

Öko-Institut e.V.
Institute for Applied ecology

Attn: Yifaat Baron
Merzhauser Str. 173

79100 Freiburg

Reply to Consultation Questionnaire Exemption No. 21 (renewal request)

Dear Mrs Baron,

The renewal of exemption for “lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses” listed in Annex III of the RoHS Directive 2011/65/EU is currently being evaluated. Lighting Europe (LEU) has submitted a request for renewal, however, at least partly, of the exemption for “lead in printing inks for the application of enamels on glasses”. Obviously, the focus of LEU is marking the glass-material of different kinds of lamps with a stamp by using lead containing inks.

Hecker Glastechnik GmbH & Co KG (HGT) is a specialist for heat-resistant and safety glass. HGT is a make-to-order supplier for the industry. HGT is a manufacturer of glass for lighting applications and technical products (e.g. glass for lighting, medical technologies, engineering and household and bath appliance as well as glass for automation). The use of lead- and cadmium-containing inks on glasses like borosilicate, soda lime glasses and others is necessary in some applications. After printing a high-temperature process combines the glass and the ink to one unit.

As a stakeholder for the renewal of exemption No. 21 HGT would like to contribute to the consultation by answering the questions in Consultation Questionnaire Exemption No. 21 (renewal request). [1]

1. LEU proposed the wording “Lead in printing inks for the application of enamels on glasses”
 - a. Do you agree with the scope of the exemption as proposed by the applicant?
HGT: no
 - b. Please suggest an alternative wording and explain your proposal, if you do not agree with the proposed exemption wording.
HGT applies for the same wording formulation of exemption no. 21 as it currently appears in Annex III of the Directive: “Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses”. As explained by LEU in [2] inks for marking lamps do contain lead but are free from cadmium. Inks used by HGT for enameling glass may contain lead and/or cadmium. Consequently, HGT proposes not to change the existing wording of exemption no. 21.

- c. Please explain why you either support the applicant's request or object to it. To support your views, please provide detailed technical argumentation / evidence in line with the criteria in Art. 5(1)(a) to support your statement.

HGT: *Inks for enameling glasses contain glass frits, high temperature stable pigments and additives like solvents. The solvents will be removed during the enameling process, glass frits and pigments will form a permanent combination with the glass, i.e. the substrate which was coated by the ink. Those inks may not only be used for marking lamps, but also for the decoration of (flat) glasses like soda-lime and borosilicate glasses (see picture 1). In most cases inks will be applied on glasses with customer-designed layouts like logos or screens to protect constructive parts like cables, just to name a few examples.*



Picture 1: Decoration of borosilicate glass with black ink.

For various reasons inks used for the decoration of glasses may contain lead and cadmium.

As explained by LEU [2], lead is a component of the glass frit and is used as an adhesion promoter. Lead-free alternatives are available on the market, but they have some disadvantages which exclude their application for the decoration of (flat) glasses. First of all, and most crucial, the adhesion on the glass will be drastically reduced when using lead-free inks (see picture 2). Beside this there are some reasons, like higher enameling temperature or reduced opacity, which contradict a stable and environmentally friendly process control.



Picture 2: Lead-free ink. View through the glass shows chipping and cracks, i.e. peeling off from the substrate.

Consequently, HGT supports LEU's request. Till now lead-free inks are not an alternative for enamels on glasses in any case.

Besides lead-containing glass frits, cadmium may be used in the pigment-component of inks. For the production of bright colorings, e.g. yellow, red or orange (see picture 3) it is indispensable to use pigments with cadmium containing compounds. There are no alternatives available.



Picture 3: Enamels on glass giving bright orange (left) or yellow (right) colorings.

Consequently, HGT applies for the same wording formulation of exemption no. 21 as it currently appears in Annex III of the Directive.

- d. Please state if the exemption could further be limited to use "in the marking of lighting equipment as required in the LVD Directive (2006/95/EC)".
HGT: Glasses with lead- and cadmium-containing enamels are used in different fields of applications, like household appliances, lighting equipment, medical devices, industrial instruments and others. A limitation to the use "in the marking of lighting equipment as required in the LVD Directive (2006/95/EC)" is not supported.
2. Please comment to the various lamp types, if some or all are in the process of phase-out in light of their replacement with other lamp types for which the exemption is not required.
HGT: The exemption for lead- and cadmium-containing enamels is not focused only on lighting applications but also on printed glasses with special requirements such as high opacity of the color or printing on glass with low coefficient of thermal expansion like borosilicate glass or glass ceramics.
3. Please provide information concerning possible substitutes or developments that may enable reduction, substitution or elimination of lead and cadmium in printing inks for enamels on glasses (comment: content changed!).
 - a. In this regard, please provide information as to alternatives that may cover part or all of the applicability range of such printing inks.
HGT: Lead-free inks are available on the market. At present the adhesion (most crucial) and the opacity of those inks are too low to allow a replacement of lead-containing inks. The applicant cannot estimate, if those parameters can be improved in future.

Cadmium-free inks are not available, as for the production of bright colorings, e.g. red or yellow, cadmium-based pigments are essential. The applicant does not suppose the invention of cadmium-free equivalents in future.

- b. Please provide quantitative data as to application specifications to support your view.

HGT: *Currently no quantitative data are available.*

4. Please provide information as to research initiatives which are currently looking into the development of possible alternatives for some or all of the application range of lead in printing inks.

- a. Please explain what part of the application range is of relevance for such initiatives.

HGT: *As far as we know a lot of suppliers for colors for glass applications are working on a lead-free application yet. But as well the adhesion as the opacity are two aspects which cannot be fulfilled satisfied. In case of potential future research projects the adhesion as well as the opacity should be the major focus for the substitution of lead in inks. Lead-free inks could be used if significant improvement in adhesion and opacity can be obtained.*

Based on our current opinion cadmium cannot be removed from inks for enameling glasses.

- b. Please provide a roadmap of such on-going research.

HGT: *To the best of our knowledge there are no ongoing research initiatives at present.*

For further questions do not hesitate to contact Dr. Petra Roese.

Yours sincerely

Dr. Petra Roese
RoHS-representative

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Bibliography

[1]

[http://rohs.exemptions.oeko.info/fileadmin/user_upload/RoHS_Pack_9/Consultation_Questio
nnaires/Ex_21_Consultation_Questionnaire.pdf](http://rohs.exemptions.oeko.info/fileadmin/user_upload/RoHS_Pack_9/Consultation_Questio
nnaires/Ex_21_Consultation_Questionnaire.pdf)

[2]

[http://rohs.exemptions.oeko.info/fileadmin/user_upload/RoHS_Pack_9/Exemption_21/21_LE
_RoHS_Exemption_Req_Final.pdf](http://rohs.exemptions.oeko.info/fileadmin/user_upload/RoHS_Pack_9/Exemption_21/21_LE
_RoHS_Exemption_Req_Final.pdf)