EXPANDED POLYSTYRENE FLAME RETARDANTS

FIRE RESISTANCE IN BUILDING & CONSTRUCTION APPLICATIONS

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SAFETY FIRST

Flame retardants (FRs) play a crucial role in protecting homes, hospitals, schools and other buildings from the life threatening consequences of fire. In 2010, 482,000 building fires occurred in the U.S. injuring 15,420 civilians and resulting in $9.7 billion in property damage.[1]

In order to reduce the risk of fires and meet building and consumer protection codes, FRs are incorporated into many building and commercial products to accomplish one or more of the following functions:

- *Raise the ignition temperature;*
- *Reduce the rate of burning;*
- *Reduce flame spread; or*
- *Reduce smoke generation.*

EPS FIRE RESISTANCE

The primary flame retardant currently used in EPS foam insulation is HBCD. Hexabromocyclododecane (HBCD) is an additive flame retardant that promotes increased fire resistance in EPS building and construction applications. This allows EPS foam insulation to meet the stringent fire safety requirements governed by the International Code Council and National Building Code of Canada, providing increased protection to buildings and building occupants. HBCD has also been used as a flame retardant in solid plastics such as high impact polystyrene and in carpets, upholstery and other textiles.

Because of its chemical properties, HBCD remains effective and stable within the EPS polymer matrix providing fire protection performance for the life of the building.

EPS FLAME RETARDANT ADVANCEMENT

In response to ongoing questions about the ecological safety of HBCD, the chemical industry has announced the development of an innovative flame retardant (FR) that is a suitable alternative for use in expanded polystyrene (EPS) foam. The process to transition to the new FR is currently underway but will take time to be fully implemented.

The new flame retardant is a polymeric compound, designed to deliver ease of substitution in existing EPS production technologies without compromising fire safety performance at similar load levels. The announcement is just the beginning of a transition process that will proceed with great care to assure that this new flame retardant performs just as well or better than HBCD in accordance with ASTM C578 and CAN S701 physical properties and U.S./Canadian building code fire safety requirements. This process is the result of ongoing collaboration among key stakeholders and government agencies to identify and implement alternative flame retardants that meet the following criteria:

- *Provide equal flame retardancy;*
- *Result in equal performance and physical properties;*
- *Maintain cost-effectiveness; and*
- *Offer compatibility with existing manufacturing processes*.

Any transition from an established product composition must proceed in a structured fashion to ensure the necessary approvals are in place. The chemical industry reports that a preliminary scientific review indicates the new FR will meet the health and environmental criteria for new chemicals. While production facilities to manufacture the new FR are being established, it will take several years to reach production levels that adequately satisfy historical market demands.

The EPS industry is currently developing a test program to ensure the new fire retardant complies with U.S. and Canadian building code fire performance requirements for EPS building applications. Once commercial quantities become available to the EPS molder community, in-house testing and quality control measures will continue to be verified via independent, third-party certification programs.

Expanded Polystyrene Flame Retardants

REGULATORY ACTION

The EPS Industry Alliance has been and will continue to work closely with the U.S. EPA and Environment Canada in their efforts to develop guidelines and regulations regarding HBCD. Although the U.S. EPA has not yet initiated any formal regulatory action for HBCD use in EPS, it has released a Chemical Action Plan to evaluate HBCD and then determine its course of action for any future regulation of this chemical. As part of that process, a Design for Environment (DfE) task group has been formed to examine next generation flame retardants that would serve as suitable replacements for HBCD in polystyrene foam insulation and the EPA has issued a Significant New Use Rule for HBCD use in textiles.

EPS- IA is likewise engaged with the Canadian government's Risk Assessment and Risk Management plan for HBCD. Key information and industry input have been provided to Health Canada and Environment Canada to ensure adequate time is provided for a smooth transition to an alternative flame retardant.

SCIENTIFIC INVENTORY

HBCD is just one of over 550 compounds currently being evaluated by the U.S. Environmental Protection Agency, Environment Canada and the European Union. This has spurred increased interest from the research community to investigate further, resulting in hundreds of studies on a variety of flame retardants, including HBCD.

EPS-IA evaluated more than ten (10) different studies on HBCD published between 2008–2011 in which several consistent themes and conclusions prevail.

HBCD Exposure Pathways Are Undetermined

Although trace amounts of flame retardants have been found in remote geographic regions, human tissue and consumer food products, the source of these flame retardants remains unclear. While the discovery of even small amounts of HBCD in the environment does raise questions as to how to prevent any further exposure, the science indicates that the concentrations are well below thresholds that would present a health risk.

HBCD Detection Levels Miniscule

Environment Canada completed a thorough risk assessment and found that HBCD is not entering the environment in a quantity or under conditions that constitute a risk to human health.[2] This determination is further supported by the European Chemicals Agency's conclusion that HBCD presents no risk to consumers or the general public.[3]

EPS Insulation Not Linked to HBCD Levels

Recent studies have supported the fact that EPS insulation is not a significant source of HBCD. Specifically, the study found high correlation between detectable levels of HBCD and the number of televisions and electronic devices present in the test areas suggesting that in-place EPS insulation is not a source of HBCD in the indoor environment.[4]

Because the scientific community has not yet been able to identify verifiable exposure pathways to explain the appearance of HBCD in remote geographical locations, it is prudent to embark on the transition to the new FR. This move is another step along the EPS industry's path to increase energy efficiency and promote environmental stewardship.

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[1] Fire Loss in the United States During 2010, by Michael J. Kartner, Jr., NFPA, Quincy, MA.
[2] Environment Canada Screening Assessment on HBCD, CAS Reg. No. 3194-55-6, November 2011
[3] European Commission Risk Assessment Report on HBCD, CAS Reg. No. 25637-99-4, EINECS No.: 247-148-4, May 2008
[4] Tri-decabrominated diphenyl ethers and hexabromocyclododecane in indoor air and dust from Stockholm microenvironments 2: Indoor sources and human exposure, de Wit et. Al., Environment International, November 2011