ADDENDUM TO ANNEX

To the

Agreement Governing the Delegation of Certain Survey and Certification Services for United States of America Flagged Vessels

Between the United States Coast Guard and Germanischer Lloyd

SUPPLEMENTAL REQUIREMENTS

CONTENTS

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 Germanischer Lloyd‘s (GL) Rules and Guidelines for the Classification and Construction of Seagoing Ships.

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.

2. Supplemental Requirements

2.1. TONNAGE

There are no supplemental requirements.

2.2. LOAD LINE

There are no supplemental requirements.

2.3. SOLAS - Safety Construction

The following supplemental requirements 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	
31.36-1	All structural fire protection elements shall be either: - Coast Guard approved according to SOLAS requirements OR - Approved to US Coast Guard national requirements where no SOLAS requirements exist OR -
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.
SUBCHAPTER F – MARINE ENGINEERING	
52.01-2	The use of cast iron for mountings, fittings, valves, or cocks attached directly to boilers operating at more than 1.03 bar is prohibited. Threaded boiler tubes are not permitted. Audible and visible high water level alarm is required for watertube boilers used for propulsion. Radiographic and ultrasonic examination of welded joints shall be as described in PW-11 of the ASME Code, except that parts of boilers fabricated of pipe material such as drums, shells, risers, downcomers, cross-pipes, headers and tubes containing only circumferentially welded butt joints shall be nondestructively examined as required by section 56.95-10 of this subchapter, even though they may be exempte d by the size limitations specified in PW-11.1.2 and PW-41.1 of the ASME Code.
52.01-10	Mercury tube actuated controls are not permitted . Boiler must satisfactorily operate with up to 30° momentary roll . The use of cast iron or malleable iron in fuel systems is prohibited . Oil fired main boilers and Auxiliary boilers supplying steam for vital services must be equipped with two fuel oil heaters (only required for high-viscosity fuels) and two fuel oil supply pumps of approximately equal capacity, each capable of being isolated from the system. Suction and discharge strainers of duplex or comparable type are to be installed. Pipe unions may be used only for pipe diameters smaller than 25 mm (46CFR 56.50-65). Nonferrous, heat sensitive materials like aluminum and aluminum alloys e.g. must not be used in fuel systems among others unless approved by the Marine Safety Center (46CFR56.60-20).

	For automatic auxiliary boilers, float type low water level cut-off controls arranged in stuffing box tightened chambers are not permitted. No other equipment than pressure controls, water columns, drains, steam gages may be connected to float chambers (46CFR63.20-1). Audible alarm and visual indication must indicate the presence of a soot fire in exhaust gas boilers (46 CFR sections 52.25-20 and 63.25-7).
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	Elements of pressure relief devices of pressure vessels shall be carried out in accordance with this regulation referring to Division 1 of Section VIII of the ASME Code UG-125 through UG-136.
56.20-15	A valve in which the closure is accomplished by resilient non-metallic materials instead of a metal to metal seat shall comply with the design, material, construction and testing for valves specified in this regulation.
56.35-10	Non-metallic expansion joints are not permitted in systems penetrating the ship's side below deepest load water line without shut off device (skin valve) at the ship's side.
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).
56.60-25	Plastic piping shall be USCG approved (164.141/xx/x) Plastic pipe that is to be used for potable water shall bear the seal of approval or NSF mark of the National Sanitation Foundation Laboratory, Incorporated, School of Public Health, University of Michigan, Ann Arbor, MI 48103
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.
61.15-12(b)	(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)	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.
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). ----------
62.20-3(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.
62.25-20(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.
62.25-25(d)	(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)	(1) Each operator control device must have a detent at the zero thrust position.
62.35-15(a)	All required fire pump remote control locations must include the controls necessary to charge the fire main and (1) A firemain pressure indicator; or (2) A firemain low pressure alarm.
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 shutdown 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)	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 46CFR111.103 of this chapter; and (7) Voice communications with the bridge.
62.50-30(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.
SUBCHAPTER H – PASSENGER VESSELS	
70.28-1	All structural fire protection elements shall be either: - Coast Guard approved according to SOLAS requirements OR - Approved to US Coast Guard national requirements where no SOLAS requirements exist OR - .

SUBCHAPTER I – CARGO AND MISCELLANEOUS VESSELS	
90.27-1	All structural fire protection elements shall be either: - Coast Guard approved according to SOLAS requirements OR - Approved to US Coast Guard national requirements where no SOLAS requirements exist OR -
92.07-1(c)	Method IC in accordance with SOLAS 74 as amended is to be applied.
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(a)	All living spaces shall be adequately ventilated in a manner suitable to the purpose of the space.
92.15-15(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.
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.
111.12-1(c)	Each prime mover must shut down automatically upon loss of lubricating pressure to the generator bearings if the generator is directly coupled to the engine. If the generator is operating from a power take-off, such as a shaft driven generator on a main propulsion engine, the generator must automatically declutch (disconnect) from the prime mover upon loss of lubricating pressure to generator bearings.
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 volta ge 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.

<table>
<tr><td>111.25-15</td><td>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

<table>
<tr><th>Application of motor</th><th>Minimum short-time rating of motor, in hours</th></tr>
<tr><td>Deck winch and direct acting capstan.....</td><td>Half.</td></tr>
<tr><td>Deck winch with hydraulic transmission.....</td><td>Continuous at no load followed by \1/2\ hr. at full load.</td></tr>
<tr><td>Direct acting windlass.....</td><td>One fourth.</td></tr>
<tr><td>Windlass with hydraulic transmission.....</td><td>Half hour idle pump operation, followed by \1/4\ hr. full load operation.</td></tr>
<tr><td>Steering gear, direct acting.....</td><td>One.</td></tr>
<tr><td>Steering gear, indirect drive.....</td><td>Continuous operation at 15 pct. load followed by 1 hr. at full load.</td></tr>
<tr><td>Watertight door operators.....</td><td>\1/12\.</td></tr>
<tr><td>Boat winches.....</td><td>\1/12\.</td></tr>
</table></td></tr>
<tr><td>111.50-3(d)</td><td>Parallel overcurrent protective devices. An overcurrent protective device must not be connected in parallel with another overcurrent protective device.</td></tr>
<tr><td>111.50-7(a)</td><td>Overcurrent devices shall be enclosed in cabinets.

Enclosures for overcurrent devices shall be mounted in vertical position.</td></tr>
<tr><td>111.50-7(b)</td><td>No enclosure may be exposed to the weather unless accepted by the Commandant.</td></tr>
<tr><td>111.54-1(d)</td><td>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.</td></tr>
<tr><td>111.54-1(e)</td><td>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.</td></tr>
</table>

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 bustie — 75 percent of generating capacity of the larger switchboard Emergency switchboard bustie — 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 netural 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 restarted 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.
111.105-32(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\

	Cargo vessels; miscellaneous self-propelled vessels; tankships; barges with sleeping accommodations for more than 6 persons; mobile offshore drilling units; and oceanographic vessels: - 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, whiche ver 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.
112.15-15-1	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 ve 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.
SUBCHAPTER S – SUBDIVISION AND STABILITY	
	- *Each vessel must comply with the applicable requirements of the Annex to IMO Resolution A. 749(18) "Code of Intact Stability for All Types of Ships Covered by IMO Instruments," as amended, and any other*

		applicable IMO guidance or requirements.
170.120	-	*(a) Except as provided in (b) below, each vessel must have a stability letter issued by the Coast Guard or the American Bureau of Shipping before the vessel is placed into service. This letter sets forth the conditions of operation.* *(b) A stability letter is not required if the information can be placed on the Certificate of Inspection or the International Load Line Certificate.*

2.4. MARPOL - Annex I

There are no supplemental requirements.