

INTOUCH

INFORMATION ON

FLEXIBLE POLYURETHANE FOAM



INTOUCH is a regular publication of the Polyurethane Foam Association. It covers topics of interest to users of flexible polyurethane foam, and is designed as a quick reference for background information on key issues. To get more detailed information about a particular topic, consult a PFA member.

California Technical Bulletin 133 (TB 133) and Furniture Fire Safety

California Technical Bulletin 133 is a landmark regulation for the furniture industry. Its development involved not only regulators, but the furniture and fire safety industries as well. The International Association of Fire Fighters (IAFF) and the American Furniture Manufacturers Association (AFMA) have established a joint effort to encourage legislative bodies in the U.S. to adopt TB 133 as the basis for uniform legislation or regulation regarding the combustibility requirements for upholstered furniture used in places of public occupancy. PFA has supported this position.

Why the agreement over California TB 133? Because TB 133 has been developed to provide a more realistic, practical test for judging the fire safety performance of seating furniture used in public occupancies.

California TB 133 is a **composite** test that evaluates a fully-assembled furniture system. In furniture, flexible polyurethane foam, fabrics, fiber and other materials are always used as **components** in a **composite** system. The most accurate way to determine the combustion performance of furniture is to evaluate the combustion performance of the composite system, rather than the performance of individual components.

California TB 133, which became effective March 1, 1992, is also important for another reason. It is being used as a model for similar legislation in other states. In fact, Illinois had passed a version of TB 133 before it officially became law in California. Minnesota and Ohio have passed laws based on TB 133, while other states are in various stages of doing the same.

**After March 1,
1992, all seating
furniture sold to
be used in public
occupancies in
California must
meet California
Technical Bulletin
133 standards
for combustion
performance.**



What California TB 133 is Intended to Cover

In California, TB 133 is designed to cover only seating furniture used in public buildings or public assembly areas. The regulation will apply to prisons and jails, hospitals, health care facilities, board and care homes, convalescent homes, licensed child care facilities, stadiums, auditoriums, and public assembly areas of hotels and motels. A public assembly area can be defined as any area containing ten or more articles of seating furniture.

California TB 133 was not intended to apply to hotel and motel guest rooms or to residential furniture. (All upholstered furniture sold in California must comply with California TB 117 as a minimum standard.) TB 133 is only intended as a special requirement for public buildings. Other states may define the term "public building" differently than does the State of California, as well as make other changes.

California TB 133 and Sprinklered Buildings

Automatic sprinkler systems are recognized as a very effective method of improving fire safety. They have been proven to extinguish fire in both commercial and residential buildings, and they put out fires no matter whether the contents of a building are fire resistant or not. The use of fire sprinklers saves lives and property.

The state of California makes compliance with TB 133 voluntary or discretionary in any fully-sprinklered facility (which complies with NFPA 13 – 1987 or UBC Standard No. 38-1, 1988). Other states such as Illinois have also made compliance with their versions of TB 133 voluntary for buildings that are fully-sprinklered. If there is any question about whether or not the furniture used in a building can be exempted from TB 133, consult a local or state fire official. Before choosing this exemption, furniture manufacturers should discuss liability ramifications with their legal counsel.

The TB 133 Test Procedure

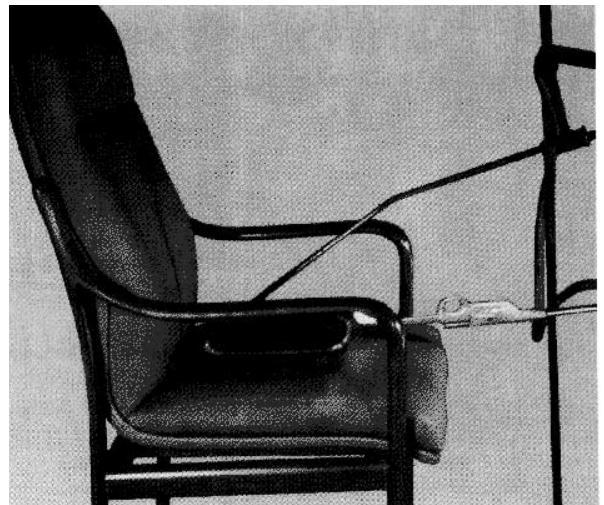
TB 133 requires that the complete seating system be subjected to a large open flame in a specially designed test room. The performance of the system is then evaluated based on a number of predetermined criteria.

The TB 133 test measures the amount of heat generated by the combustion of the furniture system (or alternatively, the rate of heat generation). Smoke opacity, carbon monoxide generation and temperature are also measured, along with the weight loss of the furniture system due to combustion.

If the system fails any one of these measurements, it does not pass the test.

The test room used for TB 133 is 12 feet by 10 feet with an 8 foot ceiling. The interior surface is unpainted sheetrock and the room is windowless. (Room dimensions may vary slightly if equivalent test results can be demonstrated.) A non-combustible platform supported from a load cell (to monitor weight loss of the furniture during combustion) is located in a corner. The furniture item to be tested is placed on this platform. A gas sampling inlet is located near the ceiling level above the furniture frame. The room contains thermocouples to measure temperature, and smoke opacity monitors are positioned at various heights in the test chamber.

Outside the chamber, an observation room contains instrumentation necessary for all measurements, plus a video monitor so the activities inside the chamber can be observed and recorded.



TB 133 is a composite test to determine the combustion performance of a complete furniture construction "system." This is a more accurate evaluation of furniture fire performance than component tests which only evaluate foam, fabric, or other materials on an individual basis. Either a sample of the furniture item or a mockup composite which duplicates the use of all the components in the finished piece of seating can be used.



For the test, the furniture sample or the specially-designed mockup is placed in the room no more than 10 inches from the wall and put in contact with an open-flame ignition source. The ignition source is a square gas burner. The burner is directed so that heat is focused on the crevice area between back and seat cushions in the furniture. If the furniture piece is less than 40 inches in width, the burner is placed in the center of the piece two inches from the back and one inch above the seat cushion. If it is more than 40 inches in width, it is placed five inches from the left arm crevice or edge.

Gas flow through the burner (at a rate of 13 liters per minute - equivalent to five sheets of newspaper burning) continues for 80 (plus or minus 2) seconds. The test continues until the fire is self-extinguished, until an hour passes, or until it becomes obvious that the furniture will become fully-involved and create flashover conditions in the test chamber.

Seating furniture fails to meet the requirements of TB 133 if:

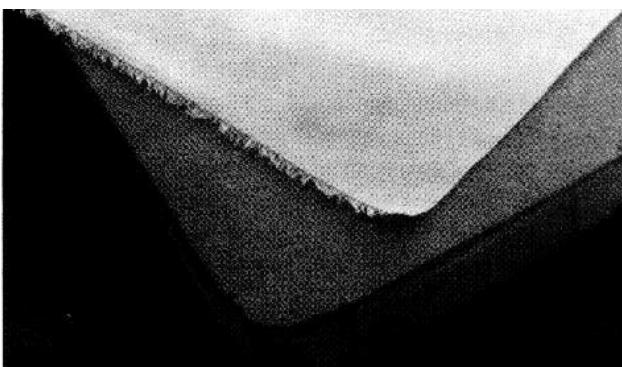
1. The temperature at the ceiling increases 200_F (93.2_C) or more.
2. The temperature at a thermocouple located 3 feet in front of the ignition box and 4 feet below the ceiling increases 50_F (10_C) or more.
3. There is greater than 75 percent opacity at the 4 foot smoke opacity monitor.
4. Carbon monoxide concentration exceeds 1,000 parts per million for a period of five minutes or more.
5. There is a weight loss due to combustion greater than three pounds from the furniture during the first ten minutes of the test.

The furniture fails to pass the test if any of these criteria are not met.

A second test method using different measurement equipment has also been approved. In this method, oxygen consumption calorimetry can be used to determine compliance. Using this test method, seating furniture fails to meet TB 133 requirements if:

1. The sample creates a maximum heat release of 80 kW (1,146 K Cal/min) or greater.
2. A total heat release of 25 MJ (5,970 K Cal or 23,700 BTU) or greater is recorded in the first ten minutes of the test.
3. There is greater than 75 percent opacity at the 4 foot smoke opacity monitor.
4. Carbon monoxide concentration exceeds 1,000 parts per million for a period of five minutes or more.

A "mock up" using a composite system of components may be substituted for an actual piece of furniture. The mock up must in all respects reflect the construction of the actual furniture, including fabrics, filling materials, combustible decorative parts, and furniture style. The specific details of assembling a mock up are explained in Appendix D of California TB 133.



Fire blocker interliners, made from fire resistant materials such as fiberglass, can be used to help furniture meet TB 133 requirements.

Criteria for Complying with TB 133

- Ceiling Temperature**
- Room Temperature at 4 feet**
- Smoke Opacity**
- Carbon Monoxide Concentration**
- Furniture Weight Loss**

How Furniture Manufacturers Can Comply with TB 133

There are two primary ways that manufacturers can comply with TB 133. The first is to develop a system of compatible components - fabric, foam, fiber, and/or other materials that will work well in conjunction with each other to pass the test. This may involve using flame retardant fabrics, combustion modified foam, or treated fiber.

Another approach is to use an interliner or fire blocker layer between the cover fabric and the cushioning materials. Materials such as fiberglass or other fire-resistant materials are available to use as fire barriers. Some fabric/interliner/foam combinations have difficulty in passing California TB 133, so it is important that such constructions be tested.

The fire blocker layer is essentially an extra upholstery step to encase the cushioning material before the cover fabric is applied. A fire resistant thread of the same composition as the fire blocker must be used to sew the fire blocker cover. Some manufacturers have laminated the fire blocker to the cover fabric to simplify the process. If this is done, the use of a fire resistant thread becomes even more important. Use of an interliner, however, does not guarantee that the TB 133 requirements will be met.

The use of a fire blocker layer can allow a number of upholstery cover fabrics to be used without the need for retesting the complete composite system.

It is important to note that no single component can claim to pass TB 133. Since the test is a composite test, it is impossible to have a "TB 133 approved" fabric, foam, or any other material.

Certain grades of foam, fabric, or fiber are more likely to allow a composite system to meet the TB 133 test criteria than others. Olefin and vinyl fabrics or conventional polyurethane foam meeting California TB 117 are unlikely to pass the test without the presence of a fire blocker layer. More heavily combustion modified foams, like CMHR or melamine types, are more suitable for TB 133 furniture constructions if a fire blocker layer is not used, but the upholstery fabric plays a vital role.

Testing for TB 133 Compliance

The California Bureau of Home Furnishings has indicated that although TB 133 is a composite test, the bureau does not intend to require furniture manufacturers to test all of the hundreds of combinations of fabric and other components possible with a furniture line. It may be possible for a furniture manufacturer to group products into categories that would require only a small number of actual pieces to be tested. The bureau recommends that "worst case" situations be considered, and that the classification should be based on furniture styles, the types of fabrics, and whether or not fire blockers are used. The bureau will provide assistance via telephone in designing worst case tests. To learn more about specific requirements and test procedures, contact the California Bureau of Home Furnishings at (916) 920-6951.

Since this is a complex process, it is recommended that individual furniture manufacturers contact the California Bureau of Home Furnishings directly for guidance and suggestions.

One concern with TB 133 is that there are limited facilities available for testing. The California Bureau of Home Furnishings can provide a list of approved facilities for testing. Effort is being made to expand the list of approved facilities.

All furniture that must meet TB 133 standards is required to have this label affixed (minimum size 2" x 3," with all capitalized letters, no smaller than 1/8" in height). The label can be placed adjacent to the "law label."

NOTICE
**THIS ARTICLE IS MANUFACTURED FOR USE IN PUBLIC
OCCUPANCIES AND MEETS THE FLAMMABILITY REQUIREMENTS OF
CALIFORNIA BUREAU OF HOME FURNISHINGS TECHNICAL
BULLETIN 133. CARE SHOULD BE EXERCISED NEAR OPEN FLAME
OR WITH BURNING CIGARETTES.**

Summary

- ▶ 1. California Technical Bulletin 133 is a combustibility test designed for seating furniture used in public occupancies. Versions of the test have been adopted in a number of states.
- ▶ 2. Unlike other combustibility tests that evaluate specific components, the TB 133 test evaluates the composite system. This approach provides a more accurate view of the furniture's actual combustion performance.
- ▶ 3. The TB 133 test measures a variety of factors, including heat generation, rate of heat generation, carbon monoxide generation, smoke opacity, and weight loss caused by combustion. Failure to meet any one of the criteria means that the furniture does not meet TB 133.
- ▶ 4. There are currently two basic approaches to complying with TB 133. The first is to assemble a group of normal furniture components - fabrics, fiber, foam, etc. - that work well as a composite to pass the test. The alternative approach is to use a fire blocker layer between the cover fabric and cushioning materials.
- ▶ 5. A manufacturer may group different furniture pieces into appropriate categories, testing a single piece from each category rather than a large furniture line. The California Bureau of Home Furnishing should be contacted for information.

This information is provided as a service of the Polyurethane Foam Association to improve the understanding of key issues that affect flexible polyurethane foam cushioning. To learn more about specific foams, contact your foam supplier.

This bulletin is intended to serve as a reference regarding the general properties and uses of polyurethane foam, and has been developed as a service for the Polyurethane Foam Association's (PFA) members and their customers. The information contained in this bulletin is offered in good faith, developed from sources to be reliable, and believed to be accurate when prepared, but is offered without warranty, express or implied, as to merchantability, fitness for a particular purpose, or any other matter. The PFA and its members disclaim all responsibility for any loss or damage arising from reliance on such information by any party. This bulletin is not intended to be all inclusive on any subject matter. The PFA makes no endorsements, assurances, warranties or guarantees concerning the quality, uses, or applications of polyurethane foam or specific products produced from polyurethane foam. PFA does not endorse the proprietary products or processes of any manufacturer. PFA and its members do not assume any responsibility for compliance with applicable laws and regulations. The PFA makes no representations regarding the combustibility of polyurethane foam under different applications or in different formulations. It is the responsibility of readers and purchasers or users of polyurethane foam to acquaint themselves with its combustibility characteristics both as to usage and storage, and any questions concerning applications and the combustibility of polyurethane foam must be directed to individual foam manufacturers or suppliers.

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