International Aircraft Materials Fire Test Working Group Meeting March 2008

Bunsen Burner Testing of Seat Cushion Materials

Presented to: Session on Materials Fire Safety

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Date: March 5, 2008

Federal Aviation Administration

Why is VBB testing of seat cushion materials still required?

a) To help substantiate the results of the oil burner test

b) Error in FAR mistakenly allowed this test to remain

c) Untreated foam was banned in state of California

d) None of the above

e) I don’t care

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Chapter 1 Handbook on VBB Testing:

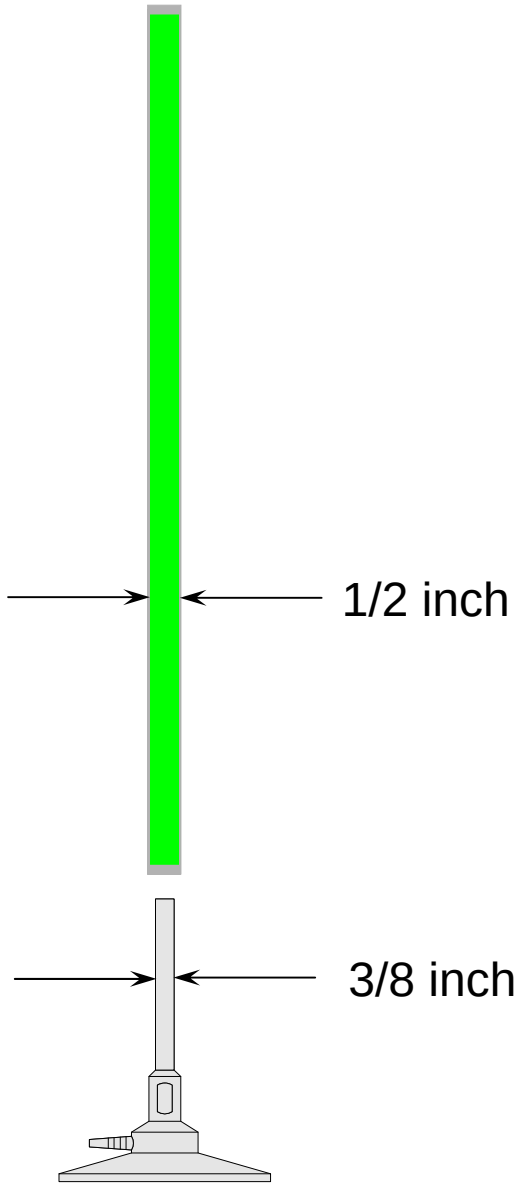
1.4.4 Specimen Thickness

The specimen thickness will be the same as that of the part qualified for use in the airplane, with the following exceptions:

1.4.4.1 If the part construction is used in several thicknesses, the minimum thickness will be tested.

1.4.4.2 Foam parts that are thicker than 1/2 inch (13 mm), such as seat cushions, will be tested in 1/2-inch (13-mm) thicknesses.

1.4.4.3 Parts that are smaller than the size of a specimen and cannot have specimens cut from them may be tested using a flat sheet of the material used to fabricate the part in the actual thickness used in the aircraft.


1/2 inch
3/8 inch

Chapter 1 Handbook Supplement 1.6.2.4:

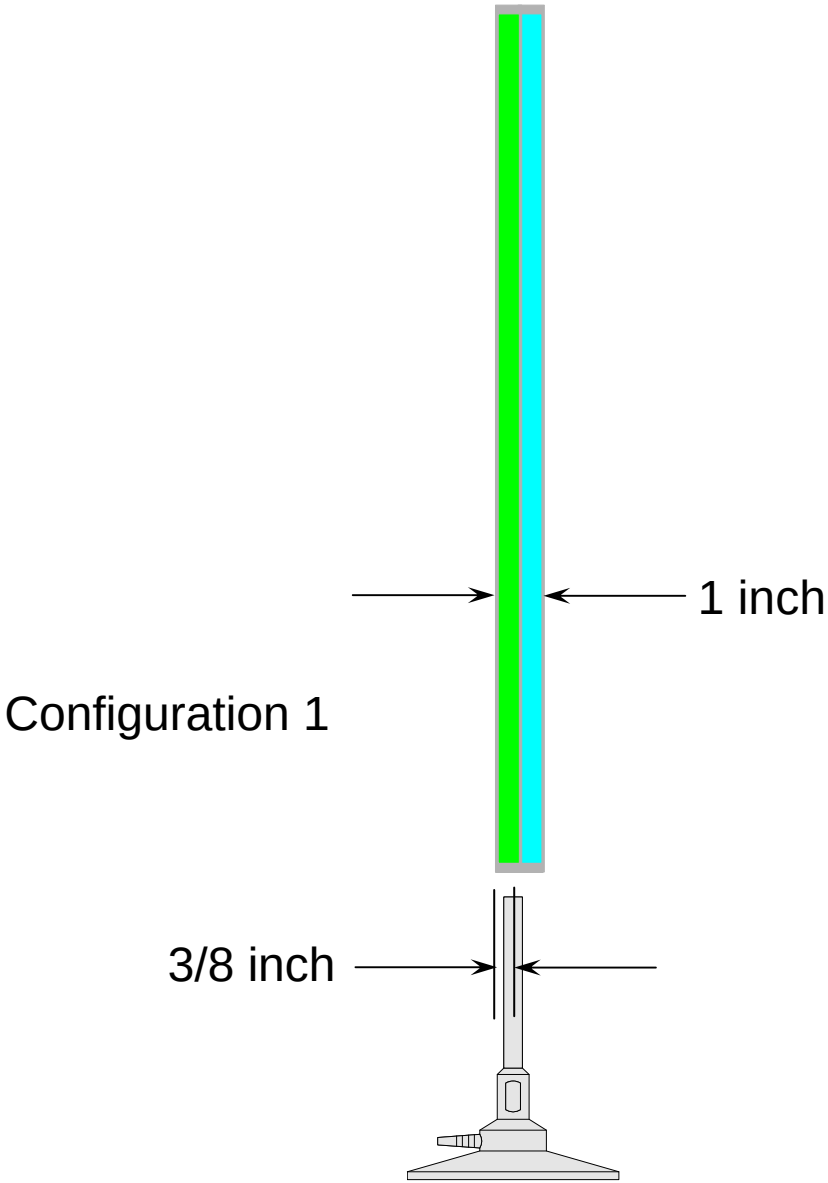
Placement of Burner

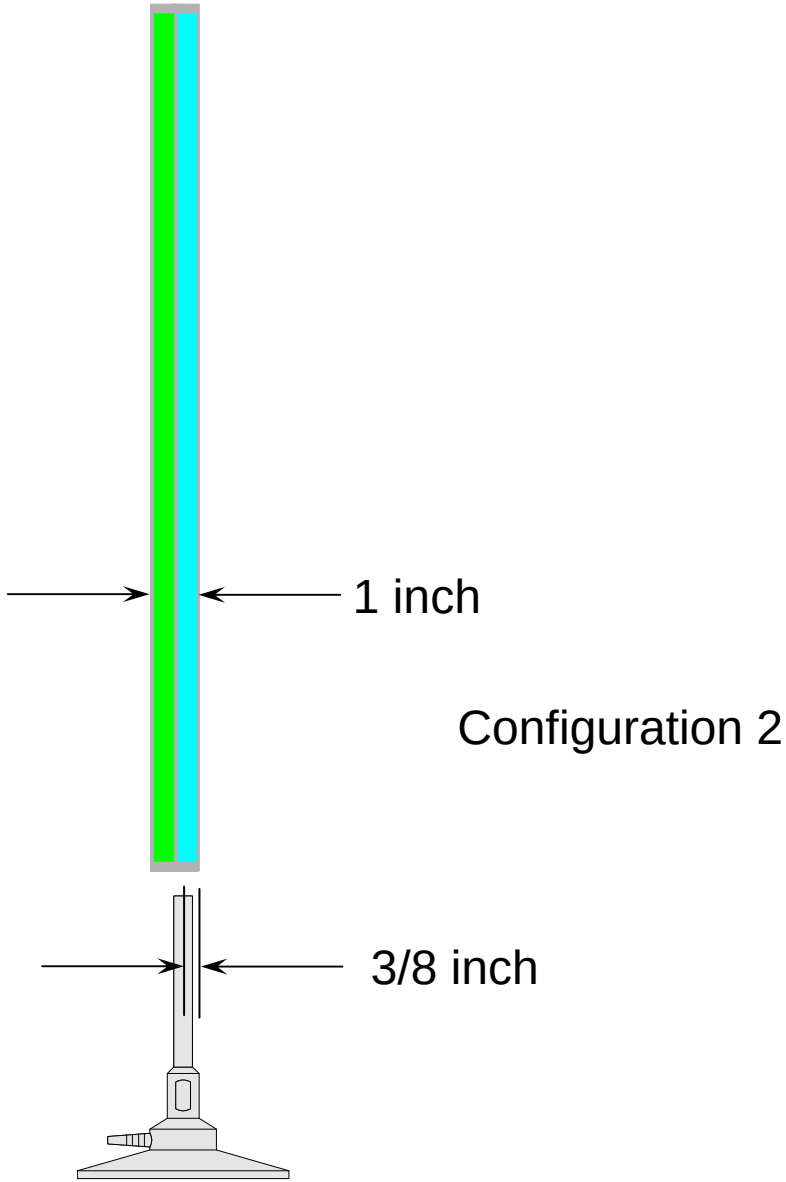
More information is available in DOT/FAA/CT-86/22, “An Investigation of the FAA Vertical Bunsen Burner Flammability Test Method.” Appendix F, FAR 25.853, Part I describes this test and specifies that the flame be placed “along the centerline of the lower edge.” The “centerline of the lower edge” is the line from the front face to the back face of the specimen. For thicker specimens, this is ambiguous since exactly “where” along the “centerline of the lower edge” is not specified.

Historically, test practices regarding burner flame placement have not been uniform or consistent within either the FAA or aircraft manufacturers. The most common placement used in the past was specified in the original issue of this handbook, viz.:

For specimens that are 3/4 inch (19 mm) thick or less, place the burner barrel centerline under the center of the bottom surface of the specimen.

For specimens thicker than 3/4 inch (19 mm), center the burner barrel under the bottom surface of the specimen 3/8 inch (10 mm) in from the surface exposed to the airplane interior, test each surface separately unless the surfaces are of the same materials and construction.

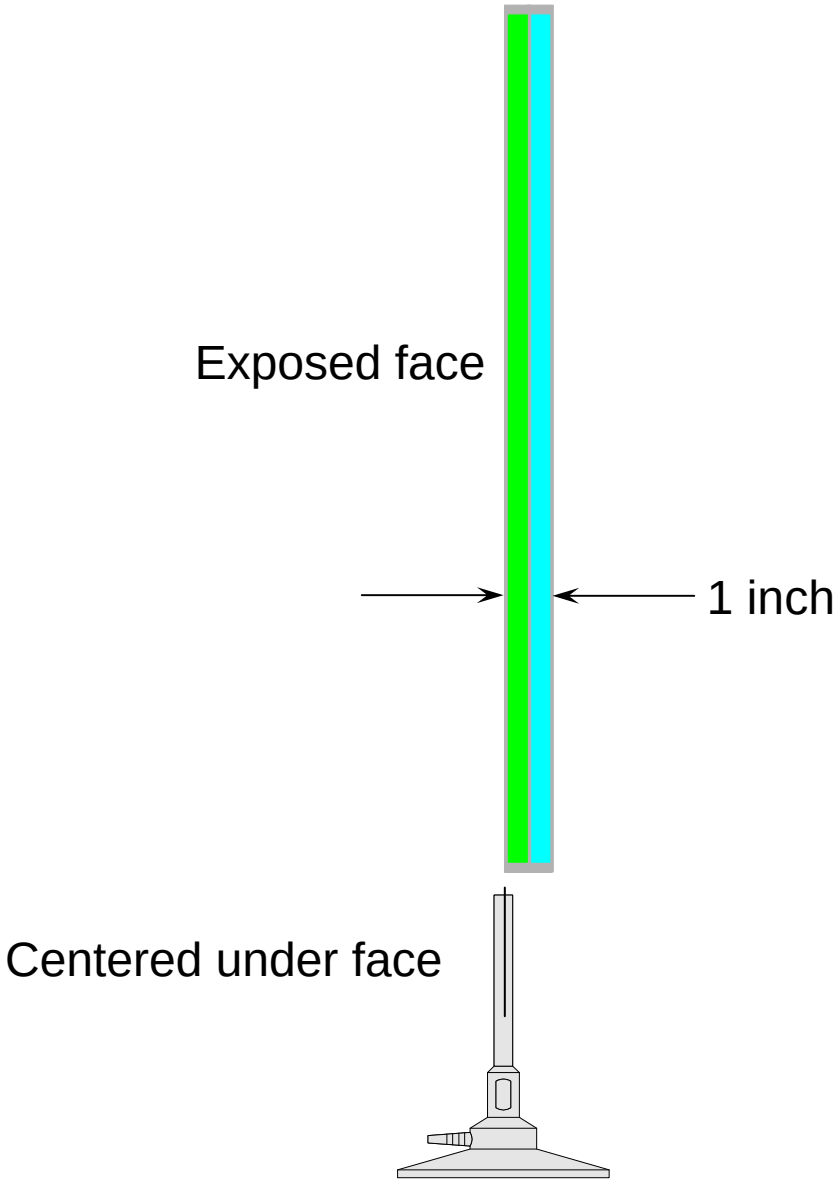

1 inch
Configuration 1
3/8 inch


1 inch
Configuration 2
3/8 inch

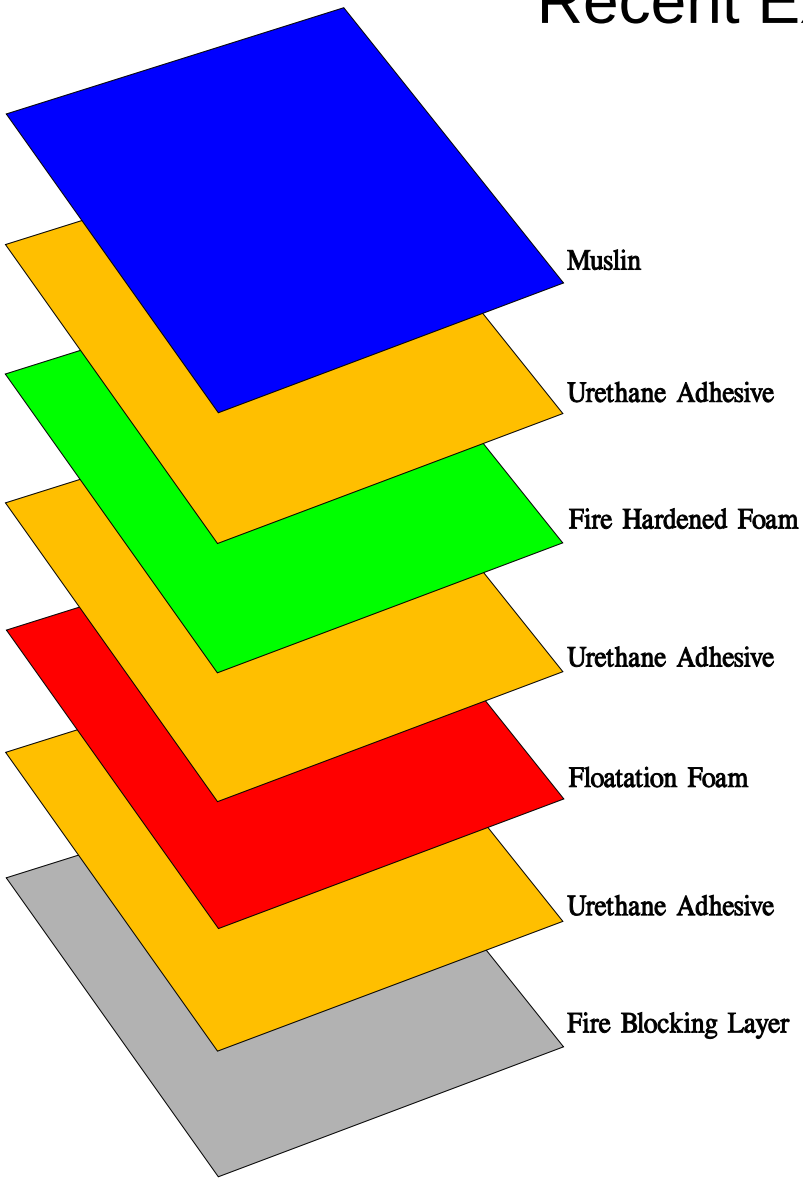
Chapter 1 Handbook Supplement 1.6.2.4:

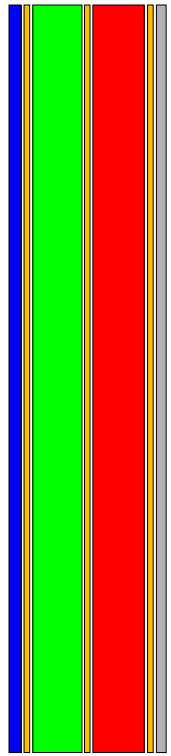
Placement of Burner

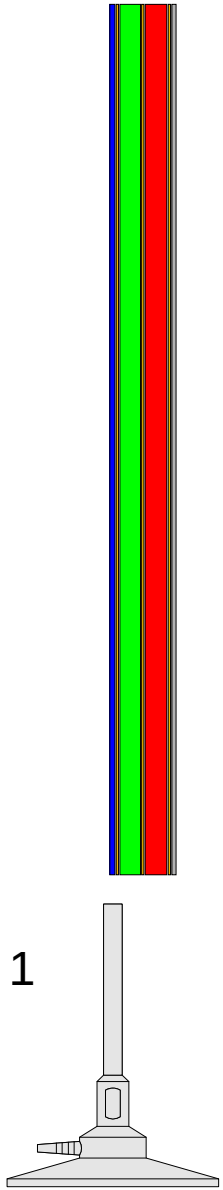
Another placement that has been less commonly used is that specified here, viz., directly under the middle of the lower edge of the face of the specimen that is exposed to the airplane interior. For specimens thinner than the burner barrel thickness (3/8 inch; 10 mm), test results are relatively insensitive to exactly where “along the centerline of the lower edge” the burner flame is placed. For samples of greater thickness, however, burn lengths are typically an inch or so longer if the burner barrel centerline is placed under or near the specimen face, and flame times are sometimes a little longer than if the flame is placed per the original handbook, Report DOT/FAA/CT-89/15, September 1990.


Exposed face
1 inch
Centered under face

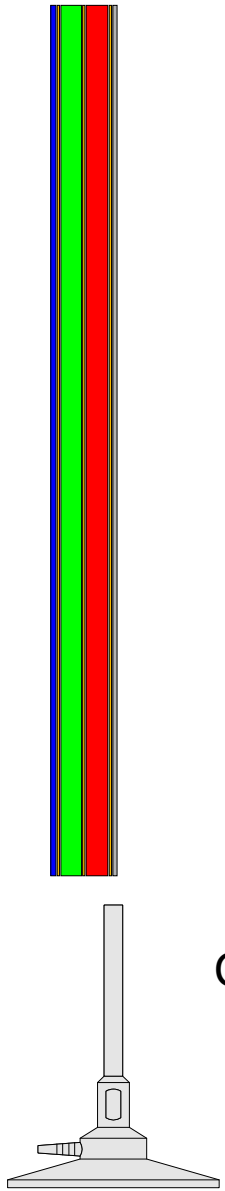
Recent Example







Configuration 1



Configuration 2

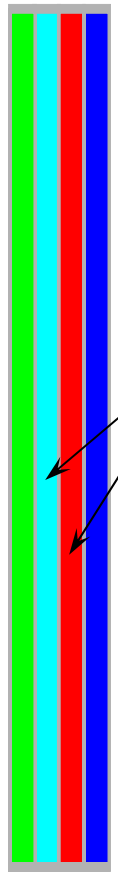
Chapter 1 Handbook Supplement 1.6.2.4:

Placement of Burner

Materials used in contemporary (especially post heat release) designs produce burn lengths and flame times that are considerably less than the acceptance criteria for certification (6 inches and 15 seconds), regardless of where the flame is placed. Although where the burner flame is applied is not of important pass/fail significance in this test, placing it directly under the specimen face generally represents a worst-case situation.

The FAA should accept data for certification using the flame placement described in the original portion of this handbook, or using the flame placed under the exposed face of the test specimen. However, the FAA and aircraft manufacturers have agreed that in the future, the preferred placement of the burner flame is under the middle of the lower edge of the face of the specimen.

What about sample with
3 or 4 different foams?



Middle foams not really exposed

Centered under face