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INTERNATIONAL
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SURFACE VEHICLE STANDARD

SAE J2032

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Submitted for recognition as an American National Standard

(R) IGNITION CABLE ASSEMBLIES

1. ***Scope—***This SAE Standard specifies the general requirements and test methods for nonshielded high-tension ignition cable assemblies.

1.1 **Field of Application—**This document applies to all types of nonshielded high-tension ignition cable assemblies used in road vehicle applications.

2. ***References***

2.1 **Related Publications—**The following publications are provided for information purposes only and are not a required part of this document.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J200—Classification Systems for Rubber Materials for Automotive Application
SAE J551—Performance Levels and Methods of Measurement of Electromagnetic Radiation from Vehicles and Devices.
SAE J2031—High Tension Ignition Cables—Cable Classes, Types, Applicable Tests, and Special Requirements

3. ***Performance Requirements and Test Methods***

3.1 **Conductor Integrity—**All finished assemblies will be tested for conductor continuity prior to testing.

3.2 **Terminal Insertion and Removal Forces**

3.2.1 REQUIREMENTS

a. Female Terminal

1. Spark Plug/Distributor/Coil Initial Insertion—20 to 80 N
2. Spark Plug/Distributor/Coil on 5th Removal—20 to 70 N

b. Male Terminal

1. Distributor/Coil Initial Insertion—20 to 58 N
2. Distributor/Coil on 5th Removal—20 to 44.5 N

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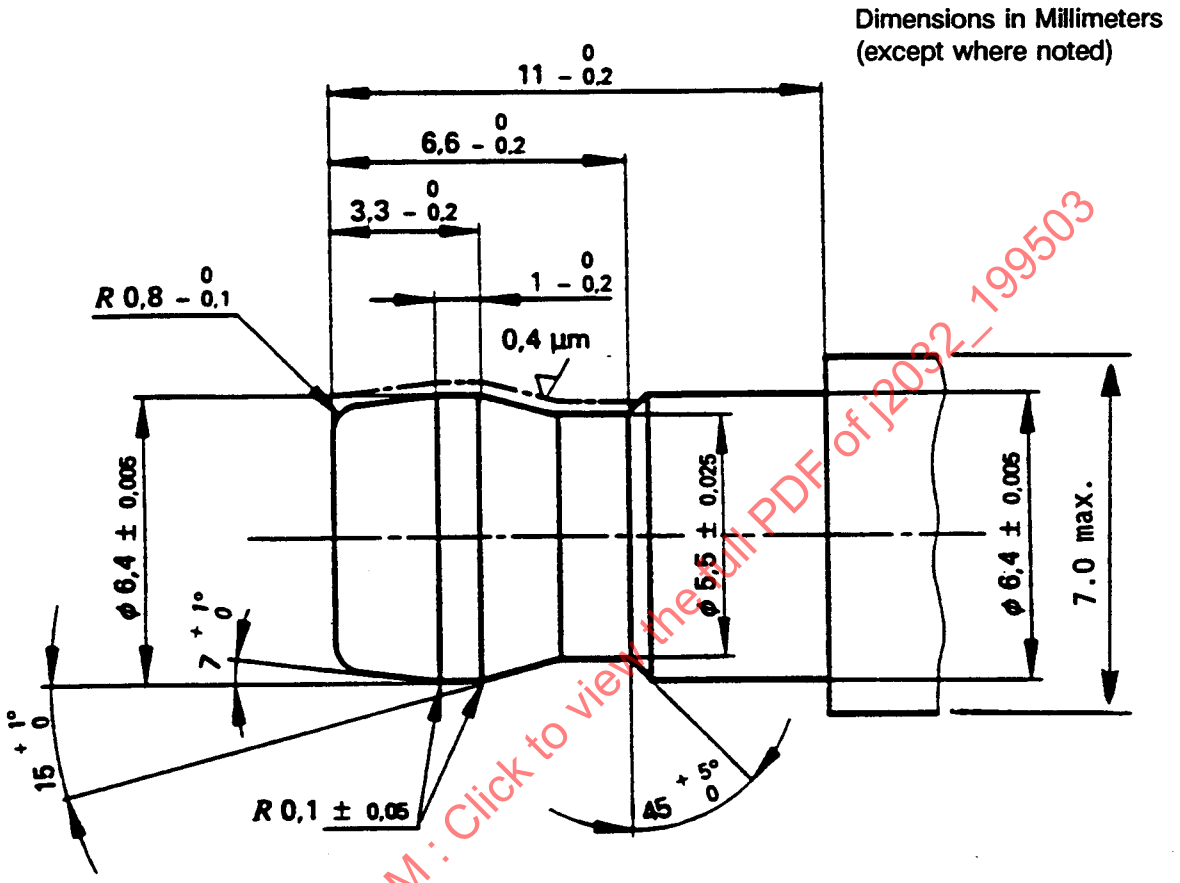
3.2.2 PROCEDURE—The test shall be conducted at room temperature 23 °C ± 5 °C with the insulator in its proper position for female terminals and without the insulator for male terminals. The initial insertion and removal shall be done on a terminal gage for female terminals as shown in Figure 1 or terminal gage for male terminals as shown in Figure 2.

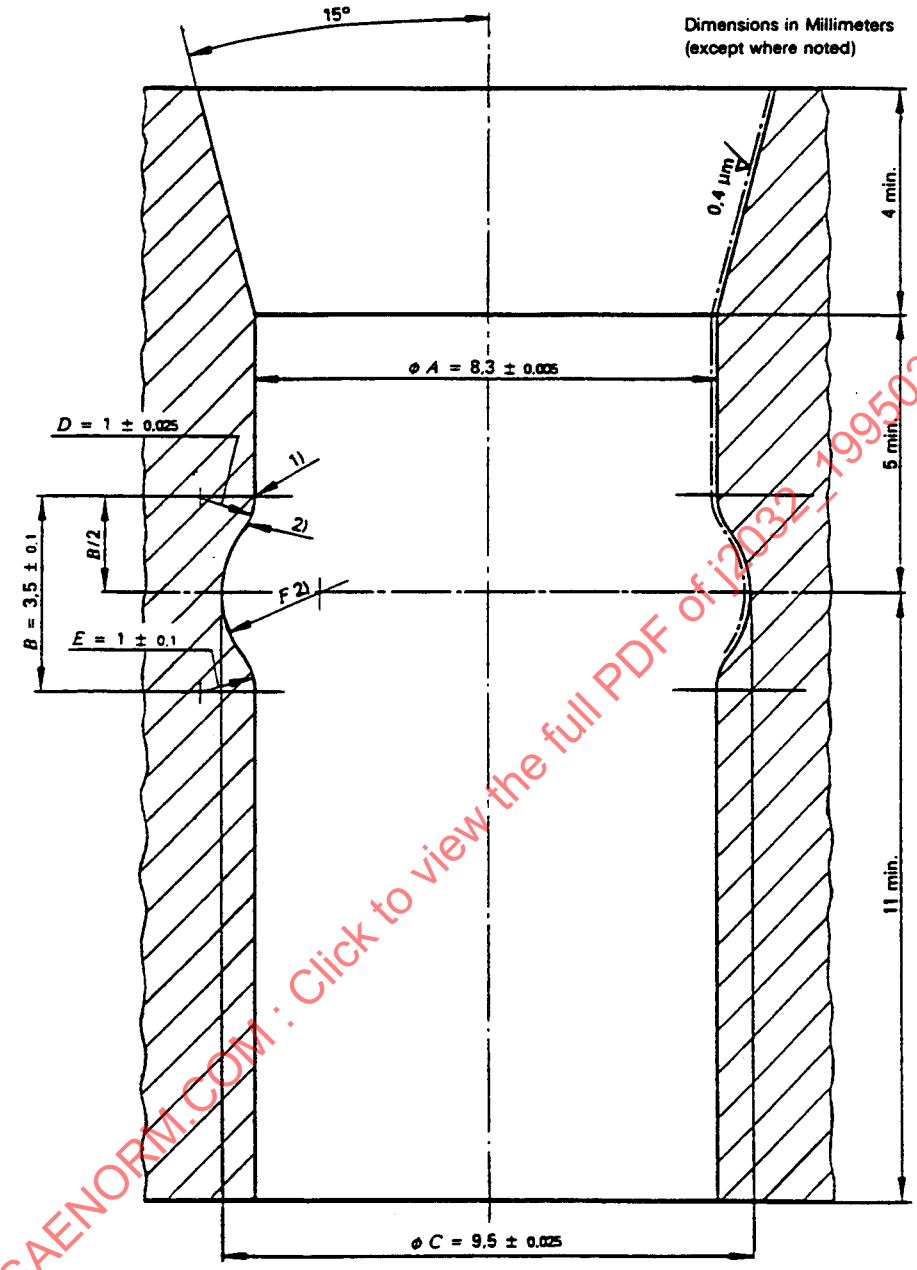


NOTES

1. The gage shall be of hardened steel.
2. The tolerances given for the gage dimensions include also the wear tolerances.

The dimensions 6.4 mm ± 0.005 mm and the angles of $7\ ^{+1^\circ}_{0}$ and $15\ ^{+1^\circ}_{0}$ are the most critical dimensions.

FIGURE 1—GAGE FOR MEASUREMENT OF INSERTION AND REMOVAL FORCES OF HIGH-TENSION CONNECTORS FOR SPARK PLUGS WITH POST TERMINALS AND FOR IGNITION COIL AND DISTRIBUTORS WITH PLUG TYPE HIGH-TENSION CONNECTIONS



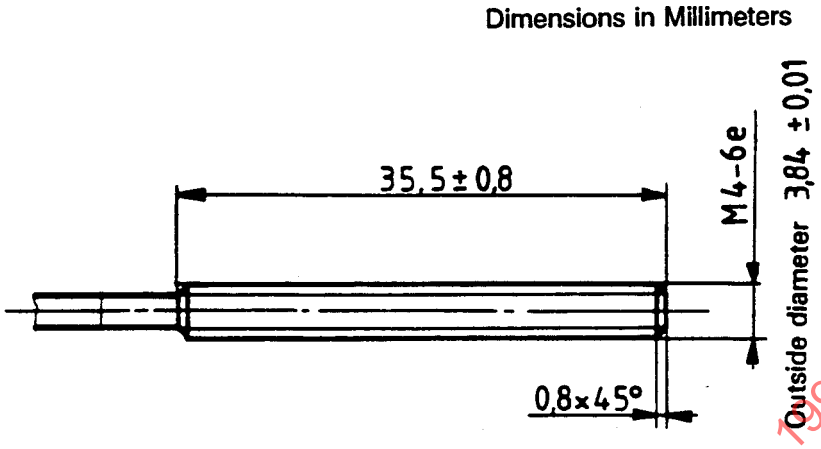
1. Tangential slope from diameter A to radius D.
2. Tangential slope from radius D to radius F. The value of F is implicitly determined by the values of dimensions A, B, C, D, and E.

NOTES

1. The gage shall be of hardened steel.
2. The tolerances given for the gage dimensions include also the wear tolerances. The dimensions A and D are the most critical dimensions.

FIGURE 2—GAGE FOR MEASUREMENT OF INSERTION AND REMOVAL FORCES OF HIGH-TENSION CONNECTORS FOR SOCKET TYPE HIGH-TENSION CONNECTION FOR IGNITION COILS AND DISTRIBUTORS

Terminals for spark plugs with threaded terminals shall use a terminal gage as shown in Figure 3.



NOTES

1. The gage shall be of hardened steel.
2. The tolerance given for the outside diameter of the gage threaded part also includes wear tolerance.

FIGURE 3—GAGE FOR MEASUREMENT OF INSERTION AND REMOVAL FORCES OF HIGH-TENSION CONNECTORS FOR SPARK PLUGS WITH THREADED TERMINALS

The insertion-removal force measurement shall be carried out using a suitable test fixture having a constant speed of 200 mm/min, aligned parallel to mating parts. Record the value obtained for initial insertion and record value on 5th removal.

3.3 Terminal Retention to Cable

3.3.1 REQUIREMENT

a. Spark Plug Terminal—92 N minimum
b. Distributor/Coil Terminal—55 N minimum

NOTE— The termination shall not lose continuity at a force below the suggested minimum value.

3.3.2 PROCEDURE—Test is to be conducted while samples are in an air circulating oven at 90 °C ± 2 °C for spark plug terminals or 70 °C ± 2 °C for distributor terminals. After a 1 h soak a pull force shall be applied by means of an accurate force gage in a direction in line with the assembly being tested. The pull rate shall be 200 mm/min. Record the highest value obtained.

3.4 Room Temperature Insulator Seal Test

3.4.1 REQUIREMENT—The insulator shall not fail dielectrically or track through the cable seal when subjected to the voltage levels listed:

a. Spark Plug, Distributor, and Coil Insulation

1. 5mm: 15 kV (RMS)
2. 7mm: 15 kV (RMS)
3. 7mm H E 23 kV (RMS)
4. 8mm: 23 kV (RMS)

3.4.2 PROCEDURE—Insulator seal test shall be conducted with the test sample submerged in tap water and the voltage applied between the cable conductor and the water (Figure 4 or equal) using an AC 60 Hz high voltage unit capable of a minimum of 35 kV with variable adjustment. Beginning at 0 V, the voltage shall be increased to the requirement at a rate of 0.5 kV/s and held for 5.0 min.

NOTE—A thin film of silicone grease may be used to seal the boot to a blank spark plug or distributor cap.

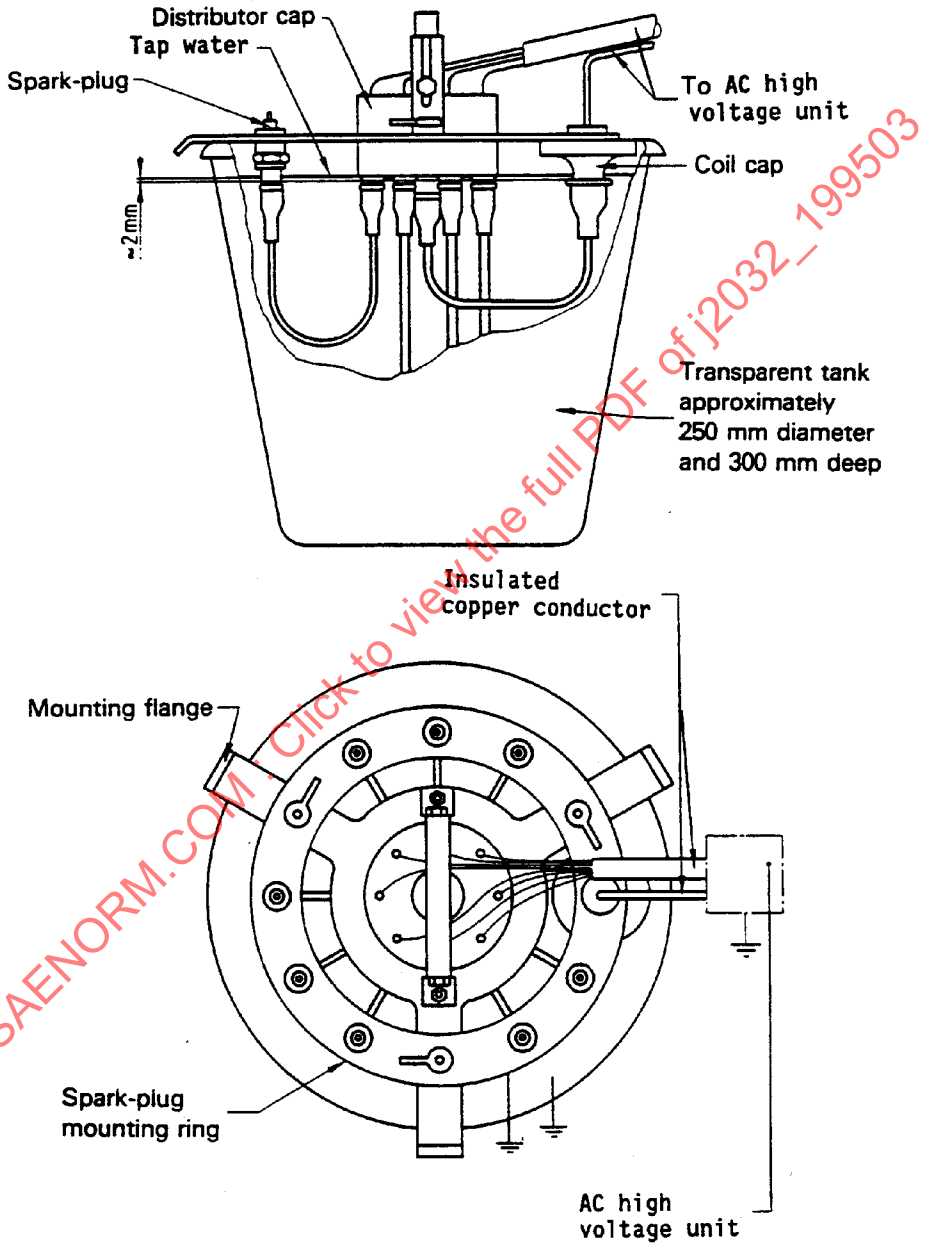


FIGURE 4—TEST APPARATUS FOR SEALING TEST

3.5 Elevated Temperature Insulator Seal Test

3.5.1 REQUIREMENT—The insulator shall not fail dielectrically or track through the cable seal when subjected to the temperature shown in Table 1 and voltage levels listed as follows:

TABLE 1—INSULATOR TEST TEMPERATURES

Test Class	1	2	3	4	5	6	7
Test Temperature °C	70 ± 2	90 ± 2	105 ± 2	120 ± 2	155 ± 2	200 ± 2	250 ± 3
Test time h	48	48	48	48	48	48	48

According to differing requirements, the high-tension cable, the connectors for the ignition coil, the distributor, the spark plug, or the boots under certain circumstances, belong to different test classes. The test classes shall be agreed upon between the manufacturer of cable assemblies and the engine manufacturer.

Voltage:

5 mm: 15 kV (RMS)
7 mm: 15 kV (RMS)
7 mm HIGH ENERGY: 20 kV (RMS)
8 mm: 20 kV (RMS)

3.5.2 PROCEDURE—Place appropriate mating component together with the test sample and condition the sample at the specified temperature (depending on material) for a period of 48 h in an air circulating oven. Remove samples from the oven and allow to cool for a period of 24 h. Disassemble, then reassemble the sample to its blank component and run the seal test according to 3.4

NOTE—Silicone grease may be applied prior to heat aging test but not before insulator seal test.

4. Notes

4.1 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

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