PERFORMANCE PRODUCTS

CFFA CHEMICAL FABRICS & FILM ASSOCIATION, INC.

THE ADDED BENEFIT: HOW FLAME RETARDANTS CONTRIBUTE TO COATED FABRICS

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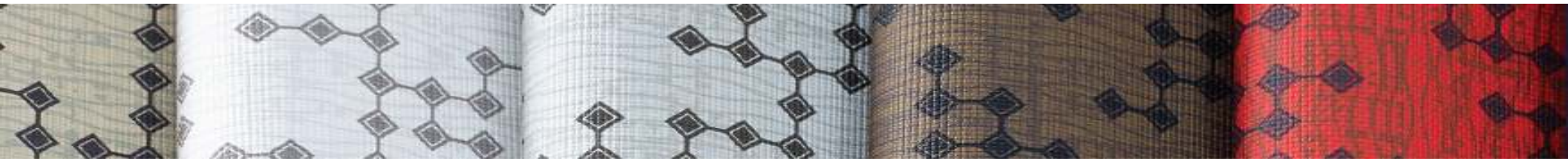
Who We Are

PATRICK DIEBEL

- Vice President, Technology, Morbern, Inc.
- Member, Chemical Fabrics and Film Association



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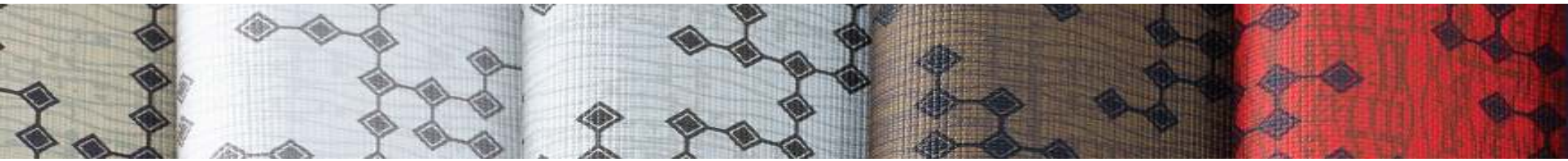
Who We Are

- THE CHEMICAL FABRICS AND FILM ASSOCIATION is an international trade association representing manufacturers of polymer-based fabric and film products, used in the building and construction, automotive, fashion and many other industries.

- The members of the Performance Products Division manufacture chemical fabrics and film used in numerous applications such as contract upholstery, pool liners, and transportation interiors.



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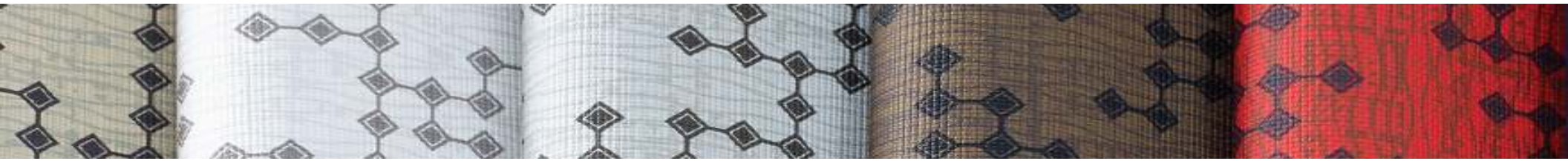
The Added Benefit: How Flame Retardants Contribute to Coated Fabrics

PVC is itself inherently flame retardant, but its ultimate resistance is determined by types and quantities of additives. A wide range of Flame Retardants can be added to enable vinyl coated fabrics to meet specific fire codes and standards, limiting or avoiding its contribution to the burning of other building products. At the end of the session, you will be able to:

1. Define Flame Retardants and understand their applications
2. Identify types of Flame Retardants contained in the polymer matrix
3. Explain how Flame Retardants help vinyl products meet fire codes and standards



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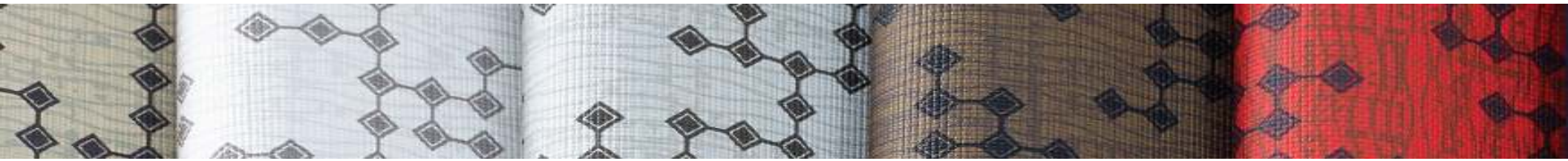
Why Vinyl/PVC is Safe

- PVC is very inert, very stable and very durable - used in buried pipes, liners, window frames, vinyl siding, automotive seating for over 50 years.
- Vinyl/PVC is the second most used plastic in the world.
- Vinyl resin is inherently flame retardant and decreases fire hazards. Most other plastics burn very quickly.
- Flexible vinyl is the number 1 material used for blood bags and IV tubes around the world (for over 40 years) and has not been shown to have caused any health-related issues.
- Vinyl is approved by the NSF in Ann Arbor and the British Standards in the UK to line potable water reservoirs and transport drinking water. It would not be used for these applications if it was toxic in any known way.
- No free Chlorine (chlorine gas) is emitted from the end product.



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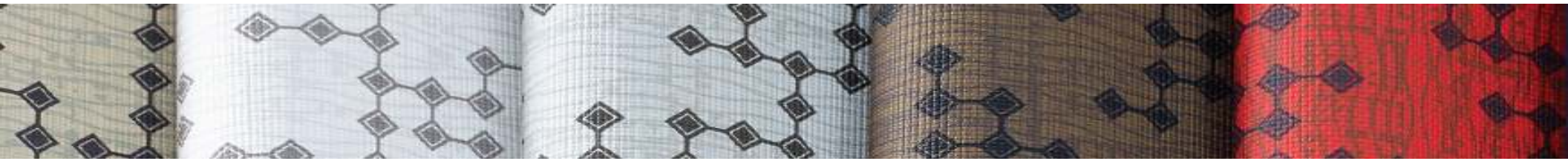
Decorative synthetic upholstery fabrics for over 50 years.

Fire and Flame Retardants

- Vinyl/PVC resin is inherently flame retardant and decreases fire hazards.
- While Vinyl/PVC does not readily burn, the supporting fabrics (polyester, poly cotton, nylon) and the plasticizers that make the product flexible, may burn.
- To maximize safety, many agencies/regulators have developed fire related specifications that must be met, including:
  - FVMSS 302 for automotive
  - ASTM E84
  - UL/ULC related,
  - European Interior Tests: Crib 5, M1/M2,/B1/B2, etc.
- These standards cannot reliably be met without adding additional Flame Retardants. If these standards are modified to have lower burn rates, coated fabrics can have all Flame Retardants removed and still perform adequately.



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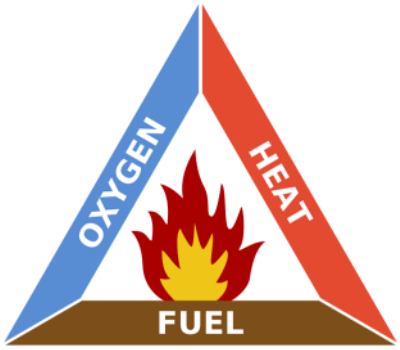
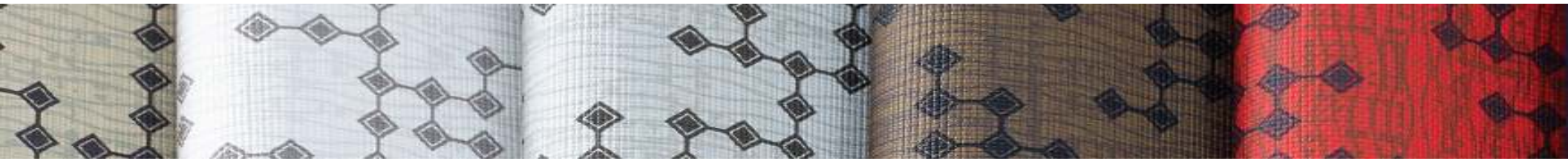
Fire and Flame Retardants: Continued

- Fire needs three things to burn: A fuel source/substrate, oxygen and a source of heat/ignition. If any one is removed, the fire will go out.



- The solid does not burn; the vapor phase burns, flammable gas released due to heat combines with the oxygen and burns, creating a flame.

- The best way is to avoid fire is to not allow the heat source, but that is often added by accident (cigarette, cooking oil, electrical malfunction).



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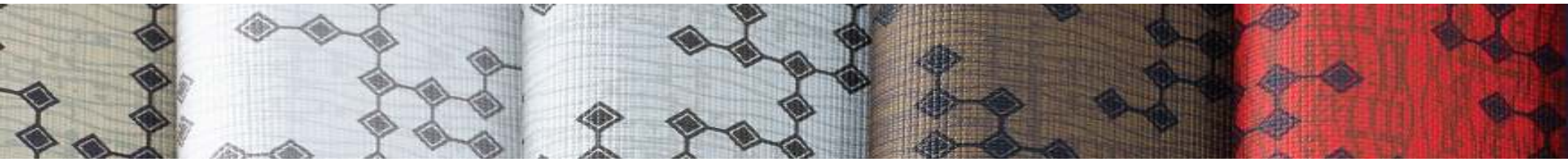
Fire and Flame Retardants (continued)

- Flame Retardants are additives that are designed to minimize the spread of flame .

- Three methods of achieving fire retardancy:

  1. Making the fuel source non combustible (in the vapor phase)
  2. Forming a char layer that insulates the fuel source and lowers the temperature.
  3. Quenching the flame by releasing water as the temperature rises and lowering the temperature and putting the flame out.

- Sometimes multiple methods are used.



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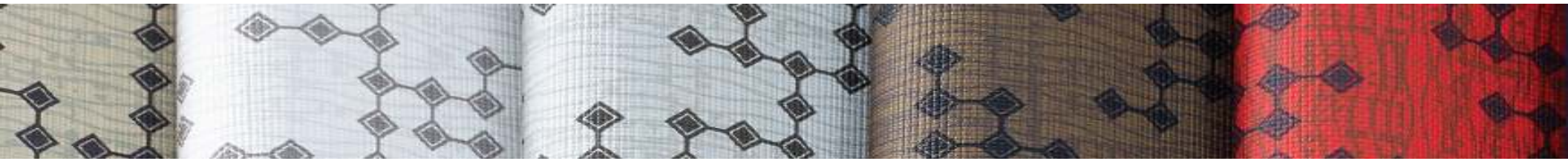
Types of Flame Retardants

- Vinyl Coated Fabrics contain PVC resin which contains Chlorine and this is released when heat is applied and disrupts the vapor phase via hydrogen radical replacement or radical recombination and minimizes flame and fire.

- The following Flame Retardants may be added:
  - Antimony Trioxide
  - Phosphorous Flame Retardants
  - Intumescent Flame Retardants
  - Alumina Trihydrate and/or Magnesium Hydroxide
  - Zinc Based Flame Retardants



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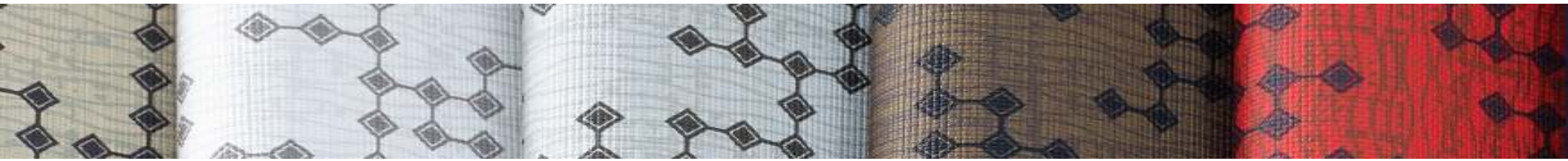
Types of Flame Retardants (continued)

- **Antimony Trioxide** is added which acts in synergy with PVC to further inhibit the combustible gases in the vapor phase. A small amount of antimony trioxide is all that is needed to meet most fire specifications.
- **Phosphorous Flame Retardants** are often used as a replacement or in addition to antimony. They also act in the vapor phase and as char formers which help insulate the fuel from the flame and retards the flame.
- **Intumescent Flame Retardants** turn the burned surface into a char layer which insulates the material and the flame reducing the heat and retarding the flame. There are several types of these, such as phosphorous and melamine based.
- **Alumina Trihydrate and or Magnesium Hydroxide** are endothermic/heat sink Flame Retardants and release water when they reach a certain temperature and this water reduces the temperature of the flame and extinguishes or retards the flame.
- **Zinc based Flame Retardants** are sometimes used in PVC as fire retardants and as smoke suppressants and char formers.



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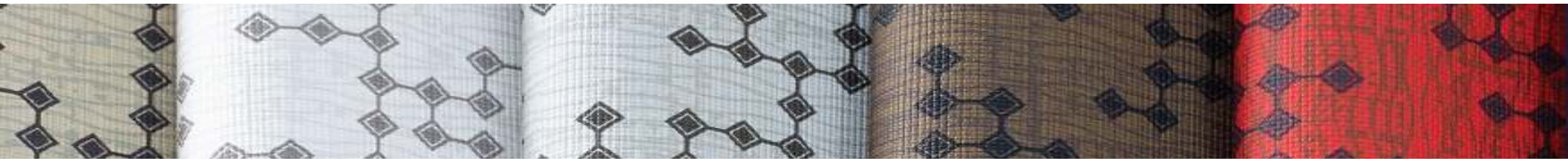
Types of Flame Retardants (continued)

- Brominated Flame Retardants, which have been banned in several jurisdictions due to toxicity concerns are not used in vinyl coated fabrics.

- Members work with the relevant regulatory organizations to ensure their products pass the specifications and minimize unnecessary additives.




QUESTIONS?

THANK YOU!

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