bvdm.
Bundesverband
Druck und Medien e.V.

Position statement

EU consultation on the continued use of mercury-containing UV lamps – RoHS-Exemption 4(f)

The German Printing and Media Industries Federation (Bundesverband Druck und Medien e. V., bvdm) is the umbrella organisation of the German printing and media industry. As an employers' association, political trade association and technical trade association, bvdm represents the positions and objectives of the printing and media industry dealing with politics, administration, trade unions and suppliers.

The German printing and media industry is characterised by small and medium-sized enterprises. In total, more than 120,000 people work in over 7200 companies of the printing and media industry.

The bvdm is pleading for retaining exemption 4(f) of the RoHS regulation. Currently there is no sensible alternative to mercury-containing UV lamps for many printing processes and print products. The bvdm agrees with the arguments of VDMA and Lightning Europe in this regard.

Mercury-containing UV lamps are used in the printing industry for curing printing inks and varnishes and for exposing printing formes.

1 Use of mercury-containing UV lamps for ink curing

For around 40 years printers have been using UV lamps integrated in the printing systems to cure inks and varnishes on the printed substrate. UV curing offers a number of technical and ecological advantages over other drying systems (e. g. solvent inks), e. g. instant curing of the printed ink layer, no VOC emissions. In addition to mercury-containing UV lamps (medium-pressure mercury vapour lamps), LED UV lamps are increasingly being used for ink curing.

1.1 Narrow-band emission spectrum of LED UV lamps

However, while mercury-containing UV lamps emit radiation in the entire wavelength range above approx. 200 nm (UV-C to UV-A) and also emit thermal energy, the emission spectrum of today's UV LEDs is limited to a single wavelength in the UV-A range (typically: 365, 375, 385 or 395 nm). UV LEDs with shorter wavelengths are not available for ink curing due to a lack of technical maturity. As the emission wavelength is reduced, both radiation power and operational life decrease and the costs increase. For economical reasons, therefore, the wavelengths 385 nm and 395 nm are being used almost exclusively for ink curing.

Even if these LED UV lamps are well suited for several areas of application, mercury UV lamps will remain indispensable for a whole range of applications until suitable LED solutions are available that emit radiation in the UV-C range (< 280 nm). UV-C is needed to ensure a good surface curing that guarantees a high scratch and abrasion resistance as well as the tack-free nature of the ink or varnish layer, especially when printed with high ink film thicknesses. These properties are crucial to quality, especially in packaging and industrial printing (printing on products).

1.2 Limited availability of printing inks

Curing with LED UV lamps requires specially formulated, highly reactive inks and varnishes. The photoinitiators which trigger the curing of the inks must be matched to the spectral emission of the UV lamp on the one hand and to the UV absorption spectrum of the ink pigments used on the other. Since the emission spectrum of LED UV lamps is extremely narrow, the choice of photoinitiators is severely limited. Further restrictions result from the REACH regulation, so that according to information from several ink manufacturers, only a handful of photoinitiators are still available for LED UV inks/varnishes. This means that the options for formulating LED UV inks/varnishes are very limited compared to inks/varnishes that can be cured with mercury-containing UV lamps. Opaque white and transparent varnishes for LED UV tend to yellow due to the photoinitiators they contain and are therefore rarely used – if available at all.

1.3 Limitations on process and product

In some printing processes LED UV inks do not guarantee sufficient ink curing at high production speeds, so that only mercury-containing UV lamps guarantee cost-efficient production. This applies, for example, to printing on 3D-objects (screen printing) on PP, PE, PET or glass, but also to metallic inks in sheet-fed offset printing.

Due to the aforementioned limitations, LED UV curing is, among other things, not considered for the printing of food contact materials, pharmaceutical or tobacco packaging, with a few exceptions, as there is a risk that components of the UV inks that pose a health risk will migrate into the product concerned. Special inks and varnishes that are printed with high layer thicknesses and/or that create certain optical, tactile and functional properties are also available today almost exclusively for mercury-containing UV lamps (e. g. Braille, structure or blister varnishes, effect inks and varnishes, printing inks for printed electronics or security printing).

The area of application for LED UV lamps is therefore essentially limited to commercial and magazine printing. In addition, LED UV lamps have some advantages as intermediate dryers in industrial and packaging printing, but for final curing mercury-containing UV lamps are still necessary to achieve the desired product features. In the food packaging sector, the UV-C radiation emitted only by the mercury-containing UV lamps is also needed for surface sterilisation.

1.4 Problems with replacement and spare parts

In existing printing systems, mercury-containing UV lamps cannot usually be replaced by LED UV lamps because of their technical design (e. g. due to the additional space required for cooling). In most other cases, replacement would be uneconomical. Some of the printing systems, which can cost up to several million euros, are in use for 20 years or more and require mercury-containing UV lamps as spare parts during this period. Used lamps are returned to the supplier or recycled by a qualified waste disposal company in a professional and environmentally friendly manner.

A premature ban on mercury-containing UV lamps would consume enormous economic value. Pre-owned UV printing systems would no longer be tradable within Europe. They could only be sold to non-EU destinations where, in many cases, proper disposal of the mercury-containing UV lamps is not guaranteed. The premature scrapping of entire production plants caused by the ban on mercury-containing UV lamps would be both ecologically and economically unreasonable.

2 Exposure of printing formes

In some printing processes, e. g. screen printing, UV lamps containing mercury are used to expose printing formes. The copying devices used for this process work with gallium-doped metal halide lamps. The purchase costs of these devices are low at around € 10,000, whereas current systems without mercury-containing UV lamps usually cost well over ten times this amount. Investments of this magnitude are not feasible for a large number of screen printers, often craft enterprises with fewer than ten employees. This is even more true for print artists who produce their serigraphs themselves.

3 Conclusion

Wherever technically feasible and economically viable, the printing industry has already stopped using mercury-containing UV lamps, especially as UV LED technology has definite advantages there. However, the range of applications for such alternatives is still very limited at the current state of technical development. For numerous printing processes and print products, however, there are still no well-engineered and affordable alternatives which enable the dispense of mercury-containing UV lamps.

A ban on mercury-containing UV lamps would mean that many print products, especially in the food, pharmaceutical and cosmetics sectors, as well as industrial print products, could no longer be manufactured due to a lack of technical alternatives. The unavailability of replacement lamps for the already existing UV printing systems would cause considerable economic damage and numerous insolvencies amongst the users in view of the up to seven-figure investment costs. In many cases, print production can be expected to be relocated to printers located outside the EU.

Avoidance strategies by printers and their suppliers, such as stockpiling mercury-containing UV lamps to ensure long-term use of the printing systems, could undermine the environmental progress intended by the directive. The capital tied up in this way would not be available for other investments.

Berlin, 2021-05-27

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