

# FOCUS on Fire Performance

# 02

November 06

## FIRE PERFORMANCE

In the past 60 years, the U.S. fire death rate has declined significantly, yet building fire loads such as furniture and carpeting have increased. The rate has dropped from 76 per million in the 1940s (when most construction and decorative products were made of “natural” materials), to below 12 per million in 2002 (when vinyl and other plastics have replaced traditional materials in numerous applications). Improved building codes and their enforcement are partly responsible. Use of sprinklers and smoke detectors is another factor, allowing the fire to be controlled and occupants alerted and evacuated at its early stages. But credit is also due to the increased use of fire retardant or more fire resistant materials like vinyl – materials that resist ignition and slow a fire’s growth, thus helping to increase escape time.

### ACHIEVING FIRE RESISTANCE

Materials do not burn in their solid state. They must be heated to the point where they emit a gas capable of being ignited. All organic (carbon-containing) materials – including natural materials like wood, cotton and wool, and synthetics like plastic – can ignite, propagate a flame and release heat due to the presence of carbon and hydrogen in their chemical makeup.

A plastic can resist fire in one of two ways. Fire-retarding chemicals may be added to the polymer to delay ignition or slow flame spread if ignition occurs. But in the case of vinyl products, fire resistance is built into the polymer. Polyvinyl chloride (vinyl or PVC) is formed when chlorine combines with hydrogen and carbon. The chlorine component of the vinyl polymer makes it naturally fire retardant – a distinction between it and all other plastics.

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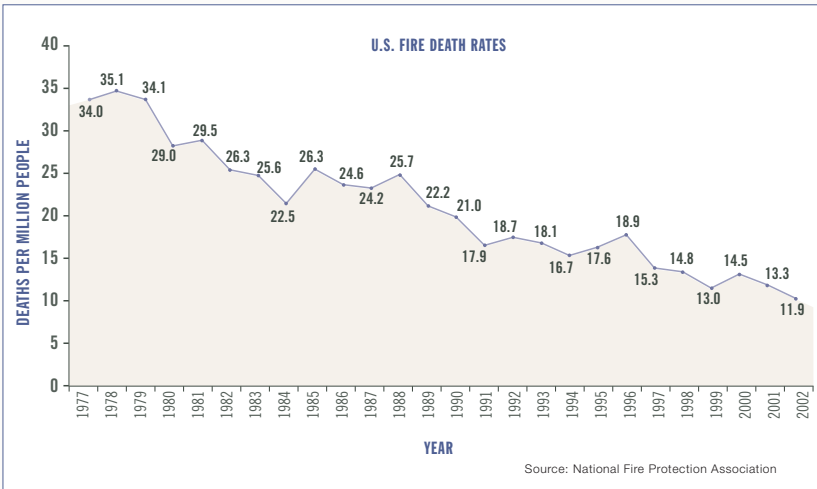
## VINYL INTERIOR PRODUCTS

Wallcoverings and upholstery made of vinyl make a positive contribution to building fire loads because the vinyl polymer is inherently fire retardant, unlike other plastic materials.

Vinyl interior products:

- Resist ignition and slow a fire’s growth, thus helping to increase escape time
- Can be formulated to meet a wide range of flame requirements
- Are no more toxic when they burn than other combustible materials, including wood and fabric





## FOR MORE ON FIRE PERFORMANCE ...

To review CFFA's Quality Standard for vinyl wall-covering, go to the CFFA Standards section at [www.chemicalfabricsandfilm.com/research.html](http://www.chemicalfabricsandfilm.com/research.html)

The State of California Department of Consumer Affairs publishes technical bulletins concerning flammability test procedures for public and high risk occupancies and requirements, test procedures and apparatus for testing flame retardance of upholstery filling materials. For more information, see [www.bhfti.ca.gov/bulletin.htm](http://www.bhfti.ca.gov/bulletin.htm)

## FIRE PERFORMANCE *continued*

### CODES AND STANDARDS

The National Fire Protection Association (NFPA) and International Code Council (ICC) each have model codes addressing the fire performance of interior finishes, as well as their respective fire codes for ongoing prevention. Applicable flame and/or smoke generation test methods for vinyl interior materials depend on a product's end use. The degree of flammability or smoke generation is determined by local code requirements or as agreed upon between the producer and the user.

Most vinyl wallcoverings are formulated to meet ASTM E-84 Class A standards governing flame spread and smoke development and can be specified throughout a building's interior, including in corridors and near exits. Commercial grade vinyl upholstery is typically formulated to meet a wide variety of stringent commercial flammability protocols.

### THE TRUTH ABOUT TOXICITY

All organic materials can burn under the right conditions and will produce toxic byproducts when burning. The combustion toxicity of gases produced by burning vinyl is similar to that produced by other combustible materials, including wood and fabric.

Carbon monoxide (CO), the largest hazard in any building fire, overwhelms other toxic gases in its impacts. Colorless, odorless CO provides no warning of its presence. If vinyl does burn, it typically produces CO, carbon dioxide and hydrogen chloride (HCl). The specific toxicity of inhaled HCl is similar to that of CO. But unlike CO, HCl is an irritant gas with a pungent odor, giving warning of its presence, and does not persist in the fire atmosphere as CO does. Instead it condenses on surfaces and tends not to reach dangerous concentrations.



## DID YOU KNOW?

Dioxins, which are produced in small amounts in many natural and synthetic chemical processes, are found in large-scale accidental fires whether vinyl is present or not. Wood and vinyl as used in typical homes contribute roughly equal amounts of dioxin in a house fire.<sup>1</sup> However, vinyl does not support combustion as wood does.

<sup>1</sup> Carroll, William F., Jr., "The relative contribution of wood and poly(vinyl chloride) to emissions of PCDD and PCDF from house fires," *Chemosphere* 45 (2001)



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