

(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, utilizing an ohm-meter.

3.2 **Terminal Insertion and Removal Forces**

3.2.1 **REQUIREMENTS**—Forces other than as follows are acceptable based upon agreement of the manufacturer and the customer. Also for non-typical terminals such as 5 mm terminals the manufacturer and the customer must agree on acceptable requirements and fixtures.

a. Female Terminal (Typical 7 and 8 mm terminals)

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

SAE J2032 Revised MAR2000

b. Male Terminal (Typical 7 and 8 mm terminals)

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

3.2.2 PROCEDURE—The test shall be conducted at room temperature $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$ 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 Figures 1 and 2 or terminal gage for male terminals as shown in Figure 3.

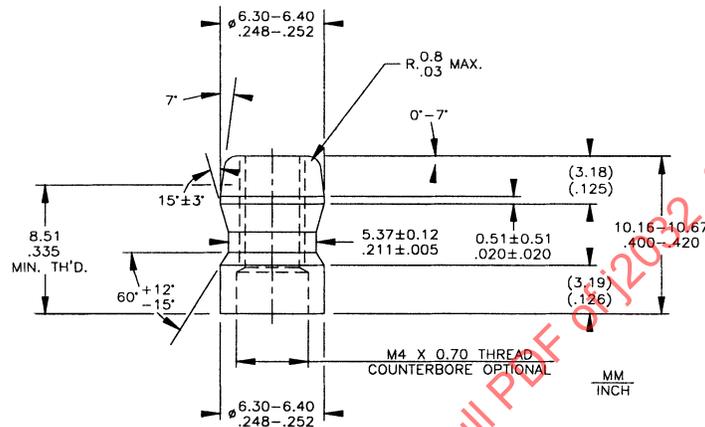


FIGURE 1—GAGE FOR MEASUREMENT OF INSERTION AND REMOVAL FORCES OF HIGH-TENSION CONNECTORS FOR SPARK PLUGS WITH POST TERMINALS AND FOR IGNITION COIL AND DISTRIBUTORS WITH PLUG TYPE HIGH-TENSION CONNECTIONS

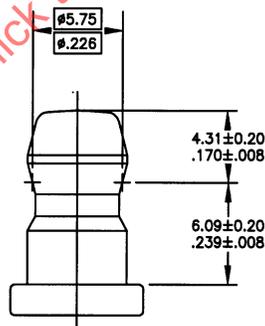
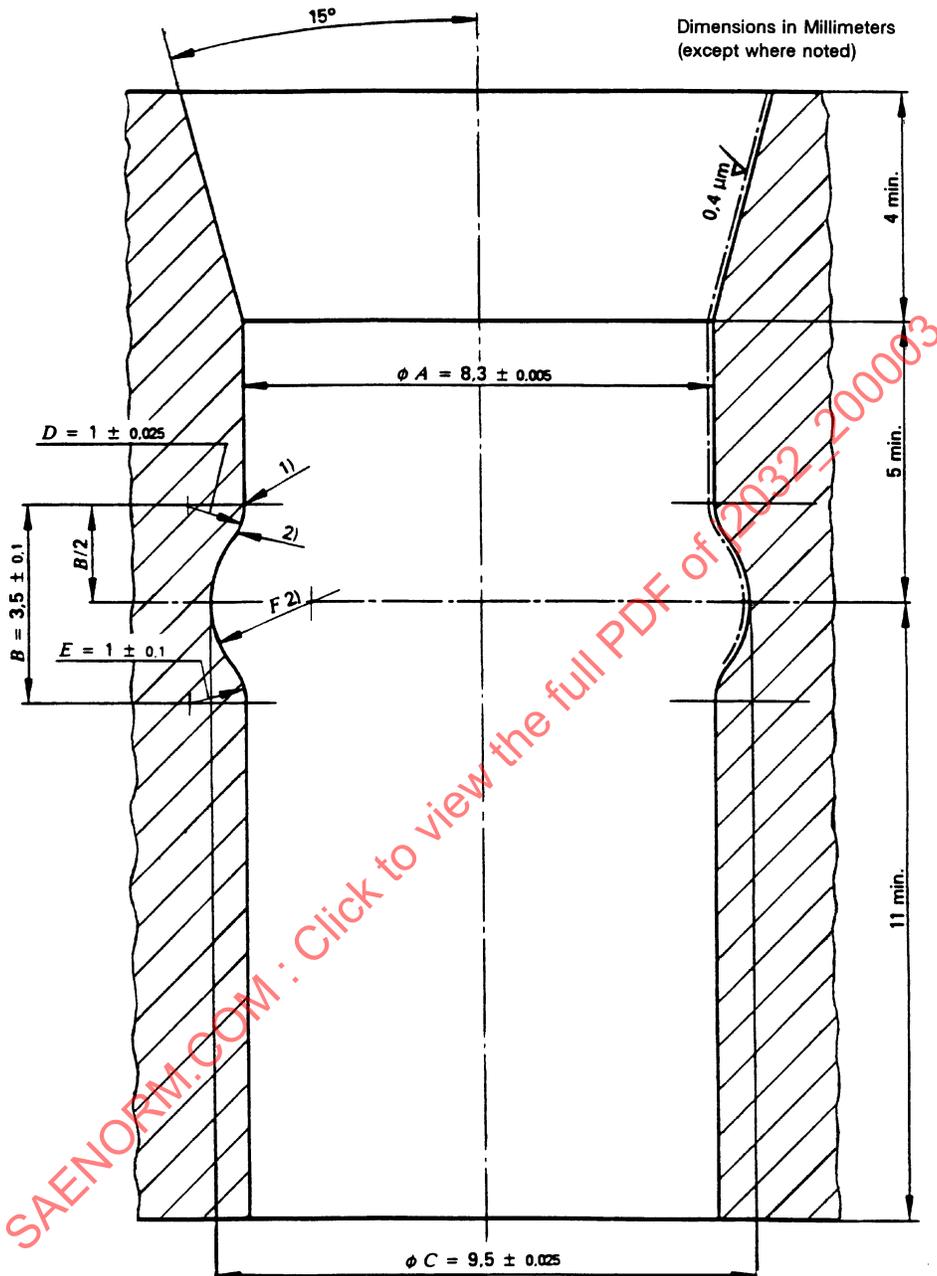


FIGURE 2—REPRESENTS THE RECOMMENDED POSITIONING OF THE TERMINAL GRIPPING BALL AND THE SPARKPLUG STUD. THIS POSITION IS TO BE USED AS THE RECOMMENDED MEASUREMENT REFERENCE POINT



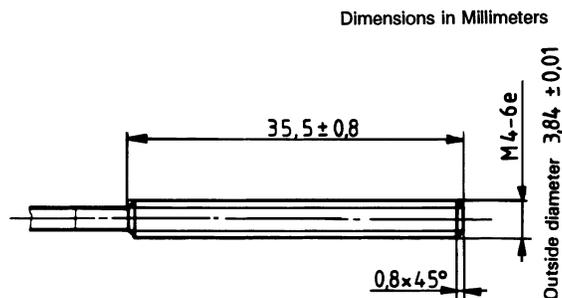
1. Tangential slope from diameter A to radius D.
2. Tangential slope from radius D to radius F. The value of F is implicitly determined by the values of dimensions A, B, C, D, and E.

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 3—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 4.



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 4—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—Forces other than shown in Table 1 are acceptable based upon agreement of the manufacturer and the customer.

TABLE 1—TERMINAL RETENTION FORCES

	cold (23 °C ± 5 °C)	Hot (see 3.3.2)
a. Spark Plug Terminal	100 N minimum	92 N minimum
b. Distributor/Coil Terminal	75 N minimum	55 N minimum

NOTE—The termination shall not lose continuity at a force below the suggested minimum value, as monitored by an ohm-meter or continuity tester.

- 3.3.2 PROCEDURE—Tests at room temperature (23 °C ± 5 °C) shall use an accurate force gage. Hot tests are 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. Both tests shall be co-axial with the assembly being tested with a pull rate of 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 Insulators

- | | |
|----------------------|-------------|
| 1. 5 mm: | 15 kV (RMS) |
| 2. 7 mm: | 15 kV (RMS) |
| 3. 7 mm HIGH ENERGY: | 23 kV (RMS) |
| 4. 8 mm: | 23 kV (RMS) |
| 5. >8 mm: | 23 kV (RMS) |

SAE J2032 Revised MAR2000

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 5 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, or alternate non-stick aid, may be used to seal the boot to a blank spark plug, distributor cap, or coil tower. Grease should not be used on assemblies where the design intent calls for no grease or if the test is to look for possible dielectric tracking failures between the boot and the plug/coil tower assembly.

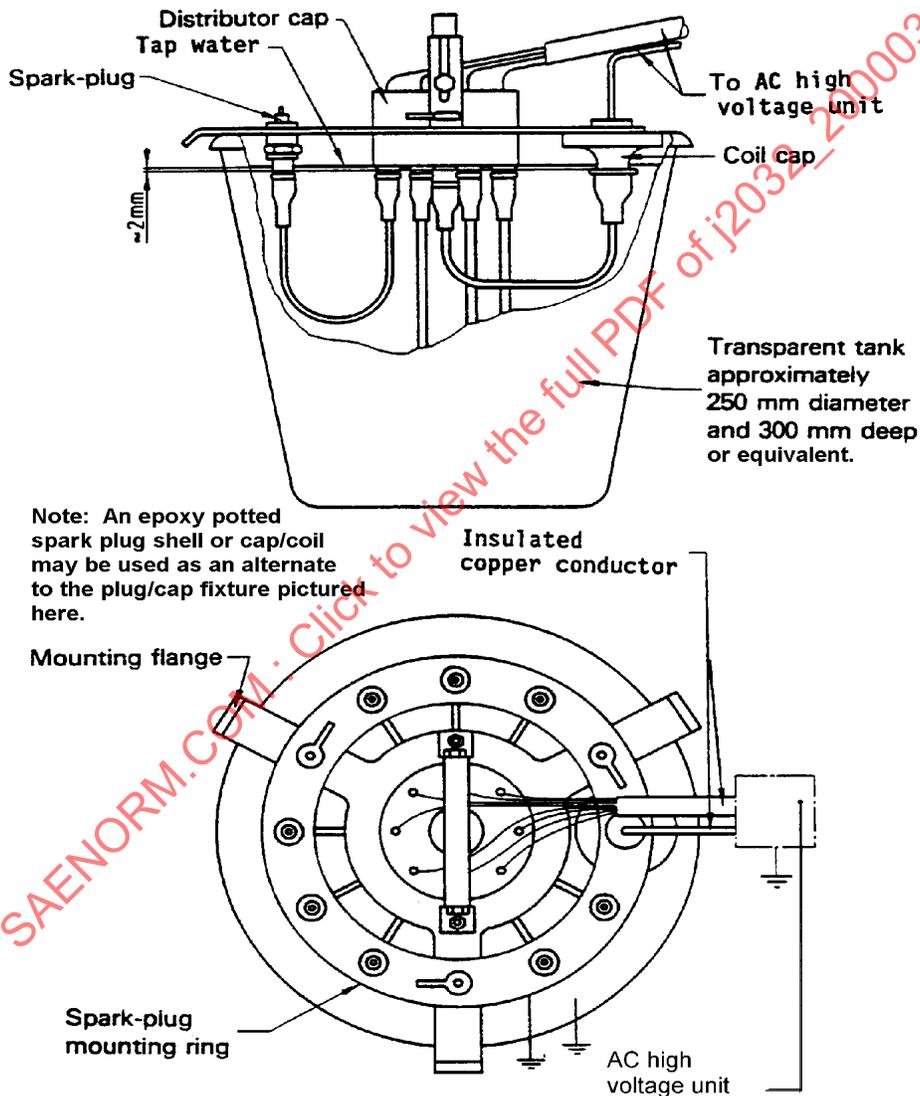


FIGURE 5—TEST APPARATUS FOR SEALING TEST