

Name and contact details of responsible person for the application and response

Lead in Ceramic	
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The response to the 27-July-2015 Oeko-Institute questionnaire is submitted on behalf of the participating industry associations and companies listed below:

American Chamber of Commerce to the European Union (AmCham EU) ID number: 5265780509-97		European Partnership for Energy and the Environment (EPEE) ID number: 22276738915-67		Avago Technologies Ltd	
DIGITALEUROPE ID number: 64270747023-20		European Passive Components Industry Association (EPCIA) ID number: 22092908193-23		Japan Electronics and Information Technology Industries Association (JEITA) ID number: 519590015267-92	
Electronic Components Industry Association (ECIA)		IPC – Association Connecting Electronics Industries		Japan Electrical Manufacturers' Association (JEMA)	
European Ceramic Industry Association (Ceram-Unie) ID number: 79465004946-12		Japan Business Council in Europe (JBCE) ID number: 68368571120-55		Japan Business Machine and Information System Industries Association (JBMIA) ID number: 246330915180-10	
European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry (COCIR); ID Number: 05366537746-69		LIGHTINGEUROPE ID number: 29789243712-03		Communications and Information network Association of Japan (CIAJ)	
European Committee of Domestic Equipment Manufacturers (CECED) ID number:		ZVEI - German Electrical and Electronic Manufacturers' Association ID number: 94770746469-09			

1st Questionnaire (Clarification Questionnaire) Exemption No. 7c-II (renewal request and scope clarification)

Exemption for „Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher“

Acronyms and Definitions

HVC High voltage capacitors

Background

The Oeko-Institut and Fraunhofer IZM have been appointed within a framework contract¹ for the evaluation of applications for the renewal of exemptions currently listed in Annexes III of the new RoHS Directive 2011/65/EU (RoHS 2) by the European Commission.¹

ZVEI et al. submitted a request for the renewal of the above mentioned exemption, which has been subject to a first evaluation. The information you have referred has been reviewed and as a result we have identified that there is some information missing and have formulated a few questions to clarify some aspects concerning your request before we can start the online consultation.

Please answer the below questions until 17 August 2015 latest or otherwise let us know until when you can provide the requested information.

Questions

- 1) ZVEI et al. indicate the amount of lead in high voltage capacitors (HVC) in 2007 with around 80 mg per component, reduced to around 30 mg in 2013. You explain that the electrical and electronic equipment industry has improved the dielectric constant through the addition of lead, used the multilayer technology and promoted miniaturization.

Please provide representative examples for this reduction of lead content in HVC.

Answer:

We provide a comprehensive reply concerning high-voltage capacitors (HVC) for this question in item 7(A) of our application request form. Please refer to it.

The improvement of the functionality and smart functions as well as network integration of electrical and electronic equipment has largely contributed to a sound, cultural life of the European citizens and the number of sectors in which electrical and electronic equipment is utilized has vastly enlarged in 2015 when compared to 2007.

¹ Contract is implemented through Framework Contract No. ENV.C.2/FRA/2011/0020 led by Eunomia

Nonetheless, as individual functions of conventional digital cameras, telephones and net PCs, etc., have been multi-functionally integrated within compact lightweight smart apparatuses through the substitution of relatively large-sized single equipment groups by one item thin-type compact smart equipment having several functions, etc. it is possible to restrain the amount of electrical and electronic equipment put on the market as well as the number of electrical and electronic component pieces built in the equipment.

Furthermore, through improvement in design, better functional efficiency and cost rationalization, the use amount of lead in electrical and electronic equipment on the whole has been suppressed with the reduction of the number of component pieces within single equipment .

Adding to these efforts, the downsizing of equipment-constituting electrical and electronic components has progressed with the promotion of sophisticated multilayer techniques applying thick layer technology to cope with the demands of miniaturization of electrical and electronic equipment as well as through the contribution of electric voltage/ current reduction in electrical circuits going along with high-frequency compatibility and power-saving demands.

As the concentration amount (rate) of lead necessary to bring out the functionality of electrical and electronic components does not change, it is possible to reduce the use amount of lead proportionally to the downsizing of the components. As a result, as stated in item 7(A) of the application form, the average value of “Lead use amount per Piece unit” has changed from 78mg to 30mg (a little less than 40% of the previous figure), and this has enabled the reduction in the use amount of lead.

- 1) You explain in your exemption request that HVC need to have the following features:
- i. High dielectric constant at high operating voltage
 - ii. High energy storage capability (also at high temperatures),
 - iii. Low leakage at high voltage and high temperatures,
 - iv. Low loss at high current, frequency, and temperatures.

You state that even for rated voltages of 125 V AC or higher, or 250 V DC or higher, lead can be avoided in applications not requiring all of the above functions i to iv.

- a) Please explain in more detail where such lead-free HVC capacitors can be used.

Answer:

As explained in item 7(A) of the exemption request form, it is necessary that lead is contained in the dielectric ceramic material in order that high voltage ceramic capacitors (HVC) can simultaneously achieve high capacitance and low dielectric loss under general use conditions.

In the current exemption 7(c)-II, a range in which “lead-free” capacitors can be used was specified because the applicable scope was established concerning a single parameter, namely, rated voltage.

However, apart from voltage, several other parameters such as frequency, temperature, electric current, capacitance, dielectric loss, etc. are related with the use conditions of HVCs.

Moreover, as these parameters are variable during use, it is not possible to uniquely specify the range in which a “lead-free” capacitor can be utilized.

- b) Are all of these lead-free capacitors composed of strontium titanate, or are there other ceramics that can cover parts of the required properties?

Answer:

Barium titanate as well as ceramic with other compositions may be utilized in specific

fields.

However, to our knowledge, our understanding is that no “lead-free” product exists which can meet all performance requirements.

- 2) Besides substitution, elimination by using alternative technologies is another principal way to avoid the use of lead. Can ceramic capacitors be replaced by other types of capacitors, possibly including a redesign of electronic circuits?

Answer:

There are cases when substitution is possible in specific fields, as for example, film capacitors. There may exist other cases as well. However, to our knowledge, our understanding is that no product exists which can substitute the advantages obtained in practice by lead-containing ceramic capacitors.

- 3) Please provide information on the research you conducted and its results since the last review of exemption 7c-I in 2008/2009.

Answer:

Information on the research background concerning high voltage capacitors (HVC) can be found in our reply to item 7(A) of our exemption request.

Please note that answers to these questions are to be published as part of the available information relevant for the stakeholder consultation to be carried out in the course of the evaluation of this request. If your answers contain confidential information, please provide a version that can be made public along with a confidential version, in which proprietary information is clearly marked. Please take into account that any recommendation on the continuation or revocation of exemption can be based on publicly available information only.

References

(Carl-Otto Gensch, Öko-Institut e. V., et al. 19 February 2009) *Adaptation to scientific and technical progress under Directive 2002/95/EC: Final Report*. With the assistance of Stéphanie Zangl, Rita Groß, Anna Weber, Öko-Institut e. V. and Otmar Deubzer, Fraunhofer IZM. Freiburg: . Accessed July 14, 2015.

http://ec.europa.eu/environment/waste/weee/pdf/final_reportl_rohs1_en.pdf;

http://ec.europa.eu/environment/waste/weee/pdf/report_2009.pdf.