Marine Electrical Switches – SAE J1320 JUN81

SAE Recommended Practice
Approved June 1981

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PREPRINT

MARINE ELECTRICAL SWITCHES—SAE J1320 JUN81

SAE Recommended Practice

Report of the Marine Technical Committee, approved June 1981. Rationale statement available.

1. Scope—This recommended practice covers the requirements for switches used in marine applications both under and over 50 V.

2. Purpose—To recommend a test procedure whereby a switch can be evaluated and tested to give acceptable reliability in the marine environment and usage.

3. General—A marine switch that is rated for over 50 V shall comply with this recommended practice in addition to UL, CSA or similar requirements normally applied to switches operating at over 50 V.

Any switch that is intended for installation in a battery compartment, an engine compartment, in fuel tank spaces, or mounted through a bulkhead or panel exposing either side of the switch to battery, engine, or fuel tank space shall comply with SAE J1171.

SAE J1171 is not required in installations that have diesel fuel as the only fuel source.

4. Termination

4.1 Terminations shall be of sufficient size to accommodate the correct gauge wire, and/or terminal, as determined by the switch ampacity and U.S. Coast Guard Standards (33 CFR 183.425).

Switch Current Rating	Wire Size Accommodated
10 A	16 AWG
15 A	14 AWG
20 A	12 AWG
25 A	10 AWG
40 A	8 AWG
55 A	6 AWG

4.2 Blade terminals shall be flat blades complying with SAE J858 and shall, when tested in accordance with SAE J378c, Section 7, with a mating wire termination, withstand a disconnect force of 6 lb for 1 min.

4.3 Screw type terminations shall have a minimum of number 8 screw size.

4.4 External solder lugs must provide for insertion or wrapping of the wire to form a mechanical lock.

4.5 External leads which are terminated internally shall be considered pigtails and, if the exposed wire is less than 7 in long, shall not be smaller than number 18 AWG. Longer pigtails shall not be smaller than number 16 AWG and meet the ampacity of the switch.

5. Electrical Requirements

5.1 Prior to test, the voltage drop across any pair of closed contacts shall not be greater than 100 mV with 10 A flowing.

5.2 Prior to test, the current flow shall not exceed 5 mA across all open circuits and/or between terminals and metallic portions of the switch when 500 V d-c is applied.

5.3 The switch shall be cycled at its rated current (resistance or inductive loading) and voltage for 25 000 cycles. Each cycle shall consist of 2 s on and 8 s off for each circuit. At the completion of the test, the voltage drop, as measured in paragraph 5.1, shall not have increased by more than a factor of three.

6. Physical Requirements

6.1 With the switch mounted as recommended by the manufacturer, each terminal or pigtail shall be subjected to 10 lb of axial tension for 1 h at room temperature. The tension loads shall then be removed. The switch shall then be hot and cold cycled 10 times with each cycle consisting of 30 min at room temperature, 30 min at -30°F (-35°C), 30 min at room temperature, 30 min at 212°F (100°C), and then allowed to cool to room temperature. The switch shall be mechanically operated ten times at each temperature extreme. The temperature cycled switch must then not have a voltage drop in excess of three times that measured in paragraph 5.1.

6.2 Marine switches shall be constructed of corrosion resistant materials, shall be tested to ASTM B 177 for 100 h, and still have a satisfactory appearance.

6.3 A water tight switch is recommended for any application where the switch may become submerged. To be considered a water tight switch, the switch must pass the conditions in paragraph 5.3 and then be submerged 14 in below the surface of a 5% solution of salt water for 1 h. After removal from the solution, the external portion of the switch is to be washed with fresh water and dried. The switch must then pass the conditions in paragraph 5.2. Water tight switches complying with this recommended practice, except those covered in paragraph 6.4, are designated Type A.

6.4 A weather tight switch is recommended for use in areas where the switch will be subjected to rain, spray, or splashing. To be considered weather tight, when mounted in the manufacturer's recommended manner, the switch shall be subjected to a 5% salt water spray test where the switch shall be mounted in the spray (reference ASTM D 1735, steps 7 and 8) for 96 h. At the completion of the test, the external portion of the switch shall be washed with fresh water and dried. There shall not be more than 10 mA flowing when tested in accordance with paragraph 5.2. Weather tight switches complying with this recommended practice, except those covered in paragraph 6.3, are designated Type B.

6.5 Switches complying with this recommended practice except for those covered in paragraphs 6.3 and 6.4 are designated Type C.

6.6 Switches that couple batteries in parallel or substitute batteries in the charging circuit, must have the make before break type of contact action. Switches used to couple or disconnect batteries must be capable of interrupting at least 300 A when used with a gasoline engine application.

7. Markings

7.1 Marine switches complying with this recommended practice shall be marked with their a-c and/or d-c ratings, and the words "MARINE" and "SAE Type A," "SAE Type B," or "SAE Type C," whichever is applicable, arranged in any suitable manner. Where marking of the switch is not practicable, the markings may alternatively appear on the smallest packaging of the switch.

7.2 Where required, marine switches for use in battery, engine, or fuel tank spaces shall be marked as prescribed in SAE J1171.