Assistance to the Commission on Technological Socio-Economic and Cost-Benefit Assessment Related to Exemptions from the Substance Restrictions in Electrical and Electronic Equipment:

Study to assess renewal requests for 29 RoHS 2 Annex III exemptions [no. I(a to e -lighting purpose), no. I(f - special purpose), no. 2(a), no. 2(b)(3), no. 2(b)(4), no. 3, no. 4(a), no. 4(b), no. 4(c), no. 4(e), no. 4(f), no. 5(b), no. 6(a), no. 6(b), no. 6(c), no. 7(a), no. 7(c) - I, no. 7(c) - II, no. 7(c) - IV, no. 8(b), no. 9, no. 15, no. 18b, no. 21, no. 24, no. 29, no. 32, no. 34, no. 37]

Carl-Otto Gensch, Oeko-Institut

Yifaat Baron, Oeko-Institut

Markus Blepp, Oeko-Institut

Katja Moch, Oeko-Institut

Susanne Moritz, Oeko-Institut

Otmar Deubzer, Fraunhofer Institute for Reliability and Microintegration, IZM

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Report for The European Commission

Prepared by Oeko-Institut e.V., Institute for Applied Ecology and Fraunhofer-Institut IZM for Environmental and Reliability Engineering

Oeko-Institut e.V.

Freiburg Head Office, P.O. Box 1771
79017 Freiburg, Germany

Tel.:+49 (0) 761 – 4 52 95-0
Fax +49 (0) 761 – 4 52 95-288

Web: www.oeko.de

Fraunhofer-Institut IZM

Gustav-Meyer-Allee 25
13355 Berlin, Germany

Tel.: +49 (0)30 / 46403-157
Fax: +49 (0)30 / 46403-131

Web: www.fraunhofer.de

Approved by:

Adrian Gibbs, Eunomia	Carl-Otto Gensch, Oeko Institute e.V
(Peer Review)	(Project Director)
.....	.....

Eunomia Research & Consulting Ltd
37 Queen Square, Bristol, BS1 4QS, UK

Tel: +44 (0)117 9172250
Fax: +44 (0)8717 142942

Web: www.eunomia.co.uk

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Disclaimer:

Eunomia Research & Consulting, Oeko-Institut and Fraunhofer Institute IZM have taken due care in the preparation of this report to ensure that all facts and analysis presented are as accurate as possible within the scope of the project. However no guarantee is provided in respect of the information presented, and Eunomia Research & Consulting, Oeko-Institut and Fraunhofer Institute IZM are not responsible for decisions or actions taken on the basis of the content of this report.

33.0 Exemption 34 “Pb in cermet-based trimmer potentiometer elements”

Declaration

In the sections that precede the “Critical Review” the phrasings and wordings of stakeholders’ explanations and arguments have been adopted from the documents provided by the stakeholders as far as required and reasonable in the context of the evaluation at hand. Formulations have been altered in cases where it was necessary to maintain the readability and comprehensibility of the text. These sections are based exclusively on information provided by applicants and stakeholders, unless otherwise stated.

Acronyms and Definitions

Cermet	Heat resistant material made of ceramic and sintered metal; here the resistive layer and the ceramic body onto which it is sintered
EEE	Electrical and Electronic Equipment
GE	General Electric

33.1 Description of the Requested Exemption

GE et al.[1850] request the renewal of exemption 34 in RoHS Annex I with its current wording:

> *“Lead in cermet-based trimmer potentiometer elements”*

In the course of the review of exemption 7(c)-I, it was found that Bourns’ application[1851] for renewal of exemption 7(c)-I covers aspects that are relevant for cermet-based trimmer potentiometer elements as well, in particular concerning the status of lead-free alternatives.

[1850] General Electric et al. 2015a “Request for continuation of exemption 34, document "34_RoHS_V_Application_Form_-_Exemption_34_lead_in_trimmer_potentiometers-final.pdf": Original exemption request,” http://rohs.exemptions.oeko.info/fileadmin/user_upload/RoHS_Pack_9/Exemption_34/34_RoHS_V_Application_Form_-_Exemption_34_lead_in_trimmer_potentiometers-final.pdf

[1851] Bourns Inc. 2015 “Answers to first questionnaire (clarification questionnaire), document "20150818_Ex_7(c)-I_Bourns_Questionnaire-1_2015-07-28.pdf": First questionnaire (clarification questionnaire),” http://rohs.exemptions.oeko.info/fileadmin/user_upload/RoHS_Pack_9/Exemption_7_c_-I/20150818_Ex_7(c)-I_Bourns_Questionnaire-1_2015-07-28.pdf

33.1.1 Background and History of the Exemption

The exemption was reviewed once in 2007[1852]. The applicant requested this exemption claiming that exemptions 5 and 7 listed in the annex of directive 2002/95/EC (RoHS 1) as they were formulated in 2006/2007 did not cover the use of lead in these cermet-based trimmer potentiometers:

- *"No. 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes"*,
  and
- *"No. 7: Lead in electronic ceramic parts (e.g. piezoelectronic devices)"*

The manufacturer said that this resistive layer in the cermet-based trimmer potentiometer is a homogeneous material, as it can be mechanically separated from the ceramic base. This homogeneous material, the thick film layer containing the lead, is neither a glass nor a ceramic material and thus would not be covered by the above exemptions. As a consequence, exemption 34 was adopted to the annex of RoHS 1 with its current wording:

> *"Lead in cermet-based trimmer potentiometer elements"*

Exemption 34 was transferred to annex II of RoHS 2 with an expiry date in July 2016.

To avoid confusion about the scope of exemption 5 and 7, and to make sure these exemptions actually cover those uses of lead where it cannot be substituted or eliminated, the consultants aspired to improve exemptions 5 and 7, and to align them with the exemption wording of parallel exemptions within the ELV Directive as far as possible.

Exemption 11 of annex II in directive 2000/53/EC (ELV Directive[1853]), the equivalent to exemption 7(c)-I of RoHS Annex III, was reviewed in 2007/2008[1854]. The stakeholders decided that the wording in the ELV Directive covers applications like lead in cermet-based trimmer potentiometers.

[1852] Carl-Otto Gensch, Stéphanie Zangl, and Otmar Deubzer 2007 "Adaptation to scientific and technical progress under Directive 2002/95/EC: Final report," Oeko-Institut e.V., http://ec.europa.eu/environment/waste/weee/pdf/rohs.pdf, page 18 et sqq.

[1853] Directive 2000/53/EC of the European Parliament and of the Council of 18 September 2000 on end-of life vehicles, ELV Directive, European Union (21 October 2000), http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32000L0053:EN:NOT

[1854] Lohse, Joachim; Gensch, Carl-Otto; Groß, Rita; Zangl, Stéphanie; [Oeko-Institut e.V.]; Deubzer, Otmar, Fraunhofer IZM (2008): Adaptation to Scientific and Technical Progress of Annex II Directive 2000/53/EC. Final Report - Amended Final. Oeko-Institut e. V., Fraunhofer IZM. https://circabc.europa.eu/sd/a/f5d79a51-2e5a-47eb-85d3-7b491ae6a4b3/Final_report_ELV_2008_Annex_II_revision.pdf; page 65 et seqq.

In the subsequent review[1855] of RoHS exemption 7c in 2008/2009, it was therefore decided to adopt the wording formulation of ELV exemption 11 with some slight adaptations, which are reflected in the current wording of RoHS exemption 7(c)-I:

> *"Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound"*

Exemptions 5 and 7 were integrated into the above new exemption, and in principle the use of lead in trimmer potentiometers in the scope of exemption 34 is now already covered by exemption 7(c)-I.

33.1.2 Technical Description of the Exemption

The technical background of the exemption was described in detail in the last review report[1856] from 2007.

33.1.3 Amount of Lead Used Under the Exemption

GE et al.[1857] quantify the content of lead in homogeneous material (% weight) with around 40 to 50 % of PbO in glass. The amount of lead entering the EU market annually through applications for which the exemption is requested is, according to GE et al.[1858], a small fraction of the ~ 350 tonnes related to exemption 7(c)-I.

GE et al.[1859] base their estimations on 2013 data from the companies listed below, who represent the major players on the EU market:

- Ceram Tec;
- Emerson;
- EPCOS;
- Freescale;
- Johnson;
- Matthey Catalysts (Germany);
- Meggitt DK;
- Morgan Advanced Materials;
- Murata; and
- PI Ceramic.

[1855] Carl-Otto Gensch, Oeko-Institut e. V., et al. (2009): Adaptation to scientific and technical progress under Directive 2002/95/EC. Final Report. With the assistance of Stéphanie Zangl, Rita Groß, Anna Weber, Oeko-Institut e. V. und Otmar Deubzer, Fraunhofer IZM. http://ec.europa.eu/environment/waste/weee/pdf/final_reportI_rohs1_en.pdf; page 98 et seqq.
[1856] Op. cit. Gensch, Zangl and Deubzer 2007, page 18 et sqq.
[1857] Op. cit. General Electric et al. 2015a
[1858] Ibid.
[1859] Ibid.

GE et al.[1860] note that the list is not exhaustive. Electrical and electronic components are used in a wide range of final products and markets, it is impossible to provide a precise figure of the amount of lead included in glass and ceramic components in the EU for electrical and electronic equipment (EEE). For this reason, although the estimates were done in good faith with the data resources available, the values shown here are provided strictly for reference purposes, and GE et al. do not want to bear responsibility concerning their accuracy or enforceability.

GE et al. were asked to provide a more detailed estimate or calculation for the use of lead in exemption 34. GE et al.[1861] stated that their figures are based on one company's estimate of 5.5kg/annum lead used in their products annually. They claim that the overall amount should not exceed 46 kg/annum.

In the 2007 review[1862] of this exemption, the amount of lead-oxide (PbO) used in cermet-based trimmer potentiometers worldwide was indicated to be around 1,600 kg. Around 93 % of the total weight of PbO being lead, the total amount of lead would be around 1,500 kg. The consultants therefore cannot exclude that the share used in the EU, which the applicant could not calculate in 2007, would be much higher than around 50 kg indicated by GE et al.

The actual lead consumption is thus not clear, but in the consultants view it could well be considerably more than 50 kg per year in the EU.

33.2 Applicants' Justification for the Continuation of the Exemption

33.2.1 Substitution of Lead

GE et al.[1863] state that this exemption follows the same justification criteria as exemption 7(c)-I "*Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound*". Alternative technologies have been evaluated, but so far no substitution technology is available for resistive inks in glass which ensures the needed properties such as mechanical endurance and contact resistance variation. Therefore they apply for the renewal of the exemption.

Stated already in the first review[1864] of this exemption in 2007, lead-free solutions were available for certain resistance ranges and applications, but it was at that time not

[1860] Ibid.
[1861] General Electric et al. 2015b "Answers to first questionnaire (clarification questionnaire, document "Exe_34_Questionnaire-1_GE-Health-et-al_2015-09-15 - reply.pdf", received via e-mail by Otmar Deubzer, Fraunhofer IZM, from James Vetro, GE Healthcare, on 15 September 2015,"
[1862] Op. cit. Gensch, Zangl and Deubzer 2007, page 19
[1863] Op. cit. General Electric et al. 2015a
[1864] Carl-Otto Gensch, Oeko-Institut e. V., et al. (2009): Adaptation to scientific and technical progress under Directive 2002/95/EC. Final Report. With the assistance of Stéphanie Zangl, Rita Groß, Anna Weber,

possible to clearly define resistance ranges and detailed performance parameters of these products, nor the applications where these trimmer potentiometers would be suitable.

GE et al.[1865] claim that since the 2007 review[1866] of the exemption, they analysed several different lead-free cermet inks from several manufacturers. According to GE et al.[1867] there are no dedicated lead-free inks available for potentiometers but it is the target to qualify available inks for resistors applications. GE et al.[1868] mention boron, phosphorus, zinc, tin, bismuth glass/inks, etc. as potential principal lead-free alternatives. GE et al.[1869] tested mainly two types of lead-free inks from vendor A with sheet resistance from 15mΩ/sq to 5Ω/sq and vendor B with sheet resistance from 10 Ω/sq to 100 MΩ/sq. GE et al.[1870, 1871] say they were processed and their performances were measured by running qualification tests. At present no alternative solutions have similar or acceptable results compared to the leaded inks, especially in life tests. The critical point is the surface roughness of the ink after firing, degrading quickly the sliding contact (wiper) or creating unacceptable electric noise. The experiments showed a more rapid wear on the sliding contact as well as electrical noise, resulting in a life expectancy of only 50 % compared to the lead bearing paste.

GE et al.[1872] et al. conclude that based on these results, a continuation of the exemption is necessary to keep the performances of the products.

Within its trimming potentiometer product line, Bourns'[1873] research team has developed lead-free inks for low to mid-range resistance values for some cermet-based trimmer potentiometers. These proprietary lead-free substitutes are a form of calcium silicate borate glass. These ink systems are used on the trimming potentiometer products only. They work for some specific Bourns' parts, but are not a solution for all Bourns' trimming potentiometers, depending on the specific potentiometer models. Another remaining challenge is the higher end resistance values for which the company is still trying to find a suitable solution.

Oeko-Institut e. V. und Otmar Deubzer, Fraunhofer IZM.
http://ec.europa.eu/environment/waste/weee/pdf/final_reportI_rohs1_en.pdf; page 98 et seqq.

[1865] Op. cit. General Electric et al. 2015b

[1866] Carl-Otto Gensch, Oeko-Institut e. V., et al. (2009): Adaptation to scientific and technical progress under Directive 2002/95/EC. Final Report. With the assistance of Stéphanie Zangl, Rita Groß, Anna Weber, Oeko-Institut e. V. und Otmar Deubzer, Fraunhofer IZM.
http://ec.europa.eu/environment/waste/weee/pdf/final_reportI_rohs1_en.pdf; page 98 et seqq.

[1867] General Electric et al. 2016a "Answers to second questionnaire, document "Exe_34_Questionnaire-2_GE-Health-et-al_2016-3-11 reply.pdf", received via e-mail by Dr. Otmar Deubzer, Fraunhofer IZM, from James Vetro, General Electric, on 12 March 2016: Second questionnaire" unpublished manuscript,

[1868] Op. cit. (General Electric et al. 2015a)

[1869] Op. cit. (General Electric et al. 2016a)

[1870] Op. cit. (General Electric et al. 2015b)

[1871] Op. cit. (General Electric et al. 2016a)

[1872] Op. cit. (General Electric et al. 2015a)

[1873] Op. cit. (Bourns Inc. 2015)

With respect to a quantification of the resistance range in which lead can be substituted, Bourns[1874] state that the resistance range varies in relation to specific potentiometer models and their applications. Some of the inks developed are specifically for a certain model. Currently, a typical upper limit for one specific lead-free ink model is 24 kΩ, and 51 kΩ for another one. Bourns[1875] highlights, however, that these models are examples of successful substitutions only. Bourns[1876] still has many models where the substitution of lead in the ead-containing glasses in all resistances – low, mid and high ranges – is scientifically and technically not yet practicable. So for many other models, there has not yet been a successful resolution, and a lot of research is still to be done as it is not a one-size fits all solution.

Bourns[1877] explain that the lead-free trimmer potentiometers can potentially be used in a variety of applications, but does not claim they can be used in all applications. Their usability depends on the end user's need and the form, fit and function of their end products. Bourns[1878] continues to work with its suppliers, to explore possible solutions through experimenting with possible alternatives. It is a slow process with research, experimentation, testing, scale-up, qualification and reliability testing. If there is a failure along the way, the process has to be started over.

33.2.2 Elimination of Lead

Bakelite-based potentiometers were identified in the 2007 review[1879] of the exemption as a potential way to eliminate the use of lead, but have proven to be no adequate replacement at that time.

GE et al.[1880] report that there are several alternative technologies to cermet trimmer potentiometers, for example:

- Conductive plastic inks;
- Other technologies (optic, magnetic, digital).

GE et al.[1881] say that for replacement the following issues have to be taken into account, as cermet trimmers:

[1874] Bourns Inc. 2016a "Answers to second questionnaire, document "Exe_7(c)-I_Questionnaire-2_Bourns_2015-12-21.pdf", sent via e-mail to Otmar Deubzer, Fraunhofer IZM, by Cathy Godfrey, Bourns Inc., on 4 January 2016: Second questionnaire" unpublished manuscript,
[1875] Bourns Inc. 2016b "Answer to second questionnaire, document "Exe_34_Questionnaire-2_Bourns_2016-03-16.pdf, received via e-mail by Dr. Otmar Deubzer, Fraunhofer IZM, from Cathy Godfrey, Bourns, on 22 March 2016: Second questionnaire" unpublished manuscript,
[1876] Ibid.
[1877] Op. cit. (Bourns Inc. 2016a)
[1878] Ibid.
[1879] Carl-Otto Gensch, Oeko-Institut e. V., et al. (2009): Adaptation to scientific and technical progress under Directive 2002/95/EC. Final Report. With the assistance of Stéphanie Zangl, Rita Groß, Anna Weber, Oeko-Institut e. V. and Otmar Deubzer, Fraunhofer IZM. http://ec.europa.eu/environment/waste/weee/pdf/final_reportI_rohs1_en.pdf; page 98 et seqq.
[1880] Op. cit. (General Electric et al. 2016a)

- Can be of a very small size;
- Are not sensitive to electrostatical discharge (ESD);
- Do not need reverse polarity or surge protections;
- Can work at high temperature without Ohm value drift, contrarily to bakelite.

Bourns[1882] explain that bakelite is a phenolic resin material typically blended with a carbon powder to create a carbon-based film. Bourns screen prints this conductive plastic ink on a ceramic substrate. It is used for potentiometers, but not trimming potentiometers. Conductive plastic potentiometers are generally lower cost, less precise, used in environments where moisture or humidity is not a factor and resistance drift is not a concern.

GE et al.[1883] detail that cermet-based trimmer potentiometers have no drift for hundreds of hours at 150 °C. With Bakelite inks, several percentages of drift for every 96 hours of testing at 125°C were observed. Cermet is robust enough to support the force of the wiper. In small dimensions, the control of the force is not easy. For cermet wipers a force from 10 cN up to 150 cN can be used. Bakelite pots are of a poorer quality than cermet. The wear of the inks used on Bakelite is quicker than the Cermet ones. Cermet potentiometers can work up to 125 °C and some up to 210 °C.

Bourns[1884] confirm that for more precision in more demanding environmental conditions, where drift is not acceptable, cermets are used. These materials do not include phenolic resins or carbon. They generally have a precious metal-based ink (e.g. silver or gold for conductors; palladium, platinum, ruthenium for resistors). The cermet material is used for trimming potentiometers. One example is a trimming potentiometer used in medical equipment. The demand is for a precise potentiometer that will not drift from the desired setting. The choice here would be a cermet-based trimmer.

33.2.3 Roadmap towards Substitution or Elimination of Lead

GE et al. were asked about their plans and ideas for the future to achieve RoHS compliance. GE et al.[1885] answered that a possible time frame would be at least 3 years: one year for evaluation, one for internal qualification, and one for qualification at customers especially for specific applications.

Still there are some trimming potentiometers that no solution has yet been found for all resistance values. It varies based on the application of the part. Some termination inks still use lead-containing glass.

[1881] Op. cit. (General Electric et al. 2016a)
[1882] Op. cit. (Bourns Inc. 2016b)
[1883] Op. cit. (General Electric et al. 2016a)
[1884] Op. cit. (Bourns Inc. 2016b)
[1885] Op. cit. (General Electric et al. 2016a)

Bourns[1886] states it will continue work with its suppliers, explore possible solutions, and experiment with possible alternatives. It is a slow process with research, experimentation, testing, scale-up, qualification & reliability testing. If there is a failure along the way, the process starts over. Each product line using lead-based thick film inks is unique so a one-size-fits-all application does not work.

33.3 Critical Review

33.3.1 REACH Compliance - Relation to the REACH Regulation

Appendix A.1.0 of this report lists various entries in the REACH Regulation annexes that restrict the use of lead in various articles and uses.

The exemption allows the use of lead.

Annex XIV contains several entries for lead compounds, whose use requires authorization:

- 10. Lead chromate
- 11. Lead sulfochromate
- 12. Lead chromate molybdate sulphate red

In the applications in the scope of the reviewed exemption, lead is used in electronic components that become parts of articles. None of the above listed substances is relevant for this case, neither as directly added substances nor as substances that can reasonably be assumed to be generated in the course of the manufacturing process.

Annex XVII bans the use of the following lead compounds:

- 16. Lead carbonates in paints
- 17. Lead sulphate in paints

Neither the substances nor the application are, however, relevant for the exemption in the scope of this review.

Appendix A.1.0 of this report lists Entry 28 and Entry 30 in Annex XVII of the REACH Regulation, stipulating that lead and its compounds shall not be placed on the market, or used, as substances, constituents of other substances, or in mixtures for supply to the general public. A prerequisite to granting the requested exemption would therefore be to establish whether the intended use of lead in this exemption request might weaken the environmental and health protection afforded by the REACH regulation.

In the consultants' understanding, the restrictions for substances under Entry 28 and Entry 30 of Annex XVII do not apply. The use of lead in this RoHS exemption in the consultants' point of view is not a supply of lead and its compounds as a substance,

[1886] Op. cit. Bourns Inc. 2015

mixture or constituent of other mixtures to the general public. Lead is part of an article and as such, Entry 30 of Annex XVII of the REACH Regulation would not apply.

Entry 63 of Annex XVII stipulates that lead and its compounds

1) *"shall not be placed on the market or used in any individual part of jewellery articles if the concentration of lead (expressed as metal) in such a part is equal to or greater than 0.05 % by weight."* This restriction does not apply to internal components of watch timepieces inaccessible to consumers;
2) *"shall not be placed on the market or used in articles supplied to the general public, if the concentration of lead (expressed as metal) in those articles or accessible parts thereof is equal to or greater than 0.05 % by weight, and those articles or accessible parts thereof may, during normal or reasonably foreseeable conditions of use, be placed in the mouth by children."* This restriction, however, does not apply to articles within the scope of Directive 2011/65/EU (RoHS 2).

The restrictions of lead and its compounds listed under entry 63 thus do not apply to the applications in the scope of this RoHS exemption.

No other entries, relevant for the use of lead in the requested exemption could be identified in Annex XIV and Annex XVII (status February 2016). Based on the current status of Annexes XIV and XVII of the REACH Regulation, the requested exemption would not weaken the environmental and health protection afforded by the REACH Regulation. An exemption could therefore be granted if other criteria of Art. 5(1)(a) apply.

33.3.2 Substitution and Elimination of Lead

Potentiometers can be made from bakelite with lead-free plastic inks and could be a potential means to eliminate the use of lead. The applicants both explain that the performance as well as the endurance of such bakelite potentiometers is inferior to the cermet-based trimmer potentiometers so that they cannot replace them.

Bourns mention that they have lead-free alternatives for cermet-based trimmer potentiometers; however, these are said to be applicable on a case by case basis and for some low to mid resistance range trimmer potentiometers only. On request, Bourns[1887, 1888] explained that it is not possible to classify and demarcate resistance and application areas where such lead-free alternatives can be applied from others where the use of lead is still indispensable.

GE et al.[1889] mention optic, magnetic, and digital technologies as approaches to eliminate the use of lead. However, they do not provide further information so it remains an open question whether and how far such technologies could eliminate the use of lead.

[1887] Op. cit. (Bourns Inc. 2016a)
[1888] Op. cit. (Bourns Inc. 2016b)
[1889] Op. cit. (General Electric et al. 2016a)

In order to substitute lead, GE et al. report about various experiments in Section 33.2.1 (from page 727). The consultants asked GE et al. who conducted these tests, and when, in order to obtain insights into the applicants' activities since the last review of this exemption in 2007. GE et al.[1890] answered that for potentiometers it is difficult to answer this question, as typically commercially available standard resistor inks are being used. They are printed and then tested regarding their performances to specification and limits.

The consultants consider that it is not plausible for GE et al. on the one hand to present these results, and on the other hand not to know who did these experiments and when.

While Bourns shows clear efforts and successful substitutions, the information provided and the way it is presented raise concerns about the motivation and willingness of GE et al. to actually research for and find alternatives to substitute or eliminate the use of lead. The answer of GE et al. to the question about their future ideas and plans to achieve RoHS compliance in the last questionnaire[1891] fuels these concerns:

> *"A possible time frame would be at least 3 years, one for evaluation, one for internal qualification, one for qualification at customers especially for specific applications."*[1892]

The applicants' exemption requests and the answers to the clarification questionnaire were made available through the online public consultation, i.e. to industry, governments, NGOs and other stakeholders, and a consultation questionnaire had been prepared with specific questions to stakeholders. No further information supporting or discrediting the technical application in question was received.

33.3.3 Conclusions

Overall, the information submitted suggests that lead is actually still required in cermet-based trimmer potentiometers, even though for some low and mid range resistance applications lead-free trimmer potentiometers are available. At this current time, these alternatives are not able to be clearly demarcated and specified in order to restrict the exemption's scope. No information is available concerning the status of optic, magnetic, and digital technologies mentioned by GE et al. as approaches to eliminate the use of lead in the application in the scope of Exemption 24.

Granting an exemption would thus be in line with the requirements of RoHS Art. 5(1)(b). The exemption should, however, be granted for a maximum of three years until 21 July 2019 only. Given the fact that the applicants did not provide information, whether lead could at least partially be eliminated within less than five years, a maximum of five years validity period in the consultants' understanding of Art. 5(1)(a) would not be justified. In

[1890] Ibid.
[1891] Ibid.
[1892] Op. cit. (Bourns Inc. 2016a)

case the exemption is still required, the applicants can apply for its renewal prior to 21 January 2018.

33.3.4 Integration of Exemption 34 into Exemption 7(c)-I

Technically, exemption 7(c)-I covers the use of lead in cermet-based trimmer potentiometers so that exemption 34 could in principle be included into the scope of exemption 7(c)-I. As exemption 7(c)-I is, however, recommended to be continued with the current wording without further specifications of the scope, the consultants recommend maintaining exemption 34 as a specific exemption for the time being so as to avoid any possible confusion, but to consider its integration into a future exemption 7(c)-I should the specification of that exemption 7(c)-I be successful in the next review.

Vice versa, the use of lead in cermet-based trimmer potentiometers in the scope of Exemption 34 should be excluded from the scope of exemption 7(c)-I to avoid that exempted uses of lead are covered by more than one exemption.

33.4 Recommendation

The information available to the consultants suggests that the substitution and elimination of lead is scientifically and technically impracticable to a degree that justifies the renewal of the exemption in line with the criteria for exemptions in Art. 5(1)(a). The exemption should, however, only be granted for a maximum of three years since the information provided and the way it is presented does not clearly demonstrate that lead cannot be eliminated within the next five years.

The reviewers recommend the renewal of exemption 34 with the identical wording, but an expiry date latest on 21 July 2019.

Exemption 34	Expires on
Lead in cermet-based trimmer potentiometers	*21 July 2019 for categories 1-7 and 10*
	21 July 2021 for · *medical equipment in category 8* · *monitoring and control instruments in category 9*
	21 July 2023 for in vitro diagnostic medical devices in category 8
	21 July 2024 for industrial monitoring and control instruments in category 9

33.5 References Exemption Request 34

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Bourns Inc. 2016a Answers to second questionnaire, document "Exe_7(c)-I_Questionnaire-2_Bourns_2015-12-21.pdf", sent via e-mail to Otmar Deubzer, Fraunhofer IZM, by Cathy Godfrey, Bourns Inc., on 4 January 2016.

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