Questionnaire 1 (Clarification) for Renewal of Exemption 9 of Annex IV

Table 1: Currently valid wording of the exemption

No.	Current exemption wording	Current scope and dates of applicability
IV-9	Cadmium in helium-cadmium lasers	Applies to categories 8 and 9. Expires on - 21 July 2021 for category 8 other than in-vitro diagnostic medical devices and for category 9 other than industrial monitoring and control instruments. - 21 July 2023 for category 9 in-vitro diagnostic medical devices. - 21 July 2024 for category 9 industrial monitoring and control instruments.

Acronyms and Definitions

Cat.	Category, referring to the categories of EEE specified in Annex I of the current RoHS Directive 2011/65/EU
Cd	Cadmium
COM	European Commission
Cadmium-free	Not containing cadmium in the applications in scope of the exemption to be reviewed
DPSS	Diode pumped solid state, used with lasers (DPSS lasers)
EEA	European Economic Area (EU 27 + Iceland, Liechtenstein and Norway)
EEE	Electrical and electronic equipment
EU	European Union
He	Helium
IMCI	Industrial monitoring and control instrument

1. Background

Bio Innovation Service, UNITAR and Fraunhofer IZM have been appointed[1] by the European Commission through for the evaluation of applications for the review of requests for new exemptions and the renewal of exemptions currently listed in Annexes III and IV of the RoHS Directive 2011/65/EU.

[1] Implemented through the specific contract 070201/2020/832829/ENV.B.3 under the Framework contract ENV.B.3/FRA/2019/0017

On 19 January 2023, JBCE requested the renewal of the above exemption with the below scope and applicability dates.

Table 2: Requested exemption

No.	*Requested exemption*	*Requested scope and dates of applicability*
IV-9	*Cadmium in helium-cadmium lasers*	*Applies to category 9 monitoring and control instruments.* *Expires on 21 July 2031 (2024 + 7 years)*

As result of a first review we identified that some information is missing. Against this background the questions below are intended to clarify aspects concerning the request at hand.

We ask you to kindly answer the below questions until 30 October 2023 latest.

2. Questions

1. Could you please confirm that Table 2 correctly reflects the requested renewal of the exemption?

   Yes

2. The scope and applicability of the currently valid exemption IV-9 is not specified for cat. 8 and 9. We therefore added the theoretically applicable scope and applicability.

   Is exemption IV-9 required for any other EEE than cat. 9 industrial monitoring and control instruments (IMCIs)?

   Yes

3. You explain in your renewal request that *"Helium cadmium lasers enable wavelengths of 325 nm to be used in Raman spectroscopy measurements. Diode Pump Solid State (DPSS) lasers, as an alternative to helium cadmium lasers, can be used in many applications. However, although DPSS lasers can be used for Raman spectroscopy, at the moment 325 nm DPSS lasers for Raman spectroscopy are not available commercially, due to a lack of stability and precision."*

   a. We understand from your above statement that He-Cd lasers are only required for 325 nm wavelength Raman spectroscopy while DPSS – or

possibly other technologies – can be used for Raman spectroscopy with other wave lengths.

Is this correct?

No, 442nm wavelength is also used for Raman Spectroscopy. However, the main wavelength for Raman Spectrometer is 325nm. 325nm wavelength is used for photoluminescence as well.

It is not only the excitation light sources for Raman spectroscopy, but also it is required the following applications. The 325nm oscillation line of the He-Cd laser is used as an excitation light source for PL (photoluminescence) in GaN manufacturing plants all over the world for material evaluation of GaN materials. And it is also used as a light source for interference.

b. If the statement under a) above is correct, the exemption could be restricted to 325 nm wavelength for use in Raman spectroscopy. The resulting wording would be:
Cadmium in helium-cadmium lasers for Raman spectroscopy with 325 nm wave length".

Please comment.

We recommend the wording "Cadmium in helium-cadmium lasers for Raman spectroscopy and Photoluminescence".

4. What is the spectrum of wave lengths which He-Cd laser can generate?

The He-Cd laser can generate both 325nm and 442nm.

5. Which wave lengths of the above spectrum are used for Raman spectroscopy?

Both 325nm and 442nm are used for Raman spectroscopy and Photoluminescence.

6. Can these different wavelengths be generated with the same laser, or does each He-Cd laser operate at a specific wavelength?

Yes, these different wavelengths be generated with the same laser and He-Cd laser can operate at a specific wavelength.

7. *In your renewal request, you mention that a He-Cd laser manufacturer has been developing diode pump solid state (DPSS) 320 nm band laser that complies with the RoHS Directive. The laser has an oscillation wavelength of 318±1 nm and an output of 100 mW, which is similar to a He-Cd laser so that it is considered an alternative laser for many of the applications that use He-Cd lasers Today the specifications of this laser do not match what is required for Raman spectroscopy, so they are conducting various evaluations to improve the quality of the laser, and they plan to place it on the market in the near future.*

   a. Can you quantify the meaning of "place it on the market in the near future"?

      Several laser manufactures have kept developing stable lasers for Raman spectroscopy. But it is not still realised. If the He-Cd laser could provide an alternative one, the manufactures of Raman Spectrometer has evaluated the quality of Raman Spectroscopy. It needs 7 years or more. An example of timeline is:

      - development of stable lasers, and if successful,
      - re-design of the instruments, reliability test, if successful,
      - evaluation of performance in service,
      - durability test,

   b. Who is the manufacturer of this DPSS laser?

      One of the diode pump solid state (DPSS) 320 nm laser manufactures is Cobolt.

   c. What are the specifications of this laser that do not (yet) match for Raman spectroscopy?

      The long-term stability of the oscillation wavelength and laser power

   d. What are the next steps and timelines to solve these insufficiencies?

      Please see the answer 7 a.

8. *In table 2 of your renewal request you present fluorescence meters and spectrophotometers as viable alternatives to the Raman spectrometry for structure analyses of organic compound materials, and fluorescence meters as an alternative for structure analyses of inorganic compounds.*

   Could the use of He-Cd lasers be restricted to crystal and stress analysis tasks which are the only analyses which can only be performed with Raman spectrometers?

   Yes, Raman and Photoluminescence spectrometers with He-Cd laser can analyse the application for stress measurement and crystallinity measurement of GaN.

9. JBCE supported by JAIMA are the only applicant requesting this exemption.

   a. Are JBCE and JAIMA members the only producers and/or users of such He-Cd lasers?

      Yes

   b. If not, which companies produce/use He-Cd lasers as well?

      Not applicable.

Please note that answers to these questions will be published as part of the evaluation of this exemption request. If your answers contain confidential information, please provide a version that can be made public along with a confidential version in which proprietary information is clearly marked.

We ask you to kindly provide the information in formats that allow copying text, figures and tables so that they can be included into the review report.