

# 检测报告

## Test Report

编号: EDG2404010118C00201R

日期: 2024 年 04 月 09 日

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委托单位 : 深圳拓竹科技有限公司  
Applicant : Shenzhen Tuozhu Technology Co., Ltd.  
地址 : 深圳市前海深港合作区前湾一路 1 号 A 栋 201 室  
Address : Room 201, Building A, No. 1 First Qianwan Road, Qianhai Shengang  
Cooperation Zone, Shenzhen

样品名称 : PETG HF  
Sample Name : 3D 打印线材  
型号 : G02-xx  
Style/Item No. : G02-xx

接收日期 : 2024 年 04 月 01 日  
Received Date : Apr. 01, 2024  
检测日期 : 2024 年 04 月 01 日 ~ 2024 年 04 月 09 日  
Test Period : Apr. 01, 2024 ~ Apr. 09, 2024

测试要求 : 根据客户要求, 对送测样品进行关于在电子电器产品中限制使用某些有害物质的欧盟指令 2011/65/EU 附件 II 及其修订指令 (EU) 2015/863 的符合性评估。  
Test Requested : As requested by the client, to evaluate the compliance of the submitted sample with EU RoHS Directive 2011/65/EU Annex II and its amendment (EU) 2015/863 on the restriction of the use of certain hazardous substances in electrical and electronic equipment.

测试方法 : 1. 对客户所提交的样品及其相关材料清单进行检查、评估。  
Test Method : Review was performed for the sample and the related Bill of Materials submitted by the Applicant.  
2. a) 参照 IEC 62321-3-1:2013: X 射线荧光扫描筛选测试。  
Refer to the standard IEC 62321-3-1:2013: Screening by XRF Spectroscopy.  
b) 湿化学测试  
Wet chemical test  
1) 参照 IEC 62321-5:2013, 测试铅和镉, 分析仪器为 ICP-OES;  
Refer to IEC 62321-5:2013, determine the Cadmium, Lead content by ICP-OES.  
2) 参照 IEC 62321-4:2013+A1:2017, 测试汞, 分析仪器为 ICP-OES;  
Refer to IEC 62321-4:2013+A1:2017, determine the Mercury content by ICP-OES.  
3) 参照 IEC 62321-7-1:2015 & IEC 62321-7-2:2017, 测试六价铬, 分析仪器为 UV-VIS;

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Refer to IEC 62321-7-1:2015 & IEC 62321-7-2:2017, determine the Hexavalent Chromium content by UV-VIS.

4) 参照 IEC 62321-6:2015, 测试多溴联苯和多溴联苯醚, 分析仪器为 GC-MS:  
Refer to IEC 62321-6:2015, determine the Polybrominated Biphenyls and Polybrominated Diphenyl Ethers by GC-MS.

5) 参照 IEC 62321-8:2017, 测试邻苯二甲酸二丁酯 (DBP), 邻苯二甲酸丁苄酯 (BBP), 邻苯二甲酸二(2-乙基己基)酯(DEHP)和邻苯二甲酸二异丁酯 (DIBP), 分析仪器为 GC-MS.

Refer to IEC 62321-8:2017, determine the Dibutyl phthalate(DBP), Benzylbutyl phthalate(BBP), Di-2-ethylhexyl phthalate(DEHP) and Diisobutyl phthalate(DIBP) by GC-MS.

测试结果 : 请参见下一页。  
Test Results : Please refer to next page(s).

### 执行测试总结: Executive Summary:

基于所提交样品中均质材料的测试结果, 所提交样品符合欧盟 RoHS 指令 2011/65/EU 附件 II 及其修订指令(EU) 2015/863 中的要求。

Basing on the test results obtained from the homogenous materials, the submitted sample **COMPLIES** with the EU RoHS Directive 2011/65/EU Annex II and its amendment (EU) 2015/863.

谨代表

Signed for and on behalf of  
东莞市信测科技有限公司  
EMTEK (Dongguan) Co., Ltd.

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### 测试结果:

### Test Results:

#### 1. Pb, Cd, Hg, Cr<sup>6+</sup>, PBBs, PBDEs 测试结果:

#### Pb, Cd, Hg, Cr<sup>6+</sup>, PBBs, PBDEs Test Results:

序号 No.	样品描述 Sample description	受限物质 Restricted substances	分析元素 Analytical element	荧光扫描 结果 <sup>(1)</sup> Results of EDXRF <sup>(1)</sup>	湿化学测试结 果 <sup>(2)</sup> (mg/kg) Results of Chemical Testing <sup>(2)</sup> (mg/kg)	结论 Conclusion	备注 Remark
1	橙色硬塑料 Orange hard plastic	Pb	Pb	BL	NA	合格 Pass	无 No comment
		Cd	Cd	BL			
		Hg	Hg	BL			
		Cr <sup>6+</sup>	Cr	BL			
		PBBs	Br	BL			
		PBDEs					

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### 测试结果:

### Test Results:

#### 2. 邻苯二甲酸酯 (DEHP, DBP, BBP, DIBP) 测试结果:

#### Phthalates (DBP, BBP, DEHP, DIBP) Test Results:

测试项目	测试结果 (mg/kg)	MDL (mg/kg)	要求(mg/kg) Requirement (mg/kg)
	Test Result (mg/kg)		
	1		
邻苯二甲酸二丁酯 (DBP) Dibutyl phthalate(DBP)	ND	30	1000
邻苯二甲酸丁苄酯 (BBP) Benzylbutyl phthalate(BBP)	ND	30	1000
邻苯二甲酸二(2-乙基己基)酯 (DEHP) Di-2-ethylhexyl phthalate(DEHP)	ND	30	1000
邻苯二甲酸二异丁酯 (DIBP) Diisobutyl phthalate(DIBP)	ND	30	1000
结论 Conclusion	合格 Pass	---	---

备注: mg/kg = 百万分之一 = ppm

ND = 未检测到 (小于 MDL)

MDL = 方法检测限

Note: mg/kg = part per million = ppm

ND = Not Detected (less than MDL)

MDL = Method Detection Limit

### 测试材料:

### Tested Materials:

序号 Item No.	样品描述 Description
1	橙色硬塑料 Orange hard plastic

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备注: (1) ① XRF 结果是初步筛选,如果有不确定结果(如下表中“X”)需要进一步通过 ICP-OES/AAS(针对镉,铅,汞), UV-VIS(针对六价铬)以及 GC-MS(针对多溴联苯,多溴联苯醚)做湿化学分析 (单位: 毫克/千克)。

Remark: Results are obtained by XRF for primary screening, and further wet chemical testing by ICP-OES / AAS (for Cd, Pb, Hg), UV-VIS (for Cr(VI)) and GC-MS (for PBBs, PBDEs) is recommended to be performed, if an inconclusive result was found (as “X” in below table) (unit: mg/kg).

② OL = 超出限值, BL = 低于限值, X = 不确定, NA= 不适用。

OL = Over Limit, BL = Below Limit, X = Inconclusive, NA= Not Applicable.

③ 针对元素的扫描结果-不均一材料的测试值与真实值可能存在差异。

XRF screening test for RoHS elements – The test result may be different from the actual content in the non-uniformity composition sample.

分析元素 Element	聚合物材料 Polymer	金属材料 Metal	电子元件 Composite Materials
镉 Cd	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$BL \leq (70-3\sigma) < X < (130+3\sigma) \leq OL$	$LOD < X < (150+3\sigma) \leq OL$
铅 Pb	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
汞 Hg	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < X < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < X < (1500+3\sigma) \leq OL$
溴 Br	$BL \leq (300-3\sigma) < X$	NA	$BL \leq (250-3\sigma) < X$
铬 Cr	$BL \leq (700-3\sigma) < X$	$BL \leq (700-3\sigma) < X$	$BL \leq (500-3\sigma) < X$

(2) ① mg/kg = ppm = 0.0001%, ND = 未检测到 (小于 MDL), MDL = 方法检测限。

mg/kg = ppm = 0.0001%, ND = Not Detected (less than MDL), MDL = Method Detection Limit.

② 湿化学测试中的单位和方法检测限 (MDL) 及限量要求。

Unit, Method Detection Limit (MDL) and Requirement limit in wet chemical test.

测试项目 Test items	Pb	Cd	Hg	Cr <sup>6+</sup> (非金属) Cr <sup>6+</sup> (Non-metal)	Cr <sup>6+</sup> (金属) Cr <sup>6+</sup> (metal)	PBBs(single)	PBDEs(single)
单位 Unit	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
MDL	2	2	2	8	---	5	5
限量要求 Requirement Limit	1000	100	1000	1000	阴性 Negative	1000	1000

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备注: (2) ③ 依据 IEC 62321-7-1:2015, 金属样品中 Cr<sup>6+</sup>的结果用阳性/阴性来表示。

Remark: According to IEC 62321-7-1:2015, result on Cr<sup>6+</sup> for metal sample shall be shown as Positive/Negative.

- a) 当六价铬的浓度高于 0.13 $\mu\text{g}/\text{cm}^2$  时, 样品为阳性, 即含有六价铬。  
The Cr(VI) concentration is more than 0.13  $\mu\text{g}/\text{cm}^2$ , the sample is positive for Cr(VI), the coating is considered to contain Cr(VI).
- b) 当六价铬的浓度低于 0.10 $\mu\text{g}/\text{cm}^2$  时, 样品为阴性, 即未检测到六价铬。  
The Cr(VI) concentration is less than 0.10  $\mu\text{g}/\text{cm}^2$ , the sample is negative for Cr(VI), the coating is considered a non-Cr(VI) based coating.

由于未知测试样品的储存条件及生产日期, 测试结果仅代表样品在测试期间的状态。

Storage condition and production date of the tested sample are unavailable and thus results of Cr<sup>6+</sup> represent status of the sample at the time of testing.

- ④ 根据 IEC 62321-3-1:2013 的标准要求, 这列内容代表化学测试结果, 而“NA”代表前面 XRF 扫描测试合格后不需要再做化学测试。

According to IEC 62321-3-1:2013, this column represents the results of wet chem test. And “NA” means no need to perform wet chem test, when the XRF screening results are acceptable.



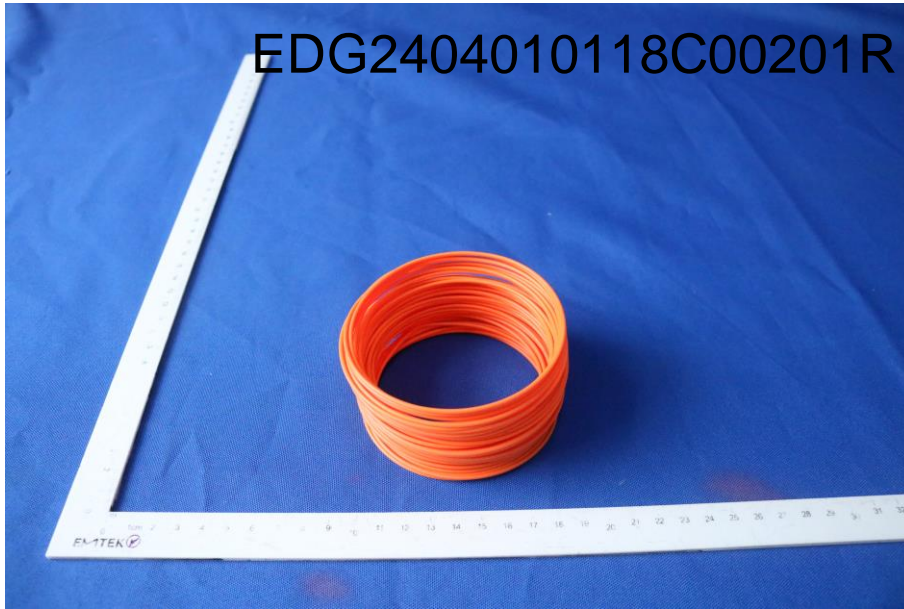
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## 样品照片 Sample Photo



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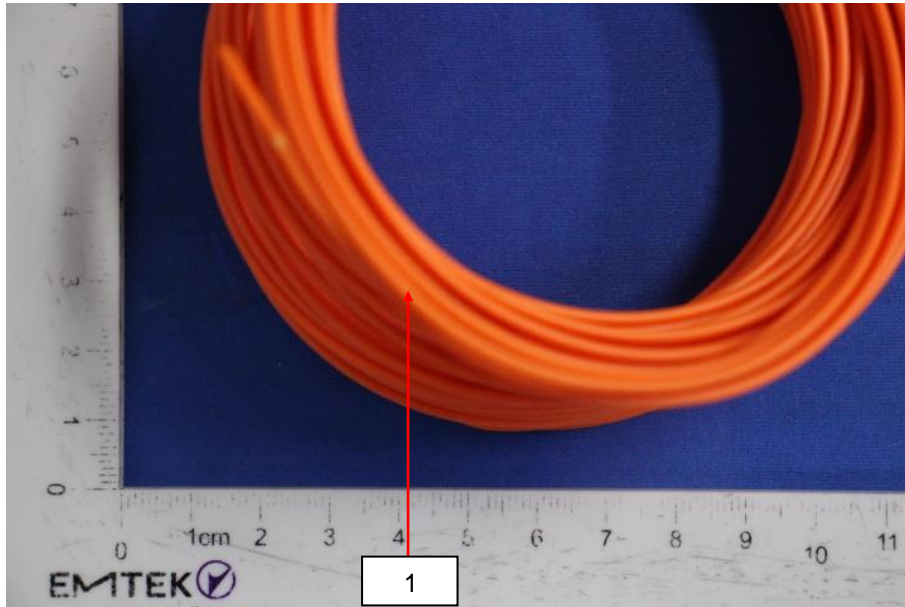
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## 样品照片 Sample Photo



\*\*\* 报告结束 \*\*\*  
\*\*\* End of Report \*\*\*

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### ANNEX

#### EXEMPTION LIST

- 1 Mercury in single capped (compact) fluorescent lamps not exceeding (per burner):
  - 1(a) For general lighting purposes < 30W: 5mg (expires on 31 December 2011; 3.5mg may be used per burner after 31 December 2011 until 31 December 2012; 2.5mg shall be used per burner after 31 December 2012)
  - 1(b) For general lighting purposes  $\geq$  30W and <50W: 5mg (expires on 31 December 2011; 3.5mg may be used per burner after 31 December 2011)
  - 1(c) For general lighting purposes  $\geq$  50W and <150W: 5mg
  - 1(d) For general lighting purposes  $\geq$  150W: 15mg
  - 1(e) For general lighting purposes with circular or square structural shape and tube diameter  $\leq$ 17mm (no limitation of use until 31 December 2011; 7mg may be used per burner after 31 December 2011)
  - 1(f) For special purposes: 5mg
  - 1(g) For general lighting purposes < 30 W with a lifetime equal or above 20 000 h: 3,5 mg (Expires on 31 December 2017)
- 2(a) Mercury in double-capped linear fluorescent lamps for general lighting purposes not exceeding (per lamp):
  - 2(a)(1) Tri-band phosphor with normal lifetime and a tube diameter < 9mm (e.g. T2): 5mg (expires on 31 December 2011; 4mg may be used per lamp after 31 December 2011)
  - 2(a)(2) Tri-band phosphor with normal lifetime and a tube diameter  $\geq$  9mm and  $\leq$  17mm (e.g. T5): 5mg (expires on 31 December 2011; 3mg may be used per lamp after 31 December 2011)
  - 2(a)(3) Tri-band phosphor with normal lifetime and a tube diameter > 17mm and  $\leq$  28mm (e.g. T8): 5mg (expires on 31 December 2011; 3.5mg may be used per lamp after 31 December 2011)
  - 2(a)(4) Tri-band phosphor with normal lifetime and a tube diameter > 28mm (e.g. T12): 5mg (expires on 31 December 2012; 3.5mg may be used per lamp after 31 December 2012)
  - 2(a)(5) Tri-band phosphor with long lifetime ( $\geq$  25000h): 8mg (expires on 31 December 2011; 5mg may be used per lamp after 31 December 2011)
- 2(b) Mercury in other fluorescent lamps not exceeding (per lamp):
  - 2(b)(2) Non-linear halophosphate lamps (all diameters): 15mg (expires on 13 April 2016)
  - 2(b)(3) Non-linear tri-band phosphor lamps with tube diameter > 17mm (e.g. T9) (no limitation of use until 31 December 2011; 15mg may be used per lamp after 31 December 2011)
- 2(b)(4) Lamps for other general lighting and special purposes (e.g. induction lamps) (no limitation of use until 31 December 2011; 15mg may be used per lamp after 31 December 2011)
- 3 Mercury in cold cathode fluorescent lamps and external electrode fluorescent lamps (CCFL and EEFL) for special purposes not exceeding (per lamp):
  - 3(a) Short length ( $\leq$  500mm) (No limitation of use until 31 December 2011; 3.5mg may be used per lamp after 31 December 2011)
  - 3(b) Medium length (> 500mm and  $\leq$  1500mm) (No limitation of use until 31 December 2011; 5mg may be used per lamp after 31 December 2011)
  - 3(c) Long length (> 1500mm) (No limitation of use until 31 December 2011; 13mg may be used per lamp after 31 December 2011)
- 4(a) Mercury in other low pressure discharge lamps (per lamp) (no limitation of use until 31 December 2011; 15mg may be used per lamp after 31 December 2011)
- 4(b) Mercury in High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner) in lamps with improved colour rendering index  $R_a > 60$ :
  - 4(b)-I  $P \leq 155W$  (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
  - 4(b)-II  $155W < P \leq 405W$  (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
  - 4(b)-III  $P > 405W$  (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
- 4(c) Mercury in other High Pressure Sodium (vapour) lamps for general lighting purposes not exceeding (per burner):
  - 4(c)-I  $P \leq 155W$  (no limitation of use until 31 December 2011; 25mg may be used per burner after 31 December 2011)
  - 4(c)-II  $155W < P \leq 405W$  (no limitation of use until 31 December 2011; 30mg may be used per burner after 31 December 2011)
  - 4(c)-III  $P > 405W$  (no limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011)
- 4(d) Mercury in High Pressure Mercury (vapour) lamps (HPMV) (expires on 13 April 2015)
- 4(e) Mercury in metal halide lamps (MH)
- 4(f) Mercury in other discharge lamps for special purposes not specifically mentioned in this Annex
- 4(g) Mercury in hand crafted luminous discharge tubes used for signs, decorative or architectural and specialist lighting and light art work, where the mercury content shall be limited as follows: (Expires on 31 December 2018)
  - (a) 20 mg per electrode pair + 0,3 mg per tube length in cm, but not more than 80 mg, for outdoor applications and indoor applications exposed to temperatures below 20 °C;
  - (b) 15 mg per electrode pair + 0,24 mg per tube length in cm, but not more than 80 mg, for all other indoor applications.

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# 检测报告

## Test Report

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日期: 2024 年 04 月 09 日

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### ANNEX

#### EXEMPTION LIST

#### Continued

- 5(a) Lead in glass of cathode ray tubes
- 5(b) Lead in glass of fluorescent tubes not exceeding 0.2% by w eight
- 6(a) Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0.35% lead by w eight
- 6(b) Lead as an alloying element in aluminium containing up to 0.4% lead by w eight
- 6(c) Copper alloy containing up to 4% lead by w eight.
- 7(a) Lead in high melting temperature type solders (i.e. lead based alloys containing 85% by w eight or more lead)
- 7(b) Lead in solders for servers, storage and storage array systems, network infrastructure equipment for switching, signalling, transmission, and network management for telecommunications
- 7(c)-I Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectronic devices, or in a glass or ceramic matrix compound
- 7(c)-II Lead in dielectric ceramic in capacitors for a rated voltage of 125V AC or 250V DC or higher
- 7(c)-III Lead in dielectric ceramic in capacitors for a rated voltage of less than 125V AC or 250V DC (expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013).
- 7(c)-IV Lead in PZT based dielectric ceramic materials for capacitors being part of integrated circuits or discrete semiconductors
- 8(a) Cadmium and its compounds in one shot pellet type thermal cut-offs (expires on 1 January 2012 and after that date may be used in spare parts for EEE placed on the market before 1 January 2012)
- 8(b) Cadmium and its compounds in electrical contacts  
Applies to categories 8, 9 and 11 and expires on:  
— 21 July 2021 for categories 8 and 9 other than in vitro diagnostic medical devices and industrial monitoring and control instruments;  
— 21 July 2023 for category 8 in vitro diagnostic medical devices;  
— 21 July 2024 for category 9 industrial monitoring and control instruments, and for category 11
- 8(b)-I Cadmium and its compounds in electrical contacts used in:  
Applies to categories 1 to 7 and 10 and expires on 21 July 2021.  
— circuit breakers,  
— thermal sensing controls,  
— thermal motor protectors (excluding hermetic thermal motor protectors),  
— AC switches rated at:— 6 A and more at 250 V AC and more, or  
— 12 A and more at 125 V AC and more,  
— DC switches rated at 20 A and more at 18 V DC and more, and  
— switches for use at voltage supply frequency  $\geq 200$  Hz.
- 9 Hexavalent chromium as an anti-corrosion agent of the carbon steel cooling system in absorption refrigerators up to 0.75% by w eight in the cooling solution
- 9(b) Lead in bearing shells and bushes for refrigerant-containing compressors for heating, ventilation, air conditioning and refrigeration (HVACR) applications
- 11(b) Lead used in other than C-press compliant pin connector systems (expires on 1 January 2013 and after that date may be used in spare parts for EEE placed on the market before 1 January 2013)
- 13(a) Lead in white glasses used for optical applications
- 13(b) Cadmium and lead in filter glasses and glasses used for reflectance standards
- 14 Lead in solders consisting of more than two elements for the connection between the pins and the package of microprocessors with a lead content of more than 80% and less than 85% by w eight (expires on 1 January 2011 and after that date may be used in spare parts for EEE placed on the market before 1 January 2011)
- 15 Lead in solders to complete a viable electrical connection between semiconductor die and carrier within integrated circuit Flip Chip packages
- 17 Lead halide as radiant agent in High Intensity Discharge (HID) lamps used for professional reprography applications
- 18(b) Lead as activator in the fluorescent powder (1% lead by w eight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP (BaSi2O5:Pb)
- 21 Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glass
- 24 Lead in solders for the soldering to machined through hole discoidal and planar array ceramic multilayer capacitors
- 25 Lead oxide in surface conduction electron emitter displays (SED) used in structural elements, notably in the seal frit and frit ring
- 29 Lead bound in crystal glass as defined in Annex 1 (Categories 1, 2, 3 and 4) of Council Directive 69/493/EEC
- 30 Cadmium alloys as electrical/mechanical solder joints to electrical conductors located directly on the voice coil in transducers used in high-powered loudspeakers with sound pressure levels of 100 dB (A) and more

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### ANNEX

#### EXEMPTION LIST

##### Continued

- 31 Lead in soldering materials in mercury free flat fluorescent lamps (which e.g. are used for liquid crystal displays, design or industrial lighting)
- 32 Lead oxide in seal frit used for making window assemblies for Argon and Krypton laser tubes
- 33 Lead in solders for the soldering of thin copper wires of 100 µm diameter and less in power transformers
- 34 Lead in cermet-based trimmer potentiometer elements
- 37 Lead in the plating layer of high voltage diodes on the basis of a zinc borate glass body
- 38 Cadmium and cadmium oxide in thick film pastes used on aluminium bonded beryllium oxide
- 39 Cadmium in colour converting II-VI LEDs (< 10 µg Cd per mm<sup>2</sup> of light-emitting area) for use in solid state illumination or display systems (expires on 1 July 2014)
- 41 Lead in solders and termination finishes of electrical and electronic components and finishes of printed circuit boards used in ignition modules and other electrical and electronic engine control systems, which for technical reasons must be mounted directly on or in the crankcase or cylinder of hand-held combustion engines (classes SH:1, SH:2, SH:3 of Directive 97/68/EC of the European Parliament and of the Council (2)) (Expires on 31 December 2018)
- 43 Bis(2-ethylhexyl) phthalate in rubber components in engine systems, designed for use in equipment that is not intended solely for consumer use and provided that no plasticised material comes into contact with human mucous membranes or into prolonged contact with human skin and concentration value of bis(2-ethylhexyl) phthalate does not exceed:
- a) 30% by weight of the rubber for
- (i) gasket coatings;
  - (ii) solid-rubber gaskets; or
  - (iii) rubber components included in assemblies of at least three components using electrical, mechanical or hydraulic energy to do work, and attached to the engine.
- b) 10% by weight of the rubber for rubber-containing components not referred to in point (a).
- For the purposes of this entry, "prolonged contact with human skin" means continuous contact of more than 10 minutes duration or intermittent contact over a period of 30 minutes, per day.
- 44 Lead in solder of sensors, actuators, and engine control units of combustion engines within the scope of Regulation (EU) 2016/1628 of the European Parliament and of the Council, installed in equipment used at fixed positions while in operation which is designed for professionals, but also used by non-professional users.

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