

High Tension Ignition Cable Assemblies - Marine**RATIONALE**

Updated the referenced SAE standards for High Tension Cable and Assemblies. Added reference to ASTM D471.

1. SCOPE

This Standard covers the requirements for all marine inboard and outboard gasoline engine ignition assemblies and components.

1.1 Purpose

To define components of ignition cable assemblies and establish accelerated aging, resistance to liquids and vapors, and dielectric requirements to assure the integrity of the system.

2. REFERENCES**2.1 Applicable Documents**

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publication

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

SAE J2031 High Tension Ignition Cable

SAE J2032 Ignition Cable Assemblies

2.1.2 ASTM Publication

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9500, www.astm.org

ASTM D471 Standard Test Method for Rubber Property- Effect of Liquids

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3. DEFINITIONS

3.1 CABLE

See SAE J2031 High Tension Ignition Cable, and J2032 Ignition Cable Assemblies).

3.2 BOOT

A molded component to provide electrical insulation of the spark plug terminal.

3.3 NIPPLE

A molded component to provide electrical insulation of the coil and/or distributor tower terminations.

4. TESTS

4.1 Cable Tests

Cable must meet or exceed the requirements of SAE J2031, High Tension Ignition Cable.

4.2 Boot and Nipple Tests

The sample boots and/or nipples to be tested must be part of a high tension lead assembly that has been assembled on production equipment. For the dielectric tests (see Figures 1 to 4) the high tension lead length must be long enough to maintain a 76.2 mm (3 in) minimum separation between the free end of the high tension lead and ground.

Prior to subjecting any boot and/or nipple to the tests described below, they must first pass the dielectric test, 4.2.5. Having passed the dielectric test, the samples shall be divided into four groups. Each group shall then be subjected to a different one of the tests described.

4.2.1 High Temperature Test

Test group No. 1 by heating in a circulated air oven at $125^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 40 h. Remove parts from oven and allow to cool to room temperature. Flex the boots by installing them on and removing them from a spark plug 10 times in succession. Flex the nipples by installing them on and removing them from distributor or coil tower 10 times in succession. Samples must then be subjected to and pass the dielectric test, 4.2.5.

4.2.2 Low Temperature Test

Place group No. 2 for 4 h in a cold chamber maintained at $0^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Immediately after removal, flex the boot by installing them on and removing them from a spark plug whose temperature is $0^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 10 times in succession. Flex nipples by installing them on and removing them from a distributor or coil tower whose temperature is $0^{\circ}\text{C} \pm 2^{\circ}\text{C}$, 10 times in succession. Samples must then be resubjected to and pass the dielectric test, 4.2.5.

4.2.3 Fuel Resistance Test

Install group No. 3 boots on spark plugs, and group No. 3 nipples on distributor or coil towers and suspend 1 in above ASTM D 471 reference fuel C in a sealed glass container for 30 h at room temperature. Immediately after removing the boots and/or nipples from the sealed glass container flex the boots by removing them from and reinstalling them on the spark plugs 10 times in succession. Flex nipples by removing them from and reinstalling them on a distributor or coil tower 10 times in succession. Samples must then be resubjected to and pass the dielectric test, 4.2.5.

4.2.4 Hot Oil Test

Immerse group No. 4 for 40 h in ASTM D 471 reference oil 3 maintained at $125^{\circ}\text{C} \pm 2^{\circ}\text{C}$. Remove from oil, allow to cool to room temperature, remove excess oil and flex boots by installing them on and removing them from spark plugs, 10 times in succession. Flex nipples by installing them on and removing them from a distributor or coil tower, 10 times in succession. Samples must then be resubjected to and pass the dielectric test, 4.2.5.

4.2.5 Dielectric Test

4.2.5.1 Boot Test

This test requires a spark plug be inserted into the boot. The spark plug must be the type intended for actual use with the boot.

To prevent flashover from the spark plug metal shell or from the center electrode to ground, the metal shall must be removed and a 76.2-mm (3-in) minimum length insulator installed in its place.

Test as follows:

- a. Immerse the boot, spark plug and lead assembly in a 3% by weight salt water solution as shown in Figures 1, 2, and 3 such that the boot is submerged.
- b. Apply the voltage from 0 to 20 kV peak (14 kV rms) 60 Hz at a rate of 500 V peak (355 V rms) per second between the free end of the high tension lead and ground (salt water solution). The boot must withstand this voltage for 2 h.

4.2.5.2 Nipple Test

Test as follows:

- a. Connect the nipple and lead assembly to an ignition distributor cap tower and immerse the nipple completely in a 3% by weight salt water solution as shown in Figure 4.
- b. Apply the voltage from 0 to 20 kV peak (14 kV rms) 60 Hz at a rate of 500 V peak (355 V rms) per second between the free end of the high tension lead and ground (salt water solution). The nipple must withstand this voltage for 2 h.

5. NOTES

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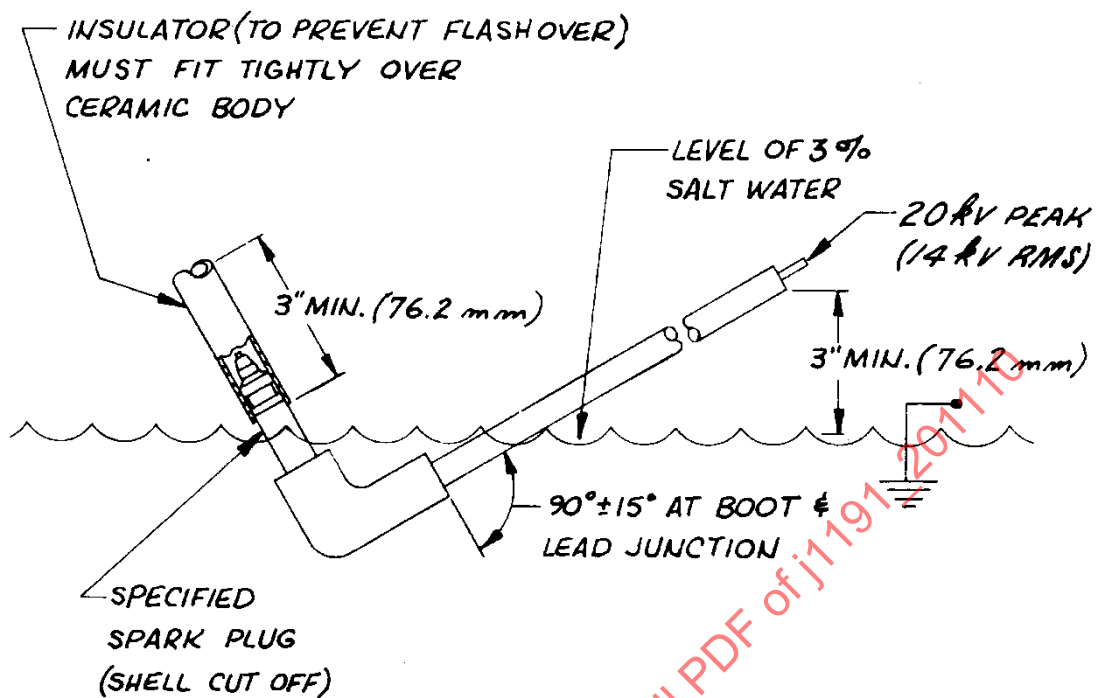


FIGURE 1 - DIELECTRIC TEST SET UP - 90 DEGREE BOOT

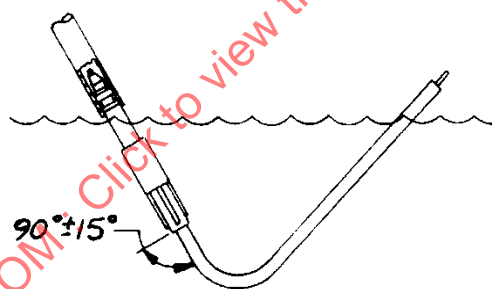


FIGURE 2 - STRAIGHT BOOT SET UP

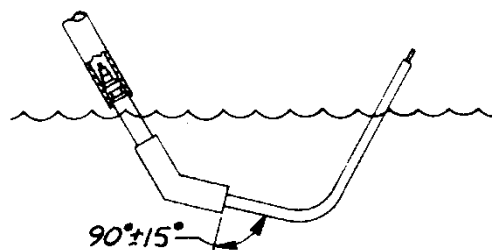


FIGURE 3 - 135 DEGREE BOOT SET UP