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EIA STANDARD

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COMBUSTION CHARACTERISTICS TEST PROCEDURE FOR ELECTRICAL CONNECTOR HOUSINGS, CONNECTOR ASSEMBLIES AND SOCKETS

EIA/ECA-364-81A

(Revision of EIA-364-81)

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Electronic Components, Assemblies & Materials Association

**ELECTRONIC COMPONENTS, ASSEMBLIES & MATERIALS
ASSOCIATION**

THE ELECTRONIC COMPONENTS SECTOR OF THE ELECTRONIC INDUSTRIES ALLIANCE



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(From Standards Proposal No. 5062 formulated under the cognizance of the CE-2.0 National Connectors Standards Committee.

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TEST PROCEDURE No. 81A

COMBUSTION CHARACTERISTICS TEST PROCEDURE
FOR
ELECTRICAL CONNECTOR HOUSINGS, CONNECTOR ASSEMBLIES AND SOCKETS

(From EIA Standards Proposal No. 5062, formulated under the cognizance EIA CE-2.0 Committee on National Connector Standards, and previously published in EIA-364-81.)

1 Introduction

1.1 Scope

This standard establishes test method that may be used to characterize the resistance of connector/socket housings, including composite housings in their as molded condition with and without contacts relative to flammability for a particular application.

1.2 Object

This test is classified as destructive and is not recommended for specimen lengths less than 25.4 millimeters (1 inch).

NOTE — The results of testing connector housings or connectors in accordance with this procedure shall not, in any way, be considered as a substitute rating for those established by other procedures used to evaluate material test bars.

1.3 Definition

1.3.1 Composite housing

A plastic housing that has metal deposition applied to its surfaces.

2 Test resources

2.1 Equipment

2.1.1 Draft-free chamber, enclosure or laboratory hood.

2.1.2 Laboratory burner

A Bunsen or Tirrill burner or equivalent having a tube with a length of 101.6 millimeters (4 inches) and an inside diameter of 9.5 millimeters (0.38 inch). The tube shall not be equipped with end attachments such as a stabilizer. The burner shall be in compliance with ASTM-D-5025.

2.1.3 Ring stand with clamps or equivalent capable of adjustment for positioning of test samples. The ring stand shall be constructed from aluminum, steel or equivalent.

2.1.4 Gas

A supply of technical grade methane gas, 98% pure minimum or natural gas with suitable regulator and meter for uniform gas flow. If natural gas is used, it shall have a heat content of 37MJ/m³.

2.1.5 Stopwatch or suitable timing device accurate to 1.0 second.

2.1.6 Dry absorbent 100% surgical cotton or equivalent.

2.1.7 A desiccator containing anhydrous calcium chloride.

2.1.8 Conditioning room or chamber capable of being maintained at 23 °C ± 2 °C (73.0 °F ± 3.6 °F) and a relative humidity of 50% ± 5%.

2.1.9 Conditioning oven

A full draft air circulating oven capable of being maintained at 70 °C ± 2 °C (158.0 °F ± 3.6 °F) and capable of changing air a minimum of 5 times per hour.

3 Test specimen

3.1 Description

3.1.1 The test specimens shall be consist of one of the following configurations:

Table 1 - Configurations

Configuration	Description
1	Plastic housing only.
2	Plastic housing with a full compliment of contacts and hardware, if applicable.
3	Plastic housing with applicable metal shells and coupling features (e.g., coupling features, bayonet locking features, etc.) with supplemental components (e.g., sealing grommets, o-rings, etc.), if applicable.
4	Same as configuration #3 with a full compliment of contacts.
5	Same as 3 or 4 but composite housings.

3.1.2 Crimp contacts shall be tested with applicable conductors terminated in the appropriate manner. Conductors shall be clamped in a manner normal to their application.

3.1.3 Three specimens per configuration from the same manufacturer of the same material shall be submitted for testing, unless otherwise specified in the referencing document. The following features are not considered identical:

- different color,
- different glass concentrations or reinforcements,
- short versus long glass fibers,
- same generic plastic from different plastic suppliers,
- same generic plastic with different fillers or additives,
- connectors with shells or those classified as composite types.

3.2 Preparation

Prior to testing, specimens shall be conditioned in accordance with one of the following classes:

Table 2 - Classes

Class	Description
1	No conditioning.
2	Conditioned for 48 hours at a temperature of $23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ ($73.0\text{ }^{\circ}\text{F} \pm 3.6\text{ }^{\circ}\text{F}$) and a relative humidity of $50\% \pm 5\%$.
3	Conditioned for 168 hours at a temperature of $70\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ ($158.0\text{ }^{\circ}\text{F} \pm 3.6\text{ }^{\circ}\text{F}$) and then cooled to room ambient conditions in a desiccator containing anhydrous calcium chloride for 4 hours minimum at room temperature. Testing shall commence within 30 minutes of removal from the desiccator.

3.2.1 Unless otherwise specified in the referencing document, class 1 shall be used.

4 Test procedure

4.1 The test shall be performed at room ambient conditions and conducted in a chamber, enclosure or laboratory hood that is free from drafts. The chamber volume shall be 0.5 cubic meters minimum. An enclosed laboratory hood with a heat-resistant glass window and an exhaust fan for removing the products of combustion shall be provided. The exhaust fan shall be off during the test and on immediately after the test to remove product of combustion.

4.1.1 Each test specimen shall be tested independent from other test samples.

4.2 Each test specimen shall be attached and/or supported by the test stand clamp. The clamping technique shall be such as to support the test specimen in a horizontal plane. Clamping shall hold the specimen at one end not covering more than 20% of the specimen surface area. If, due to the configuration of the test specimen, special clamping may be required, it shall be specified in the referencing document.

4.3 The test specimen shall be positioned in a horizontal position so the lower surface of the specimen is 9.5 millimeters (0.38 inch) above the top of the burner tube and 305 millimeters (12 inches) above and centered to a horizontal layer of dry absorbent surgical cotton.

4.3.1 The layer of cotton shall be of such a size as to be equal to plus 50% of the test specimen area with a freestanding thickness not to exceed 6.4 millimeters (0.25 inch).

4.4 The burner shall be ignited at a distance greater than 152 millimeters (6 inches) from the test specimen.

4.4.1 The flame shall be adjusted to produce a yellow tipped blue flame 19 millimeters to 20 millimeters (0.75 inch) in length. The air supply shall be increased until the yellow tip disappears and flame height adjusted, if required.

4.4.2 The methane gas supply to the burner shall be arranged and adjusted to produce a gas flow rate of 105 milliliters per minute with a backpressure less than 10 millimeters water in accordance with ASTM-D-5207.

4.4.3 The test flame shall be calibrated in accordance with ASTM-D-5207 at least once per week, when the gas supply is changed, when test equipment is replaced or when test data is questioned.

4.5 The test flame shall be centrally placed under the test specimen in the following manner.

4.5.1 The flame shall be applied to the free end at the lower edge of the test specimen. The central axis of the burner tube is to be in the same vertical plane as the longitudinal bottom edge of the test specimen and inclined toward the end of the specimen at an angle of approximately 45° to the horizontal; see figure 1.

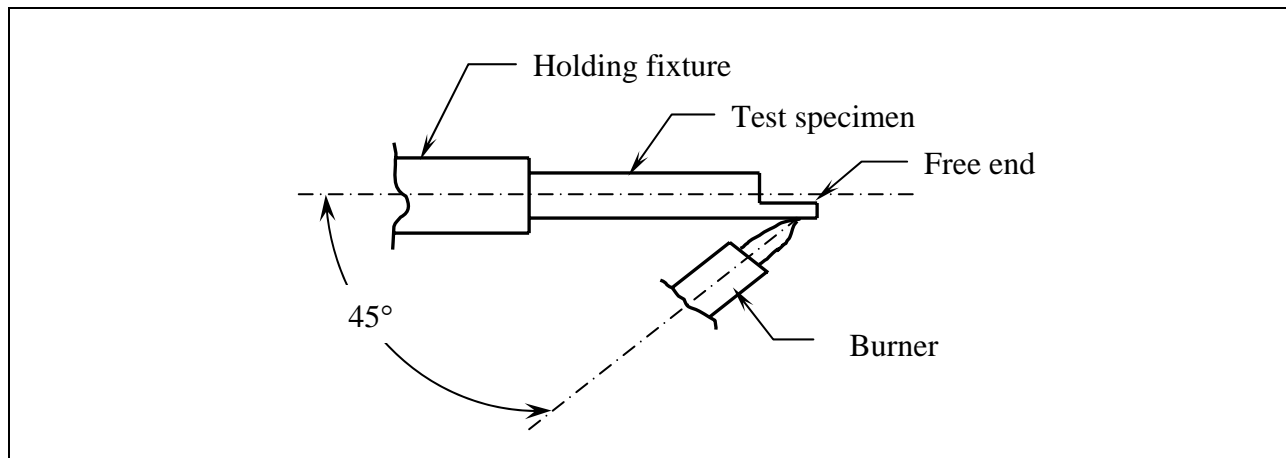


Figure 1 - Test setup

4.6 The test flame shall be applied for 10 seconds, unless otherwise specified in the referencing document.

4.6.1 After the 10 seconds application the test flame shall be removed a minimum of 152 millimeters (6 inches) from the point of application.

4.6.2 In the event of flaming or glowing of the test specimen, the duration of said flaming and glowing shall be noted and recorded. Dripping of molten and/or flaming material and igniting of the layer of cotton, if occurring, shall be noted and recorded.

4.6.3 To distinguish between flaming and glowing, a small piece of surgical cotton (50 millimeters square) shall be brought into the area in question. Ignition of the cotton shall be indicative of flaming.

4.7 The flame shall be reapplied for 10 seconds in accordance with 4.5 and 4.6. The flame shall be immediately applied after the first application or when the flaming or glowing ceases to exist, if occurring on the first application.

4.8 If the test specimen drips molten and/or flaming material during the flame application, the burner may be tilted to an angle up to 45 degrees and slightly removed to the specimen side to avoid material dripping into the burner tube.

4.8.1 The 9.5 millimeters (0.38 inch) distance between the bottom of the test specimen and top of the burner tube shall be maintained.

4.8.2 Any molten "strings" of material are to be ignored and the flame is to be applied to the major portion of the specimen.

4.9 Charring, melting etc., of the test specimen shall be ignored.

5 Details to be specified

The following details shall be specified in the referencing document:

5.1 Configuration to be tested

5.2 Conditioning classification

5.3 Requirements

5.4 Clamping technique

5.5 Final measurements and requirements

5.6 Flame application time, if other than 10 seconds

6 Test documentation

Documentation shall contain the details specified in clause 5, with any exceptions, and the following:

6.1 Title of test

6.2 Test equipment used, and date of last and next calibration

6.3 Connector description, including material and connector length

6.4 Duration of flaming after each flame application

6.5 Duration of glowing after each flame application

6.6 Name of operator and date of test