To the European Commission
DG Environment, Unit G4 – Consultation Directive 2002/95/EC
B-1049 Brussels, Belgium.

STAKEHOLDER CONSULTATION ON THE ADAPTATION TO SCIENTIFIC AND TECHNICAL PROGRESS UNDER DIRECTIVE 2002/95/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON THE RESTRICTION OF THE USE OF CERTAIN HAZARDOUS SUBSTANCES IN ELECTRICAL AND ELECTRONIC EQUIPMENT FOR THE PURPOSE OF A POSSIBLE AMENDMENT OF THE ANNEX

Statement of the Photo and Optical Industry in Germany

represented by their federations Spectaris, Photoindustrie-Verband e.V. and the European Special Glass Association

Chapter 7 of the Stakeholder Consultation lists the following questions concerning

Lead and cadmium in optical and filter glass

- Do feasible substitutes currently exist in an industrial and/or commercial scale?
- Do any restrictions apply to such substitutes?
- What are the costs and benefits and advantages and disadvantages of such substitutes?

To Question 1:
Do feasible substitutes currently exist in an industrial and/or commercial scale?

Yes, a large number of lead-free glass types is available. They have been developed for the consumer optics market and are widely used there.

To Question 2:
Do any restrictions apply to such substitutes?

Yes, for special optical systems the performance of those substitutes is not sufficient, they work fairly well only with consumer mass products. Therefore lead and cadmium containing glasses are still in use, when special properties of these glasses are needed. This holds especially for optical systems, where highest specifications have to be met, e.g. with professional and industrial optics, scientific and technical research and development, medical equipment, safety and monitoring systems.

To Question 3:
What are the costs and benefits and advantages and disadvantages of such substitutes?

There are some favorable changes like lower density, better chemical resistance, better workability and lower fluorescence. On the other hand especially the lower light transmission in the blue-violet to the ultra-violet range may cause significant problems. Additionally the color dispersion behavior is different. With lead-free glass types quite a lot of special optical functions may be realized only with significantly lower performance.

- For more details please see below

Generally intelligible, brief technical explanation of the prohibition of lead and cadmium

The prohibited substances cited by the directive include lead and cadmium. If this prohibition also covers optical glass (including optical glass fibres made of it) and filter glass, this would have unforeseeable consequences for the entire field of optical technologies. The use of lead and cadmium for optical glass and filter glass is required whenever specific properties and quality standards must be achieved. The fields of application are extremely varied and crucial for the function of the devices concerned. This also and most particularly affects the branches of industry, which utilize these technologies in production and quality monitoring. Further areas affected include the entire photo industry with its high-grade lenses and systems, but also science, research and healthcare.

We therefore request the exemption of lead and cadmium in optical glass and filter glass (including optical glass fibres) from the requirements of the RoHS directive.

Lead and cadmium are functionally essential constituents of the glass compound, which cannot be replaced for some important applications:

- Excellent optical properties (high resolution, colour neutrality, high contrast)
- High refractive index combined with good blue, violet and UV transmission and/or special dispersion properties of glass for colour correction
- Special wavelength transmission properties (filter effect)
- Radiation protection glass/ X-ray protection glass provides its shielding effect only due to its lead content. Only the use of lead can guarantee high absorption values.
- Lead improves the conductivity of optical components. This reduces thermal lensing an guaranties stable optical behaviour
- Lead is inert to the environment if it is chemically bound to a glass matrix

Optical glass and coloured glass are contained in an overwhelming number of technical systems and products. In terms of value and weight, these glass types are only of minor importance; their proportion ranges in tenths of a percent. Nevertheless, they are key elements without which the systems concerned would only function at a substantially reduced quality level, if indeed at all. The possibilities of technological and economic advancement in Europe are based to a large extent on these high-technology materials. Their availability or non-availability has a leverage effect that can hardly be overrated.

Example cases (devices, categories)

The prohibition of colour filter glass containing cadmium or lead would have disastrous consequences. Glass filters are produced in many different versions and with maximum optical quality for a diverse spectrum of applications. Prohibition would mean that green, yellow, orange and red filter glass as well as various blue types could no longer be produced. The fields of use of the filters include, for example:

- General photography and photographic art: correction filters
- Aerial photography: IR filters are absolutely vital for the visualization of environmental damages
- Criminology: verification of art forgery
- TV and video technology
- Industrial image processing such as digital and scanning technologies, process monitoring and quality assurance. Red filters /IR filters and to a certain extent UV filters are indispensable for the operation of advanced image processing systems for a wide range of applications. Only the use of suitable filters can guarantee the quality standard required.
- Photo scanners: a UV/IR blocking filter containing cadmium is required in the optical system of these scanners.
- Traffic monitoring/ traffic radar units: the famous red filter for speed checks

- Road toll systems: The sensor systems for the upcoming truck toll in Germany contain IR filters.
- Safety technology / laser technology / LED illumination technology: they use IR glass.
- Cheque readers, automatic letter sorting systems / parcel readers: different types of colour filter glass are used here to enhance contrast and improve readability.
- Environmental technology / waste separation: different types of colour filter glass affected by the directive are used here e.g. for the recognition of specific recyclable, non-degradable and residual materials.

The prohibition of lead-containing optical glass would mean that products whose optical properties must meet crucial requirements could no longer be manufactured. Optical systems of low or medium quality are not sufficient for use in professional and industrial applications. Major fields of use include:
Professional lenses for 35-mm cameras

- Lenses for medium and large formats
- Objective lenses for movie projection
- Optical systems of photo lab equipment (minilabs/large-scale lab equipment: image setters and scanners)
- Imaging optics of image setters for printing plates and film in the graphical area
- Binoculars (electronically stabilized; night vision scopes)
- Projection equipment (beamers)
- Temperature-compensated objective lenses
- Scanners
- Professional TV and cine cameras, camcorders
- Objective lenses and optical fibres for traffic control systems
- Objective lenses and optical fibres for industrial image processing
- Light guides made of optical glass for illumination systems
- Microlithography: e.g. manufacturing of wafer exposure and projection systems
- Light microscopy devices and systems: micro system technology, nano technology, biotechnology

- Category 8 – Medical devices
    - Surgical microscopes, light and laser scanning microscopes,
    - Ophthalmic instruments,
    - Objective lenses for X-ray amplifiers, electron microscopes,
    - Optical glass for use in the near UV region (e.g. genetic analysis),
    - Optical glass fibres for image, light and data transmission, e.g. in medical endoscopy (diagnosis and therapy systems),
    - Lasers and laser systems for surgery and minimally invasive surgery,
    - Laboratory and analytical instruments for medical / research laboratories.

- Category 9 – Monitoring and control instruments
    - Microscopes, laboratory and analytical instruments, laser systems for production monitoring and control / quality assurance e.g. in the food industry, automotive industry, chemical and pharmaceutical industries, in mechanical engineering and, of course, in environmental protection.
    - Optical glass fibres in technical endoscopes, e.g. for jet engine and motor inspection.

In many cases – e.g. in conjunction with surgical microscopes, medical and technical endoscopes – video cameras or camera systems with special optics are used (support of the surgeon, documentation, analysis).

Lead is contained as an oxide in optical glass. It provides technological properties such as a high refractive index combined with good transmission and low stress birefringence and the absorption of X-ray radiation.

Filter glass containing Cd is used, for example, in microscopes to create various illumination and imaging modes. Banning these glass types would have drastic consequences for, e.g. semiconductor production, the entire spectrum of material examinations, biotechnology and the various applications in the field of healthcare.

In life science the fluorescence microscopy with multi wavelength is used to fight cancer and other deceases. For the optical excitation of a sample UV light is used. Highly transmitting UV optics contains lead for the beam shaping of the radiation. The scientific progress of fighting cancer depends on the availability of lead in glass.

Alternatives

According to current knowledge in glass technology, there is currently no full-fledged substitute for the use of optical and filter glass containing lead and cadmium due to the high standards required in technology, medicine and science. High optical quality is absolutely vital to meet professional and industrial requirements.

Due to the complexity of the properties and applications involved, a clear-cut delimitation of glass types containing heavy metal is not feasible, nor is it possible to address the problem on a case-to-case basis. In addition, this approach would obstruct technological progress, as every modification and new application would entail a new approval procedure for an exemption.

During the 90s, the production of less advanced consumer goods such as cameras, camcorders and binoculars was switched to the use of lead-free glass. As soon as crucial demands are involved, however, lead and cadmium remain indispensable (e.g. in beamers for image and data transmission, TV cameras, professional cameras).

It is the industry's interest that the use of heavy metals should be reduced to the technologically feasible minimum. This has largely been achieved in the sector of consumer products. However, technological limits undeniably exist in this area and cannot be exceeded. Otherwise, the competence and competitiveness of the entire industry and of subsequent industrial sectors, which use its products would be jeopardized. This would have immense impacts on the economy as a whole, which cannot be the intention. The quality of consumer products is not sufficient for use in professional and industrial applications.

Spectrum of manufacturers

Importance of the topic for the industry

The consequences of the prohibition for the Optical Industry would be disastrous. Approx. 50% of all products offered could no longer be manufactured with the present quality standard, if indeed at all.
Optical technologies constitute a cross-section technology whose products are increasingly used in a wide variety of other areas, as previously mentioned.

Distribution of manufacturers in Germany, EU, non-EU countries

Devices and instrument containing optical systems/filters are produced in Germany by approx. 900 companies with a workforce of just under 100,000. Sales in 2002 totalled approx € 11 bn, with domestic sales accounting for approx. € 5 bn and export for approx. € 6 bn. Other countries besides Germany primarily affected in the EU are France, Italy and UK. Outside the EU, the leading vendors are currently the US and Japan. China is catching up at an enormous speed and is now also offering high-grade optics. A similar development can be anticipated for Russia in the medium term.

It should be stressed once again: Apart from the Optical Industries, the sectors particularly affected are all those using the optical devices and instruments concerned – and the consequences here are in no way foreseeable. About 14 % of the industrial employment in Europe depends on Optical Technologies. They are a key technology to withstand the global competition.

Environmental relevance

Optical glass and filter glass present no hazard whatsoever to instrument users and consumers, as the lead and cadmium elements are firmly incorporated in the glass matrix in the form of oxides and do not constitute any toxic potential. In addition, the lenses placed on the market have been surface-coated and antireflection-coated using layers of extremely hard to- dissolve, strongly adhesive oxidic or fluorous compounds. This means that the user cannot possibly get into contact with the actual glass matrix.

The majority of the products concerned are high-grade, durable industrial goods with an average service life of 10 to 20 years. The warranty periods are specified accordingly, i.e. the manufacturer must guarantee replacement featuring the same optical quality standard for this duration.

Quantities involved: How much heavy metal is used for the applications concerned?
Approx. 250 tons of lead-containing optical glass with a lead oxide content of approx. 140 tons were processed in 2002 in the EU. The use of cadmium-containing filter glass totalled in the EU approx. 8 tons, the cadmium quantity being approx. 80 kg.

What are the anticipated volumes in the RoHS area of application? (Rough estimate)
This question cannot be answered, as the products using the glass types concerned are sold not only within EU territory, but are also exported to other countries. No information is available about any relevant imports to the EU. It can be assumed, however, that there will be no major variations in the delivery quantities specified above, as imports and exports will compensate each other.

Are there any other environmentally relevant impacts?
No, since there is no emission of lead and cadmium.

Measures taken by the industry to date to prepare for the implementation of the RoHS requirements research

The Optical Industry has always been spending substantially higher amounts on R&D than the other industries in the manufacturing sector. In 2002, R&D expenditure was as high as 9.5% of total revenue, while an average of approx. 5% was spent in the manufacturing sector in general. For advanced technical solutions and for the design of optical systems in the field of e.g. Biophotonics, Nanotechnology, Ultra Short Pulsed Lasers etc. it is important, to have as much different optical materials as possible.

Support by industrial associations

SPECTARIS
German Industrial Association for Optical, Medical and Mechatronical Technologies,
Kirchweg 2, 50858 Köln, Germany
Contact: Marcus Wenzel, phone: +49 (0) 221 - 94 86 28-30,
e-mail: wenzel@spectaris.de
Internet: www.spectaris.de

Photoindustrie-Verband e.V.
German Photographic Industry Association, Karlstraße 19-21, 60329 Frankfurt/Main, Germany.
Contact: Bernd Berressem, phone: + 49 (0) 69 - 25 56 1410,
e-mail: bernd.berressem@photo.vci.de
Internet: www.photoindustrie-verband.de

ESGA
European Special Glass Association, 89 avenue Louise, B-1050 Brussels, Belgium Phone +32-2-5384446
Contact : Dr. R. Schumacher, Chairman, Phone +322-2-7193830,
e-mail: reiner.schumacher@schott.com

Cologne, 2004-06-30

ESGA **European Special Glass Association** SPECTARIS Photoindustrie-Verband e.V.