



FLAME RETARDANTS

Other Names None Identified

CAS Number	Substance
32534-81-9	Pentabromodiphenyl ether (PentaBDE)
32536-52-0	Octabromodiphenyl ether (OctaBDE)
1163-19-5	Decabromodiphenyl ether (DecaBDE)
Various	All other Polybrominated diphenyl ethers (PBDE)
79-94-7	Tetrabromobisphenol A (TBBP A)
59536-65-1	Polybromobiphenyls (PBB)
3194-55-6	Hexabromocyclododecane (HBCDD)
3296-90-0	2,2-bis(bromomethyl)-1,3-propanediol (BBMP)
13674-87-8	Tris(1,3-dichloro-isopropyl) phosphate (TDCPP)
25155-23-1	Trixylyl phosphate (TXP)
126-72-7	Tris(2,3-dibromopropyl) phosphate (TRIS)
545-55-1	Tris(1-aziridinyl)phosphine oxide (TEPA)
115-96-8	Tris(2-chloroethyl)phosphate (TCEP)
5412-25-9	Bis(2,3-dibromopropyl) phosphate (BDBPP)

May Be Found In

- Adhesives
- Coatings
- Foam
- Inks
- Plastics
- Sealants
- Textile articles

Flame retardants are chemicals added to products to meet established flammability standards by decreasing the ability of materials to ignite. They are typically used in a wide range of consumer products such as upholstered furniture, carpets and draperies, automotive interior textiles and plastics, consumer electronics, and baby products.

Uses in the Supply Chain

Within the apparel and footwear supply chain, flame retardant chemicals may be incorporated into textiles or applied by sprays to decrease flammability of treated products. Some flame retardant chemicals are widely used in plastics, adhesives, coatings and inks.⁴ Historically, flame retardant chemicals were used in children's and infants' clothing – particularly sleepwear – to meet safety standards. They are now rarely used to meet flammability requirements in children's clothing and adult products. They should no longer be used in apparel and footwear.



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Why Flame Retardants are Restricted¹⁻⁶

- Flame retardants are regulated in various global regions including Canada, Egypt, European Union, Japan, South Korea, Switzerland, Turkey and the United States.
- Many regions have restrictions on the use of flame retardant chemicals in textiles, leather and apparel. This is because flame retardant chemicals have been associated with adverse health impacts including:
 - Neurodevelopmental toxicity
 - Reduced fertility
 - Liver toxicity
 - Thyroid disruption
 - Cancer
- Additionally, some flame retardant chemicals are classified as persistent, bioaccumulative and toxic (PBT).

Sourcing Compliant Materials from Your Suppliers

- Contact your suppliers and explain that you require materials with no intentionally added restricted flame retardant chemicals.
 - Pay special attention to plastics, adhesives, coatings and inks, as some flame retardant chemicals are widely used in such products.
- Share this information sheet with your material suppliers and instruct them to work with their chemical suppliers to source chemical formulations which are compliant with flame retardant requirements using the guidance in the next section.

Sourcing Compliant Formulations from Your Chemical Suppliers

- Contact your chemical suppliers and explain that you require chemical formulations with no intentionally added flame retardant chemicals.
- Check the Safety Data Sheets (SDS) of all chemical formulations, to ensure the CAS numbers of restricted flame retardants are not listed as ingredients.
- If a flame retardant chemical is to be added to materials, have your chemical suppliers verify that their chemical formulations do not contain any of the restricted flame retardant chemicals by providing a test report from a third-party testing laboratory. Request your chemical supplier to confirm the alternative flame retardant chemical being used is safer by providing a comparative chemical hazard assessment data for review.
- Conduct random tests on your chemical suppliers' formulations by submitting samples to a third-party laboratory for testing to ensure restricted flame retardant limits are not present in chemical formulations.

Safer Alternatives

- Alternatives to some flame retardant chemicals exist. However, for some alternatives there are limited or lack of environmental, health and safety data available in comparison to the chemicals they are replacing. Rather than seeking alternatives with unknown impacts, most brands are seeking to comply with flammability requirements without the use of flame retardant chemicals through fiber choices and construction. Although this may not be possible for all types of materials, it is known to be feasible for many textile applications.⁶
- If a flame retardant chemical is required in polymers, consider reactive flame retardant chemicals which are added during polymerization processes and become an integral part of the polymer. These types of flame retardant chemicals may be relatively safer. This is because unlike additives, reactive flame retardants are less likely to leach out of materials and/or products. However, the properties of the polymer may be impaired as a result.^{6,7}
- Possible alternative chemicals for some textile applications may include the following substances.⁷ These alternative substances have uses in back coatings and impregnation for carpets, automotive seating, etc.



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Check with your chemical supplier to confirm whether the identified alternatives will meet your specific needs. A case by case assessment may be needed.

- Aluminum hydroxide
- Magnesium hydroxide
- Tetrakis hydroxymethyl phosphonium salts such as chloride (THCP) or ammonium (THPX)
- Dimethyl phosphono(N-methylol) propionamide
- Diguanidine hydrogen phosphate

Additional Information

Visit ECHA's Candidate List of substances of very high concern to view dossiers for many restricted substances <https://echa.europa.eu/candidate-list-table>.

References

- ¹ World Health Organization (WHO). Environmental Health Criteria 209: Flame Retardants - Tris(Chloropropyl) Phosphate and Tris(2-Chloroethyl) Phosphate. Accessed at http://www.who.int/ipcs/publications/ehc/who_ehc_209.pdf
- ² U.S. Environmental Protection Agency (EPA). Fact Sheet: Assessing Risk from Flame Retardants. Accessed at <https://www.epa.gov/assessing-and-managing-chemicals-under-tsca/fact-sheet-assessing-risks-flame-retardants>
- ³ U.S. Environmental Protection Agency (EPA). Fact Sheet: Reducing Your Child's Exposure to Flame Retardants Chemicals. 2016. Accessed at https://www.epa.gov/sites/production/files/2016-05/documents/flame_retardant_fact_sheet_3-22-16.pdf
- ⁴ European Commission. Regulation (EU) 2017/227: Amending Annex XVII to Regulation (EC) No 1907/2006 of the European Parliament and of the Council concerning the REACH as regards Bis(Pentabromophenyl)Ether. 2017. Accessed at <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32017R0227&from=EN>
- ⁵ Safer States. Accessed at <http://www.saferstates.com/bill-tracker/FilterBills>
- ⁶ Textile Exchange Chemical Snapshot: Halogenated Flame Retardants.
- ⁷ The Norwegian Pollution Control Authority (SFT). Guidance on Alternative Flame Retardants to the Use of Commercial Pentabromodiphenylether (c-PentaBDE). Accessed at http://chm.pops.int/Portals/0/docs/POPRC4/intersession/Substitution/pentaBDE_revised_Stefan_Posner_final%20version.pdf
- ⁸ Apparel and Footwear International RSL Management Group (Ed.). (2018, January 31). Restricted Substances List (RSL). Retrieved <http://afirm-group.com/afirm-rsl/>