



EUROPEAN  
COMMISSION

Brussels, **XXX**  
[...](2017) **XXX** draft

**COMMISSION DELEGATED DIRECTIVE (EU) .../...**

**of **XXX****

**amending, for the purposes of adapting to scientific and technical progress, Annex III to  
Directive 2011/65/EU of the European Parliament and of the Council as regards an  
exemption for cadmium in colour converting light-emitting diodes (LEDs) for use in  
display systems**

(Text with EEA relevance)

## **EXPLANATORY MEMORANDUM**

### **1. CONTEXT OF THE DELEGATED ACT**

This Commission Delegated Directive amends, for the purpose of adapting to technical progress, Annex III of Directive 2011/65/EU of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment (recast)<sup>1</sup> (RoHS 2) as regards an exemption for specific applications containing cadmium.

RoHS 2 restricts the use of certain hazardous substances in electrical and electronic equipment, as provided for in its Article 4. It entered into force on 21 July 2011.

The restricted substances are listed in Annex II to RoHS 2; while the restrictions of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, and polybrominated diphenyl ethers are in force, the restrictions of bis(2-ethylhexyl) phthalate (DEHP), butyl benzyl phthalate (BBP), dibutyl phthalate (DBP), diisobutyl phthalate (DIBP) shall apply from 22 July 2019. Annexes III and IV to RoHS 2 list the materials and components of electrical and electronic equipment (EEE) for specific applications exempted from the substance restriction of RoHS 2 Article 4(1).

Article 5 makes provision for the adaptation to scientific and technical progress (inclusion, renewal, amendments and revoking of exemptions) of Annexes III and IV. Pursuant to Article 5(1)(a), exemptions are to be included in Annexes III and IV only if such inclusion does not weaken the environmental and health protection afforded by Regulation (EC) No 1907/2006<sup>2</sup> and where any of the following conditions is fulfilled: their elimination or substitution via design changes or materials and components which do not require any of the materials or substances listed in Annex II is scientifically or technically impracticable; the reliability of substitutes is not ensured; or the total negative environmental, health and consumer safety impacts caused by substitution are likely to outweigh the total environmental, health and consumer safety benefits thereof.

Furthermore, Article 5(1) provides that the European Commission (the Commission) shall include materials and components of EEE for specific applications in the lists in Annexes III and IV by means of individual delegated acts in accordance with Article 20. Article 5(3) and Annex V establish the procedure for submitting applications for granting, renewing, or revoking an exemption.

### **2. CONSULTATIONS PRIOR TO THE ADOPTION OF THE ACT**

Since the publication of RoHS 2, the Commission has received numerous<sup>3</sup> requests from economic operators, according to the provisions in Article 5(3) and Annex V, for both granting new and renewing existing exemptions.

The current Annex III exemption 39 permits the use of cadmium in certain colour converting light-emitting diodes (LEDs) for lighting and display applications. The colour converting component in LEDs consists of cadmium containing quantum dots. The Commission received an application for renewal of exemption 39 of Annex III in December 2012 and a related application specifically for cadmium quantum dots in displays in May 2013. The Commission services decided to address both applications in a common assessment. While exemption 39

<sup>1</sup> OJ L 174, 1.7.2011, p. 88.

<sup>2</sup> OJ L 396, 30.12.2006, p. 1

<sup>3</sup> The list is given at: [http://ec.europa.eu/environment/waste/rohs\\_eee/adaptation\\_en.htm](http://ec.europa.eu/environment/waste/rohs_eee/adaptation_en.htm)

had 1 July 2014 as former expiration date, in line with the requirements of the RoHS Directive (Article 5 (5), second subparagraph), it continues to apply until a decision on the renewal application is taken by the Commission.

Following the renewal applications in 2012/2013, the Commission adopted a Delegated Directive in January 2015.<sup>4</sup> However, the European Parliament objected to the Commission's Delegated Directive: in its Resolution<sup>5</sup> of 20 May 2015 the European Parliament mainly based its objection on market developments which had occurred since the Commission's assessment, with certain cadmium-free quantum dot equipment becoming available in March 2015, and called on the Commission to reassess its decision. Consequently, the Commission initiated a new assessment as required by the Directive, with the support of external consultants and involving new stakeholder consultations. The new scientific and technical assessment was finalised in June 2016<sup>6</sup>. A further Member States consultation took place during an expert meeting on 1 and 2 September 2016, which also involved presentations from the applicants and stakeholders most concerned. All necessary steps pursuant to Articles 5(3) to 5(7) have been performed. The Council and the European Parliament were notified of all activities.

Quantum dots are a technology available on the market which, as other competing technologies, is expected to replace older colour converting designs in many applications in the near future. The scientific and technical assessment from June 2016 showed that the use of cadmium-based quantum dots in displays with higher performance in terms of colour gamut has an overall positive environmental impact due to their lower energy consumption compared with indium phosphide alternatives, the main potential substitute technology currently on the market. Therefore, the Commission concluded that the total negative environmental, health and consumer safety impacts caused by substitution of cadmium in quantum dot applications are likely to outweigh the total environmental, health and consumer safety benefits thereof. In light of Article 5(1)(a) third criterion, a specific exemption for the use of cadmium selenide limited to less than 0.2 µg cadmium per mm<sup>2</sup> of screen area for display applications is therefore currently justified. In comparison with the currently applicable exemption, such new exemption is more restrictive: a much lower threshold value is allowed, only the use of cadmium selenide (the inorganic compound actually used in the application concerned) is exempted and the applications are more precisely defined.

The assessment carried out in preparation of the current delegated directive has also shown that, given the rapid technological progress and very dynamic market in this field, indium-phosphide-based applications and, possibly, other emerging technologies may lead to rapid performance enhancement of cadmium-free displays. Based on the above considerations, it is therefore justified to grant a short-termed exemption only, of two years from publication of the Delegated Directive in the Official Journal of the European Union. This short period is the minimum duration possible for a RoHS 2 exemption given the 18-month deadline in RoHS 2 Article 5 for requesting the renewal of an exemption. It is also intended to avoid any adverse impacts on innovation and in particular the further development of equivalent cadmium-free alternatives.

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<sup>4</sup> C(2015) 383 final:

<http://ec.europa.eu/transparency/regdoc/rep/3/2015/EN/3-2015-383-EN-F1-1.PDF>

<sup>5</sup> <http://ec.europa.eu/transparency/regdoc/rep/3/2015/EN/3-2015-383-EN-F1-1-ANNEX-1.PDF>

<sup>6</sup> <http://www.europarl.europa.eu/sides/getDoc.do?pubRef=-//EP//TEXT+TA+P8-TA-2015-0205+0+DOC+XML+V0//EN&language=EN>.

<sup>6</sup> <http://bookshop.europa.eu/en/assistance-to-the-commission-on-technological-socio-economic-and-cost-benefit-assessment-related-to-exemptions-from-the-substance-restrictions-in-electrical-and-electronic-equipment-pbKH0416553/>

Regarding lighting applications, while cadmium-based quantum dots LEDs for illumination (lamps) have been claimed to lead to overall performance improvement in related lighting technology, they are not available on the market yet. Hence, the so far existing exemption has in this respect not found an application in practice. Theoretical and not properly quantifiable advantages in specific applications claimed to be offered by cadmium-based prototype lamps do not justify a renewal of the exemption as regards general illumination applications, also in view of the rapid efficiency progress being made by lamps in the last years. Overall, reliable substitutes exist and there is not sufficient evidence enabling a comparison of the environmental, health and consumer safety impacts of cadmium-based illumination applications and existing alternatives. Thus, in the light of the three criteria in Article 5(1)(a), it has not been demonstrated that an exemption is justified as regards illumination applications. These are therefore not included in the Delegated Directive. Nonetheless, it is always possible to submit a request for exemption in the future when information is available for applicants to demonstrate that cadmium-based specific illumination applications have benefits over other light source alternatives, so to meet one of the criteria for RoHS exemptions.

### **3. LEGAL ELEMENTS OF THE DELEGATED ACT**

The Delegated Directive grants an exemption from the restrictions in Article 4(1), to be listed in Annex III of Directive 2011/65/EU, for the use of cadmium in specific applications.

The instrument is a Delegated Directive, as provided for by Directive 2011/65/EU, and in particular meeting the relevant requirements of Article 5(1)(a) thereof.

The objective of the Delegated Directive is to contribute to the protection of human health and the environment and approximate related provisions to ensure the functioning of the internal market in the field of electrical and electronic equipment. This is done by allowing the use of otherwise banned substances for specific applications, in line with the provisions and under the conditions of RoHS 2 and the therein established procedure for the adaptation of the Annexes III and IV to scientific and technical progress.

In accordance with the principle of proportionality, the measure does not go beyond what is necessary to achieve its objective.

The proposal has no implications for the EU budget.

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**amending, for the purposes of adapting to scientific and technical progress, Annex III to Directive 2011/65/EU of the European Parliament and of the Council as regards an exemption for cadmium in colour converting light-emitting diodes (LEDs) for use in display systems**

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2011/65/EU of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment<sup>7</sup>, and in particular Article 5(1)(a) thereof,

Whereas:

- (1) Directive 2011/65/EU requires Member States to ensure that electrical and electronic equipment placed on the market does not contain cadmium.
- (2) Point 39 in Annex III to Directive 2011/65/EU exempted the use of cadmium in colour converting light-emitting diodes (LEDs) for illumination and display applications from the prohibition until 1 July 2014. The Commission received an application for renewal of this exemption before 1 January 2013, in accordance with Article 5(5) of Directive 2011/65/EU.
- (3) Colour converting LEDs using quantum dots have been shown advantageous as compared to earlier technology regarding energy efficiency and colour performance. The overall balance of the use of cadmium-based quantum dots in displays has a positive impact due to their lower energy consumption as compared to currently available alternative technologies. The total negative environmental, health and consumer safety impacts caused by substitution of cadmium-based quantum dots in display applications where quantum dots are used are likely to outweigh the total environmental, health and consumer safety benefits thereof.
- (4) The use of cadmium selenide in downshifting cadmium-based semiconductor nanocrystal quantum dots for use in display lighting applications should therefore be exempted from the prohibition for the period of two years after the publication of the Delegated Directive in the Official Journal of the European Union. This short validity period for the exemption is unlikely to have adverse impacts on innovation and the development of cadmium free alternatives.
- (5) Cadmium-based quantum dot LEDs for illumination are not yet available on the market and their potential advantages in comparison with existing technologies are not properly quantifiable, thus a renewal of the exemption as regards illumination applications is not justified.

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<sup>7</sup> OJ L 174, 1.7.2011, p. 88.

(6) Annex III to Directive 2011/65/EU should therefore be amended accordingly,

HAS ADOPTED THIS DIRECTIVE:

#### *Article 1*

Annex III to Directive 2011/65/EU is amended as set out in the Annex to this Directive.

#### *Article 2*

1. Member States shall adopt and publish, by [12 months after the date of entry into force of this directive] at the latest, the laws, regulations and administrative provisions necessary to comply with this Directive. They shall forthwith communicate to the Commission the text of those provisions.

They shall apply those provisions from [12 months after the date of entry into force of this directive + 1 day].

When Member States adopt those provisions, they shall contain a reference to this Directive or be accompanied by such a reference on the occasion of their official publication. Member States shall determine how such reference is to be made.

2. Member States shall communicate to the Commission the text of the main provisions of national law which they adopt in the field covered by this Directive.

#### *Article 3*

This Directive shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

#### *Article 4*

This Directive is addressed to the Member States.

Done at Brussels,

*For the Commission*  
*The President*  
[...]



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ANNEX 1

## ANNEX

to

### Commission Delegated Directive

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## ANNEX

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### Commission Delegated Directive

**amending, for the purposes of adapting to scientific and technical progress, Annex III to Directive 2011/65/EU of the European Parliament and of the Council as regards an exemption for cadmium in colour converting light-emitting diodes (LEDs) for use in display systems**

In Annex III to Directive 2011/65/EU, point 39 is replaced by the following:

"39	Cadmium selenide in downshifting cadmium-based semiconductor nanocrystal quantum dots for use in display lighting applications ( $< 0.2 \mu\text{g Cd per mm}^2$ of display screen area)	Expires for all categories on <a href="#">[two years after the publication of the Delegated Directive in the Official Journal]</a> "
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