



Proposed RoHS Additional Substances Consultation – Tetrabromobisphenol A (TBBP-A)

Submitted by:

John Wagner

Director of Materials Management

Association of Equipment Manufacturers

Email: jwagner@aem.org

Tel: 001 414 298 4164

Background and issues caused by substitution

AEM is a US trade association representing manufacturers of industrial equipment including products in the construction and agricultural sectors. Some of AEM members' products are in scope of the RoHS directive although many are excluded as types of professional Non-Road Mobile Machinery (as defined by RoHS) or as equipment that is specifically designed to be installed in excluded types of equipment. Products that are in scope are believed to be mainly in RoHS category 11 with some in categories 6 and 9.

Most AEM members' products are complex products designed for long lifetimes and high reliability. They must comply with other legislation apart from RoHS, such as the Non-Road Mobile Machinery (NRMM) Emissions Regulation that necessitates gaining approval in the EU from a Notified Body after any changes are made to product design such as would result from new RoHS restrictions. The NRMM Regulation requires engines to meet strict emissions limits, have proven reliability and long lifetimes and manufacturers must test engines to obtain this data before approval can be granted.

Another issue for AEM's members is that most of their products have niche uses and are not made in large numbers. However many of the component parts used are obtained from suppliers whose main markets are types of products that are excluded from RoHS, such as in heavy goods vehicles. AEM members may buy less than 1% of the total sales of a type of part from a component supplier and so have no influence over if or when the supplier develops an alternative RoHS-compliant version without the newly restricted substance. Suppliers will be reluctant to make changes if most of their customers do not want changes made as they will not want to have to gain re-approval for their products. As a result, it can take AEM's members many years to identify substitute parts, assess them, test them in engines, test in finished equipment and finally apply for EU approval before these can be sold. This can take 10 years or longer if sourcing substitute parts is especially difficult. The use of less reliable or lower performance parts is not an option as EU NRMM Emissions Regulation approval would not be granted. This 10 year timescale assumes that no new restrictions are adopted part way through, because if so, new components would need to be identified and tested before finished equipment testing has to be re-started (this takes typically two years), which would extend the overall timescale required significantly.

Due to the considerable difficulties in achieving compliance, along with the uncertainties caused by the exemption request process (e.g. the time taken between submission and publication is now much longer than previously), some AEM members may consider withdrawing products from the EU market. If the next recast review results in the removal of some of the RoHS scope exclusions there could be more EU market withdrawal of products, especially if the list of RoHS restricted substances were to increase from the current 10. This would have a significant negative socio-economic impact on the EU.

The usage of RoHS substances in these products is limited to very small quantities comparing to the overall materials embedded in the finished product, which are nearly always collected for materials recycling or for refurbishment at end of life.

Supply chain RoHS data collection has been a significant challenge for our members due to the complexity of the impacted products and their supply chains. There can be up to 14 companies involved between raw material producer and AEM member manufacturer and this makes obtaining substance data difficult and time consuming. Some suppliers have been able to provide data on the proposed 7 additional RoHS substances, but most do not have this information and it will take some at least a year to obtain this information.

Some AEM members have identified needs for several RoHS exemptions for their products which have been requested in recent years via EUROMOT. Because of the safety, durability, and reliability requirement in our industry, alternative materials for restricted RoHS substances may not be available or feasible for machinery/equipment products that AEM members offer on the EU market. The restriction of one or more of the proposed 7 new substances under RoHS is likely to result in need for additional exemption requests from our members. Due to the sophisticated material technologies embedded in the products our members offer, it is likely to take several years to just confirm the need for exemption requests.

AEM members have pointed out that it would be very beneficial across the industrial equipment industry, if any future restrictions were to be application specific, as is the approach used for REACH Annex XVII restrictions, or to exclude types of equipment that are unlikely to enter the EU waste stream due to manufacturers operating within the circular economy and so collect end of life equipment and ensure that it is safely recycled or refurbished for reuse, as is the case with most industrial equipment.

Answers to questions.

1. Applications and quantities

Some AEM members have surveyed their suppliers to determine if TBBPA is used in any parts that they supply. Some suppliers have provided information on parts where TBBPA has been used reactively, so is present as polymers that contain TBBPA monomer linkages but no free TBBPA. These parts include printed circuit boards and many types of electronic components.

Reactive uses: TBBPA is used as a flame retardant that reacts with other ingredients during the production process to make polymeric materials with flame retardant properties, but TBBPA should not be present in the cured polymer. The most common uses are in printed circuit board laminates and flame retarded polycarbonate. It is also used in these forms as epoxy resin sealants, adhesives and encapsulants for electronic components. AEM members

report that it is used in control units, relays, sensors, pumps and many other types of component. One manufacturer reports that 15grams of TBBPA may be used in production processes but free-TBBPA occurs in these materials only as unintended trace impurities at low ppm concentrations. One publication found only 0.7 micrograms of residual (or “free”) TBBPA per gram of PCB¹, which is 0.7ppm.

Additive uses: Relatively small amounts are added to ABS (and possibly other polymers). AEM members however are not aware if they use any mouldings or other parts that contain TBBPA. The reason for this is that AEM manufacturers produce relatively complex equipment which they manufacture from parts obtained from suppliers. Supply chains can be very long so that obtaining data on substances that are not restricted can be very difficult. If AEM members buy parts from a sub-contractor, these parts may include plastic mouldings which are made by suppliers to the sub-assembly manufacturer. The moulding manufacturer will use polymer granules to make mouldings; polymer granules should be supplied with Safety Data Sheets if they contain substances that are classified as hazardous. If the granules contain TBBPA at >0.1%, this will be listed in the Safety Data Sheet as TBBPA has EU harmonised hazard classifications of aquatic acute and aquatic chronic category 1. At present, the moulding supplier has no obligations to inform their customers if the articles that they supply contain TBBPA because TBBPA is not restricted in the EU and also is not a REACH SVHC. As a result, AEM members currently have no information on the occurrence of additive TBBPA in parts that they use.

2. Production and regulation of TBBP-A

Amounts: AEM members do not make TBBPA so cannot answer this question. One example product, which is an industrial engine weighing several hundred kilograms contains about 11g of TBBPA in a reacted form within cured polymers. No free TBBPA occurs.

Voluntary phase out initiatives: As the EU human health risk assessment published in 2006 (see Q 6 below) showed that TBBPA causes no harm to human health and there are no restrictions globally, there has been no need or incentive to find replacements.

3. Potential emissions in the lifetime (use phase) of products and waste stream

For each type of use in the use phase:

Reactive – there should be no emissions from AEM members’ products as no free TBBPA is present and the polymers that are made with it are stable in the use phase.

Additive – TBBPA is bound within the polymer matrix. A study by the US EPA reports that dermal exposure should not occur and air emissions will be extremely small as the vapour pressure of TBBPA is relatively high². The human health risk assessment described below in section 6 concluded that TBBPA posed no risk to human health.

Waste management

¹ https://www.epa.gov/sites/production/files/2015-08/documents/pcb_ch5.pdf

² https://www.epa.gov/sites/production/files/2015-08/documents/pcb_ch5.pdf

AEM members' products are all used only by professionals. They have long lifetimes and most are large size and have a significant value from the metal content at end of life. As a result they are recycled by professional waste treatment companies in the EU that comply with EU waste treatment legislation so that emissions are within legally permitted limits.

4. Substitution

Which applications are substitution either not practicable or reliable and why?

Many AEM members' products must have proven long term reliability to be permitted to be placed on the EU market. This is especially the situation with equipment that contains engines where EU emissions legislation is applicable. There are many types of professional equipment that is in scope of RoHS (i.e. that is not a form of transport or professional non-road mobile machinery as defined by RoHS) and which is also in scope of the Non-Road Mobile Machinery (NRMM) Regulation (this uses a different definition to that used by RoHS). The Non-Road Mobile Machinery Regulation requires that engines are extensively tested after any change is made, such as would occur if TBBPA were restricted, to prove that substitution does not negatively affect lifetime or reliability and also that the EU's emissions limits are still met. This type of redesign work and testing takes at least eight years after all substitute parts and components have been identified and assessed for suitability. At present, the reliability and suitability of substitutes is not known and due to the operating temperatures and environmental conditions close to engines, there is a high likelihood that substitution could be difficult to achieve for some applications.

Constraints

Fire retardancy of the alternative flame retarded polymer must be at least equal to polymers that contain TBBPA. Also, all physical and chemical properties of the substitute polymer must meet multiple physical and chemical requirements. Engine components are often exposed to harsh environments including dust and chemicals, high temperatures, severe vibration, engine fluids such as lubricants and coolants. They must also maintain these properties for the lifetime of the engine which can be 25 – 40 years for some types of industrial equipment.

5. Socio economic impact

If a restriction were to be adopted, even though we believe that this is unnecessary, it will be important to allow manufacturers sufficient time to identify, test and gain approvals for substitutes. From past experience with phthalate substitution in AEM members' products, this can take up to 10 years or longer if some substitute parts are not available from component suppliers and so new parts have to be designed and tested. Note that many components used by AEM's members are made primarily for sectors outside of the scope of RoHS and so component manufacturers have no incentive to develop substitutes. If research shows that no substitutes exist, AEM could apply for exemptions, but this would not be possible until the research had been completed with negative results available to justify the exemption. In addition, past experience has shown that it can take more than 3 years (>4 years in recent years) from submission of an exemption request to the exemption being published in the EU Official Journal. On this basis, a minimum of 10 year transition period appears reasonable.

If TBBPA were to be restricted before fully RoHS compliant equipment can be tested and gain EU NRMM Emissions Regulation approval from a Notified Body, many types of equipment could not be sold in the EU. For example, EU hospitals could not buy emergency generators, with potentially disastrous implications, construction equipment would not be available so that new buildings could not be constructed, and some farm machinery will not be available in the EU therefore affecting food production.

6. Other information

A comprehensive EU human health risk assessment was carried by the UK in 2006 for this substance³. This concluded that there were “No health effects of concern have been identified for TBBP-A”. As a result, no restrictions were adopted at that time. An EU environmental risk assessment⁴ was also published which identified concerns, but no restrictions were subsequently adopted, presumably as these were deemed to be unnecessary.

³ <https://echa.europa.eu/documents/10162/32b000fe-b4fe-4828-b3d3-93c24c1cdd51>

⁴ <https://echa.europa.eu/documents/10162/17c7379e-f47b-4a76-aa43-060da5830c07>