

FLAME RETARDANTS IN FURNITURE: IS THERE A FIRE SAFETY BENEFIT?

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Introduction

Since the 1970s, new flammability standards and regulations have led to the increased use of organohalogen flame retardants in consumer products, with the highest levels of use in North America. One example is a unique California furniture flammability standard called Technical Bulletin 117 (TB 117) that requires the polyurethane foam in upholstered furniture and juvenile products to withstand exposure to a small open flame for twelve seconds. Since 1975 this standard has primarily been met with the use of organohalogens such as penta-brominated diphenyl ether (pentaBDE), TDCPP, and Fire Master 550, which either have been shown to be toxic or lack adequate health information. The TB117 standard appears to have contributed to the finding of higher levels of the pentaBDE congeners (47, 99, 100, and 153) in dust and body fluids in California compared to other states.

Methods

The literature was reviewed and leaders in fire science, government, and the private sector were interviewed regarding regulations leading to the uses of halogenated flame retardants. Fire safety data showing impacts in consumer products were also examined.

Results

Products meeting the California furniture standard TB117, when tested, did not prevent ignition from small flame sources and following ignition did not exhibit a reduction in the fire severity. While foam treated to meet the standard can by itself resist a small open flame such as a candle or lighter for 12 seconds, most furniture has fabric covering the foam. After the furniture fabric is ignited by a small flame, the fire can become many times larger. Materials that can withstand small flame ignition cannot resist a larger flame.

The severity of a fire is quantified by its peak heat release rate, which is the maximum amount of heat generated per second during the combustion of the product. No measurable difference was found between the peak heat release rates of different pieces of furniture containing cushioning foam that was and was not TB117-compliant. Also, the spread of the fire in flame-retardant-treated versus untreated furniture was visually identical. In addition, no difference was found in the time-to-peak heat release (a measure of escape time) for treated and untreated furniture foams.

National fire statistics confirm that fire safety effectiveness of this standard has not been proven. The U.S. National Fire Protection Association (NFPA) data do not show a greater reduction in the rate of fire deaths in California than in other states that do not have furniture flammability standards.

Discussion

The California furniture flammability standard TB117 does not appear to provide a fire safety benefit and has led to the use of organohalogen flame retardants that are in some cases associated with adverse health and environmental impacts. Flame retardant standards for building insulation, electronic enclosures, and other consumer products should be evaluated to both their efficacy in creating fire safety and potential harm based on current peer-reviewed fire science, exposure, and health research results.