

Adaption to scientific and technical progress under Directive 2002/95/EC

Results previous evaluation
Exemption No. 22

“Lead as impurity in RIG (rare earth iron
garnet) Faraday rotators used for fibre
optic communications systems”

(Excerpt from Öko-Institut Report 2007;
Annex 1 Monthly Report 6)

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Therefore, the exemption request is too poorly justified: it is neither clear what efforts have been made to replace the two devices in question nor justified why a early redesign of the application was not be feasible.

5.2.3 Draft final recommendation

Considering the above-mentioned arguments and the evaluation results, the recommendation would be not to grant an exemption since a redesign is feasible and the applicant could not prove why redesign could not be in place by 1 July 2006.

Nevertheless, the question remains whether due to the kind of application an exemption is necessary at all, since it is probably that the application can be categorised as a “fixed installation”. Furthermore, the attention is drawn to the fact that this exemption request belongs to the lot of the so-called LTB requests and that an evaluation sticking closely to Article 5 (1) (b) does not seem to be adequate: In this particular case the relatively small amounts of lead involved and the need to scrap remaining components in case an exemption is not granted lead to the conclusion that – from a general environmental point of view – an exemption seems to be recommendable; though this argumentation is not in line with Article 5 (1) (b).

5.3 Request to delete exemption for "Lead as impurity in RIG (rare earth iron garnet) Faraday rotators used for fibre optic communications systems" – Integrated Photonics (set 6 request no. 21)

5.3.1 Description of the request to revoke and existing exemption

As part of the Commission decision of 12 October 2006 the Annex to the RoHS Directive was amended for “Lead as impurity in RIG (rare earth iron garnet) Faraday rotators used for fibre optic communication systems.” The amendment was based on a request for exemption brought forward by JEITA (Japan Electronics & Information Technology Industries Association) on behalf of NEC Corporation and Murata Manufacturing Co., Ltd and SUMITOMO METAL MINING CO., LTD. (see monthly report 3 section 5.15 and update of 21 June 2006).

The function of optical isolators consists in the reduction of reflection noise in several optic communication systems (transceiver, transmitter and receiver, optical amplifier). For this purpose rare earth iron garnet (RIG) are used because of their magneto-optical effect.

The garnet crystal is grown by the so called LPE (liquid phase epitaxial) method which uses lead oxide as flux material. In doing so lead is slightly included in the crystal as an impurity.

The total annual quantity of RIG used for optical isolators in the EU is specified to be 6.000 g. Starting from a typical Pb content of 0,3 to 1,0 % the total amount of Pb in this application accounts for less then 100 g per year. According to JEITA in a dissolution test using Dutch

serial batch test Pb has not been detected. It is thus not expected that there are traceable impacts on the environment when entering the waste stream.

In November 2005 Öko-Institut received first references of garnet Faraday rotators equivalent to those described in the request for exemption. According to the manufacturer of these products (Integrated Photonics, Inc.) all of the bismuth rare-earth iron garnet Faraday rotator products have been third party certified to be compliant to all RoHS requirements and, in particular, all have less than 1000 wt. ppm of lead.

In the context of the last stakeholder consultation which closed in January 2007, Integrated Photonics, Inc. (IPI) now requests to revoke the existing exemption.

5.3.2 Summary of justification for revoking an existing exemption

IPI provides detailed data and information in order to support the requested revoke of the exemption. Data and information span the following considerations:

- Background and cause for developing RoHS compliant RIG Faraday rotators
- Technical and scientific feasibility
- Production capacity
- Qualification time
- Testing method accuracy
- Environmental burden
- Impact of the existing exemption on innovation

The applicant argues substantially that he had been able for five years producing and delivering Faraday rotators that meet the RoHS Maximum Concentration Limits. An independent testing laboratory confirms both, the accuracy of the testing method as well as the results of the tests. Furthermore, an extensive programme of methods development, methods comparison, methods calibration and methods validation had been undertaken in order to assure that lead levels can be accurately determined.

The applicant claims to be well capable of addressing the EU and worldwide market need for RoHS compliant Faraday rotators without any exemption. IPI were already a qualified vendor of Faraday rotators to numerous isolator suppliers.

IPI's Faraday rotator garnets were essentially identical in form, fit, function, chemical, mechanical and structural properties to non-compliant Faraday rotators being replaced. Against this background the applicant argues that a change of such a nearly identical component typically only requires qualification at the first level of device manufacture.

In the stakeholder consultation some comments were received in order to support the existing exemption¹. The main arguments are as follows:

- System vendors are dependent on a supply chain to provide optical modules. Typically this supply chain consists of (1) Vendors of lead free garnets, (2) Vendors of isolators (with or without fiber), (3) vendors of laser diodes, (4) vendors of optical subsystems, (5) system vendors putting telecommunication network equipment systems on the market. Against this background exchanging the subsystem of one vendor by that of another would generally require time consuming design changes and testing regimes. The system vendors would be dependent on their supply chain to provide optical modules using alternate garnet technologies which are fully tested to meet all functional, quality and long term reliability requirements of fiber optic communication systems. The specific structure of the supply chain would require “a long time due to ordering and testing / qualification of engineering samples which has to take place on each level of integration starting on the garnet level and subsequently processing to the system vendor level.” System vendors would not be in a position to assess the feasibility of substitutes further up in the supply chain and currently there were no feasible substitutes on the optical module-level containing RIG faraday rotators with less than 1000 ppm Pb available. The time-span necessary to qualify low-Pb substitutes would require 27 to 36 months.
- Another stakeholder requests further analysis of the request on revoking the current exemption with respect to aspects of competitiveness, referring to extended evaluation done within impact assessments of EU legislation. However, such an extended analysis goes far beyond the framework of this service contract.

Taking into account both, the application to revoke the existing exemption as well as the stakeholder comments mentioned above, the following conclusions can be drawn:

- As pointed out already in the final report “This exemption request does not represent an application which has a significant environmental impact. The lead content in the RIG Faraday rotator is very low and the probability that it will enter the environment is very low too. Thus, this exemption requests rather relates to the question of the rapidity of technological innovation in a very complex supply chain.”
- However, evaluation should stick closely to criteria of Article 5 (1) (b) in order not to undermine the original intention of the Directive with regard to technological innovation.
- It is not clear to Öko-Institut why the corresponding tests in the supply chain could not be done in parallel in order to gain time and to ensure deliverability along the chain.

¹ NEC Europe on behalf of 9 system vendors putting telecommunication network equipment systems on the EU market and direct suppliers to system vendors; Intel Optical Platform Division

- Furthermore, the applicant's argument is comprehensible that a change of such a nearly identical component typically only requires qualification at the first level of device manufacture.

5.3.3 Draft final recommendation

Against the above mentioned background and with regard to the criteria given in Article 5 (1) (b) the existing exemption for "Lead as impurity in RIG (rare earth iron garnet) Faraday rotators used for fibre optic communications systems" should be revoked. Also taking into account that the environmental impact of granting or not granting the exemption request is negligible the existing exemption should be revoked in order to support innovation and to promote early efforts for substitution.

5.4 Explanation concerning set 1 request no. 16, set 2 request no. 9 and set 4 request no. 15 (former contract)

During the last contract with the Commission on the revision of RoHS exemption requests, the Öko-Institut has reviewed three requests referring to the same area of application (i.e. the use of lead in certain lamps):

1. Mercury free flat panel lamps – Osram (set 1 request no. 16)
2. PbO (Lead in Seal Frit) used for making BLU (Back Light Unit Lamp) for LCD televisions – Samsung (set 2 request no. 9)
3. Mercury free flat panel lamps – Osram (set 4 request no. 15)

In a first step a recommendation was given in monthly report 4 with regard to the first two requests on granting an exemption with the following wording: "Lead oxide in glass used for bonding front and rear glass substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCD)."

This wording was adopted in the further process and incorporated into the RoHS Annex as entry no. 20.

Since Osram had initially intended to get an exemption for any kind of application for its mercury free flat panel lamps, it put forward the third request mentioned above. The Öko-Institut reviewed the request and gave the recommendation to grant the exemption with the following wording: "Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting)".

The Commission has now informally consulted Member States on taking over this proposed wording for a replacement of exemption no. 20 of the RoHS Annex. This was not the intention of Öko-Institut when giving its recommendation with regard to set 4 request no. 15. The intention had been to add a new exemption to the Annex explicitly referring to mercury free flat fluorescent lamps in diverse applications (not only LCDs).