

## Report of Committee on Marine Fire Protection

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| <b>Braxton B. Carr,</b> The American Waterways Operators, Inc.              | <b>J. R. Lindgren,</b> United States Salvage Assn., Inc.   |
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| <b>George A. Hale,</b> Marine Chemists Assn.                                | <b>Pierre R. Vallet (ex-officio),</b> Chairman, Sectional Committee on Marinas and Boatyards.        |
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### Alternates.

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| <b>Stanley Beckett,</b> Canada Dept. of Transport. (Alternate to A. Cumyn.) | <b>B. H. Lord, Jr.,</b> American Petroleum Institute. (Alternate to T. T. Wilkinson.) |
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†Non-voting member.

Reports this year on marine matters consist of proposals for amendments to the Fire Protection Standard for Motor Craft and to the Fire Protection Standard for Marinas and Boatyards as recommended by the Sectional Committee on Motor Craft and the Sectional Committee on Marinas and Boatyards respectively. The Committee on Marine Fire Protection concurs in these submittals and its final vote statement will be presented at the meeting.

## Part I

### Sectional Committee on Motor Craft

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Richard D. Jaeschke, United States Salv-  
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John C. Loeser, Ridgewood, N. J.

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Capt. Stanley H. Rice, U. S. Coast Guard.

Richard H. Roy, Internal Combustion  
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Capt. Howard Saffer, Fireman's Fund In-  
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#### Alternates.

P. W. Engels, American Petroleum Institute.  
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Richard Hanna, Internal Combustion En-  
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Fred B. Lifton, Outboard Boating Club of  
America. (Alternate to Donald I. Reed.)

*This report has been submitted to letter ballot of the Sectional Committee which consists of eighteen members of whom 14 have voted affirmatively, none negatively, and 4 have not returned ballots. It has also been submitted to letter ballot of the Committee on Marine Fire Protection whose voting statement will be presented at the annual meeting.*

### Proposed Amendments to Fire Protection Standard for Motor Craft

NFPA No. 302 — 1964 Edition

1. In 111 (a) delete words "sufficiently tight."
2. In 111 (b) delete word "tight."
3. Delete 121 (a).
4. In 122 substitute words "fire retardant" for "noncombustible."
5. Revise 132 (b) to read:

(b) Cross sectional areas of the individual ventilation ducts within a compartment should be the same with each equal to one square inch per foot of beam as a minimum.

6. Add new paragraph 133 (b) as follows:

(b) Each helm position should be placarded with a warning to operate blowers to free compartments of hazardous vapors before starting main or auxiliary engines.

7. Revise 212 to read as follows:

**212.** Marine carburetors shall be so designed as to prevent leakage of fuel around shafts or other connections and shall not be externally vented.

8. Revise 212 (a) to read as follows:

(a) Carburetors shall have integral or properly connected drip collectors of adequate capacity which return all drip and overflow to the engine intake manifold.

9. Revise 212 (b) to read as follows:

(b) Carburetors shall be installed in such a manner as to prevent any drip or accumulation of fuel in the drip collector from escaping into the bilges or engine compartment.

10. Revise 213 (a) to read as follows:

(a) Electrical components should be so mounted on engines as to be above the bilges and as remote as practical from the fuel system.

11. In 214 delete the word "approved" and substitute "A" for "An."

12. Revise 215 to read as follows:

**215.** Gages to indicate cooling water discharge temperature shall be so located as to be readable by the operator at all helm positions.

13. Revise 215 (a) to read as follows:

(a) Gages to indicate lubricating oil pressure shall be provided for all propulsion engines having pressure lubricating systems. These gages shall be located so as to be readable by the operator at all helm positions.

14. Add new paragraph 215 (b) as follows:

(b) Warning lights may be used in lieu of gages provided that they are of a type that can be tested at any time by the operator.

15. Delete 217 and 217 (a).

16. In 231 (a) *NOTE*, insert the words "turbo chargers" between the words "silencers" and "spark arresters."

17. Revise 232 (e) (1) to read as follows:

(1) A separate exhaust system for each exhaust manifold is recommended. If a single exhaust system is used, it shall be so designed that any back pressure difference between manifolds and the total back pressure is within the limits set by the manufacturer's specifications.

18. Substitute in 235 (a) the word "suitable" for the word "metallic."

19. Revise 235 (c) to read as follows:

(c) Provision shall be made to prevent any rain or sea water from entering the engine exhaust manifold.

20. Delete the first sentence of 30.

21. Delete the words "and labelled" from the second sentence of 31.

22. Revise 311 (a) to read as follows:

(a) All fuel tanks shall be constructed of materials of suitable characteristics to withstand the stresses and exposure of marine service, and completed tanks shall be capable of withstanding without failure exposure to free-burning gasoline for 2½ minutes.

23. In 311 (b) delete the word "gasoline" from the first sentence.

24. Revise Table 2 by deleting the word "gasoline" from the heading and by the following changes:

(1) Opposite "copper" in the last column, change ".080 in." to ".081 in."

(2) Opposite "copper silicon" in the third column, change ".050 in." to ".051 in."

(3) Opposite "sheet steel" in the second column, change "A93-59T" to "A415."

(4) Add:

Note 6. Steel tanks must be galvanized inside and outside by the hot dip process, except tanks for diesel fuel.

25. Insert in 312 (g) the word "metal" after the word "all".
26. Delete the second sentence of 321 (e).
27. Delete from 322 (a) the words "approximately 1800° F" and the parentheses from around the words "free-burning gasoline."
28. In 322 (b) change ".035 inch" to ".032 inch."
29. Revise 323 (g) to read as follows:
- (g) The minimum internal diameter of the vent pipe shall be not less than that of  $\frac{5}{8}$ -inch O.D. copper tubing and if the fill pipe extends to near the tank bottom, it shall be not less than that of  $\frac{3}{4}$ -inch O.D. copper tubing.
30. Revise 324 (a) to read as follows:
- (a) Engine-driven mechanical fuel systems shall be used except the independent electric pump systems may be used provided that they are energized only when the engine is turning over.
31. In 324 (b) (1) insert the words "Where possible" at the beginning of the sentence.
32. Revise 427 (b) (1) to read as follows:
- (1) All appliances designed for operation with pilot lights, glow plugs, switches, etc., shall have them so protected as to prevent ignition of external vapors or addition of further combustible material to those vapors.
33. Revise first sentence of 431 (c) to read as follows:
- (c) Heating units designed for operation with pilot lights, glow plugs, switches, etc., shall have them so protected as to prevent ignition of external vapors or addition of further combustible material to those vapors.
34. Revise first sentence of 432 (a) (3) to read as follows:
- (3) Heaters designed for operation with pilot lights, glow plugs, switches, etc., shall have them so protected as to prevent ignition of external vapors or addition of further combustible material to those vapors.

35. *Revise 432 (b) to read as follows:*

(b) Heating boilers shall be of types approved for marine use.

36. *Revise title of Chapter 5 to read:*

## **CHAPTER 5. DIRECT CURRENT ELECTRICAL SYSTEMS**

37. *Revise 524 to read as follows:*

524. Acid batteries shall be located in a liquidtight tray of adequate capacity to retain normal spillage or boilover of the electrolyte. It shall be constructed of, or lined with materials resistant to deterioration by the electrolyte.

38. *In 526, delete the word "Alkaline."*

39. *In 543 substitute the word "practical" for the word "possible" in the first sentence. Also delete the phrase "outside the fuel tank and engine spaces" from the second sentence.*

40. *Add new paragraph 562 (c) as follows:*

(c) Wiring leading to engine-mounted electrical components may be formed into a coil so as to minimize the effect of vibration.

41. *Add entire new chapter as follows:*

## **CHAPTER 6. ALTERNATING CURRENT ELECTRICAL SYSTEMS**

**NOTE:** The recommended practices and standards in this section are intended as a guide for the design and installation of single phase Alternating Current (AC) Electrical Systems operating at potentials under 300 volts on boats.

### **60. Definitions.**

**601. GROUND** — Applies to the potential of the earth's surface and is established by a conducting connection (intentional or accidental with the earth, including any conductive part of the wetted surface of a hull.

**602. GROUNDED CONDUCTOR** — A current-carrying conductor connected to the side of the source which is intentionally maintained at ground potential.

**603. GROUNDING CONDUCTOR** — A normally non-current-carrying conductor provided to connect the exposed metallic enclosures of electrical equipment to ground for the purpose of minimizing shock hazard to personnel.

**61. Circuit Arrangement.**

611. The system shall be so designed that on-board AC generators and shore power cannot simultaneously feed the same circuit.

**62. General.**

621. It is recommended that the AC system be designed for a nominal system voltage of 115/230 VAC. However, boats confined to a specific geographic location may be designed for the available nominal system voltage in the area.

622. A frequency of 60 cycles per second will be considered standard for AC powered systems on boats.

623. Motors, generators and other electrical equipment intended to be installed in machinery spaces shall be designed for operation in an ambient temperature of no less than 50°C (122°F). Where equipment is designed for use outside of machinery spaces in cabins or on deck, etc., the designed ambient temperature may be reduced to 40°C (104°F).

624. All component parts of the system shall be designed, constructed and installed so as to perform with safety under the environmental conditions of continuous exposure to vibration, shock, corrosion in salt atmosphere and high humidity.

625. The system shall be permanently installed in such a manner as to provide a maximum protection against electrical shock for persons on the boat, persons in the water in contact with the boat, and persons in contact with the boat and a grounded object on shore.

626. The system frequency and nominal voltage shall be clearly and prominently marked at the AC switchboard or other readily visible location.

**63. Equipment.**

631. All appliances and fixed AC electrical equipment used on boats shall be so designed that the current-carrying parts of the device are effectively insulated from all exposed metal parts by a dielectric material suitable for use in damp and/or wet locations, depending on the location of the device and its intended usage.

(a) The frames of all electrical appliances and equipment shall be grounded to the hull of metallic boats or to the bonding system of non-metallic boats.

632. Electrical equipment containing potential sources of ignition of flammable vapors installed in machinery spaces or other areas

where flammable vapors may be present, shall be so designed, enclosed, or protected to prevent ignition of external flammable vapors.

**633.** Shore power polarity devices should not be used with the systems recommended by this standard since the systems on the boat are not polarized and the device itself could introduce an artificial ground.

**634.** All switches and circuit breakers used in the circuit shall be of an approved type that will simultaneously disconnect both current-carrying conductors, except that switches which are an integral part of permanently installed cabin lighting fixtures may be of the single pole type.

#### **64. Electrical Meters.**

**641.** A system voltmeter installed to read input voltage from shore and/or the output voltage of on-board AC generators, shall be provided and mounted in a readily visible location, except that a voltmeter need not be provided for simple systems with straight resistive loads (lighting and heating, etc.).

(a) It is recommended that the system voltmeter be marked with voltage limit markings plus and minus ten (10) per cent of the designed nominal system voltage.

#### **65. Receptacles and Plugs.**

**651.** All receptacles and matching plugs shall be of the grounding type and shall conform to the configurations described in ASA Standard C73 for the voltage and current to be used.

(a) Receptacles provided on the boat for purposes of connecting the boat's shore power cable shall be of the reverse service type.

(b) Receptacles located on deck, in cockpits or other exposed areas shall have self-closing water-tight caps.

(c) It is recommended that receptacle boxes be of an approved non-metallic type.

**652.** A shore power cable, compatible with the shore power receptacle and the power rating of the boat shall be provided by the manufacturer of the boat.

#### **66. Recognized Types of Circuit.**

**661. THREE WIRE SHORE GROUNDED SYSTEM** — This system utilizes directly the shore grounded and ungrounded conductors,



together with both the shore grounding wire and boats ground to keep the exposed non-current-carrying parts of the system at ground potential. This system may be used on any non-metallic hulled boat with underwater hardware of metal alloys which are galvanically compatible with normal marine bronzes. It may also be used with metal-hulled boats where no problems with galvanic corrosion are anticipated or where protection against galvanic corrosion is provided by means of a suitable cathodic protection system.

(a) The shore current-carrying conductors shall be connected from the shore connection (reverse service receptacle) through overload protective devices to the boat's AC electrical system. Where the shore power receptacle is not readily accessible to serve as a shore power disconnect, a disconnect switch complying with Paragraph 634 shall be provided between the shore power connection and overload protective devices.

(b) Neither current-carrying conductor shall be grounded on the boat.

(c) The shore grounding conductor shall be connected through the shore power receptacle directly to the boat and all non-current-carrying parts of the system without interposing switches or overload protective devices. The boat's ground alone will not be considered adequate for purposes of grounding the non-current-carrying parts of the AC electrical system.

**662. ISOLATION TRANSFORMER SYSTEM** — This system utilizes an isolation transformer to conductively separate the shore feeder conductors from the electrical load circuits on the boat. The shore grounding conductor is used to ground the non-current-carrying parts of the isolation transformer but is conductively separated from the boat ground. The isolation transformer system should be used on all metal-hulled boats where galvanic corrosion may occur and where other suitable means of protection against galvanic corrosion is not provided.

(a) The shore current-carrying conductors shall be connected from the shore connection (reverse service receptacle) through overload protective devices in each conductor to the primary windings of the isolation transformer.

(b) The shore current-carrying conductors shall not be grounded on the boat.

(c) Where the shore power receptacle is not readily accessible to serve as a shore power disconnect, a separate disconnect complying with Paragraph 634 shall be provided between the shore power connection and the overload protective devices.

(d) The shore grounding conductor shall be connected through the shore power receptacle directly to the non-current-carrying parts of the isolation transformer, which in turn shall be insulated from any contact, directly or indirectly with the hull.

(e) It is recommended that the secondary circuit of the isolation transformer be ungrounded throughout the system. However, a polarized system with one side of the circuit purposely held at boat ground potential may be used.

(f) Approved devices employing isolation transformers such as battery chargers, may be connected in the same manner as the boat system isolation transformer so as to be fed directly from the shore power or may be connected to the secondary side of the isolation transformer.

#### **67. Circuit Protection for AC Circuits.**

**671.** Each current-carrying conductor from the shore-power inlet receptacle to the main AC switchboard or panel, except the grounded neutral of a three-wire, single phase 115/230 VAC service, shall be protected from excessive current by circuit breakers or fuses having a rating equal to no more than 125 per cent of the total normal load.

**672.** Where port and starboard shore-power inlet receptacles are provided, overload protection shall be provided for each receptacle.

**673.** Overload protection shall be provided at the generator in all ungrounded conductors.

**674.** Fuses or trip-free circuit breakers shall be provided at the main AC switchboard for all current-carrying conductors to distribution panels. Where a main disconnect switch is provided for the panel in the main switchboard, the overload protection shall be located between the switch and panel.

**675.** All current-carrying conductors of branch circuits shall be provided with suitable overload protection at their points of connection to the main switchboard or distribution panel bus. Each fuse or trip-free circuit breaker used for this purpose shall be rated according to either the current rating of the smallest feeder wire between the overload protection device and the load or the maximum current rating of the device being served, whichever is less. Up to four 115-volt AC outlets rated at 15 amperes each may be serviced in the same circuit provided that the circuit is fused at 15 or 20 amperes, depending on the current-carrying capacity of the complete circuit (wiring, connectors, etc.). Special-purpose, 115-volt AC outlets rated above 15 amperes shall be wired separately

and, provided that the circuit capacity is adequate, each shall be fused at the rating of the receptacle. Thermal overload devices without manual controls should not be used at the power source.

676. Each circuit supplying a motor or motor-operated device shall be protected by an overload device that is responsive to the motor current. The overload device shall not be rated at more than 125 per cent of the motor full load current rating.

42. *Because of insertion of new Chapter 6, the present Chapters 6 and 7 will be redesignated as Chapters 7 and 8 respectively. Designation of paragraphs in the following amendments are for the current (1964) text.*

43. *In 711, change "shall" to "should."*

44. *Revise 712 (b) to read as follows:*

(b) If power exhaust blowers are installed they should be operated long enough to free compartment of hazardous vapors before starting main or auxiliary engines.

45. *Revise 712 (c) to read as follows:*

(c) Vent (open) the entire boat before operating any appliances.

46. *In 721 substitute the word "satisfactory" for the words "the best."*

47. *In 721 (a) substitute the words "any engine" for the word "engines."*

48. *In 721 (c) delete the word "gages."*

49. *In 732 (b) delete the word "safety."*

50. *Revise 733 (c) (2) to read as follows:*

(2) Extinguish all open flames.

51. *Revise 733 (f) (3) to read as follows:*

(3) Vent (open) the entire boat as recommended in Paragraph 712 before starting any engines or operating any appliances.

52. *In 741 (d) delete the word "safety."*

53. *Add new paragraph 763 (c) as follows:*

(c) Extinguishers of this type should be manually shaken at least every six months to avoid caking that may develop in them.

54. *Revise 771 to read as follows:*

771. Pyrotechnics should be stored in a dry place in a suitable waterproof container and inspected frequently for signs of deterioration. Any sign of deterioration should be cause for replacement.

55. *In Part II, revise 311 (a) to read as follows:*

(a) Metal fuel tanks shall be of iron, steel or nickel-copper and comply with Part I, Paragraph 311.

## Part II

### Sectional Committee on Marinas and Boatyards

**Pierre R. Vallet**, *Chairman*,

Insurance Company of North America, 770 Broadway, New York 3, N. Y.

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| <b>R/C Norris C. Barnard</b> , United States Power Squadrons.  | <b>Richard T. Montgomery</b> , National Park Service.                     |
| <b>Irving D. Jakobson</b> , Jakobson Shipyard, Inc. (Personal) | <b>Donald I. Reed</b> , Outboard Boating Club of America.                 |
| <b>C. F. Kelley</b> , Greenwich, Conn. (Personal)              | <b>Elmer F. Reske</b> , Illinois Inspection and Rating Bureau.            |
| <b>George E. Maxwell</b> , Fort Lee, N. J. (Personal)          | <b>Peter M. Wilson</b> , National Assn. of Engine and Boat Manufacturers. |

#### Alternate.

**Fred B. Lifton**, Outboard Boating Club of America. (Alternate to Donald I. Reed.)

*This report has been submitted to letter ballot of the Sectional Committee which consists of nine persons, of whom eight have voted affirmatively, none negatively, and one has not returned his ballot. It has also been submitted to letter ballot of the Committee on Marine Fire Protection whose voting statement will be presented at the Annual Meeting.*

### Proposed Amendments to Fire Protection

## Standard for Marinas and Boatyards

NFPA No. 303 — 1963

#### 1. Add to 201 (c) a new sub-section as follows:

1. If an auxiliary power supply, arranged to provide lighting for pier and dock areas is not provided, an approved battery powered emergency lighting fixture conforming to the requirements of Article 700-22 National Electrical Code, and of weatherproof type, should be installed at the outboard end and the shore end of each pier.

#### 2. Add a sentence to 302 (h) as follows:

In the construction of the fuel hose assembly, provision shall be made so the fuel delivery nozzle is properly bonded to the shore electric grounding facilities as required in Section 405 (b) of this standard.

#### 3. Correct the spelling of the word "chargers" in 309 (c) and add to 309 (g) a new sub-paragraph as follows:

7. When nickel-cadmium batteries are to be charged or serviced in the reserved area, the work shall be done in a

separate work area from which servicing or charging is done on lead-acid types of storage batteries. Tools and equipment used in servicing or charging nickel-cadmium batteries shall be distinguished by an appropriate color applied to them and shall be at all times reserved only for such usage.

4. *Add a new sentence to 311 (a) as follows:*

When boats are placed in dry storage the following shall be observed:

5. *Delete 311 (a)-3 and substitute the following:*

3. Lead-acid type batteries shall be removed.

6. *Delete 311 (b) 6.*

7. *Delete opening word "Many" from 401.*

8. *Revise 404 (f) to read as follows:*

(f) When auxiliary emergency stand-by power supply equipment with an output rating in excess of 5 kw is provided and is driven by an internal combustion engine, the emergency electric system shall be arranged as required by Article 700, National Electrical Code and shall also be arranged as follows:

1. The engine and generator shall be housed in a well-ventilated fire resistive enclosure located above the level of possible flooding by abnormally high water and which shall contain only the auxiliary power unit and the necessary controls for the engine. Interior areas of the enclosure shall be lighted by a fixture connected to the normal power supply. An approved battery-powered emergency lighting fixture conforming to the requirements of Article 700-22 National Electrical Code shall be permanently installed in the enclosure, arranged to illuminate the engine control equipment. The fuel supply tank or tanks for the auxiliary power equipment shall be located outside of the structure and shall fully comply with the requirements of this standard related to the storage and handling of flammable liquid fuels.

9. *Add two new sub-paragraphs to 406 (a) as follows:*

2. Nonmetallic molded or cast boxes, composed of materials which are resistant to corrosion and having a heat

resistance to deformation at a minimum of 300 degrees F, may be used as junction boxes or as enclosures for circuit breakers, switches, receptacles and wired outlets provided that such nonmetallic boxes shall be equipped with gasketed covers of the same material as the box. The equipment ground conductor required by Sections 405 (a) and 405 (b) of this standard shall be extended through such box or enclosure and shall be properly connected as required by Article 250, National Electrical Code, to all noncurrent-carrying metal parts of electrical apparatus or equipment served by the conductors entering or passing through such nonmetallic enclosures or boxes.

3. Junction boxes and enclosures which are not fitted with external mounting lugs or ears shall be installed only when a proper gasket is located between the box and the heads of the mounting screws.

10. *Revise 406 (c) to read as follows:*

(c) Switches, circuit breakers and panels installed in enclosures as provided in this standard shall be equipped with an approved means of operating without exposing the interior of the enclosure to external atmosphere.

11. *Revise 406 (e) to read as follows:*

(e) Lighting fixtures shall conform to the requirements of the National Electrical Code (Sections 410-4, 410-5 and 410-6), and additionally shall be located to prevent damage by contact with stored or moving material.

12. *Add sentence to end of 406 (g) as follows:*

All such receptacles and matching plugs shall conform to the configurations described in ASA Standard C 73 for the voltage and current to be used at such outlet.

13. *Revise 406 (h) to read as follows:*

(h) All receptacles installed in wet locations shall be installed in enclosures as provided in this standard. A permanently affixed cap shall be provided on the enclosure and arranged effectively to seal the receptacle opening against weather or splash whenever the receptacle is not in use.

14. *Revise 406 (i) to read as follows:*

(i) Attachment plugs for use with receptacles rated in excess of 20 amperes shall be provided with an approved means of locking the plug to the receptacle and to complete the sealing of the receptacle opening.

15. *Amend 407 (d) 2 by inserting at the beginning of the first sentence, "Except as provided for in Section 406 (a) 2 of this standard, . . ., etc." and by inserting the word "metal" before the words "junction box" in the final sentence.*

16. *Add to 407 a new sub-paragraph (e) as follows:*

(e) Conductors in pier feeder circuits installed in accordance with this sub-section shall be of the proper size, according to Tables 310 and 312 of the National Electrical Code, which will accommodate the total current to be used with a voltage drop of not more than 3% of the input voltage at every pier outlet. Feeder circuits extending from main incoming distribution equipment to, and installed on, piers of any type of construction, which are used or intended for use in providing power for shore connections to one or more boats, should preferably be of the 3-wire, grounded neutral, single phase type (115/230; 120/240 or 120/208 volts according to availability from the local public power source).

17. *Delete entire 410 and substitute the following:*

**410. Circuit Breakers for Use in Outdoor Locations:** Circuit breakers installed outdoors in gasketed enclosures in locations exposed to the direct rays of the sun shall be of the fully magnetic type with no thermally operated elements.