

TBBPA

TETRABROMOBISPHENOL A

The largest volume brominated flame retardant in production today. There are no legislative restrictions on the use of TBBPA in Europe, or anywhere in the world.



APPLICATION AND FIRE SAFETY

- The main application of TBBPA is as a reactive flame retardant in laminates (e.g. epoxy resins) for an estimated 90+% of printed wiring boards
- TBBPA is chemically bound in these applications and has no potential for emissions to the environment
- TBBPA is also used as an additive flame retardant in ABS plastics. In certain applications, plastics have to comply with stringent fire safety standards such as UL 94 V0 for electronic equipment



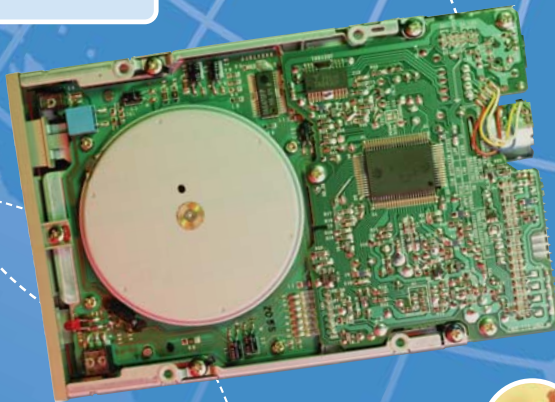
ENVIRONMENTAL AND HEALTH PROFILE

- Among all the different flame retardants that can be used in printed wiring boards, TBBPA is the most well researched flame retardant
- According to both the WHO and the currently undertaken EU Risk Assessments, TBBPA has little potential for bioaccumulation and presents no significant health effects of concern
- No emissions from circuit boards could be detected
- The product has been found in limited biota, sediment and soil samples which can be linked to industrial emissions



TBBPA IN UNITES STATES

- TBBPA is not restricted under any legislation in the US



BSEF EMISSIONS REDUCTION PROGRAMME

- In 2003, BSEF launched an emissions reduction program for TBBPA in Europe. This is still a pilot phase.
- The objective of the program is to fully control emission levels of TBBPA to both water and/or air during industrial usage in all known applications
- BSEF plans to establish joint commitments with user industries in order to further reduce emissions
- BSEF will establish a Best Practice Guidance (BPG) document in 2004 in consultation with IPPC (Integrated Pollution Prevention & Control) regulators. The BPG will give advice on best ways to store, handle and use products, on handling waste, together with levels of investment required for emissions reduction facilities



TBBPA IN ASIA

- The TBBPA market in Asia totaled 110.000 tons in 2002 (84.62% of worldwide use).
- The major application of TBBPA in Asia is as a reactive FR (over 80% of the total use) in either FR 4 resins for PWB laminates, or as a building material for brominated epoxy oligomers and polymers.
- The use of TBBPA is not subject to regulatory restriction in Asia.



TBBPA IN EUROPE

- TBBPA is not produced in Europe. The total market demand in Europe in 2002 was 7.800 tons (6% of worldwide use). Around 90% of TBBPA is used as a reactive flame retardant.
- TBBPA is not part of the Restriction of Hazardous Substances (RoHS) Directive
- As of August 2004, the Directive on Waste of Electrical and Electronic Equipment (WEEE) will also require separation of printed circuit boards of more than 10 cm² regardless of the substance they contain.

RISK ASSESSMENT

TBBPA is currently being risk-assessed at the EU-level. The current human health report has reached an overall conclusion that TBBPA is safe for human health, and consumer exposures is negligible. The industry has completed tests on earthworm reproduction which has raised concerns over emissions to soil. Additional studies are planned to address the potential degradation of TBBPA to Bisphenol A and the potential risk to sediment and soil. final adoption of the European Risk Assessment Report expected during 2004.

