container, measuring devices, and other items peculiar to this system shall be of an approved type.
34.20-10 (e)	(e) The deck foam system on each tankship that has a keel laying date on or after January 1, 1975, must be capable of being actuated, including introduction of foam to the foam main, within three minutes of notification of a fire.
34.20-15 (b)	(b) All piping, valves, and fittings of ferrous materials shall be protected inside and outside against corrosion unless specifically approved otherwise by the Commandant.
34.20-20 (a)	Discharge outlets shall be of an U.S. Coast Guard approved type.
34.25-15 (b)	Water Spray Extinguishing Systems (b) 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. The piping shall be subject to approval for each installation.
34.25-20 (a)	Water Spray Extinguishing Systems (a) Spray nozzles shall be of an approved type.
34.50 (a)	(a) Portable and semiportable extinguishers shall be classified by a combination letter and number symbol. The letter indicating the type of fire which the unit could be expected to extinguish, and the number indicating the relative size of the unit. GL-Comment: For further information please see 46CFR34.50.
35.30-20 (c1)	(c) Each emergency outfit shall be equipped as follows: (1) One pressure-demand, open-circuit, self-contained breathing apparatus, approved by the Mine Safety and Health Administration (MSHA) and by the National Institute for Occupational Safety and Health (NIOSH) and having at a minimum a 30-minute air supply, a full facepiece, and a spare charge.
35.40-7	Adjacent to all carbon dioxide fire extinguishing alarms installed after November 19, 1952, there shall be conspicuously marked: ``WHEN ALARM SOUNDS VACATE AT ONCE. CARBON DIOXIDE BEING RELEASED."
35.40-10	Steam, foam, or CO2 fire smothering apparatus shall be marked ``STEAM FIRE APPARATUS" or ``FOAM FIRE APPARATUS" or ``CO2 FIRE APPARATUS," as appropriate, in not less than 2-inch red letters. The valves of all branch pipes leading to the several compartments shall be distinctly marked to indicate the compartments or parts of the vessel to which they lead.
38.10-15 (d)	Piping, Valves, Fittings, and Accessory Equipment (d) The safety relief valves shall meet the arrangement and inspection requirements of Sec. 54.15-25 of subchapter F (Marine Engineering) of this chapter.

46CFR ...	Supplemental Requirement
SUBCHAPTER F – MARINE ENGINEERING	
56.20-15	Valves employing resilient material. (a) A valve in which the closure is accomplished by resilient nonmetallic material instead of a metal to metal seat shall comply with the design, material, construction and testing for valves specified in this part. (b) 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: (1) Positive shutoff valves. The closed valve must pass less than 10 ml/hr (0.34 fluid oz/hr) of liquid or less than 3 l/hr (0.11 cubic ft/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 must be fitted with positive shutoff valves located at the tank in accordance with Sec. 56.50-60(d). Otherwise positive shutoff valves may be used in any location in lieu of a required Category A or Category B valve. (2) Category A valves. The closed valve must pass less than the greater of 5 percent of its fully open flow rate or 15 percent divided by the square root of the nominal pipe size (NPS) of its fully open flow rate through the line after complete removal of all resilient seating material and testing at full rated pressure; as represented by the formula: (15% / SQRT x (NPS)) (Fully open flow rate). Category A valves may be used in any location except where positive shutoff valves are required by Sec. 56.50-60(d). Category A valves are required in the following locations: (i) Valves at vital piping system manifolds; (ii) 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. (iii) Valves providing closure for any opening in the shell of the vessel. (3) 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. (c) 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 (G-MSE).
56.60-25	Nonmetallic materials (a) Plastic pipe installations shall be in accordance with the International Maritime Organization (IMO) resolution A.753(18), Guidelines for the Application of Plastic Pipes on Ships and the following supplemental re-

	quirements: (1) Materials used in the fabrication of plastic pipe shall comply with the appropriate standards listed in Sec. 56.01-2 of this chapter. (2) Plastic pipe is not permitted in a concealed space in an accommodation or service area, such as behind ceilings or linings or between double bulkheads, unless-- (i) Each trunk or duct containing such piping is completely surrounded by ``A" class divisions; or (ii) An approved smoke-detection system is fitted in the concealed space and each penetration of a bulkhead or deck and each installation of a draft stop is made in accordance with IMO resolution A.753(18) to maintain the integrity of fire divisions. (3) Plastic pipe used outboard of the required metallic shell valve in any piping system penetrating the vessel's shell (see Sec. 56.50-95(f)) shall have the same fire endurance as the metallic shell valve. Where the shell valve and the plastic pipe are in the same unmanned space, the valve shall be operable from above the freeboard deck. (4) Pipe that is to be used for potable water shall bear the seal of approval or NSF mark of the National Sanitation Foundation Testing Laboratory, Incorporated, School of Public Health, University of Michigan, Ann Arbor, MI 48103. (b) Nonmetallic flexible hose. (1) Nonmetallic flexible hose must be in accordance with SAE J-1942 and may be installed only in vital and nonvital fresh and salt water systems, nonvital pneumatic systems, lube oil and fuel systems, and fluid power systems. (2) Nonmetallic flexible hose may be used in vital fresh and salt water systems at a maximum service pressure of 150 psi. Nonmetallic flexible hose may be used in lengths not exceeding 30 inches where flexibility is required subject to the limitations of paragraphs (a) (1) through (4) of this section. Nonmetallic flexible hose may be used for plastic pipe in duplicate installations in accordance with paragraph (a) of this section. (3) Nonmetallic flexible hose may be used for plastic pipe in nonvital fresh and salt water systems and nonvital pneumatic systems subject to the limitations of paragraphs (a) (1) through (4) of this section. Unreinforced hoses are limited to a maximum service pressure of 50 psi, reinforced hoses are limited to a maximum service pressure of 150 psi. (4) Nonmetallic flexible hose may be used in lube oil, fuel oil and fluid power systems only where flexibility is required and in lengths not exceeding 30 inches. (5) Nonmetallic flexible hose must be complete with factory-assembled end fittings requiring no further adjustment of the fittings on the hose, except that field attachable type fittings may be used. Hose end fittings must comply with SAE J-1475. Field attachable fittings must be installed following the manufacturer's recommended practice. If special equipment is required, such as crimping machines, it must be of the type and design specified by the manufacturer. A hydrostatic test of each hose assembly must be conducted in

	accordance with Sec. 56.97-5 of this part. (c) Plastic valves, fittings, and flanges may be used in systems employing plastic pipe. Such valves, fittings, and flanges shall be designed, fabricated, tested, and installed so as to satisfy the intent of the requirements for plastic pipe contained in this section. (d) If it is desired to use nonmetallic materials other than those specified in this section, a request furnishing the chemical and physical properties of the material shall be submitted to the Commandant for consideration.
62.50-20 (c)	Additional requirements for minimally attended machinery plants (c) Fire detection and alarms. An approved automatic fire detection and alarm system must be provided to monitor all machinery spaces. The system must activate all alarms at the ECC, the navigating bridge, and throughout the machinery spaces and engineers' accommodations. The ECC 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.
62.50-20 (d)	(d) Fire pumps. (1) The ECC 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.

<table>
<tr><th>46CFR ...</th><th>Supplemental Requirement</th></tr>
<tr><td colspan="2">SUBCHAPTER H – PASSENGER VESSELS</td></tr>
<tr><td>70.28-1</td><td>All lifesaving appliances and arrangements on passenger vessels must be in accordance with subchapter W (Lifesaving Appliances and Arrangements) of this chapter.</td></tr>
<tr><td>72.15-10</td><td>Vessels using fuel having a flashpoint of 110 degrees F. 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)
<table><tr><th colspan="2">Size of space, cubic feet</th><th rowspan="2">Minutes per air change</th></tr><tr><th>Over</th><th>Not over</th></tr><tr><td></td><td>500</td><td>2</td></tr><tr><td>500</td><td>1,000</td><td>3</td></tr><tr><td>1,000</td><td>1,500</td><td>4</td></tr><tr><td>1,500</td><td></td><td>5</td></tr></table>
(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.</td></tr>
</table>

	(g) All ducts shall be constructed of non-ferrous metal or galvanized ferrous metal not less than No. 22 USSG, intact and gastight from end to end and shall be of substantial construction. The ducts shall lead as direct as possible and be properly fastened and supported. (h) 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 increased 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.
72.15-15 (c) (2)	Ventilation for closed spaces (c) The ventilation of spaces which are ``specially suitable for vehicles'' shall be in accordance with the provisions of this paragraph. In addition, if vehicles are operated inside of enclosed spaces, the ventilation shall be in accordance with subpart 78.83 of this subchapter. (2) The quantity of ventilating air shall be not less than 1 cubic foot per minute per square foot of deck area.
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, skylights, 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.
72.40-10	Storm Rails (a) 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.
76.05-20	Fixed fire extinguishing systems Approved fire extinguishing systems must be installed, as required by table 76.05-1
76.10-10(a)	Fire Main System, Fire station hydrants, hose and nozzles (a) The size of fire hydrants, hose, and nozzles and the length of hose required shall be as noted in table 76.10-5(a).

<table>
<tr><td></td><td>
TABLE 76.10–5(a)
<table>
<tr><th colspan="2">Gross tons</th><th colspan="2">Minimum number of pumps</th><th rowspan="2">Hose and hydrant size, inches</th><th rowspan="2">Nozzle orifice size, inches</th><th rowspan="2">Length of hose, feet</th></tr>
<tr><th>Over</th><th>Not over</th><th>International voyage</th><th>Other</th></tr>
<tr><td>.....</td><td>100</td><td>2</td><td>1</td><td>1½</td><td>½</td><td>50</td></tr>
<tr><td>100 .....</td><td>500</td><td>2</td><td>1</td><td>1½</td><td>⅝</td><td>50</td></tr>
<tr><td>500 .....</td><td>1,500</td><td>2</td><td>2</td><td>1½</td><td>⅝</td><td>50</td></tr>
<tr><td>1,500 .....</td><td>4,000</td><td>2</td><td>2</td><td>[1] 2½</td><td>[1] ⅞</td><td>[1] 50</td></tr>
<tr><td>4,000 .....</td><td>.....</td><td>3</td><td>3</td><td>[1] 2½</td><td>[1] ⅞</td><td>[1] 50</td></tr>
</table>
[1] 75 feet of 1½-inch hose and ⅝-inch nozzles may be used where specified by §76.10–10(b).
</td></tr>
<tr><td>76.15-10 (g)</td><td>Carbon Dioxide Extinguishing Systems, Controls
(g) All distribution valves and controls shall be of an approved type.</td></tr>
<tr><td>76.15-20 (i)</td><td>Carbon dioxide storage
(i) All cylinders used for storing carbon dioxide must be fabricated, tested, and marked in accordance with Sec. Sec. 147.60 and 147.65 of this chapter.</td></tr>
<tr><td>76.25-1</td><td>Automatic Sprinkling System, Application
Where an automatic sprinkling system is installed, the systems shall comply with NFPA 13-1996.</td></tr>
<tr><td>76.27-15 (e)</td><td>Electric Fire Detecting System, Operation and installation
(e) All wiring and electrical circuits and equipment shall meet the applicable requirements of subchapter J (Electrical Engineering) of this chapter.</td></tr>
<tr><td>76.33-20</td><td>Smoke Detecting System, Operation and Installation
(e) The accumulators, detecting cabinet, interconnecting valves with the fire extinguishing system, alarms, and indicating devices shall be of an approved type.
(f) All wiring and electrical circuits and equipment shall meet the applicable requirements of subchapter J (Electrical Engineering) of this chapter.</td></tr>
<tr><td>76.35-15</td><td>Manual Alarm System, Operation and Installation
(b) The manual alarm boxes, cabinet, and alarms shall be of an approved type.
(d) All wiring and electrical circuits and equipment shall meet the applicable requirements of subchapter J (Electrical Engineering) of this chapter.</td></tr>
<tr><td>78.47-13</td><td>Markings for Fire and Emergency Equipment, Fire detecting and manual alarm, automatic sprinkler, and smoke detecting alarm bells
(a) The fire detecting and manual alarm automatic sprinklers, and smoke detecting alarm bells in the engine room shall be identified by at least 1 inch 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.</td></tr>
<tr><td>78.47-17</td><td>Markings for Fire and Emergency Equipment, Fire extinguishing system</td></tr>
</table>

	controls (a) 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 2 inches high--``STEAM FIRE APPARATUS'', ``CARBON DIOXIDE FIRE APPARATUS'', ``FOAM FIRE APPARATUS'', ``WATER SPRAY FIRE APPARATUS'', ``MANUAL SPRINKLING SYSTEM'', or ``AUTOMATIC SPRINKLING SYSTEM'', as the case may be.

46CFR ...	Supplemental Requirement
SUBCHAPTER I – CARGO AND MISCELLANEOUS VESSELS	
90.27-1	All lifesaving appliances and arrangements must be in accordance with subchapter W (Lifesaving Appliances and Arrangements) of this chapter.
92.07-1	Structural Fire Protection, Application (a) The provisions of this subpart, with the exception of Sec. 92.07-90, shall apply to all vessels of 4,000 gross tons and over contracted for on or after January 1, 1962. Such vessels contracted for prior to January 1, 1962, shall meet the requirements of Sec. 92.07-90(a). (b) The provisions of this subpart, with the exception of Sec. 92.07-90, shall apply to all industrial vessels of 300 gross tons and over but less than 4,000 gross tons, contracted for on or after July 1, 1968, which carry in excess of 12 industrial personnel. Such vessels contracted for prior to July 1, 1968, shall meet the requirements of Sec. 92.07-90(b). (c) SOLAS-certificated vessels complying with method IC, as described in SOLAS 74, regulation II-2/42, may be considered equivalent to the provisions of this subpart.
95.05-10	Fixed fire extinguishing systems (d) On vessels of 1,000 gross tons and over, contracted for on or after November 19, 1952, or where conversion from coal to oil is contracted for on or after November 19, 1952, a fixed carbon dioxide, foam, or water spray system shall be installed in all spaces containing oil fired boilers, either main or auxiliary, or their fuel oil units, valves, or manifolds in the line between the settling tanks and the boilers. (e) Fire extinguishing systems shall be provided for internal combustion installations in accordance with the following: (1) If a fixed fire-extinguishing system is installed to protect an internal combustion propelling machinery installation, the system shall be of the carbon dioxide type. (2) On vessels of 1,000 gross tons and over on an international voyage, the construction or conversion of which is contracted for on or after May 26, 1965, a fixed carbon dioxide system shall be installed in all spaces containing internal combustion or gas turbine main propulsion machinery, auxiliaries with an aggregate power of 1,000 b. hp. or greater, or their fuel oil units, including purifiers, valves, and manifolds. (3) On vessels, the construction, conversion or automation of which is contracted for on or after July 1, 1968, the systems shall be in accordance with the following: (i) A fixed carbon dioxide system shall be installed in any space containing machinery using fuel having a flashpoint of less than 110[deg] F. (ii) On vessels of 1,000 gross tons and over, a fixed carbon dioxide system shall be installed in all spaces containing internal combustion or gas

	turbine main propulsion machinery, auxiliaries with an aggregate power of 1,000 b. hp. or greater, or their fuel oil units, including purifiers, valves, and manifolds.
95.10-10 (a)	(a) The size of fire hydrants, hose, and nozzles and the length of hose required shall be as noted in Table 95.10-5(a). TABLE 95.10–5(a) Gross tons (Over / Not over); Minimum number of pumps; Hose and hydrant size, inches; Nozzle orifice size, inches; Length of hose feet Over: — / 100 / 100 / 1,000 / 1,500 Not over: 100 / 1,000 / 1,500 / ..... / — Minimum number of pumps: [1] 1 / 1 / 2 / 2 / — Hose and hydrant size, inches: [1] 1½ / 1½ / 1½ / [2] 2½ / — Nozzle orifice size, inches: [1] ½ / ⅝ / ⅝ / [2] ⅞ / — Length of hose feet: [1] 50 / 50 / 50 / [2] 50 / — [1] On vessels of 65 feet in length or less, ¾-inch hose of good commercial grade together with a commercial garden hose nozzle may be used. The pump may be hand operated and the length of hose shall be sufficient to assure coverage of all parts of the vessel. [2] 75 feet of 1½-inch hose and ⅝-inch nozzle may be used where specified by § 95.10–10(b) for interior locations and 50 feet of 1½-inch hose may be used in exterior locations on vessels in other than ocean or coastwise service.
95.10-15 (b)	Fire Main System, Piping b) All distribution cut-off valves shall be marked as required by Sec. 97.37-10 of this subchapter: 97.37-10 (a): The branch line valves of all fire extinguishing systems shall be plainly and permanently marked indicating the spaces served.
95.15	Carbon dioxide fire extinguishing systems All fixed gas fire extinguishing systems shall be designed and installed in accordance with the manufacturer's U.S. Coast Guard approved manual.
95.15-10 (g)	Carbon Dioxide Extinguishing Systems, Controls (g) All distribution valves and controls shall be of an approved type. All controls shall be suitably protected.
95.15-15 (c)	Carbon Dioxide Extinguishing Systems (c) All piping, valves, and fittings of ferrous materials shall be protected inside and outside against corrosion unless specifically approved otherwise by the Commandant.
95.15-20 (i)	(i) All cylinders used for storing carbon dioxide must be fabricated, tested, and marked in accordance with Sec. Sec. 147.60 and 147.65 of this chapter. ***147.60 Compressed gases.*** (a) Cylinder requirements. Cylinders used for containing hazardous ships' stores that are compressed gases must be— (1) Authorized for the proper shipping name of the gas in accordance with 49 CFR 172.101 and 49 CFR part 173; (2) Constructed in accordance with subpart C of 49 CFR part 178 or exempted under 49 CFR part 107; (3) Filled, marked, and inspected in accordance with 49 CFR 173.301 through 173.308; and (4) Except as provided in §147.65, maintained and retested in accordance with 49 CFR 173.34 (b) Stowage and care of cylinders. (1) Cylinders must always be secured and, when not in use, they must

	be stowed in a rack in an upright position, with the valve protection cap in place. (2) Lockers or housings must be vented to the open air near the top and bottom for positive circulation of vapors. (3) Cylinders must be protected from all sources of heat which may cause the cylinders to be heated to a temperature higher than 130 °F. (c) Pressure vessels other than cylinders. Pressure vessels, other than cylinders subject to paragraph (a) of this section, used for containing ships' stores that are compressed gases must— (1) Be constructed and inspected in accordance with SOLAS and requirements contained in section 2.3; and (2) Carry only nitrogen or air, unless permission is granted by Commandant (CG-3MSO) to do otherwise. ***147.65 Carbon dioxide and halon fire extinguishing systems.*** a) Carbon dioxide or halon cylinders forming part of a fixed fire extinguishing system must be retested, at least, every 12 years. If a cylinder is discharged and more than five years have elapsed since the last test, it must be retested before recharging. (b) Carbon dioxide or halon cylinders must be rejected for further service when they— (1) Leak; (2) Are dented, bulging, severely corroded, or otherwise in a weakened condition; (3) Have lost more than five percent of their tare weight; or (4) Have been involved in a fire. (c) Cylinders which have contained carbon dioxide or halon and have not been tested within five years must not be used to contain another compressed gas on board a vessel, unless the cylinder is retested and re-marked in accordance with §147.60 (a)(3) and (a)(4). (d) Flexible connections between cylinders and distribution piping of semi-portable or fixed carbon dioxide fire extinguishing systems and discharge hoses in semi-portable carbon dioxide fire extinguishing systems must be renewed or tested at a pressure of 6.9 MPa (1000 psig). At test pressure, the pressure must not drop at a rate greater than 1.03 MPa (150 psi) per minute for a two minute period. The test must be performed when the cylinders are retested. (e) Flexible connections between cylinders and distribution piping of fixed halon fire extinguishing systems must be tested at a pressure of one and one-half times the cylinder service pressure as marked on the cylinder. At test pressure, the pressure must not drop at a rate greater than 1.03 MPa (150 psi) per minute for a two minute period. The test must be performed when the cylinders are retested.
95.15-30(a)	Carbon Dioxide Extinguishing Systems, Alarms (a) Spaces which are protected by a carbon dioxide extinguishing system and are normally accessible to persons on board while the vessel is being navigated, other than paint and lamp lockers and similar small spaces, shall be fitted with an approved audible alarm in such spaces which will be automatically sounded when the carbon dioxide is admitted to the space. The alarm shall be conspicuously and centrally located and shall be marked as required

	by Sec. 97.37-9 of this subchapter. For systems installed on or after July 1, 1957, alarms will be mandatory only for systems required to be fitted with a delayed discharge. Such alarms shall be so arranged as to sound during the delay period prior to the discharge of extinguishing agent into the space, and the alarm shall depend on no source of power other than the extinguishing agent unless otherwise specified in the U.S. Coast Guard approved manual for the system.
95.50-5 (a)	(a) Hand portable fire extinguishers and semiportable fire extinguishing systems shall be classified by a combination letter and number symbol. The letter indicating the type of fire which the unit could be expected to extinguish, and the number indicating the relative size of the unit. GL-Comment: For further information please see 46CFR34.50.
96.35-5	(a) All flame safety lamps shall be of an approved type, constructed in accordance with subpart 160.016 of subchapter Q (Specifications) of this chapter. (b) Each self-contained breathing apparatus must be of the pressure-demand, open-circuit type, approved by the Mine Safety and Health Administration (MSHA) and by the National Institute for Occupational Safety and Health (NIOSH), and have at a minimum a 30-minute air supply and full facepiece
98.25	GL does only accept gas tankers for carriage of anhydrous ammonia.

46CFR ...	Supplemental Requirement
SUBCHAPTER J – ELECTRICAL ENGINEERING	
113.30-5(b)	Communication and Alarm Systems and Equipment, Requirements (b) Gyrocompass. Each vessel that has a master gyrocompass that is not in or next to the navigating bridge must have a means of communication between the master gyrocompass and the navigating bridge repeater compass.
113.30-5(c)	(c) Radar. Each vessel that has a radar plan position indicator that is not in or next to the navigating bridge must have a means of communication between the navigating bridge and the radar plan position indicator.
113.30-5(d)	Communication and Alarm Systems and Equipment, Requirements (d) Emergency lockers. If the emergency equipment lockers or spaces used by the emergency squad are not next to the navigating bridge or, on a mobile offshore drilling unit, next to the control room, there must be a means of communication between the navigating bridge or control room and the emergency equipment lockers or spaces.
113.30-5(e)	(e) Radio and radio direction finder. Communication to the radio and radio direction finder must meet the following requirements: (1) Each vessel that has a radio installation must have a means of communication between the radio room, the navigating bridge, or, if the vessel is a mobile offshore drilling unit, the control room, and any other place from which the vessel may be navigated under normal conditions, other than a place that is only for emergency functions, a place that is only for docking or maneuvering, or a place that is for navigating the vessel in close quarters. A location that has the apparatus that is necessary to steer the vessel, give engine orders, and control the whistle, is a place from which the vessel may be navigated. (2) If the operating position of the emergency radio installation is not in the compartment normally used for operating the main radio installation, there must be means of communication between the emergency radio room, the navigating bridge, or, if the vessel is a mobile offshore drilling unit, the control room, and any other place from which the vessel may be navigated under normal conditions; other than a place that is only for emergency functions, a place that is only for docking or maneuvering, or a place that is for navigating the vessel in close quarters. (3) Each vessel equipped with radio direction-finding apparatus that is not in or next to the navigating bridge must have a means of communication between the navigating bridge and the direction-finding apparatus. (4) The communication system required by this paragraph must be independent of all other systems on the vessel. The location of the termination of these systems is subject to approval by the Federal Communication Commission.
113.30-5(f)	(f) Fire or smoke detecting systems. Each vessel equipped with a fire or smoke detecting system, if control units are not in the navigating bridge, must have means of communication between the navigating bridge and the stations where the control units are located.

113.30-5(g)	(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.
113.30-5(h)	(h) Engine room local control station. Each self-propelled vessel equipped with control from the navigating bridge must have a means of communication between the local station for the control of the speed or direction of thrust of the propulsion machinery and the engine control room, unless an engine order telegraph is installed in accordance with Sec. 113.35-3. Each communication station at a local control station must-- (2) Provide the capability of reliable voice communication when the vessel is underway.

46CFR ...	Supplemental Requirement
SUBCHAPTER W – LIFESAVING APPLIANCES ANS ARRANGEMENTS	
199.70 (a)	Personal lifesaving appliances a) Lifebuoys. Each vessel must carry lifebuoys approved under approval series 160.150 as follows: (1) Stowage. Lifebuoys must be stowed as follows: (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).
199.70 (b)	(b) Lifejackets. Each vessel must carry lifejackets approved under approval series 160.155, 160.176 or 160.177. If the vessel carries inflatable lifejackets, they must be of the same or similar design and have the same method of operation.
199.70 (c)	c) Rescue boat and marine evacuation system immersion suits or anti-exposure suits (2) Stowage. Immersion suits or anti-exposure suits 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). (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.
199.110 (h)	Survival craft muster and embarkation arrangements (h) 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.
199.130 (a)	(a) General. Each survival craft must be stowed-- (7) 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 weights 185 kilograms (407.8 pounds) or less may be lifted not more than 300 millimeters (1 foot) in order to launch.
199.150 (f)	Survival craft launching and recovery arrangements (f) Each launching appliance must be arranged so that-- (2) The launching appliance remains effective under conditions of icing;
199.153(f)	Survival craft launching and recovery arrangements, in addition to meeting the requirements in Sec. 199.150, must meet the following requirements: (f) Each winch drum must be arranged so the fall wire winds onto the drum in one or more level wraps. A multiple drum winch must be arranged so that the falls wind off at the same rate when lowering and onto the drums at the

	same rate when hoisting.
199.153 (i)	(i) The lowering speed for a survival craft loaded with all of its equipment must be not less than 70 percent of the speed required under paragraph (h) of this section.
199.153 (l)	(l) Each launching appliance must be fitted with brakes that meet the following requirements: (2) The brake pads must, where necessary, be protected from water and oil.
199.157	Free-fall lifeboat launching and recovery arrangements. (a) The launching appliance for a free-fall lifeboat must be designed and installed so that the launching appliance and the lifeboat it serves operate as a system to protect the occupants from harmful acceleration forces and to effectively clear the vessel. (b) The launching appliance must be designed and arranged so that, in its ready to launch position, the distance from the lowest point on the lifeboat it serves to the water surface with the vessel in its lightest seagoing condition does not exceed the lifeboat's certificated free-fall height. (c) The launching appliance must be arranged to preclude accidental release of the lifeboat in its unattended stowed position. If the means provided to secure the lifeboat cannot be released from inside the lifeboat, the means to secure the lifeboat must be arranged to preclude boarding the lifeboat without first releasing it. (d) Each free-fall launching arrangement must be provided with a secondary means to launch the lifeboat by falls. Such means must comply with the requirements of Sec. Sec. 199.150, 199.153, and 199.155. Notwithstanding Sec. 199.150(c), the secondary launching appliance must be capable of launching the lifeboat against unfavorable conditions of trim of 2 degrees either way and of list of 5 degrees either way. The secondary launching appliance need not comply with the speed requirements of Sec. Sec. 199.153 (g), (h), and (i). If the secondary launching appliance is not dependent on gravity, stored mechanical power, or other manual means, the launching arrangement must be connected both to the vessel's main and emergency power supplies.

199.175 (b)	(b) Each lifeboat, rigid liferaft, and rescue boat, unless otherwise stated in this paragraph, must carry the equipment listed in this paragraph and specified for it in table 199.175 of this section under the vessel's category of service. A lifeboat that is also a rescue boat must carry the equipment in the table column marked for a lifeboat. (14) Heaving line. The heaving line must be buoyant, must be at least 30 meters (99 feet) long, must have a buoyant rescue quoit attached to one end, and should be at least 8 millimeters (\5/16\inches) in diameter. (20) Oars and paddles. Each lifeboat and rescue boat must have buoyant oars or paddles of the number, size, and type specified by the manufacturer of the boat. An oarlock or equivalent device, either permanently installed or attached to the boat by a lanyard or chain, must be provided for each oar. Each oar should have the vessel's name marked on it in block letters. (28) Searchlight. (i) The searchlight must be of the type originally provided with the approved lifeboat or rescue boat, or must be certified by the searchlight manufacturer to meet ASTM F 1003 (incorporated by reference, see Sec. 199.05). The boat must carry two spare bulbs.
199.178 (a)	Marking of stowage locations (a) Containers, brackets, racks, and other similar stowage locations for life-saving equipment must be marked with symbols in accordance with IMO Resolution A.760 (18) indicating the device stowed in that location.
199.178 (b)	(b) If more than one device is stowed in a location, the number of devices stowed must be indicated.
199.178 (c)	(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.
199.178 (d)	(d) Each liferaft stowage location should be marked with the capacity of the liferaft stowed there.
199.214 (c)	Immersion suits and thermal protective aids (c) The immersion suits and thermal protective aids required under paragraphs (a) and (b) of this section are not required if the passenger vessel operates only on routes between 32 degrees north and 32 degrees south latitude.

Additional supplemental requirements apply:

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

Cite: II-2/6 & FSS Code Chapter 4
Fire Extinguishers.
Fire extinguishers must be USCG type - approved equipment.

Cite: II-2/7.2 & FSS Code Chapter 9
Fixed Fire Detection and Fire Alarm Systems.
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 & FSS Code Chapter 9.2.4 Requirements
Fixed Fire Detection and Fire Alarm Systems – Installation
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-2/9.2.3.3 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-2/10.2.1.5 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 & FSS Code Chapter 5
Fixed Gas Fire-Extinguishing Systems – General.
Fixed gas fire extinguishing systems must be USCG approved equipment.

Cite: II-2/10.4 & FSS Code Chapter 5.2.2
Fixed Gas Fire-Extinguishing Systems – Carbon Dioxide Systems.
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 especially 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. I n 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/mm^2 (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-2/10.4 & FSS Code Chapter 14
Fixed Deck Foam Systems.
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".

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

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 GL 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 inconspicuous red letters at least 50 mm (2 in) high "WATER SPRAY FIRE APPARATUS."

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

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 GL 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 GL 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-2/10.10.3 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-2/13 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.

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 aluminium 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
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 millimetres (1 foot) above the deck.
Each winch drum must be arranged so the fall wire winds onto the drum in a level wrap.

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).

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.

2.5 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 Plans (Reg.26) outlined in IMO Res. MEPC.86(44) can only be approved by the U.S. Coast Guard.

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 U.S. Coast Guard 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 œ 1.0 foot candle measured 3 feet above the deck œ and at transfer connections œ 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 so 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 worldwide 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

U.S. dates for required double hull construction are approximately three (3) years earlier than under MARPOL Annex I. There is no minimum tonnage limit for applicability to vessels. (MARPOL Annex I applies to vessels greater than 5000 dwt.) Specific dates 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 U.S. Coast Guard 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. (Regulation 1.28.4 defines "new" as four (4) years later.)

Interpretation: MARPOL Reg 18.5
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 19.4 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 20 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 28.1 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.

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

There are no supplemental requirements for this authorization.

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.

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.

ANNEX VI

Cite: 46 CFR 63.25-9 Shipboard Incinerators

Each incinerator shall be approved by the Administration in accordance with the standard specifications for shipboard incinerators developed by the IMO. Additionally, each incinerator must be USCG approved.

2.6 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.

2.7 Accommodations for Officers and Crew

Cite: 46 CFR 92.20 Accommodations for Officers and Crew

92.20-1 Application

(a) The provisions of this subpart apply to all vessels of 100 gross tons and over contracted for on or after November 19, 1952. Vessels of 100 gross tons and over contracted for prior to November 19, 1952 must meet the requirements of Sec. 92.20-90.

(b) Vessels of less than 100 gross tons must meet the applicable requirements of this subpart insofar as is reasonable and practicable.

92.20-5 Intent

It is the intent of this subpart that the accommodations provided for officers and crew on all vessels must be securely constructed, properly lighted, heated, drained, ventilated, equipped, located, arranged, and insulated from undue noise, heat, and odors.

92.20-10 Location of crew spaces

(a) Crew quarters must not be located farther forward in the 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 water line. However, for vessels in other than ocean or coastwise service, this distance need not exceed 8.5 meters (28 feet). For the purposes of this paragraph, the vessel's length must be as defined in Sec. 43.15-1 of subchapter E (Load Lines) of this chapter. Unless approved by the Commandant, no section of the deck head of the crew spaces may be below the deepest load line.

(b) There must be no direct communication, except through solid, close fitted doors, or hatches between crew spaces and chain lockers, or machinery spaces.

92.20-15 Construction

All crew spaces are to be constructed and arranged in a manner suitable to the purpose for which they are intended and so that they can be kept in a clean, workable, and sanitary condition.

92.20-20 Sleeping accommodations

(a) Where practicable, each licensed officer must be provided with a separate stateroom.

(b) Sleeping accommodations for the crew must be divided into rooms, no one of which shall berth more than 4 persons.

(c) Each room must be of such size that there is at least 2.78 square meters (30 square feet) of deck area and a volume of at least 5.8 cubic meters (210 cubic feet) for each person accommodated. The clear head room must be not less than 190 centimeters (75 inches). In measuring

sleeping accommodations, any furnishings contained therein for the use of the occupants are not to be deducted from the total volume or from the deck area.

(d) Each person shall have a separate berth and not more than one berth may be placed above another. The berth must be composed of materials not likely to corrode. The overall size of a berth must not be less than 68 centimeters (27 inches) wide by 190 centimeters (75 inches) long, except by special permission of the Commandant. Where 2 tiers of berths are fitted, the bottom of the lower berth must not be less than 30 centimeters (12 inches) above the deck. The berths must not be obstructed by pipes, ventilating ducts, or other installations.

(e) A locker must be provided for each person accommodated in a room.

92.20-25 Washrooms and toilet rooms

(a) There must be provided at least 1 toilet, 1 washbasin, and 1 shower or bathtub for each 8 members or portion thereof in the crew who do not occupy rooms to which private or semi-private facilities are attached.

(b) The toilet rooms and washrooms must be located convenient to the sleeping quarters of the crew to which they are allotted but must not open directly into such quarters except when they are provided as private or semi-private facilities.

(c) All washbasins, showers, and bathtubs shall be equipped with adequate plumbing, including hot and cold running water. All toilets must be installed with adequate plumbing for flushing.

(d) At least 1 washbasin must be fitted in each toilet room, except where private or semi-private facilities are provided and washbasins are installed in the sleeping rooms.

(e) Where more than 1 toilet is located in a space or compartment, each toilet must be separated by partitions.

92.20-30 Messrooms

(a) Messrooms must be located as near to the galley as is practicable except where the messroom is equipped with a steam table.

(b) Each messroom must seat the number of persons expected to eat in the messroom at one time.

92.20-35 Hospital space

(a) 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, must be provided with a hospital space. This space must be situated with due regard to the comfort of the sick so that they may receive proper attention in all weathers.

(b) The hospital must be suitably separated from other spaces and must be used for the care of the sick and for no other purpose.

(c) The hospital must be fitted with berths in the ratio of 1 berth to every 12 members of the crew or portion thereof who are not berthed in single occupancy rooms, but the number of berths need not exceed 6.

(d) The hospital must have a toilet, washbasin, and bathtub or shower conveniently situated. Other necessary suitable equipment such as a clothes locker, a table, and a seat shall be provided.

(e) On vessels in which the crew is berthed in single occupancy rooms, a hospital space will not be required, provided that one room is designated and fitted for use as a treatment or isolation room. This room must meet the following standards:

(1) The room must be available for immediate medical use; and

(2) 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.

92.20-40 Other spaces

Each vessel must have--

(a) Sufficient facilities where the crew may wash and dry their own clothes, including at least 1 sink supplied with hot and cold fresh water;

(b) Recreation spaces; and

(c) A space or spaces of adequate size on an open deck to which the crew has access when off duty.

92.20-45 Lighting

Each berth must have a light.

92.20-50 Heating and cooling

(a) All manned spaces must be adequately heated and cooled in a manner suitable to the purpose of the space.

(b) The heating and cooling system for accommodations must be capable of maintaining a temperature of 21[deg] C (70[deg] F) under normal operating conditions without curtailing ventilation.

(c) Radiators and other heating apparatus must be so placed and shielded, where necessary, to avoid risk of fire, danger, or discomfort to the occupants. Pipes leading to radiators or heating apparatus must be insulated where those pipes create a hazard to persons occupying the space.

92.20-55 Insect screens

Provisions must be made to protect the crew quarters against the admission of insects.

92.20-90 Vessels contracted for prior to November 19, 1952

(a) Vessels of less than 100 gross tons, contracted for prior to November 19, 1952, must meet the general intent of Sec. 92.20-5 and in addition must 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 Officer in Charge, Marine Inspection.

(2) 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, must meet the following requirements:

(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 Officer in Charge, Marine Inspection.

(2) 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 Sec. Sec. 92.20-5 through 92.20-55 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, must meet the following requirements:

(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 Officer in Charge, Marine Inspection. Minor repairs and alterations may be made to the same standard as the original construction.

(2) Each vessel, which in the ordinary course of its trade makes a voyage of more than 3 days duration between ports and which carries a crew of 12 or more persons, must be provided with a suitable hospital space for the exclusive use of the sick or injured.

(3) The crew spaces must be securely constructed, properly lighted, heated, drained, ventilated, equipped, located, arranged, and insulated from undue noise, heat, and odors.

(d) Vessels of 100 gross tons and over, contracted for on or after January 1, 1941, but prior to November 19, 1952, must meet the following requirements:

(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 Officer in Charge, Marine Inspection. Minor repairs and alterations may be made to the same standard as the original construction.

(2) Washbasins, showers, and bathtubs if substituted for showers, must be equipped with adequate plumbing including hot and cold running water.

(3) Each crewmember must have a separate berth, and berths may not be placed more than 2 high.

(4) Each vessel, which in the ordinary course of its trade makes a voyage of more than 3 days duration between ports and which carries a crew of 12 or more persons, must be provided with a suitable hospital space for the exclusive use of the sick or injured. Berths shall be provided in the ratio of 1 berth for each 12 members of the crew or fraction thereof, but the number of berths need not exceed 6.

(5) The crew spaces must be securely constructed, properly lighted, heated, drained, ventilated, equipped, located, arranged, and insulated from undue noise, heat, and odors.

2.8 Navigation Safety Requirements

This part 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 Navigation Safety Regulations

164.33 (2) (i) and (3) (ii) Charts and publications

(2) For the area to be transited, a currently corrected copy of, or applicable currently corrected extract from, each of the following publications:

(i) U.S. Coast Pilot.

(3) For the area to be transited, the current edition of, or applicable current extract from:

(i) Tide tables published by private entities using data provided by the National Ocean Service.

(ii) Tidal current tables published by private entities using data provided by the National Ocean Service, or river current publication issued by the U.S. Army Corps of Engineers, or a river authority.

164.35 (g) Equipment

g) The following maneuvering information prominently displayed on a fact sheet in the wheelhouse:

(1) A turning circle diagram to port and starboard that shows the time and distance and advance and transfer required to alter course 90 degrees with maximum rudder angle and constant power settings, for either full and half speeds, or for full and slow speeds. For vessels whose turning circles are essentially the same for both directions, a diagram showing a turning circle in one direction, with a note on the diagram stating that turns to port and starboard are essentially the same, may be substituted.

(2) The time and distance to stop the vessel from either full and half speeds, or from full and slow speeds, while maintaining approximately the initial heading with minimum application of the rudder.

(3) For each vessel with a fixed propeller, a table of shaft revolutions per minute for a representative range of speeds.

(4) For each vessel with a controllable pitch propeller, a table of control settings for a representative range of speeds.

(5) For each vessel that is fitted with an auxiliary device to assist in maneuvering, such as a bow thruster, a table of vessel speeds at which the auxiliary device is effective in maneuvering the vessel.

(6) The maneuvering information for the normal load and normal ballast condition for:

(i) Calm weather--wind 10 knots or less, calm sea;

(ii) No current;

(iii) Deep water conditions--water depth twice the vessel's draft or greater; and

(iv) Clean hull.

(7) At the bottom of the fact sheet, the following statement:

Warning

The response of the (name of the 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.

164.41 Electronic position fixing devices

(a) Each vessel calling at a port in the continental United States, including Alaska south of Cape Prince of Wales, except each vessel owned or bareboat chartered and operated by the United States, or by a state or its political subdivision, or by a foreign nation, and not engaged in commerce, must have one of the following:

(1) A Type I or II LORAN C receiver as defined in Section 1.2(e), meeting Part 2 (Minimum Performance Standards) of the Radio Technical Commission for Marine Services (RTCM) Paper 12-78/DO-100 dated December 20, 1977, entitled ``Minimum Performance Standards (MPS) Marine Loran-C Receiving Equipment". Each receiver installed must be labeled with the information required under paragraph (b) of this section.

(2) A satellite navigation receiver with:

(i) Automatic acquisition of satellite signals after initial operator settings have been entered; and

(ii) Position updates derived from satellite information during each usable satellite pass.

(3) A system that is found by the Commandant to meet the intent of the statements of availability, coverage, and accuracy for the U.S. Coastal Confluence Zone (CCZ) contained in the U.S. ``Federal Radionavigation Plan" (Report No. DOD-NO 4650.4-P, I or No. DOT-TSC-RSPA-80-16, I). A person desiring a finding by the Commandant under this subparagraph must submit a written application describing the device to the Assistant Commandant for Op-

erations, 2100 Second Street SW., Washington, DC 20593-0001. After reviewing the application, the Commandant may request additional information to establish whether or not the device meets the intent of the Federal Radionavigation Plan.

Note: The Federal Radionavigation Plan is available from the National Technical Information Service, Springfield, Va. 22161, with the following Government Accession Numbers: Vol 1, ADA 116468, Vol 2, ADA 116469, Vol 3, ADA 116470, Vol 4, ADA 116471

(b) Each label required under paragraph (a)(1) of this section must show the following:

(1) The name and address of the manufacturer.

(2) The following statement by the manufacturer: This receiver was designed and manufactured to meet Part 2 (Minimum Performance Standards) of the RTCM MPS for Marine Loran-C Receiving Equipment.