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UV technology with and without mercury

LED UV technology will increasingly replace the conventional UV lamps based on mercury-containing medium pressure lamps. In some applications, however, there is still no adequate substitute for the conventional UV lamps.

Frankfurt am Main /Germany, 27th April 2016 – Lamps in conventional UV dryers contain mercury which produces the specific radiation spectrum that ensures full curing (polymerisation) of the ink and coating layers in combination with the components of the printing ink and especially the photoinitiators acting as catalysts. It is, however, also a well-known fact that mercury may cause damages to the environment and human health if not handled properly. Therefore, there are more and more restrictions for the mining of mercury, directives for mercury emissions and bans on the use of mercury in products (inter alia, thermometers, lamps). The latter, however, with exceptions.

Due to the physical limitations still present, the UV LED technology cannot replace the existing UV dryers with mercury-containing medium-pressure UV lamps in all applications because of the very low radiation dose of UV LEDs in the UVB-B and UVC-C range.

The increasing ban on mercury, of course, also causes some uncertainty in the printing industry as far as the continued availability of mercury containing medium-pressure UV lamps for UV dryers is concerned.

Therefore, the VDMA Printing and Paper Technology Association with its member companies seeks to achieve transparency and an objective discussion of this topic.

The manufacturers intensively work on the further development of the LED UV technology. The continued availability of the conventional UV technology shall be ensured until LED UV technologies offering the required performance will be available for all fields of application.

How is the present situation in Europe?

Here, the use of specific substances in electrical and electronic devices is regulated by the RoHS Directive (Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment) which limits, inter alia, the mercury content to a very low value.

However, this regulation does not apply to the larger printing machines since they are so-called "large-scale stationary industrial tools" (LSSITs) and the UV dryer modules specifically manufactured for them are exempted from the RoHS Directive.

Mercury containing medium pressure UV lamps in smaller machines and devices make use of an exemption defined in the Annex to the RoHS Directive that is applicable to many products, inter alia, a large number of lamp types for which there is not yet a corresponding alternative technology.

The respective Exemption 4(f) in Annex III of the Directive "Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex" is applicable until 21 July 2016, unless it is extended on request.

In 2015, the VDMA and its member companies filed an application for extension of this exemption for another five years, as did two other European associations. In the application, the reasons for the extension are explained in detail. The application was assessed by Ökoinstitut in Freiburg/Germany on behalf of the EU Commission. A public consultation about the applications was carried out in autumn 2015. The decision of the EU Commission is expected to be made at the end of 2016 at the earliest. Until the decision of the EU Commission has been taken, the exemption will remain applicable beyond its expiry date.

Insofar, the application alone has already brought about a renewal of the exemption.

Due to the development stage of the conventional UV technology, through compliance with the manufacturer's information and proper disposal (product return to the manufacturer or delivery to a certified waste disposal company), the use of mercury containing medium-pressure UV lamps in the printing industry is safe. The quantity of mercury used in dryers of the printing industry per year worldwide is approximately 220 kg. In Europe, this is an estimated amount of mercury of 0.2 per mille used in the total industry.

The manufacturers are happy to give information about the use of different UV technologies and are working intensively on the further development and integration of the LED UV technology.

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