

## Questionnaire Exemption Request No. 10

**“Lead in solders used on PCBs for mounting cadmium telluride and cadmium zinc telluride digital array detectors”**

### Background

The Öko-Institut together with Fraunhofer IZM has been appointed for the technical assistance in reviewing the requests for exemptions from the requirements of the RoHS Directive 2011/85/EU (RoHS II) by the European Commission. You have submitted the above mentioned request for exemption which has been subject to a first completeness and understandability check.

As a result we have identified that there is some information missing and a few questions to clarify before we can proceed with the online consultation on your request. Therefore we kindly ask you to reformulate your request taking the following points into consideration.

### Questions

1. Please provide more substantiated data on the amounts of lead used in this exemption:
  - a) Which types of equipment would use this exemption (CT, PET, ...)?

CT is probably the only equipment that will use this exemption initially although it could potentially also be used for other imaging technologies such as PET and SPECT. Although the intention is not to use any lead solder, at present the reliability requirement may force companies to do so.
  - b) How much solder/lead per detector?

0.2g Pb in each detector module could be estimated.
  - c) How many detectors per equipment?

There are total 57 modules in each system, so the total Pb weight in each system will be 11.4g.
  - d) How many of such devices are sold annually worldwide and in the EU?

COCIR estimates 500 systems worldwide and 100 units in EU.
  - e) How much lead would be used in this exemption in equipment put on the market in Europe and worldwide?

The used Pb will amount to 5700g (5.7kg) worldwide and 1140g (1.14 kg) in EU annually.

2. Which solder is used? Only SnPb37 solder, or other lead solders as well?

Sn63Pb37 solder will be used

3. In section 4.1 of your exemption request you put forward that tests with lead-free solders have shown bad results.

a) Please provide the tests and the results.

The tests referred to in the dossier compare assembly of CZT onto PCBs. These tests showed the yield difference explained in the dossier (page 4). There are no records of specific long term reliability testing yet with CZT, but there is a reasonable confidence that the lead solder will result in much better reliability for the modules based on the research described in the dossier.

b) Were the tests conducted with adapted and optimized material selection and process design for lead-free soldering?

Yes

4. Which CTE-adapted material choices are available for the substrates onto which the CTZ detectors are soldered?

The CTE matching material for the substrate is alumina ceramic or other ceramic material.

5. You state that CZT replaces silicon digital detectors because of its superior sensitivity to radiation.

a) Please provide examples of doses in CT using silicon digital detectors compared to CZT detectors for some specific examinations.

b) Please provide example doses for radioisotope administrations using silicon and CZT sensors.

For CT product, CZT replaces the current sensor including both scintillator and silicon photodiode. In this case a dose reduction of 50% can be expected due to much better detection efficiency and lower electronic noise.