

EU Directive 2011/95/EC

Application for an renewal of exemption no. 7(c)-I

1. Name and contact details

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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: 7(c)-I

Proposed or existing wording:

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.

Duration where applicable: No expiry date

Other: _____

3. Summary of the exemption request / revocation request

To ensure the production of high quality hermetic packages for opto-electronic devices it is crucial to use lead-oxide based glasses. These so called “solder-glasses” are necessary to attach optical elements like windows or lenses into metal components.

Lead oxide as a glass constituent is responsible for the low working temperature of the glass, yet maintaining an acceptable level of environmental resistance.

Higher working temperatures will damage the optical elements of our components. Without using lead containing solder glasses we will no longer be able to produce our huge variety of high level electronic components.

Regarding the small amount of lead containing solder glasses needed for our purposes and the fact that glass is an inert and stable material which does not pose any danger to human health and environment along the lifecycle, we apply for the extension of the existing exemption in Annex III, no. 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.”

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:

SCHOTT AG, Site Landshut produces components for many types of EEE.

Applications of these components are:

- Fiber Optic Data Communication Components
 - Laser Diodes for Transmit Modules
 - Photodiodes and Avalanche Photo Diodes for Receive Components
- Laser Packaging
- Optical Sensor Devices
 - Laser Diode based Gas Sensors
 - Infrared Sensors
 - Photodiodes and -resistors
- Optical MEMS Packaging
- High Power LED Packaging

SCHOTT AG, Site Landshut uses lead-oxide based glasses, so called “solder-glasses” to attach optical elements like windows or lenses into metal components. This assembly is part of a hermetic package (“Cap”) for opto-electronic devices like laser diodes, photo detectors etc.

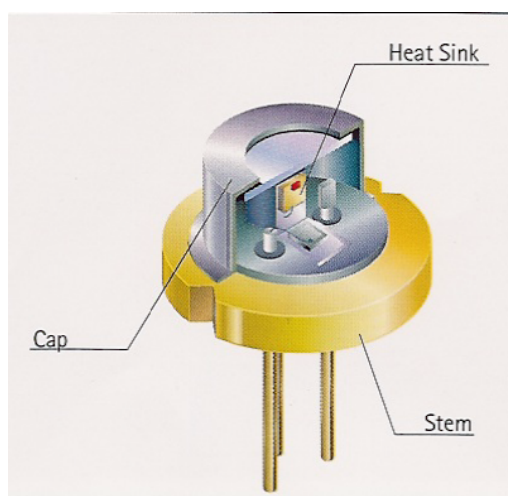


Figure 2, TO56 Laser Diode Package

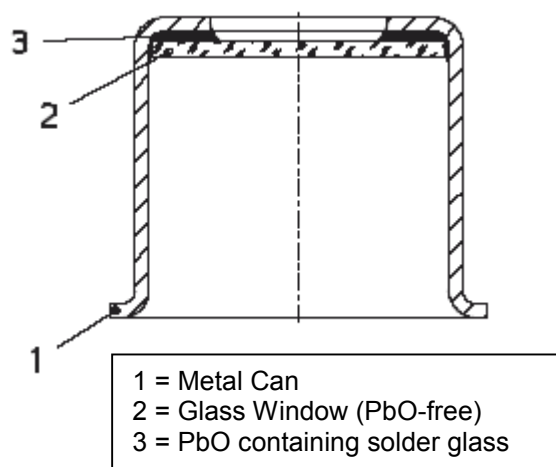


Figure 1, Cross Section of a typical Window Cap

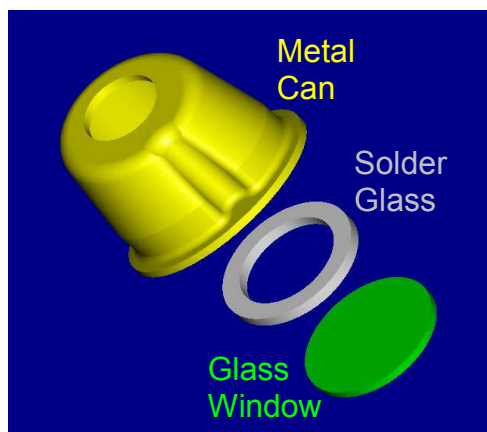


Figure 3, Exploded View of a typical Window Cap

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: [constituent of solder glasses, it essential for low working temperatures](#)

4. Content of substance in homogeneous material (%weight): [appr. 75%](#)

5. Amount of substance entering the EU market annually through application for which the exemption is requested:

Please supply information and calculations to support stated figure.

Estimated Solder Glass Content in Standard Window Cap

Mass Glass Window: 0,0072 g
 Mass Metal Can: 0,077 g
 Mass Solder Glass Ring: 0,0086 g

=> Solder Glass Content: 9,3 %

=> PbO Content in Cap: 7,0 %

Contents of PbO in the homogenous material solder glass	Appr. 75%
Annual Production Qty for Hermetic Caps using solder Glass	32 Mio Pcs.
Annual Consumption of PbO	Appr. 150Kg
Sales volume for this type of hermetic optical caps into the EU	10%

6. Name of material/component: [lead-oxide based solder glass](#)

7. Environmental Assessment:

LCA: Yes

No - LCA is not applicable to this exemption renewal request

Solder glass is very stable and inert. 100% of the lead content remains within the glass under all normal use conditions of electrical equipment.

- (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-oxide based glasses, so called "solder-glasses". This solder glasses are used to attach optical elements like windows or lenses into metal components.](#)

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

Lead oxide is used to produce glasses with low working temperature, yet maintaining an acceptable level of environmental resistance.

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

The EU directive 2012/19/EU applies to electrical and electronic equipment (EEE). As SCHOTT AG, Site Landshut produces components for EEE and our products can not be classified in any EEE category, the requirements of the above mentioned directive affects our customers.

We firmly assume that our customers fulfill the requirements regarding waste from EEE to the best of their ability.

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

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

SCHOTT has started PbO substitution project for solder glasses in the year 2000. New glass systems have been developed for replacement of PbO containing solder glasses. These new glasses were based on the following substitutes:

- Bismuth-Oxide, Bi_2O_3
- Phosphate Glasses P_2O_5

Development for these glasses was mainly done for glass to glass or glass to ceramic joints. In a separate project which was launched 2004, we tested all these new systems for usability for metal to glass joints.

The following requirements have to be met by a substitute glass as well:

- Gas tight seal (Hermeticity better than 1×10^{-8} mbar*l/s)
- No outgassing
- Mechanically strong bond, Assembly has to pass stringent shock (typ. 1500g acceleration) and vibration testing
- Chemical resistance (No performance change after 1000h 85°C / 85% r. Humidity)
- Hermeticity must maintain unchanged after 15 cycles thermal shock Liquid to liquid
- (-65°C <> 150°C)
- Low Cost (Excludes the usage of metalized windows and metal solder)
- Working temperature less than 500°C
- Mechanical stable up to 260°C

The following results have been achieved:

Glass System	Weaknesses	Positive Findings	Further conclusion
Bi ₂ O ₃	<ul style="list-style-type: none"> Sealing Temperature 550-570°C (dependant on Cap geometry) Optical elements damaged by high sealing temperature Metal surface requirement cannot be met (Damp Heat, Bellcore Spec GR468) 	<ul style="list-style-type: none"> Mechanically good bonding to metal and glass Chemical resistance of solder glass improved compared to PbO 	<ul style="list-style-type: none"> Launch of new project for improved Bi₂O₃ glass with lower sealing temp (see next line)
Bi ₂ O ₃ Next Gen. Glasses	<ul style="list-style-type: none"> Sealing Temperature only reduced to 530-550°C No glass composition identified with lower seal temp. (appr. 50 new glass compositions tested) 	<ul style="list-style-type: none"> See above 	<ul style="list-style-type: none"> No Solution found with Bi₂O₃ system
P ₂ O ₅	<ul style="list-style-type: none"> No bond to suitable metal surfaces Chemical resistance no adequate for Cap application 	<ul style="list-style-type: none"> None 	<ul style="list-style-type: none"> No further activities
SnO ₂ -P ₂ O ₅	<ul style="list-style-type: none"> Environmental Stability not adequate 	<ul style="list-style-type: none"> Sealing Temperature requirement <500°C met Bond between Solder glass and metal achieved 	<ul style="list-style-type: none"> No further activities
Metalized Windows & Metal Solder	<ul style="list-style-type: none"> Metallization process is too costly for this application (costs are about 5-10x too high) Not applicable to all products (i.e. ball lenses) 		<ul style="list-style-type: none"> No further activities

7. Proposed actions to develop possible substitutes

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

After spending 5,5 manyears of research, and thorough testing of available substitute systems, we see no adequate replacement for PbO for this application. Therefore, no substitutes are likely to be developed in the foreseeable future and so the maximum validity period is required for this exemption.

(B) Please elaborate what stages are necessary for establishment of possible substitute and respective timeframe needed for completion of such stages.

Please see 7(A).

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

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

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

- Authorisation
 - SVHG
 - 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:

(B) Elimination/substitution:

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

- Yes. Consequences? _____
- No. Justification: [see chapter 6\(B\)](#)

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

- Yes.
 - Design changes:
 - Other materials:
 - Other substance:

- No. Justification: [see chapter 6\(B\)](#)

3. Give details on the reliability of substitutes (technical data + information):
[not applicable, there are no substitutes](#)

4. Describe environmental assessment of substance from 4.(A)1 and possible substitutes with regard to
- 1) Environmental impacts
 - 2) Health impacts
 - 3) Consumer safety impacts

Substance from 4.(A)1:

There is much evidence that glass is inert and does not pose any danger to human health and environment along the lifecycle. Glass is characterized by a continuous and essentially non-crystalline or vitreous inorganic macromolecular structure, which is highly insoluble and inert.

Substitutes:

Not applicable, there are no substitutes

- ⇒ Do impacts of substitution outweigh benefits thereof?
Please provide third-party verified assessment on this:
not applicable, there is no substitute

(C) Availability of substitutes:

not applicable, there are no substitutes

- a) Describe supply sources for substitutes: _____
- b) Have you encountered problems with the availability? Describe:
- 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?

(D) Socio-economic impact of substitution:

not applicable, there are no substitutes

- ⇒ 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:

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:

[The information above has not to be regarded as proprietary information.](#)