

UNDERSTANDING THE CHANGES TO CALIFORNIA TB 117 – 2013 ON FLAME RETARDANCE OF RESILIENT FILLING MATERIALS USED IN UPHOLSTERED FURNITURE





California Technical Bulletin 117, often called TB 117, is the Requirements, Test Procedure and Apparatus for Testing the Flame Retardance of Resilient Filling Materials Used in Upholstered Furniture. TB 117 is published by California Bureau of Home Furnishings (now BEARHFTI) and covers residential upholstered furniture component materials, except for the frames. Until recently in 2013, TB 117 included both open flame tests and smoldering cigarette tests. Last year, TB 117 was changed significantly to remove the open flame tests. The new 2013 version of the Standard, TB 117-2013, also more clearly defines the test approaches for cover fabrics, barrier materials, and resilient filling materials. This article discusses the “previous” version of the Standard compared to the “new” version, and summarizes some of the discussions surrounding the change.

As far back as 1972, the State of California passed a law requiring all upholstered furniture sold in California to be flame retardant. California TB 117 was developed and became mandated in 1975. While TB 117 is not required outside of California, it quickly became widely accepted and emerged as a de facto national standard for upholstered furniture.

To better understand the previous TB 117 Standard, let’s examine the Open Flame Tests and Smoldering Ignition Tests prior to 2013. The Open Flame Tests were outlined in the Standard as follows:

Component Material	Test Ignition Source	Pass / Fail
Resilient cellular (foam) & natural materials	1½ inch flame for 12 seconds	Char length, Flame & glowing time
Polystyrene beads (bean bag chair filling)	“Pill” test (burns about 2 minutes)	Weight Loss
Feathers, down & loose-fill materials		Must be encased in flame retardant fabric/ticking Flame spread rate
Synthetic and blend fiber fill materials	5/8 inch flame for 5 seconds	Flame spread rate

As you can see, only the foams and filling materials were subjected to small open flame tests, not combinations of materials that comprise the furniture or the complete furniture itself.

The Smoldering Resistance Tests involved the following:

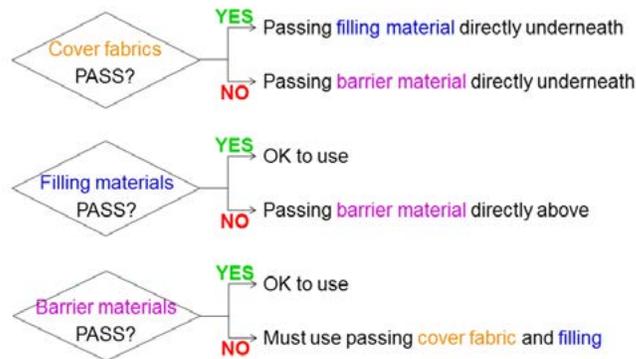
Resilient cellular materials (foam) are wrapped in a “standardized” fabric in a chair mock-up configuration. Specified test cigarettes are placed along the crevice and covered with smolder-prone fabric. The pass/fail criteria are based on weight loss.

For all other resilient filling materials, they are wrapped in a “standardized” fabric in a chair mock-up configuration. Specified test cigarettes are placed along the crevice and covered with smolder-prone fabric. The pass/fail criteria are based on char length.

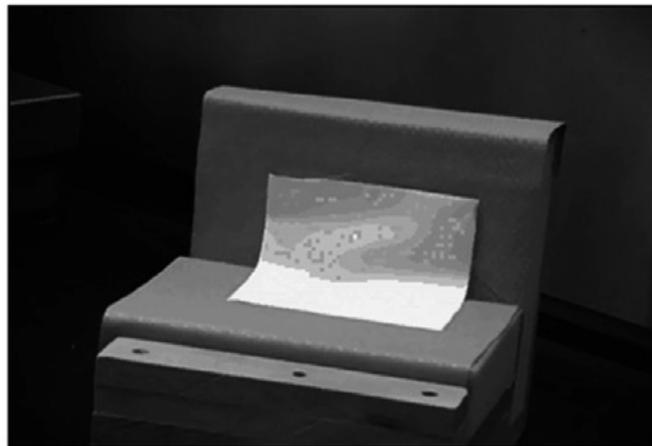


TB 117 was and remains a performance-based Standard, and does not specify or dictate the use of flame retardant chemicals. However, compliance with the open flame test requirements for some furniture components, such as polyurethane foam, was only achieved by the use of fire retardant chemicals. In recent years environmental advocates, health professionals and academics, expressed concern about the use of FR chemicals in upholstered furniture.

These concerns ultimately led to an executive order from the California Governor instructing the BHFTI to revise California TB 117 to eliminate the need for FR chemicals in furniture sold in California, while at the same time not reducing the level of safety to the public. In response, BHFTI held workshops and public hearings, and solicited input from the public. The result was TB 117-2013 with the Open Flame Tests removed and only the Smoldering Cigarette Tests remaining. The smoldering ignition test scheme was clarified as follows:



Section 1 covering the Cover Fabric Test measures the tendency of upholstery cover fabrics to smolder and contribute to fire propagation, when subjected to a smoldering ignition source. The cover fabric is wrapped around “standardized” FR-free foams in a chair mock-up configuration. A specified cigarette is placed along the crevice and covered with smolder-prone fabric. The pass/fail criteria are based on smolder duration, char length, and no flames.





Section 2 covering the Barrier Materials Test measures the tendency of the barrier material to smolder after exposure to smoldering cigarettes under specified conditions. Type 2 cover fabric is wrapped around the candidate barrier material encasing FR-free foam in a chair mock-up configuration. A specified cigarette is placed along the crevice and covered with smolder-prone fabric. The pass/fail criteria are based on smolder duration, char length, and no flames.

Section 3 covering Resilient Filling Material Test measures the tendency of resilient filling materials to smolder and contribute to fire propagation, when covered with smolder resistant fabric and subjected to a smoldering ignition source. Type 1 cover fabric is wrapped around the candidate resilient filling materials in a chair mock-up configuration. A specified cigarette is placed along the crevice and covered with smolder-prone fabric. The pass/fail criteria are based on smolder duration, char length, and no flames.

Lastly, **Section 4** covers Decking Materials Test and measures the tendency of decking materials to smolder and contribute to fire propagation, when subjected to a smoldering ignition source. For this test, Type 2 cover fabric is placed over decking material in a flat configuration. Specified cigarettes are placed and covered with smolder-prone fabric. The pass/fail criteria are based on smolder duration, char length, and no flames.

Many furniture and component manufacturers, environmental advocates, and others are celebrating the changes to TB 117-2013 and look forward to the promise of a wholesale removal of fire retardant additives to furniture foams. The rationale for the change was that the previous open flame test only addressed the performance of the interior foams and filling, but did not really positively impact the overall fire performance of the complete assembled furniture. Another point supporting the change to TB 117 was that all states within the US have moved to require Fire Standard Compliant (FSC) cigarettes. These cigarettes are required to have a reduced ignition propensity RIP as determined by ASTM E2187 - Standard Test Method for Measuring the Ignition Strength of Cigarettes. Based on these new RIP cigarettes, the assumptions are that RIP cigarettes will result in fewer cigarette ignitions of products with a smoldering potential, and consequently fewer lives will be lost and injuries will be reduced.

However, there are some furniture and component manufacturers that have shown reluctance to remove the FRs from their products. Fire safety advocates and organizations (such as NIST, CPSC, and UL) have voiced that TB 117 only addresses the performance of upholstered furniture under conditions of exposure to a smoldering cigarette and is lacking in evaluating performance under conditions of a small open flame exposure (such as a match or candle), or under severe, more fully developed fire exposure. TB 117 also does not necessarily indicate the performance of the same material component in other geometrical configurations, such as in full size furniture.

In response to the points regarding the RIP cigarettes (discussed earlier) used within the US, the following has been discussed:

- Only 75% of the cigarettes in a pack need comply
- There are limited fire statistics to support the effectiveness of RIP cigarettes
- Claims that RIP cigarettes do not prevent ignition under real-life conditions [1]
- CPSC studies did not predict (1) differences in the ignition propensity between RIP and non-RIP cigarettes, and (2) smoldering behavior on mattress substrates [2]



It is important to note that while the new TB 117 regulation can be met without using FR chemicals, it does not prohibit the use of FR chemicals. The TB 117-2013 change has certainly caught the attention of many different stakeholders, including but not limited to furniture manufacturers, component manufacturers, health and environmental advocates, the fire safety community, FR chemical industry, state and local officials, and first responders.

UL has several laboratories across the globe that can test to the revised standard. Please contact us at FurnitureNA@ul.com for inquiries.

[1] John DeHaan and James C. Albers, “Fire Safe Cigarettes, Aren’t”, presented at Fire & Materials 2013 (January 2013)

[2] Shivani Mehta, “Cigarette Ignition Risk Project”, Consumer Public Safety Commission (November 2012)

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