Sensata Technologies
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Almelo, 31 March 2008

Stakeholder Consultation
on the adaptation to scientific and technical progress
under Directive 2002/95EC on the
Restriction of the use of Hazardous Substances in electrical and electronic equipment
(the RoHS Directive)
for the purpose of a possible amendment of the exemption Annex in particular to
the use of lead in glass in electronic components

COMPANY OVERVIEW:
Sensata Technologies is one of the worlds leading suppliers of Sensors, Electrical Protectors and Controls with annual revenue in excess of $1.4B. Our product portfolio is centered around satisfying the worlds growing need for Safety, Energy and a Clean Environmental by providing world class engineered solutions on safety critical applications.
Sensata's Electrical Protection division has been making thermal overload protectors and motor starters for over 70 years under in our trademarked KLIXON® brand of protectors designed specifically as the last line of defense for preventing fires and overheating conditions . Today we are one of the world's largest thermal over-load suppliers, manufacturing over 1 billion protectors annually in every region of the world that go into various household appliances and systems that we all use daily, from simple fans, hairdryers, and washing machines to large industrial HVAC systems.

We offer the following information for your consideration for granting a continuation of the exemption.

Sensata Technologies Holland BV

B. ten Hulscher
Product Legal Services

G. Borghuis
Engineering Manager

Sensata
Technologies

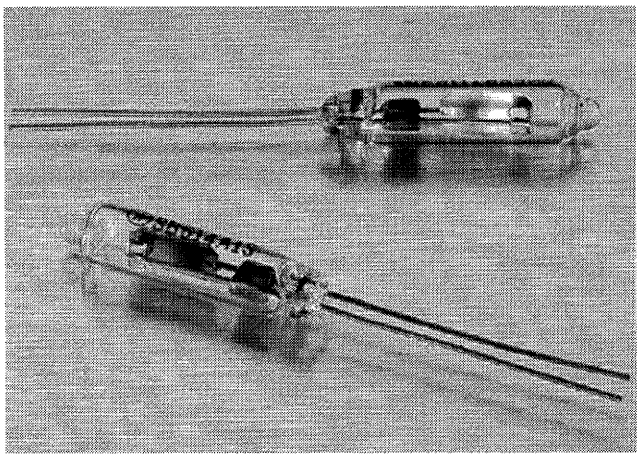
Specific questions exemption 5

"Lead in glass of cathode ray tubes, electronic components and fluorescent tubes"

The following specific questions should be answered in your stakeholder contribution if you support exemption 5 to be continued / amended / discontinued:

1 Please specify in detail the "**electronic components**" in the wording above where lead is used in glass.

Subject components are thermal overload devices used as line break over-temperature and/or over-current safety devices in end-applications such as refrigerators, freezers, lamp-ballast and pumps. These applications are generally unattended and sometimes mounted inaccessibly. They are used as "safety critical" devices, meaning that they are counted on as the "last line of defense" in a system to prevent against catastrophic failure should other failures or extreme operating conditions occur in the applications they are installed in. This type of use requires these thermal overload protectors to provide safe and reliable operation – many times over thousands of line break and line make operating cycles until the defective end application is discovered and corrected. Safety requirements of these end-appliances are specified in EN 60335 and EN 60598 series of standards.
These are hermetically sealed devices for mounting in high temperature, high pressure environments, free from penetrations of fluids and highly flammable refrigerants as used in today's refrigerators and freezers.
For this reason glass is used as the overall housing for sealing and electrical insulation.



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2. Please state the **amount of lead** used per application, the lead content in the homogeneous material, the annual production volume as well as the number of applications put on the EU market annually in applications falling under the scope of RoHS for electronic components.

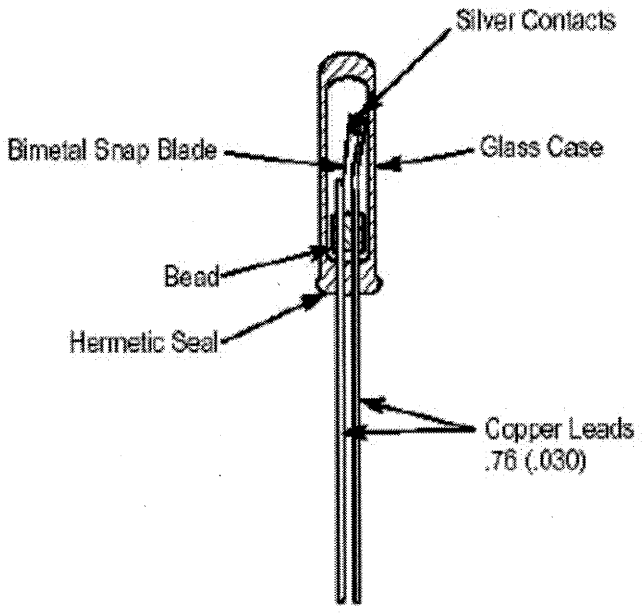
The family consists of two constructional members, Small device SB and Large device SL.

	SB	SL	
Amount of lead	***0,423***	***0,718***	***gram***
lead content in the homogeneous material	***19,87***	***19,87***	***%***
Annual production volume	***10.000.000***	***2.500.000***	***pcs***
number of applications put on the EU market annually	***7.000.000***	***2.000.000***	***pcs***

3. Please provide detailed information about the **specific function** and related performance criteria of lead in glass for electronic components.

Lead in glass has two functions:

- ***It provides for low enough softening points to prevent any negative effects of the already calibrated sub-assembly (bead with bimetal snap blade, contacts and leads). Too high process temperatures will lead to annealing of the bimetal snap blade and consequently loss of calibration influencing performance, safety and reliability.***
- ***To provide hermetic sealing between glass and the electrical conductor leads, the coefficient of expansion of the two materials should be equal or very close. It should be noted here that the ambient temperature range of the device is in the order of 150 to 200 K. A failure in the hermetic sealing can cause the highly flammable refrigerants to penetrate into the product. Together with the arcing during opening and / or closing of an electrical contact system this can cause a catastrophic failure.***



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4 What **technical characteristic**s do substitutes need to fulfill as a minimum requirement?

- ***Need glass with similar softening points***
- ***Similar coefficient of expansion***
- ***Similar mechanical strength***

A combination of the three characteristics shall assure the hermetic sealing between the glass and the electrical conductor leads.

5 Please provide evidence that manufacturers have put effort in **research on alternatives** for lead. What are the alternatives to lead and which ones are (likely to be) used as substitutes? Are there any results about strengths and weaknesses expressed in results relating to (technical) performance criteria?

In 2006 Sensata aquired First Technology (FT), the manufacturer of subject devices. FT started a project about 20 years ago with the aim to ban the lead from the used glass. However suppliers at that time had no interest due to the low volumes. Today Sensata still is depending on the availability of lead-free glass from the glass industry. The amount of glass used by Sensata is so small that it is unthinkable we can be the "teaching customer" for glass suppliers.

6. Are manufacturers still **investigating alternatives**?
a. If yes, please provide a **roadmap** or similar evidence showing until when they intend to replace lead in glass in the applications mentioned above.
b. If no, please explain and justify why no further research has been undertaken against the background that the RoHS Annex is subject to regular revisions.

Today we are actively testing lead-free glass.
The Sensata project is a piggy back with the Luminaire industry where barium-strontium glass is widely tested for use in fluorescent and incandescent lamps.
Testing so far has shown problems with sealing function mechanical strength and cleanness of the lead wires in the seal area. (oxides on wire, air entrapment).

Roadmap is difficult to provide. Assuming the material now under test is adequate, the design has to be optimized, the manufacturing process changed / optimized, agency certification to the applicable standards, customer release and their agency certification done. This would be an estimate of 4 years from now.

7 Assuming the current exemption will be given an **expiry date**, what date do you think is technologically feasible for industry?

Re the above assumption we would need an expiry date of at least July 2012.