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REGULATIONS

of the

NATIONAL FIRE PROTECTION ASSOCIATION

GOVERNING

Marine Fire Hazards

Prepared by the Committee on Marine Fire Hazards, Adopted 1922

FIRE PREVENTION REGULATIONS FOR THE CONSTRUCTION AND MAINTENANCE OF VESSELS.

Throughout the following, where the word "approved" is used in designating type, construction, etc., it refers to the approval of the Inspection Department and Classification Societies having jurisdiction.

No provision in these regulations is to be retroactive as regards construction.

CONSTRUCTION.

Article I. Boilers.

1. Lagging. All boilers, including steam domes, shall be thoroughly covered with asbestos or other approved heat-insulating material; such covering to extend down sides below the line of grate bars. However, vertical or donkey boilers need not be covered provided all woodwork within 18 inches at sides or within 2 feet 6 inches of uptakes or breeching is covered with sheet metal over sheet asbestos.

Note: Vessels having boiler houses with steel sides, ends, and roof, will not be required to have boilers covered.

2. Floors. All fire-room floors shall be covered with iron plate or at least 2 inches of cement, or other approved material. At least ¼-inch asbestos board or 1-inch plastic asbestos or equivalent shall be laid over all woodwork under a fire-room floor.

3. Foundations. The floor under the grate bars of all externally fired or leg boilers shall be of brick or cement at least 6 inches thick, vented by the insertion of old tubing laid horizontally, or its equivalent, under which shall be at least ⅜-inch asbestos board or 1½-inch plastic asbestos or

equivalent covered with sheet metal. The floor under vertical boilers, if laid on a wood deck, shall be of brick or cement or other approved material, similarly vented, at least 2½ inches thick, extending out in front at least 3 feet; or, if less, shall have a fire-resistive coaming around said floor projecting at least 2½ inches above it, or be covered by a metal pan with projecting edges. On all such floors, under the brick or cement there shall be at least ¼-inch board or 1-inch plastic asbestos or equivalent covered with sheet metal.

4. In Way. Where coal and wood, or stores, or cargo of any description, except oil, are carried or may be carried alongside of boilers, a partition shall be built at least 4 inches clear, to prevent anything being placed next to the boilers; and under no circumstances may anything be placed between such partitions and the boilers. If anything is or may be carried near the back ends of boilers, similar partitions or bulkheads are to be fitted, but these shall be at least 2 feet distant from boilers, and space between them and boiler kept clear and clean. Under no circumstances may a wood platform, locker or grating be fitted over top of any boiler nearer than 12 inches, and no lines, clothes, or other combustible articles be laid over or alongside of boilers.

5. Ash Guards. A steel coaming at least 12 inches high shall extend from the front of all boilers to side partitions to prevent coal or ashes getting into wings.

6. Drip Pans. Where oil is used for fuel, on leg or externally fired boilers there shall be a drip-pan of heavy iron under the fire boxes to catch all drip. Where wood is used for fuel, a water pan shall be fitted under the grates, and a partition or metal screen erected to prevent cinders or sparks

being blown into the woodpiles. In no case may the wood be stacked against the boiler.

7. Casings. The construction of the house or casing over and around the boiler should be of such nature that hot air or gases cannot be pocketed at any high point; but if such exist, suitable vent louvres shall be cut in sides of house or casings to provide a circulation of air.

8. Bulkheads. Screen bulkheads between fire room and engine room should, where possible, extend down to the tank top or shell of the vessel in order to form a fire wall between engine room and fire room bilges. Where oil burning equipment is installed, these bulkheads should be made oil-tight to at least two feet above the tank top and bilges to prevent any oil reaching the engine room bilges and tank top.

Article II. Stacks.

9. In Way. Where a smoke stack passes through a wood deck, the woodwork should be cut away at least 12 inches from the stack and the wood faced with a metal collar over sheet asbestos; but where the construction of the vessel will not permit a space of 12 inches, there shall be an opening at least 4 inches wide around stack; this opening to be completely faced with a metal collar extending at least 6 inches above roof and 6 inches below same, and the carlins and roof on under side around opening, covered with sheet iron extending back radially at least two feet. Sheet asbestos at least ⅛ inch thick shall be placed under all metal.

10. Umbrellas. The bottom of the flange of the umbrella around stack shall be higher than the top of the flange around the opening in the deck, leaving a clear horizontal space for the escape of the gases or else a perforated coaming shall be used.

11. Wood Burners. The stacks of all vessels using wood for fuel shall be fitted with spark arresters.

Article III. Steam Pipes.

12. Lagging and Clearances. All main and auxiliary steam pipe lines shall be thoroughly covered with asbestos or other approved material if within six inches of woodwork; and where such steam pipes pass through woodwork, they shall be fitted with a proper metal collar and the woodwork cut away or protected in an efficient manner.

Article IV. Bunkers and Holds for Coal.

13. Vents. Ventilation of all hold, wing, and 'tween-deck bunkers shall be provided for by pipes or trunks leading to outside atmosphere.

14. Temperature Testing. Reserve bunkers and holds shall be provided with sounding trunks so that internal temperatures may be read as required.

Article V. Bunkers and Tanks for Oil.

15. General. The storage of oil shall be restricted to cellular double bottom, hold, deep, peak, bunker, settling and other tanks specially constructed for this purpose. These compartments and tanks shall be fitted with approved bulkheads, sub-divisions or swash plates. They shall be so strengthened as to satisfactorily withstand the stresses brought upon them in a seaway when partially filled; and if separate from the hull, shall be properly braced and secured thereto by chocks or clips riveted to both tank and foundation. The scantlings and riveting shall be in accordance with the requirements of the American Bureau of Shipping, or approved equivalent, for vessels and tanks carrying oil in bulk.

16. Location. Fuel tanks should not be located on deck; but if such an arrangement is necessary, the installation must be approved.

In order to avoid as far as possible uncontrollable flooding in event of accident; the amount of piping under static head of fuel oil should be reduced to a minimum consistent with the design of the system.

17. On Wooden Vessels. On wooden vessels a lead lining shall be placed under tanks which are separate from the hull. Lining shall be not less than 8 lbs. per square foot, laid over a coaming at least 6 inches high and drained to a sump fitted with independent stripping suction at the lowest point. These tanks shall be not less than 18 inches from boilers at all points except the back where they shall be at least 24 inches distant.

18. Tests. All oil storage compartments and tanks shall be tested by a head of water in accordance with the requirements of the American Bureau of Shipping or approved equivalent.

19. Painting. All oil tanks, compartments, and bunkers shall be thoroughly coated on the outside with a suitable non-flammable and rust-resisting material.

20. Vents. An independent, permanently open, iron vent pipe terminating in a goose neck or approved automatic valve in the open air and above the upper deck shall be provided for every oil tank, compartment or bunker.

Vent openings shall be screened (40 x 40 non-corrodible mesh). and of sufficient freeing area to permit unrestricted inflow of liquid during the filling operation (in no case less than two inches in diameter) and accessible for examination and removal.

Vents shall terminate well above the top of the fill pipe; or, if tight connection to the tank is made in the filling line, at a point one foot above the level of the top of the highest reservoir from which the tanks may be filled and never less than 3 feet, measured horizontally and vertically, from any porthole, window or other similar opening.

21. Fill Pipes. On tankers, fill pipe deck terminals shall be kept closed when not in use; and on other oil burning vessels, they shall be so designed as to make access difficult by unauthorized persons.

22. Manholes and Hatches. Manhole and hatch covers of oil tanks on all vessels shall be designed to fasten securely; and on oil burning cargo or passenger vessels shall be bolted, dogged or locked, and labeled or painted a distinctive color designating them as openings to oil tanks.

23. Drainage. Adequate means shall be provided by wells or gutter-ways and sparring or lining, to prevent any leakage from the fuel oil compartments coming into contact with cargo and to ensure that any such leakage shall have free drainage into the limbers or wells. In machinery spaces, such leakage shall be confined by gutterways to bilge cofferdam spaces next to tank bulkheads; and these spaces shall be drained independent of the main bilges by stripping suctions to a suitable pump.

24. Double Bottoms. If double bottoms under holds are used for carrying oil fuels, the ceiling shall be laid on transverse battens, having at least a two-inch air space between the ceiling and tank top and permitting free drainage from tank top into the limbers. The method of venting this space shall be subject to approval.

25. In Way. A clearance between oil tanks and boilers, boiler casings and breachings of not less than 24 inches at the back ends of boilers and 18 inches elsewhere shall be arranged; and all structures giving off heat shall be effectively insulated if within 18 inches of any oil tank or compartment.

26. Cofferdams. The practice of constructing a cofferdam between deep fuel tanks and cargo tanks or storage compartments is recommended for all oil burning steam vessels. Such construction is considered unnecessary on motor vessels using fuel other than gasolene. On steam vessels burning oil of a flash point lower than 150° F., closed cup, there shall also be a cofferdam between fuel bunker and fire-room compartment. The space enclosed by cofferdams shall be vented in accordance with the provisions of section 20.

Article VI. Oil Burning and Heating Systems.

27. General. It is strongly recommended that systems whereby oil is pumped from tank to the burners be used; but in cases where pumping system is deemed impractible and the use of gravity feed is desired, special permission shall be obtained for installation and detailed plans submitted and approved.

Pumps shall be in duplicate, of an approved design, well secured against leaks under a test pressure 50% in excess of the designed pressure of the system carried.

Whether pumps are located inside or outside of the fire room, gear shall be installed for operation from deck of stop valves on each tank and throttle valves on both service and booster pumps. This provision does not apply to fuel pumps on motor vessels.

On steam vessels burning oil of a flash point

lower than 150° F., closed cup, the pumps handling such oil shall be located in a compartment separated from the rest of the machinery space by gas-tight bulkheads and accessible therefrom only by a gas-tight door.

The piping and spindles of fire-room controls shall be made gas-tight where they pass through the pump room bulkheads.

This pump room shall be provided with induced ventilation always sufficient to reduce the pressure therein slightly below that in the compartment from which entry is made. The provision of section 20 shall also be observed.

28. Oil Level Indicating Devices. Devices for ascertaining or indicating the oil level in storage and service tanks shall be provided. Use of gauge classes is prohibited except on motor vessels using fuel other than gasolene. Sounding pipes and spring loaded trycocks normally closed are approved. It is recommended that, where practical, a compression chamber connected by air piping to a mercury gauge be installed, with gauge and annunciator mounted on a board to indicate and signal audibly when the contents of each tank reaches a predetermined level. Other methods of meeting this provision are subject to approval.

29. Heating of Tanks. Where it is necessary to heat oil in storage tanks in order to handle it, the heating shall be done by means of properly installed coils or other approved system using only steam or water. Thermostatic control and thermometer are recommended for all heating devices.

30. Heaters, Other than Those For Tanks. Heaters shall be of substantial construction with oil-tight joints. Only steam, water or approved electric device may be used for heating. A ½-inch relief valve, set at 400 pounds per square inch and

discharging to the suction line or tank shall be fitted on the oil side of all heaters to prevent the accumulation of excess pressure when the heater is shut down, due to expansion of the oil caused by leaky steam supply valve or failure to shut off the steam supply.

31. Burners and Air Registers. Drip pans shall be fitted under each burner. Air registers should include provisions for the inspection of burner tips while register is in use. Registers should permit ready adjustment in area of air openings.

Burners shall be fitted in the registers so that they may be shut off, readily removed, or cleaned independently of each other.

Article VII. Fuel Oil Piping and Fittings.

32. Tank Piping. A piping system for fuel oil storage tanks separate and distinct from other piping in the vessel is recommended; but an interchangeable system providing a method which precludes the possibility of a mixture of ballast water and oil may be used subject to approval.

33. Type and Material. All piping and fittings comprising the fuel oil system between pumps and burners shall be of the extra heavy type. Seamless drawn pipe is recommended for all pressure lines, but in installations burning oil of a flash point lower than 150° F., closed cup, such piping shall be seamless drawn. No pipe less than ⅜ inch internal diameter may be used. Unions, if used in place of right and left couplings, shall be of an approved type.

34. **Installations.** All piping shall be run as directly as possible without sags and so installed that, where possible, pipes pitch toward supply tanks without traps, and provisions shall be made for expansion, contraction, jarring and vibration.

35. Test. Oil piping between pumps and burners shall be tested and proven tight at a pressure of not less than 500 pounds per square inch. All joints and fittings in the pressure piping shall be kept oil-tight under service conditions.

36. Protection. Piping shall be exposed to sight wherever possible to insure prompt detection of leaks, and shall be protected against mechanical injury in an approved manner.

Pipes extending above the floor, particularly risers to furnaces, shall be effectively cased or jacketed to prevent loosening or breakage.

Fill and vent pipes shall be protected in an approved manner against mechanical injury.

37. Valves. All valves shall be of an approved type. Shut-off valves shall be located as follows: On both sides of any strainers installed in pipe lines; in discharge and suction lines at the pumps; in discharge and suction lines to any tank, directly on the tank; and in branch lines to burners.

A pressure relief valve shall be installed in the discharge line to burners and so arranged as to return surplus oil to the suction line.

38. Strainers. Duplex strainers shall be fitted in the suctions of both booster and fuel oil service pumps; provided, however, that if booster pumps are used to deliver oil to the suctions of the service pumps, the strainers need be fitted only in the booster suction. Strainers shall be so designed that one side can be cut out for cleaning while the other is the service.

Article VIII. Lighting.

39. Lamp Rooms. All wooden oil and lamp rooms or lockers shall be completely lined with sheet metal nailed over asbestos at least ¼ inch thick, and nailing protected in accordance with

N. F. P. A. standard for fire door construction. No openings except doors or covers will be permitted.

40. Oil Lights. All oil lamps shall have metal bodies and, except hand lanterns, shall be kept in brackets well secured or suspended and stayed. They shall be secured in the brackets by an approved device for holding them in place, and shall have metal shields over them. Hand lanterns when suspended shall be secured by clips. It is recommended that solidified fuel, being safer and smokeless, be used in lamps, where possible.

41. Electric Lights. On all vessels using electric lights, the wiring for same shall be run in armored cable or metal conduit in the following locations: In holds, in engine and boiler rooms, in bunkers, in cargo spaces or other places where cargo is carried, and where wiring is run outside. Switchboards, fixtures, wiring and all other electric apparatus shall be installed in accordance with the rules of the National Electric Code.

Note: The "Recommended Practice for Electrical Installations on Shipboard" issued by the American Institute of Electrical Engineers is recommended as a guide for electrical installations. This is consistent with the requirements of the National Electrical Code and goes more into detail both with regard to good practice as affecting fire hazards, and also with regard to many other questions of installation, maintenance and operation having bearing on durability and safety on vessels.

Article IX. Galley and Heating.

42. Ranges. The galley range shall be securely fastened to the deck, at least 1 inch air space or approved equivalent insulation being provided between the bottom of range and deck; and, if galley floor is wood, range shall have metal under it extending out in front at least two feet. If range is within 18 inches of a wooden bulkhead, such bulkhead shall be covered with sheet metal over

asbestos at least ¼ inch thick. All smoke-pipes or stacks passing through wooden bulkheads or partitions shall be fitted with a proper metal collar and have woodwork cut away. Galley ranges shall have metal hood over them or have the ceiling protected with sheet metal over asbestos at least ⅛ inch thick. No wooden warming racks over stoves will be permitted.

43. Steam Heat. A complete steam-heating plant on steam vessels is recommended. All steam-heating pipes and radiators shall be kept clear of woodwork. Where radiators are adjacent thereto, a metal shield shall be fitted behind each with ¼ inch air space between shield and woodwork.

44. Stoves. The use of stoves is discouraged; but where used, they shall be securely fastened to the deck, at least 1 inch air space being provided between bottom of stove and deck; and shall have sheet metal on the floor under them extending out on all sides at least 12 inches. If stove is within 18 inches of a wooden bulkhead, such bulkhead shall be protected with sheet metal over asbestos at least ¼ inch thick. All smokepipes or stacks passing through wooden bulkheads or partitions shall be fitted with proper metal collars and have woodwork cut away; and all woodwork within 8 inches of smokepipe shall be protected with sheet metal over asbestos at least ⅛ inch thick.

APPLIANCES.

Article I. General.

45. In addition to fire fighting equipment required by rules of U. S. Steamboat-Inspection Service, it is recommended that small gear such as smoke helmets, life lines, slickers, and gloves, be provided and kept in approved convenient places.

Article II. Hose and Couplings.

46. Hose shall be of an approved type. All hose couplings and fittings shall be in accordance with National Standard of the N. F. P. A.

Article III. Sprinklers.

47. Features of Design. To improve and encourage the use of sprinkler fire protection aboard ship, it is recommended that the following features be incorporated in any system.

The system and apparatus should be as simple and inexpensive as possible; and, so far as applicable to marine work, should comply in detail with regulations of the N. F. P. A.

The design should be such that it would operate only in case of fire, and not subject the ship or its contents to consequential damage due either to freezing, accidental operation, breakage or to any causes other than fire. To this end, the sprinkler pipes should preferably be empty and under atmospheric pressure; but served by fire pumps of ample capacity. The control should be dual, both manual and automatic; but it is recommended that the automatic feature be attained only through the use of a thermostatic control or other system which would prevent release of water except in the presence of heat.

48. Location. Automatic sprinkler equipment is recommended in cabin, store, crew and passenger spaces; and optionally, in cargo and machinery spaces, owing to the usual impracticability of stowing cargo or arranging machinery to allow proper distribution of a sprinkler equipment.

Article IV. Smothering Devices.

49. Steam Jets. Steam jets controlled by master valves in accessible location are considered a satisfactory means of fighting fires in the cargo

spaces of a vessel in the present stage of development of extinguishing apparatus. The size and number of steam smothering pipes called for herein are based on a steam pressure of 100 pounds. These sizes are suitable for higher pressure than 100 pounds, but for lower pressure they should be proportionately increased.

(a) Each compartment shall have a branch with steam jets of sufficient size to fill it in not more than fifteen (15) minutes.

(b) The main supply pipe from boilers on steam line shall be of sufficient size to supply 50% of the total volume of all the cargo spaces at one time.

(c) Main supply line on deck, running forward and aft, shall be of equal area at any point to the combined area of the branches taken from same, but at no point need its area be in excess of the main supply from machinery space or 50% of the area of all the branches in the vessel.

(d) The orifice area of the steam jets supplied by any branch pipe shall be at least equal to the cross sectional area of such pipe; that is, the end of the pipe may be left open, or it may be closed and a number of openings made in the pipe, the combined area of which shall be at least equal in area to the open end of the pipe.

(e) Maximum size of branch steam pipe to any cargo compartment shall be one and one half inches (1½″) nominal diameter.

(f) Cargo spaces requiring more steam than would be supplied by a one and one-half inch (1½″) pipe shall have additional branch pipes and steam jets.

(g) Minimum size of branch pipe to any cargo compartment shall be one inch (1″) nominal diameter.

(h) Minimum size of branch pipe to lamp rooms, paint lockers, etc., shall be three-quarters inch (¾″) nominal diameter.

Where
L—Length of compartment ,in feet.
B—Breadth of compartment, mean, in feet.
H—Depth of compartment, mean. in feet.
D—Diameter of pipe required, in inches.
Then

$$D^2 = \frac{L \times B \times H}{30000}$$

Or in accordance with the following table:

Values of $L \times B \times H$	Connection No. of Inlets	Size of Inlets
30,000	1	1″ I.D.
46,000	1	1¼″ I.D.
67,000	1	1½″ I.D.
94,000	2	1¼″ I.D.
135,000	2	1½″ I.D.
203,000	3	1½″ I.D.

Size of Main steam pipe

$$D^2 = \frac{\text{Summation of all } (L \times B \times H)}{60,000}$$

50. Gas. The use of inert gas, such as carbon dioxide for extinguishing or preventing fire may be applied to holds, bunkers, and other closed compartments not normally accessible to crew or passengers; but, on account of danger to life, the use of gas of this character shall be restricted to such spaces. On motor vessels and those equipped with insufficient boiler capacity to permit effective application of steam smothering, the installation of a gas system, subject to the foregoing restrictions, is recommended.

Article V. Fire Room Apparatus.

51. On Coal or Wood Burners. In addition to regularly prescribed hose and extinguishers in

each fire room; steam fire hose, coupled to the injectors and of sufficient length to reach all parts of fire room, should be provided.

52. On Oil Burners. *In fire rooms with oil* burning boilers a sufficient number of 2½-gallon foam-type chemical fire extinguishers shall be provided; and a box of dry sand with a scoop may also be supplied. It is also recommended that an extinguishing system be piped to inaccessible parts of fire room, such as under boilers and floor plates and in bilges. A foam or steam-smothering installation is approved for this purpose. Either an automatic or manual system or a combination of both may be used, but control of all manual systems should be from both inside and outside of the fire and engine room spaces. The type, number and location of extinguishers and layout of pipe lines and nozzles shall be subject to approval.

Article VI. Extinguishers.

53. General. Hand chemical extinguishers should be distributed through all parts of the vessel accessible to crew or passengers and the selection and distribution governed by the regulations of the N. F. P. A. Committee on Field Practice. All extinguishers should be of types approved by the U. S. Steamboat-Inspection Service and on the list of inspected mechanical appliances issued by the Underwriters' Laboratories.

Article VII. Detection and Alaram.

54. General. It is recommended that on passenger and cargo vessels, except tankers, pipes for detection of smoke or fumes be led from holds, bunkers and inaccessible parts liable to fires, to the bridge, engine room or other points where they may be readily observed; and that vessel be equipped throughout with a fire alarm system approved as to type and installation.

OPERATION.

Article I. General Requirements.

55. In addition to the U. S. Government Rules as to operation, quarters, stowage and packing of hazardous cargoes, etc., the following are recommended or required as noted.

Article II. Drills and Quarters.

56. It is recommended that certain members of the crew be designated as fire wardens and trained to special duties such as use of smoke helmets and extinguishing apparatus, life saving, etc.; and that some form of compensation or privilege be accorded the men so designated.

Article III. Care of Coal Bunkers.

57. Care shall be taken that all vents are clear when bunkering is completed. In case of vessels having wooden bunkers using soft coal for fuel, same shall be thoroughly cleaned out at least once every sixty days while vessel is in commission. The coal bunkers of all vessels shall be cleaned on going out of commission or being laid up for over sixty days, making sure that all coal dust and rubbish are removed. Special care shall be taken in cleaning shelf pieces.

Article IV. Painting.

58. Care shall be taken to ventilate, so far as possible, all confined spaces where paint containing inflammable ingredients is being used or stored and naked lights in such spaces are prohibited. Paint lockers shall not be located in close proximity to boilers or stacks.

Article V. Fuel Oil Requirements.

59. Flash Point. These regulations are intended to apply generally to those oil burning

equipments using only liquids having a flash point above 150° F., closed cup tester; however, the necessity, under certain conditions, of burning fuel oil of lower flash than this point is recognized and additional requirements for the use of such oils are noted in sections 26, 27, 33 and 78 of these regulations. No untopped oil shall be used for fuel except in accordance with these additional precautions.

60. Flash Test. In determining the flash point, either Elliott, Abel, Abel-Pensky or Tag closed testers shall be used, but the Tag closed testers (Standardized by the United States Bureau of Standards) shall be authoritative in case of dispute. All tests shall be made in accordance with the methods of tests as adopted by the American Society for Testing Materials.

Article VI. Loading and Bunkering of Oil.

61. Preliminary. Before commencing to load oil, all signal bells, gongs, etc., shall be tested to insure working condition.

62. Oil Hose. Hose used for filling or discharging shall be of the flexible metallic type equipped with oil tight flanged joints or some other approved coupling device for the purpose of preventing rupture of connections. The inner metallic lining of such hose shall be effectively grounded against possible charge of induced electricity.

63. Hatches and Manholes. No double bottom, deep, peak or independent tank manhole or hatch opening shall be used for fuel oil filling purposes, except on tankers where trunk hatches extend to weather deck and proper warnings are posted while operation is underway.

Hatches on tankers shall be kept closed during loading or discharging except when in use for such

purposes. Tugs or other steam vessels shall not be allowed alongside when oil tank hatches are open.

64. In Way. While oil is being received or discharged, no open lights or fire, smoking, or electrical apparatus liable to spark shall be permitted within 50 feet of an opening in any oil hose, tank or compartment containing a tank or vents.

65. Galley. *If practicable, galley fires in* tankers shall be extinguished during loading or discharging; otherwise, openings to the galley shall remain tightly closed.

66. Lights. Loading or discharging should, as far as possible, be carried on in the day time. When carried on at night, no lights shall be permitted on the deck. Flood lighting or lights in clusters suspended in the rigging well above the deck are approved. Wires shall not lie on or drag across the deck. The use of portable connected electric lights on deck of tankers or in tanks or pump rooms of any oil burning or oil carrying vessels is prohibited.

Article VII. Tank Cleaning and Disposal.

67. Dry Dock. When vessels containing fuel oil of any kind are in dry dock, care shall be taken that no oil drains onto the dock. Should it be necessary to remove oil from tanks, precautions shall be taken to prevent any oil escaping to form an accumulation of vapor or oil on or around the dock. Should any oil so escape, it shall be skimmed and disposed of ashore.

68. In Port. Tankers or other vessels carrying water for ballast in fuel oil compartments or double bottom shall not discharge such water

ballast into rivers or harbors or adjacent to ships or docks.

69. Tank Freeing. Tanks, valves and pipe lines throughout the vessel shall be freed of vapor in accordance with the regulations of Appendix A before repairs in way are undertaken.

Article VIII. Precautions on Oil Burning and Tank Vessels.

70. Inspection. The inside of oil compartments and tanks should be inspected at least annually; and bulkheads separating such compartments from others should be examined for leaks during inspections and whenever oil is taken aboard.

71. Tank Readings. Gauge valves or cocks fitted to the storage or settling tanks shall be kept closed, except when a reading is to be made; and shall be closed immediately upon completion of the reading.

72. Dampers. Dampers in stacks and up-takes shall always be kept sufficiently open while burning oil, in order to prevent dangerous accumulations of vapor in the furnace or breechings with consequent blowing back into the fire room.

73. Tests. Whenever that part of the oil system subject to pressure has not been in use for a week, or after joints in same have been remade, it should be tested cold under a pressure at least equal to the working pressure; and a careful inspection made for leaks before fires are lighted. All fuel oil fittings should at all times be kept in working order; and the oil slats, drafts, and valves should be frequently moved when not in use to insure such condition.

74. Vents. Frequent inspection shall be made to insure that wire gauze screens in vents are clean and intact.

Article IX. Furnaces and Fires on Oil Burning and Tank Vessels.

75. Re-Lighting. In the event of oil accumulating in the furnace, such as might be caused by sudden extinguishing of the burners, the vapor must be blown out and drip oil removed before burners are again lighted.

76. Fire Room. Oil shall not be permitted to accumulate in the oil boxes, openings of furnaces, bilges, or on the floor plates; and no lighted material shall be allowed access to the bilges. After fires are out, bottoms of furnaces shall be examined and any oil remaining removed. In case of leakage of oil system in fire room, immediate action shall be taken to shut off the oil supply.

77. Galley. On tankers, when coal burning galley fires are lighted, the use of waste, chips, oil, etc., shall be prohibited, and only a limited amount of wood covered with coal shall be used. Every precaution shall be taken to prevent sparks or flame from blowing out the smokepipe.

78. Low Flash Oil. When oil of a flash point lower than 150° F., closed cup, is used, attention is called to the extra hazard incurred by permitting any such oil to escape and gas therefrom to form an explosive mixture with the inclosed atmosphere of fire room or compartment. Rules for handling, heating and burning of such oil should be laid down by the superintending engineer according to his best judgment and experience, and no deviation therefrom on the part of engineering subordinates allowed. This general regulation is promulgated pending the results of further investigation of low flash oil hazards.

79. Matches. The use aboard tankers or oil burning ships of other than strike-on-box matches is prohibited.

Article X. Cargoes.

80. General. A comprehensive treatment of the subject of hazardous cargoes and their packing and stowage is beyond the scope of these regulations; but specific cases for stowage of such cargoes may be referred to regulations of the following authorities: Interstate Commerce Commission for Transportation on Railways of U. S. as contained in Bureau of Explosives Pamphlet No. 9; U. S. Steamboat Inspection Service, as contained in Revised Statutes No. 4472 and special bulletins; and the Rules of the American Steamship Owners' Protection and Indemnity Association; which regulations the committee recommends adopting in full, pending regulations to be drawn by the Interstate Commerce Commission covering marine transportation as authorized by Act of Congress in March, 1921.

APPENDIX—A.

Regulations For Freeing Oil Tanks, Bunkers and Compartments of Flammable and Explosive Vapors Previous to Entering for any Purpose or Making Repairs on Oil Burning or Oil Tank Vessel.

1. For the purpose of these regulations, an "explosive or inflammable liquid" is defined as one which when vaporized and mixed with air in proper proportion, is flammable or explosive.

2. No repairs of any kind shall be made to any tank, compartment, bunker, or other container or space, previously containing explosive and flammable liquids, in any vessel until the requirements hereinafter outlined have been complied with.

At sea or in ports where the means of carrying out these requirements are not available and the safety of the vessel necessitates emergency or temporary repairs, such repairs may be made to permit the vessel to proceed to the port of destination.

3. The process of freeing such containers of vapor shall be as follows:

4. (a) Tanks shall be closed and live steam blown into the tanks or space to be cleaned and all pipes leading thereto or therefrom for a period of time to be governed by the condition and the nature of the oil carried. Vent pipes shall be proved and left open.

Inasmuch as the time for steaming will be determined by the foregoing, no definite rule is laid down to cover all contingencies, but the following table is recommended as covering average general conditions.

Where

L—Length of compartment in feet.

B—Breadth of compartment in feet.

H—Depth of compartment in feet.

The time of steaming is arrived at by taking the number of hours given in the table under the actual size of steam connection corresponding to the value given for L × B × H, or the volume in cubic feet of the compartment to be steamed.

Value of L × B × H Not Exceeding	Size of Steam Connection at 100 pounds pressure.		
	1″	1¼″	1½″
	Hours Steaming	Hours Steaming	Hours Steaming
30,000	20	14	10
40,000	26	18	13
50,000	32	22	16
60,000	38	26	19
70,000	44	30	22

The above calculations are based on a steam pressure of 100 lbs. per square inch.

Note: In steaming tanks the last one-fifth of the steaming period should be carried out with manhole plates or tank lids opened to the atmosphere.

(b) Upon completion of the operation above noted the tank or space so treated shall have all manhole plates and covers or other openings removed and thoroughly ventilated by means of wind sails, forced or induced draft.

(c) Following this process, specimens of air shall be taken by a competent chemist, whose ability and reliability shall be certified to by the American Bureau of Shipping. These samples shall be analyzed or tested by him, and if the tank or space from which samples have been taken still contains explosive or flammable gases, such further steaming, and/or ventilating shall be carried out as recommended by the chemist. After such steaming and/or ventilating, further samples shall be taken by him and analyzed or tested; this process to continue until the tank is certified by the chemist to be free of all explosive or flammable gases.

5. (a) In cases where a tank or space to be repaired adjoins another tank or space, no repairs shall be permitted unless adjacent tanks or spaces are freed of vapor as provided in paragraph 4 (c).

In cases where a vessel having carried cargo of flash point below 150° F., closed cup, is to undergo repairs at a shipyard, or alongside a wharf, all the vessel's compartments or tanks containing inflammable gases, with the exception of the ship's bunker tanks, shall have been steamed and ventilated for at least twenty-four hours prior to delivery to repair yard, and all tanks in which any repairs are to be made, and tanks adjacent to same, shall have been freed from explosive or flammable gases as provided in paragraph 4 (c); the balance of the tanks shall be sealed tight.

The only exception to this rule shall be, where the repairs to be made are confined exclusively to the engine and fire room spaces or/and to quarters, or where vessel is placed on dry dock merely for the purpose of cleaning and painting under water body and overhauling sea valves, in which case it will only be deemed necessary that all tank lids and/or covers shall be sealed tight.

(b) Repairs may be made to equipment, etc., in pump room without freeing from gas any space on the vessel other than pump room space.

(c) No repairs necessitating the use of fire or of tools liable to cause sparks by contact with metal, may be made to the decks of a vessel, except by special permission of the certified chemist, without first freeing adjacent tanks from explosive or flammable gases.

6. (a) The tests herein prescribed and required shall be made as provided by a competent chemist whose ability and reliability shall be certified to by the American Bureau of Shipping.