















# Exemption Request Form Annex III, Exemption 34

Date of submission: January 16, 2015

## 1. Name and contact details

### 1) Name and contact details of applicant:

<p><b>American Chamber of Commerce to the European Union (AmCham EU)</b> ID number: 5265780509-97</p> 	<p><b>European Garden Machinery Industry Federation (EGMF)</b> ID number: 82669082072-33</p> 	<p><b>Information Technology Industry Council (ITI)</b> ID Number : 061601915428-87</p> 	<p><b>DIGITALEUROPE</b> ID number: 64270747023-20</p> 
<p><b>IPC – Association Connecting Electronics Industries</b> Association Connecting Electronics Industries</p> 	<p><b>TechAmerica Europe (TAE)</b> ID number: 2306836892-93</p> 	<p><b>European Passive Components Industry Association (EPCIA)</b> ID number: 22092908193-23</p> 	<p><b>Zentralverband Elektrotechnik- und Elektronikindustrie e. V. (ZVEI)</b> ID number: 94770746469-09</p> 
<p><b>European Ceramic Industry Association (Cerame-Unie)</b> 79465004946-12</p> 	<p><b>European Committee of Domestic Equipment Manufacturers (CECED)</b> ID number: 04201463642-88</p> 	<p><b>European Semiconductor Industry Association (ESIA)</b> ID Number: 22092908193-23</p> 	<p><b>European Coordination Committee of the Radiological, Electromedical and Healthcare IT Industry (COCIR)</b> ID number: 05366537746-69</p> 
<p><b>Ferro Corporation</b> Global Headquarters 6060 Parkland Boulevard Mayfield Heights, Ohio 44124 U.S.A.</p> 	<p><b>Avago Technologies Ltd.</b></p> 		

**2) Name and contact details of responsible person for this application  
(if different from above):**

Company: General Electric Tel.: 1-262-548-2051  
Name: James Vetro E-Mail: james.vetro@ge.com  
Function: Engineering Address: 3000 N. Grandview  
Blvd., Waukesha, WI 53188

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**2. Reason for application:**

Please indicate where relevant:

- Request for new exemption in:  
 Request for amendment of existing exemption in  
 Request for extension of existing exemption in  
 Request for deletion of existing exemption in:  
 Provision of information referring to an existing specific exemption in:  
 Annex III  Annex IV

No. of exemption in Annex III or IV where applicable: 34

Proposed or existing wording:

Lead in cermet-based trimmer potentiometer elements

Duration where applicable:

We apply for renewal of this exemption for categories 1 to 7, 10 and 11 of Annex I for an additional validity period of 5 years. For these categories, the validity of this exemption may be required beyond this timeframe. Although applications in this exemption renewal request may be relevant to categories 8 & 9, this renewal request does not address these categories. Further, categories 8 & 9 have separate maximum validity periods and time limits for application for renewals.

Other: \_\_\_\_\_

**3. Summary of the exemption request / revocation request**

\_\_\_\_\_

We are requesting renewal for the exemption 34 for lead in cermet-based trimmer potentiometer elements. We suggest to keep the numbering and wording the same to avoid confusion and maintain the initial intention of scope of exemption 34.

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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 are 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 we request renewal of the exemption.

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**4. Technical description of the exemption request / revocation request**

**(A) Description of the concerned application:**

1. To which EEE is the exemption request/information relevant?

Name of applications or products: All types of electrical and electronic equipment (EEE) (Large and small household appliances; IT and telecommunications equipment; consumer equipment; lighting equipment; electrical and electronic tools; toys, leisure and sports equipment; automatic dispensers and other EEE categories not covered by any of the categories above.)

a. List of relevant categories: (mark more than one where applicable)

- |                                       |                                        |
|---------------------------------------|----------------------------------------|
| <input checked="" type="checkbox"/> 1 | <input checked="" type="checkbox"/> 7  |
| <input checked="" type="checkbox"/> 2 | <input type="checkbox"/> 8             |
| <input checked="" type="checkbox"/> 3 | <input type="checkbox"/> 9             |
| <input checked="" type="checkbox"/> 4 | <input checked="" type="checkbox"/> 10 |
| <input checked="" type="checkbox"/> 5 | <input checked="" type="checkbox"/> 11 |
| <input checked="" type="checkbox"/> 6 |                                        |

b. Please specify if application is in use in other categories to which the exemption request does not refer: \_\_\_\_\_

Although applications in this exemption renewal request may be relevant to categories 8 & 9, this renewal request does not address these categories. Therefore, we have not completed section 4(A)1.c. Further, categories 8 & 9 have separate maximum validity periods and time limits for application for renewals.

c. Please specify for equipment of category 8 and 9:

- The requested exemption will be applied in
- monitoring and control instruments in industry
  - in-vitro diagnostics

other medical devices or other monitoring and control instruments than those in industry

2. Which of the six substances is in use in the application/product?

(Indicate more than one where applicable)

Pb       Cd       Hg       Cr-VI       PBB       PBDE

3. Function of the substance:

Lead is used to obtain appropriate physical characteristics as a functional element in potentiometers.

4. Content of substance in homogeneous material (%weight):

40-50% PbO in glass.

5. Amount of substance entering the EU market annually through application for which the exemption is requested: a small fraction of the ~ 350 tons from exemption 7(c)-I.

Please supply information and calculations to support stated figure.

Estimate based on 2013 data from below companies, who represent the major players on the EU market:

Ceram Tec

Emerson

EPCOS

Freescale

Johnson Matthey Catalysts (Germany)

Meggitt DK

Morgan Advanced Materials

Murata

PI Ceramic

[Disclaimer]

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].

Electronic equipment industry is engaged in the reduction of lead and environmental burdens within its powers, although it is impossible to completely cease the use of lead under the scope of exemption 34.

We present the results of an estimate based on above company figures.

It should be noted that there may be companies which are not included.

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 we shall bear no responsibility concerning their accuracy or enforceability.

6. Name of material/component:

Lead (Pb) in Cermet based trimmer potentiometers

7. Environmental Assessment: no, since there is no alternative to compare against.

LCA:  Yes  
 No

**(B) In which material and/or component is the RoHS-regulated substance used, for which you request the exemption or its revocation? What is the function of this material or component?**

Lead in Cermet based trimmer potentiometers used as resistive inks.

**(C) What are the particular characteristics and functions of the RoHS-regulated substance that require its use in this material or component?**

\_\_\_\_\_

Glass containing lead as a constituent element is able to provide the high functionality required for electrical and electronic components. Such glass can fulfil the appropriate characteristics and satisfy the high reliability requirements over a wide range of applications

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**5. Information on Possible preparation for reuse or recycling of waste from EEE and on provisions for appropriate treatment of waste**

1) Please indicate if a closed loop system exist for EEE waste of application exists and provide information of its characteristics (method of collection to ensure closed loop, method of treatment, etc.)

Currently one third of WEEE in the EU is being reported by compliance schemes as separately collected and appropriately managed (note some of this might be via destinations outside the Member State of origin).

The remaining WEEE is either

- 1) collected by unregistered enterprises and properly treated
- 2) collected by unregistered enterprises and improperly treated or even illegally exported abroad or
- 3) disposed of as part of residual waste (e.g. to landfills or incinerators).

References:

[1] Eurostat

[http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/key\\_waste\\_streams/waste\\_electrical\\_electronic\\_equipment\\_weee](http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/key_waste_streams/waste_electrical_electronic_equipment_weee)

In general there is no closed loop system, just on customer basis related to specific sectors.

**2) Please indicate where relevant:**

- Article is collected and sent without dismantling for recycling
- Article is collected and completely refurbished for reuse
- Article is collected and dismantled:
  - The following parts are refurbished for use as spare parts: \_\_\_\_\_
  - The following parts are subsequently recycled: \_\_\_\_\_
- Article cannot be recycled and is therefore:
  - Sent for energy return
  - Landfilled

Note: Some EE Equipment is recycled and refurbished. Some Equipment is disposed as part of residual waste (e.g. to landfills or incinerators)

**3) Please provide information concerning the amount (weight) of RoHS substance present in EEE waste accumulates per annum:**

- In articles which are refurbished \_\_\_\_\_
- In articles which are recycled \_\_\_\_\_
- In articles which are sent for energy return \_\_\_\_\_
- In articles which are landfilled \_\_\_\_\_

Total Waste (t)	2005	2006	2007	2008	2009	2010
Products put on the market	1.394.785	6.636.645	9.719.550	10.398.205	9.205.514	9.574.734
Reuse	3.147	20.725	26.404	44.001	59.316	69.368
Recovery	334.462	1.391.705	2.297.955	2.874.517	3.071.115	2.785.286
Total recycling and reuse	305.816	1.236.613	2.030.483	2.564.782	2.833.061	2.564.384
Treated in the Member State	251.034	1.280.288	2.119.001	2.554.495	2.790.144	2.775.050
Treated in another Member State of the EU	9.222	82.917	125.786	150.912	141.180	165.717
Treated outside the EU	7	25.932	96.891	95.759	110.988	106.465
Pb content (t) max	2005	2006	2007	2008	2009	2010
Products put on the market	1.395	6.637	9.720	10.398	9.206	9.575
Reuse	3	21	26	44	59	69
Recovery	334	1.392	2.298	2.875	3.071	2.785
Total recycling and reuse	306	1.237	2.030	2.565	2.833	2.564
Treated in the Member State	251	1.280	2.119	2.554	2.790	2.775
Treated in another Member State of the EU	9	83	126	151	141	166
Treated outside the EU	0	26	97	96	111	106

Based on the trend of waste amount during the period 2007 to 2010 an estimated mean value can be calculated for 2013 waste under the assumption that threshold level of the waste is not exceeding the RoHS limit.

Estimate 2013:

Maximum lead content for Products on the market: ~ 9.000 t

Reuse: ~ 100 t

Recovery: ~ 3500 t

Total Recycling and reuse: ~3300 t



EEE Waste Pb  
Amount.xlsx

References:

[1] Eurostat

[http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/key\\_waste\\_streams/waste\\_electrical\\_electronic\\_equipment\\_weee](http://epp.eurostat.ec.europa.eu/portal/page/portal/waste/key_waste_streams/waste_electrical_electronic_equipment_weee)

## 6. Analysis of possible alternative substances

- (A) **Please provide information if possible alternative applications or alternatives for use of RoHS substances in application exist. Please elaborate analysis on a life-cycle basis, including where available information about independent research, peer-review studies development activities undertaken**

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no suitable substance for substituting lead has been identified. Therefore such information and analysis are not applicable in this case.

- (B) **Please provide information and data to establish reliability of possible substitutes of application and of RoHS materials in application**

There is no suitable substance for substituting lead. Therefore such information and analysis are not applicable in this case.

## 7. Proposed actions to develop possible substitutes

1. **Please provide information if actions have been taken to develop further possible alternatives for the application or alternatives for RoHS substances in the application.**

Boron, phosphorus, zinc, tin, bismuth, etc. have been investigated as elements for substituting lead as a constituent element of glass.

However, when compared with lead-containing glasses, chemical stability and mechanical strength of the glasses are insufficient (to meet the required functionality).

As a result, there are concerns of crucial failures in EEE incorporating electrical and electronic components composed of glass with lead substituted by these elements due to their insufficient reliability and quick deterioration.

2. **Please elaborate what stages are necessary for establishment of possible substitute and respective timeframe needed for completion of such stages.**

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There are no prospects concerning the technical scope of exemption 34 for a comprehensive substitution to “lead-free” trimmer potentiometers in the currently foreseeable future



## 8. Justification according to Article 5(1)(a):

Scientifically or technically impracticable, Reliability not ensured.

### (A) Links to REACH: (substance + substitute)

1) Do any of the following provisions apply to the application described under (A) and (C)?

- Authorisation
  - SVHC
  - Candidate list
  - Proposal inclusion Annex XIV
  - Annex XIV
- Restriction
  - Annex XVII
  - Registry of intentions
- Registration

2) Provide REACH-relevant information received through the supply chain.

Name of document: \_\_\_\_\_ none

### (B) Elimination/substitution:

1. Can the substance named under 4.(A) **2** be eliminated?

- Yes. Consequences? \_\_\_\_\_
- No. Justification:

Please refer to Product Examples in Annex 1

2. Can the substance named under 4.(A) **2** be substituted?

- Yes.
  - Design changes:
  - Other materials:
  - Other substance:
- No.

Justification:

Please refer to Product Examples in Annex 1

As there are no substitutes, we are not able to provide reliability data and LCA data of substitutes in 3 and 4 below.

We are not able to evaluate availability and socio-economic impact in (C) and (D) below for the aforementioned reasons.

3. Give details on the reliability of substitutes (technical data + information):

4. Describe environmental assessment of substance from 4.(A) 2 and possible substitutes with regard to

1) Environmental impacts:

N/A

2) Health impacts: \_\_\_\_\_

N/A

3) Consumer safety impacts: \_\_\_\_\_ N/A

Lead Oxide does not provide an environmental impact (Pb does not leak into environment because it is tightly bound in the glass)

○ Do impacts of substitution outweigh benefits thereof?

Please provide third-party verified assessment on this: \_\_\_\_\_ N/A

**(C) Availability of substitutes:**

a) Describe supply sources for substitutes: none

b) Have you encountered problems with the availability? Describe: N/A

c) Do you consider the price of the substitute to be a problem for the availability?

Yes  No

d) What conditions need to be fulfilled to ensure the availability? N/A

**(D) Socio-economic impact of substitution:**

○ What kind of economic effects do you consider related to substitution?

Increase in direct production costs

Increase in fixed costs

Increase in overhead

Possible social impacts within the EU

Possible social impacts external to the EU

Other: \_\_\_\_\_

- Provide sufficient evidence (third-party verified) to support your statement:

## 9. Other relevant information

**Please provide additional relevant information to further establish the necessity of your request:**

Until the present moment substitution technology has not been found, but many potential compositions have been investigated in order to develop reliable technical solutions on industrial scale

The environmental impact of Pb in Ceramics and Glass is low, because the water solubility of lead contained in ceramic and glass and therefore leakages into environment are very low.

References:

[1] Worker Exposure to Lead Titanate Zirconate in an Ontario Company M.L. Roy, MD, PhD; S.Siu, Md; W.Waddell, MD; P.Kennedy, BSc



Worker Exposure to  
lead.pdf

[2] COMMENTS ON AN ANNEX XV DOSSIER FOR IDENTIFICATION OF A SUBSTANCE AS SVHC AND RESPONSES TO THESE COMMENTS



rcom\_lead\_titanium\_z  
irconium\_oxide\_en.rtf

Below are examples of availability of the major candidate materials.

Potential Elements for Substitute materials are: Niobium, Tantalum, Antimony, Lithium, Rare Earth, some are critical raw materials Niobium is contained in Coltan, which is a conflict mineral.

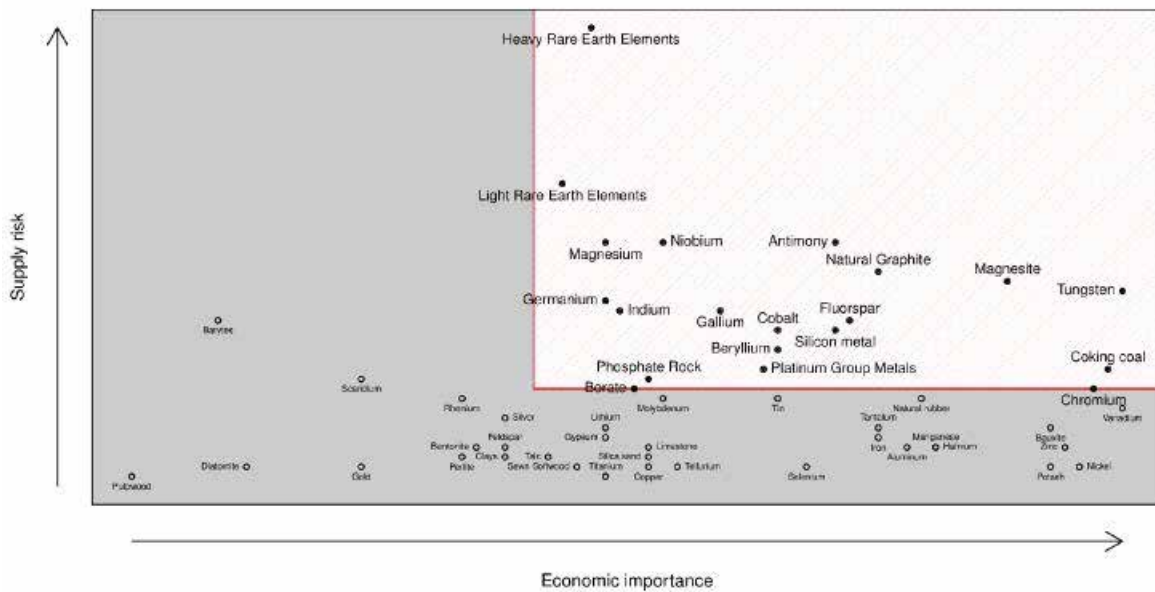
Twenty critical raw materials were identified as critical from the list of fifty-four candidate materials in 2013:

Antimony	Beryllium	Borates	Chromium	Cobalt	Coking coal	Fluorspar
Gallium	Germanium	Indium	Magnesite	Magnesium	Natural Graphite	Niobium
PGMs	Phosphate Rock	REEs (Heavy)	REEs (Light)	Silicon Metal	Tungsten	

Rem: Tantalum was on the previous critical raw materials list

[1] [http://ec.europa.eu/enterprise/policies/raw-materials/critical/index\\_en.htm](http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm)

The overall results of the 2013 criticality assessment are shown below; the critical raw materials are highlighted in the red shaded criticality zone of the graph.



Supply risk: in order to measure the supply risk of raw materials, the World Governance Indicator (WGI) was used. This indicator takes a variety of influences into account such as voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, rule of law or control of corruption.

References:

[1] [http://ec.europa.eu/enterprise/policies/raw-materials/critical/index\\_en.htm](http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm)

[2]



EU-Rohstoffinitiative.pdf

[3]



COM\_2011\_0025\_FIN\_DE\_TXT.pdf

**10. Information that should be regarded as proprietary**

Please state clearly whether any of the above information should be regarded to as proprietary information. If so, please provide verifiable justification:

None

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## Annex 1: Product Example



Exemption\_34 Lead  
in cermet based potm