The Alliance for FLAME RETARDANT FREE FURNITURE

Unwanted toxic flame retardants preventing circularity and increasing fire toxicity

The Alliance for Flame Retardant Free Furniture welcomes the New Circular Economy Action Plan and calls on the EU institutions to address the unnecessary and unwanted use of chemicals which prevent circularity and climate goals, such as toxic flame retardants in furniture, which endanger at the same time people's and firefighters' health, as they migrate out of products and may lead to an increase in fire toxicity. The use of toxic flame retardants is a historical, hazardous and ineffective practice which is not proven to decrease the number of fires. Ensuring fire safety is a must, but it needs to be done in unhazardous ways. Many alternatives to chemical flame retardants exist that are less harmful for human health and the environment. To address the unwanted use of flame retardants and barriers in the Single Market, harmonisation of flammability standards for furniture across Europe is needed to a level where toxic flame retardants are not needed to comply with flammability standards, buildings and Fire Safety Regulations. Changes in key standards, such as California TB133 should be taken as examples to follow. In addition to this, restriction of chemicals under REACH should target classes of chemicals rather than individual substances. All in all, a balance should be achieved between fire safety, chemical safety and circularity.

Toxic flame retardants hampering true circular economy

The Alliance welcomes the new Circular Economy Action Plan and the measures announced by the European Commission, including the sustainable product policy legislative initiative and sustainability principles to improve reusability, upgradability and reparability. The Alliance also welcomes initiatives to address the presence of hazardous chemicals in products and to develop methodologies to minimise the presence of substances posing problems to health or the environment in recycled materials, as well as initiatives to create a well-functioning EU market for secondary raw materials and to introduce minimum mandatory Green Public Procurement criteria for public authorities. **The use of toxic flame retardants is not compatible with circularity objectives and their unwanted presence in furniture actively counteracts the ambition to introduce and increase circularity.**

Firstly, toxic flame retardants are not compatible with Ecodesign principles, which dictate that harmful substances should be removed from the manufacturing cycle from the design phase. Secondly, the presence of these substances also brings concerns at later stages, namely during use and at end-of-life. Once added, chemicals are almost impossible to separate from many materials, and when possible, the required processes are very inefficient, both from a time and energy-intensity perspective. This jeopardises circular business models based on reuse, refurbishment, remanufacturing, but also recycling practices and ensuring the safety of secondary raw materials.

A value chain approach from material sourcing to production, use and end-of-life, is needed to avoid and remove toxic substances in support of a cleaner and more efficient circular economy. This will mean increasing the quality and durability of furniture and enabling more material to be safely reused or recycled. This would also reduce the risks for health and enhance the competitiveness of the furniture industry, who is already embracing circular practices.

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Toxic flame retardants and effects on health

Flame retardants are used in many consumer goods, including upholstered furniture, mattresses, headboards, textiles, building insulation, electrical and electronic goods (TVs, computers, telephones, etc.). Adding toxic flame retardants and processing products containing flame retardants presents a risk for workers during production, sale and end-of-life processing. These chemicals are also harmful for consumers, as flame retardants off-gas[1] from foam and also migrate out of articles into air, dust and onto surfaces. They are often detected in homes, offices, vehicles, gymnasiums, hotels, schools and public buildings. Infants, children and adults are exposed to them through maternal milk, diet, breathing, ingestion and dermal contact. Small children are particularly exposed as they spend a lot of time on the ground and place objects into their mouths thereby ingesting flame retardants. **These examples show the need to better consider the risks from substances that are present in our everyday life but not visible.**

Many flame retardants have been documented to have harmful effects and can be dangerous for human health, animals and the environment, yet their usage is still very common in furniture as they are used to comply with stringent national flammability standards and requirements. The use of toxic flame retardants is also common due to a remarkably slow implementation of the restriction process of chemicals on a substance-by-substance basis under REACH (EC Regulation 1907/2006), enabling flame retardants from a same class to be put on the market although others from that class may have been restricted. This is not sustainable for the furniture industry, who is already embracing circular practices.

Evidence that flame retardants do harm has been reported in a large collection of scientific literature and comes from assays (*in vitro*), animal (*in vivo*) and human studies. Their presence is likely to remain for a very long time and generations to come, therefore stemming their use as soon as possible is crucial. For example, although PBDEs (a class of brominated flame retardants) have been largely phased out, they are still present in products that are in use. PBDEs have been linked to endocrine disruption, neurotoxicity, developmental, behavioural and learning defects, reproductive impacts and cancer [1]. PBDEs have been replaced by other brominated flame retardants (BFRs), including one with a strikingly similar structure – DBDPE. A lengthy process is underway and DBDPE is currently being evaluated under CoRAP, where it has been for many years. Additionally, organophosphorus flame retardants (OPFRs), some chlorinated (e.g. TCPP[2], TDCPP, TCEP) and others not (e.g. TPhP, TBOEP, TEP, TBP) have also been introduced despite the uncertainty concerning their health and environmental risks. As such, the Alliance trusts that the ongoing restriction process for TCPP, TDCPP and TCEP in childcare articles and residential upholstered furniture[3], initiated by ECHA based on exposure risks identified for children, will be relaunched as soon as possible.

- Developmental, behavioural and neurotoxic effects of BFRs and OPFRs have been reported in many studies [2].
- Endocrine disrupting effects of flame retardants include effects on: sex and thyroid hormones, carbohydrate & lipid metabolism, diabetes risk, adipogenesis, obesity, reproduction, and ano-genital distance [3].
- Some OPFRs are suspected to be carcinogenic [4]. TDCIPP is listed as a known carcinogen by the US Consumer Product Safety Commission [5]. In the EU, restrictions on TDCIPP and TCPP have been issued based on toxicological concerns related to their carcinogenic potency [6]. Median concentrations of TCPP in all UK microenvironments exceeded those reported elsewhere in the world [7].
- Tetrabromobisphenol A (TBBPA), a widely used flame retardant, has been reported to cause uterine tumours in rats [8]. Studies also report DNA damage or DNA methylation effects [9].
- Cardiotoxicity and cardiac abnormalities have been reported in different in vitro and in vivo studies with one calling 'for a greater attention to the health risk of fetus in pregnant women exposed to such OPFRs' [10].
- Hepatoxicity has been reported for both BFRs and OPRS including inflammation, apoptosis, changes in liver metabolism and gene expression and possibly hepatocellular carcinoma [11].
- Other studies, but fewer in number, have reported hearing, corneal cell damage, allergic, immune and kidney effects [12].

[1] A gas produced as a by-product of an industrial process or that is given off by a manufactured object or material
[2] Registered volume of 10,000-100,000 tpa (see Justification Document for the Selection of a CoRAP Substance)
[3] ECHA Registry of Intentions

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Toxic flame retardants and fire safety – fire toxicity

Flame retardants are a historic, hazardous and ineffective solution to fire safety. In fact, they are not proven to decrease fires [13] and according to the 2017 UCLAN [14] and The Elephant in the Room study [15], to name a few, many flame retardants increase fire toxicity (the greatest risk of fatal harm in a fire), endangering people's lives and health. Flame retardants prevent escape and put both residents and firefighters at increased risk of asphyxiation and reduced visibility due to the toxic black fumes released from the combustion of materials containing these toxic substances. **The inability of firefighters to safely enter, find and put out the fire is putting fire safety at risk.**

Fire toxicity risks explained

The scientific paper 'The Elephant in the Room' of 2017 explains how fire toxicity is increased with the use of toxic flame retardants. In a nutshell and quoting the paper, *'gas phase flame retardants interfere with the reactions responsible for flaming combustion, resulting in higher yields of all products of incomplete combustion. These products include carbon monoxide, hydrogen cyanide, hydrocarbons, oxygenated organics, among others, and are more toxic than cleaner products of complete combustion (carbon dioxide and water). Fire toxicity increases as combustion becomes more incomplete, which can arise from chemical quenching (for example by gas phase flame retardants), insufficient heat or when the fire becomes ventilation controlled, and there is insufficient oxygen for complete combustion. As most fire deaths, and most fire injuries result from toxic gas inhalation, the use of gas phase flame retardants is a compromise between supressing ignition and increasing the fire toxicity (or decreasing the fire risk at the expense of increasing the fire hazard).'*

Evidence and research supporting harmful substances

In this context, this Alliance is concerned about studies such as the 'Comparative Room Burn Study of Furnished Rooms from the United Kingdom, France and the United States' [16] carried out by M. Blais et al of the Southwest Research Institute in the US (and funded by the North American Fire-Retardant Association and the American Chemistry Council). This paper is a study of 9 room burns using three different furniture configurations and three different ignition sources which concludes that the UK Furniture Fire Safety legislation offers the highest protection, despite the many limitations observed by Don Lucas Ph.D. [17], such as that from a scientific methodology perspective there are too many variables involved, many of which are uncontrolled.

The results obtained are dependent on the room size and ignition sources selected, there is a lack of realistic room design that mimics ventilation conditions seen in real homes and results would change if there were different conditions used and subtle changes were made. In addition to this, ignition does not always occur between the seat cushion and backing. Ignition in the arm of a sofa, in the center of the cushion or underneath the furniture can significantly change fire behavior. Finally, the exact chemicals used as flame retardants were not identified and the types used vary from room to room. This is important information, not only to learn about the effectiveness of the flame retardants, but also to help evaluate any toxic health or environmental effects from the use of these chemicals. Real fires are complex events, and even small changes can affect results. This example shows the importance of solid research and the need for accurate information.

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Non-toxic fire safety solutions

- Design-based solutions for furniture and buildings: Material and structural
- Smoke detectors & automatic sprinklers in buildings
- Regular testing of electrical and gas installations
- Self-extinguishing ignitors (e.g. cigarettes and candles)
- Improved fire safety education (including behavioural education related to smoking) and prevention, as well as evacuation plans and fire exits

The furniture industry is already looking into developing alternative solutions, trying to eliminate flame retardants while keeping the needed level of fire safety, however the right regulatory environment, supported by standards, is needed to introduce such superior fire-safety measures. In the short term, measures such as the use of interliners are envisaged as one solution. For a long-term sustainable approach, new materials which are much less flammable and 'fire toxic' than those currently used will need to be market ready. But even with these solutions, many companies simply cannot meet decades-old large open flame testing methods in specific countries without the use of chemical flame retardants.

This Alliance wants to ensure that legislation and requirements in all markets balance three aspects: fire safety, chemical safety and circularity. To support this agenda, EU-wide action against the use of flame retardants is needed. Improving fire-test standards to be more realistic, effective and to account for fire toxicity is a top priority. Moreover, efficacy and safety of chemicals should be evaluated throughout the whole lifecycle of products, from the crucial design phase to the end-of-life.

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About the Alliance

The Alliance for Flame Free Furniture was created in 2016 and gathers a wide range of stakeholders, from furniture and bedding manufacturers, NGOs, firefighters organisations and trade unions, working together towards one goal: achieving a harmonisation of furniture flammability standards across Europe to a level where toxic flame retardants are not needed. The Alliance is convinced that toxic flame retardants do not bring any fire safety benefit and are harmful to human health and the environment.

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