

**Report No.** 70.400.15.698.01-00/01

**Dated** 2015-06-15



China

## Technical Report

**Applicant:** Ningbo Strong Optoelectric Co., Ltd.  
No.1, EAST YONGXING ROAD, EAST SUBURBS INDUSTRIAL ZONE  
315499 YUYAO, ZHEJIANG  
PEOPLE'S REPUBLIC OF CHINA

**Attn:** Li Guoxian

**Manufacturer:** Ningbo Strong Optoelectric Co., Ltd.

**Test subject:** **Product Name:** Flashlight

**Model No.:** 182

**Tested components:** Refer to Page 3~10

**Test specification:** **2011/65/EU (RoHS) Directives**  
Test with reference to EN 62321:2009

**Test result:** Refer to the data listed in following pages

**Conclusion:** With regard to the data of tested components, the requirements of Directive 2011/65/EU (RoHS) are complied.

**Remarks:**

1. The result relates only to the items tested
2. Samples were tested as received

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Shanghai Chemical Lab  
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Tel.: +86-21-6037-6501

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**1 Order**

**1.1 Date of Purchase Order**

2015-05-11

**1.2 Customer's Reference**

Nil

**1.3 Receipt Date of Test Sample**

2015-05-13

2015-05-28 (sample 022)

**1.4 Date of Testing**

2015-05-14~2015-05-19

2015-05-29~2015-06-01 (sample 022)

**1.5 Document submitted**

Bill of Material

**1.6 Location of Testing**

TÜV PS SHA

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## 2. Description of the tested specimen

No.	Tested sample	Conclusion	Picture
001	Shell Metal, silvery	Pass	 A cylindrical metal shell with a threaded end, shown against a blue background. A red arrow points to the threaded section.
002	Plate Metal, silvery	Pass	 A circular metal plate with several small holes, shown against a blue background. A red arrow points to one of the holes.
003	Battery box Plastic, black	Pass	 A cylindrical metal component with flanges at both ends, shown against a blue background. A red arrow points to one of the flanges.
004	Spring Metal, silvery	Pass	 A cylindrical metal component with flanges at both ends, shown against a blue background. A red arrow points to the central threaded section.

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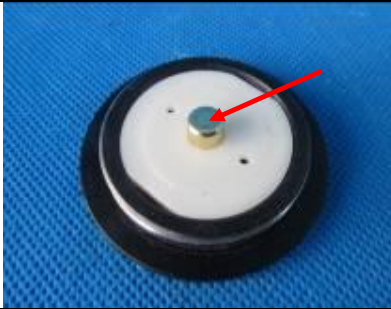
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No.	Tested sample	Conclusion	Picture
005	Block Plastic,white	Pass	
006	Plate White	Pass	
007	Rod Metal,golden	Pass	
008	Handle Metal,silvery	Pass	

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No.	Tested sample	Conclusion	Picture
009	Ring Plastic, golden	Pass	
010	Button Rubber, black	Pass	
011	Handle Plastic, black	Pass	
012	Rod Metal, silvery	Pass	

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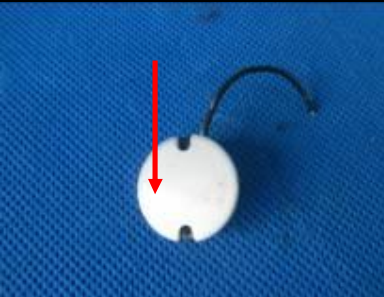

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No.	Tested sample	Conclusion	Picture
013	Piece Gray	Pass	
014	LED Yellow	Pass	
015	Board Metal, silvery	Pass	
016	Ring Rubber, black	Pass	

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No.	Tested sample	Conclusion	Picture
017	Ring Metal,silvery	Pass	
018	Cover Plastic,transparent	Pass	
019	Screw Metal,silvery	Pass	
020	Jacket Plastic,white	Pass	

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No.	Tested sample	Conclusion	Picture
021	Jacket Plastic,blue	Pass	
022	Jacket Plastic,black	Pass	
023	Jacket Plastic,red	Pass	
024	Jacket Plastic,red	Pass	

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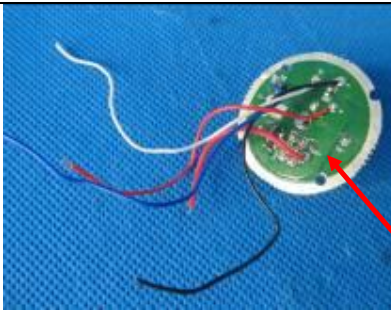
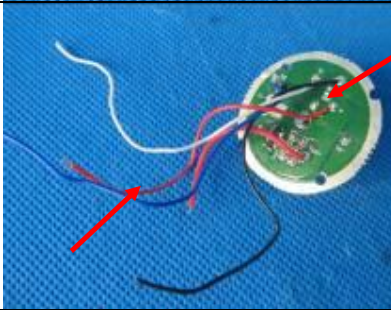
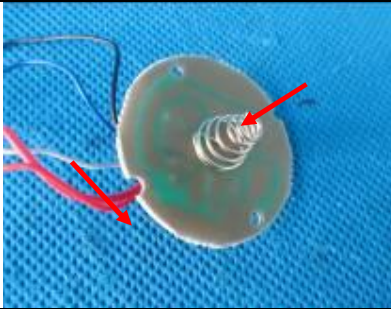



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No.	Tested sample	Conclusion	Picture
025	PCB Green	Pass	 A photograph of a green printed circuit board (PCB) with several wires (red, white, blue, black) soldered to it. A red arrow points to a specific solder joint on the board.
026	Soldering tin Metal, silvery	Pass	 A photograph of a green PCB with wires, similar to sample 025. A red arrow points to a silvery soldering tin on the board.
027	Spring Metal, silvery	Pass	 A photograph of a circular metal component with a central spring. A red arrow points to the spring, and another red arrow points to a silvery metal part of the component.
028	Screw Metal, silvery	Pass	 A close-up photograph of a small, silvery metal screw lying on a blue textured surface.

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No.	Tested sample	Conclusion	Picture
029	Screw Metal,black	Pass	
030	Piece Metal,silvery	Pass	

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### 3. Test Results

#### 3.1 ED-XRF Spectrometer test for total Cadmium, Chromium, Mercury, Lead and Bromine according to EN 62321:2009

##### Criteria of XRF test results

##### **Pass:**

Because of the nature of the testing procedure (caused by the uncertainty of the used, XRF method), a definite pass is given only if the XRF test score is less than 60% of the respective RoHS limit.

##### **Retest:**

If the XRF test score is between 60% and 150% of the respective RoHS limit, further chemical test on the sample is required.

##### **Fail:**

A definite FAIL is given if the XRF test score is above 150% of the respective RoHS limit

##### \*Explanation for RoHS limit

Regarding Chromium and Bromine, the XRF test score shows the total Chromium and the total Bromine, but the RoHS limit of 1000 mg/kg, according to the directive 2011/65/EU, is only for Hexavalent Chromium and Brominated Flame Retardants. Therefore, if the XRF test result for the total Chromium and the total Bromine is more than 600 mg/kg and 300 mg/kg respectively, further analytical tests are necessary to find out the exact amount of Hexavalent Chromium and Brominated Flame Retardants

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	TOTAL CADMIUM [mg/kg]	TOTAL LEAD [mg/kg]	TOTAL MERCURY [mg/kg]	TOTAL CHROMIUM [mg/kg]	TOTAL BROMINE [mg/kg]	OVERALL RESULT
ROHS LIMIT	100	1000	1000	1000*	1000*	
Pass result	< 60	< 600	< 600	< 600	< 300	
Retest result	60 – 150	600 – 1500	600 – 1500	> 600	> 300	
Fail result	> 150	> 1500	> 1500	-	-	
Test score, sample 001	<30	<50	<50	--	--	Pass
Test score, sample 002	<30	<50	<50	--	--	Pass
Test score, sample 003	<30	<50	<50	<50	<50	Pass
Test score, sample 004	<30	<50	<50	<50	--	Pass
Test score, sample 005	<30	<50	<50	<50	<50	Pass
Test score, sample 006	<30	<50	<50	<50	<50	Pass
Test score, sample 007	<30	<50	<50	<50	--	Pass
Test score, sample 008	<30	<50	<50	<50	--	Pass
Test score, sample 009	<30	<50	<50	<50	<50	Pass
Test score, sample 010	<30	<50	<50	<50	<50	Pass
Test score, sample 011	<30	<50	<50	<50	578	Retest
Test score, sample 012	<30	18802 <sup>##</sup>	<50	<50	<50	Retest
Test score, sample 013	<30	<50	<50	<50	<50	Pass

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	TOTAL CADMIUM [mg/kg]	TOTAL LEAD [mg/kg]	TOTAL MERCURY [mg/kg]	TOTAL CHROMIUM [mg/kg]	TOTAL BROMINE [mg/kg]	OVERALL RESULT
ROHS LIMIT	100	1000	1000	1000*	1000*	
Pass result	< 60	< 600	< 600	< 600	< 300	
Retest result	60 – 150	600 – 1500	600 – 1500	> 600	> 300	
Fail result	> 150	> 1500	> 1500	-	-	
Test score, sample 014	<30	<50	<50	<50	<50	Pass
Test score, sample 015	<30	--	<50	--	--	Pass
Test score, sample 016	<30	<50	<50	<50	<50	Pass
Test score, sample 017	<30	<50	<50	--	--	Pass
Test score, sample 018	<30	<50	<50	<50	<50	Pass
Test score, sample 019	<30	<50	<50	3466	--	Retest
Test score, sample 020	<30	<50	<50	<50	<50	Pass
Test score, sample 021	<30	<50	<50	<50	<50	Pass
Test score, sample 022	<30	<50	<50	<50	<50	Pass
Test score, sample 023	<30	<50	<50	<50	<50	Pass
Test score, sample 024	<30	<50	<50	<50	<50	Pass
Test score, sample 025	<30	<50	<50	<50	57238	Retest
Test score, sample 026	--	<50	<50	<50	--	Pass

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	TOTAL CADMIUM [mg/kg]	TOTAL LEAD [mg/kg]	TOTAL MERCURY [mg/kg]	TOTAL CHROMIUM [mg/kg]	TOTAL BROMINE [mg/kg]	OVERALL RESULT
ROHS LIMIT	100	1000	1000	1000*	1000*	
Pass result	< 60	< 600	< 600	< 600	< 300	
Retest result	60 – 150	600 – 1500	600 – 1500	> 600	> 300	
Fail result	> 150	> 1500	> 1500	-	-	
Test score, sample 027	<30	1342	<50	<50	--	Retest
Test score, sample 028	<30	<50	<50	<50	--	Pass
Test score, sample 029	<30	<50	<50	<50	--	Pass
Test score, sample 030	<30	1085	<50	<50	--	Retest

Remark:

1. “<” means “less than”.
2. “mg/kg” denotes “milligram per kilogram”.
3. With regard to the stoichiometry of Br in PBBs and PBDEs, the lower limit for Br is set at 300 mg/kg.
4. “--” means the substance for this sample are not tested.
5. “##” means the exempt item according to DIRECTIVE 2011/65/EU ANNEX III item No 6(c), refer to APPENDIX III on page 22.

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### 3.2 Wet chemical test

#### Main instruments used for wet chemical test

Testing Target	Instrument	Method
Lead & Cadmium	ICP-OES	EN 62321:2009
Mercury	ICP-OES	
Hexavalent Chromium	UV-Vis	
PBBs & PBDEs	GC/MS	

#### Criteria of chemical test results

##### **Pass:**

A definite Pass is given If the chemical test result meets the requirements of RoHS.

##### **Fail:**

A definite Fail is given If the chemical test result exceeds the full respective RoHS limit.

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Test Sample	Cadmium [mg/kg]	Lead [mg/kg]	Mercury [mg/kg]	Chromium (VI) [mg/kg]	PBBs (Sum) [mg/kg]	PBDEs (Sum) [mg/kg]	OVERALL RESULT
Limit	100	1000	1000	1000	1000	1000	
sample 011	--	--	--	--	ND	122	Pass
sample 012	--	29900 <sup>##</sup>	--	--	--	--	Pass
sample 015	--	275	--	--	--	--	Pass
sample 025	--	--	--	--	ND	ND	Pass
sample 026	ND	--	--	--	--	--	Pass
sample 027	--	188	--	--	--	--	Pass
sample 030	--	121	--	--	--	--	Pass

Remark:

1. ND = Not detected (Detected limit of Cd :2mg/kg;Pb, Hg, and Cr(VI):10mg/kg; PBBs and PBDEs: 5mg/kg)
2. " mg/kg " denotes " milligram per kilogram ".
3. "--" means the substance for this sample are not tested.
4. "##" means the exempt item according to DIRECTIVE 2011/65/EU ANNEX III item No 6(c), refer to APPENDIX III on page 22.

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Test Sample	Cadmium [mg/kg]	Lead [mg/kg]	Mercury [mg/kg]	Chromium# (VI) [mg/kg]	PBBs (Sum) [mg/kg]	PBDEs (Sum) [mg/kg]	OVERALL RESULT
Limit	100	1000	1000	§	1000	1000	
sample 001	--	--	--	Negative	--	--	Pass
sample 002	--	--	--	Negative	--	--	Pass
sample 015	--	--	--	Negative	--	--	Pass
sample 017	--	--	--	Negative	--	--	Pass
sample 019	--	--	--	Negative	--	--	Pass

Remark:

1. “-” means the substance for this sample are not tested.
2. “mg/kg” denotes “milligram per kilogram”
3. “#” Spot-test:  
Negative = Absence of CrVI coating, Positive = Presence of CrVI coating;  
(The tested sample should be further verified by boiling-water-extraction method if the spot test result can not be confirmed.)  
Boiling-water-extraction:  
Negative = Absence of CrVI coating  
Positive = Presence of CrVI coating; the detected concentration in boiling-water- extraction solution is equal or greater than 0.02mg/kg with 50cm<sup>2</sup> sample surface area.
4. “§” Positive indicates the presence of Hexavalent Chromium on the tested areas and result be regarded as conflict with RoHS requirement.  
Negative indicates the absence of Hexavalent Chromium on the tested areas and result be regarded as no conflict with RoHS requirement.

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Shanghai Branch  
Chemical Lab

Engineer:

Mr. Yang Sirong

Checked by:

Ms. Qi Nannan

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**APPENDIX I: Product photos**



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**APPENDIX II: Additional Style.**

**The client declared that the materials used of below styles are same as tested style 182.**

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XYZ

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“X” stands for 1,2,3. “Y” stands for 0,1,2,3,4,5,6,7,8,9. “Z” stands for 0,1,2,3,4,5,6,7,8,9

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Remark:

Since the client was not able to provide the sample of additional Style, above additional Style(s) hasn't been tested, but only based on the guarantee letter provided by the client. TÜV SÜD takes no responsibility for any mistakes and the problems of product consistency caused by inaccurate and/or invalid information submitted by the client. The client will take the responsibility of all discrepancy and risk.

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### APPENDIX III: Official Exemption Items

Below items are quoted based on 2011/65/EU Directives.

Exemption		Scope and dates of applicability
1	Mercury in single capped (compact) fluorescent lamps not exceeding (per burner)	
1(a)	For general lighting purpose < 30 W:5mg	Expires on 31 December 2011; 3,5mg maybe 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 $\geq 30$ W and < 50 W:5mg	Expires on 31 December 2011; 3.5mg
1(c)	For general lighting purposes $\geq 50$ W and < 150 W:5mg	
1(d)	For general lighting purpose $\geq 30$ W and $\geq 150$ W:15mg	
1(e)	For general lighting purpose with circular or square structural shape and tube diameter < 17mm	No limitation of use until 31 December 2011; 7 mg may be used per burner after 31 December 2011
1(f)	For special purposes:5mg	
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 < 9 mm (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 $\geq 9$ mm and $\leq 17$ mm (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 > 17 mm and $\leq 28$ mm (e.g. T8): 5mg	Expires on 31 December 2011; 3,5 mg 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 2011; 3,5 mg may be used per lamp after 31 December 2011
2(a)(5)	Tri-band phosphor with long lifetime ( $\geq 25$ 000h): 8mg	Expires on 13 December 2011; 5mg may be used per lamp after 31 December 2011
2(b)	Mercury in other fluorescent lamps not exceeding (per lamp):	

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Exemption		Scope and dates of applicability
2(b)(1)	Linear halophosphate lamps with tube >28 mm (e.g. T10 and T12): 10mg	Expires on 13 April 2012
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; 15 mg 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; 15 mg 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(≤500mm)	No limitation of use until 31 December 2011; 3,5 mg may be used per lamp after 31 December 2011
3(b)	Medium length (> 500mm and ≤ 1 500mm)	No limitation of use until 31 December 2011; 5 mg may be used per lamp after 31 December 2011
3(c)	Long length (> 1 500mm)	No limitation of use until 31 December 2011; 13 mg 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; 15 mg 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 Ra >60;	
4(b)-I	P≤155 W	No limitation of use until 31 December 2011; 30mg may be used per burner after 31 December 2011
4(b)-II	155 W < P ≤ 405 W	No limitation of use until 31 December 2011; 40mg may be used per burner after 31 December 2011
4(b)-III	P > 405 W	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≤155 W	No limitation of use until 31 December 2011; 25mg may be used per burner after 31 December 2011
4(c)-II	155 W < P ≤ 405 W	No limitation of use until 31 December 2011; 30mg may be used per burner after 31 December 2011

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Exemption		Scope and dates of applicability
4(c)-III	P > 405 W	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-artwork, where the mercury content shall be limited as follows: (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.	Expires on 31 December 2018
5(a)	Lead in glass of cathode ray tubes	
5(b)	Lead in glass of fluorescent tubes not exceeding 0,2 % by weight	
6(a)	Lead as an alloying element in steel for machining purposes and in galvanized steel containing up to 0,35 % lead by weight	
6(b)	Lead as an alloying element in aluminium containing up to 0,4 % lead by weight	
6(c)	Copper alloy containing up to 4 % lead by weight	
7(a)	Lead in high melting temperature type solders (i.e. lead-based alloys containing 85 % by weight 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	

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Exemption		Scope and dates of applicability
	ceramic matrix compound	
7(c)-II	Lead in dielectric ceramic in capacitors for a rated voltage of 125 V AC or 250 V DC or higher	
7(c)-III	Lead in dielectric ceramic in capacitors for a rated voltage of less than 125 V AC or 250 V 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	
9	Hexavalent chromium as an anticorrosion agent of the carbon steel cooling system in absorption refrigerators up to 0,75 % by weight 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(a)	Lead used in C-press compliant pin connector systems	May be used in spare parts for EEE placed on the market before 24 September 2010
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
12	Lead as a coating material for the thermal conduction module C-ring	May be used in spare parts for EEE placed on the market before 24 September 2010
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 weight	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	

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Exemption		Scope and dates of applicability
16	Lead in linear incandescent lamps with silicate coated tubes	Expires on 1 September 2013
17	Lead halide as radiant agent in high intensity discharge (HID) lamps used for professional reprography applications	
18(a)	Lead as activator in the fluorescent powder (1 % lead by weight or less) of discharge lamps when used as speciality lamps for diazoprinting reprography, lithography, insect traps, photochemical and curing processes containing phosphors such as SMS ((Sr,Ba) <sub>2</sub> MgSi <sub>2</sub> O <sub>7</sub> :Pb)	Expires on 1 January 2011
18(b)	Lead as activator in the fluorescent powder (1 % lead by weight or less) of discharge lamps when used as sun tanning lamps containing phosphors such as BSP(BaSi <sub>2</sub> O <sub>5</sub> :Pb)	
19	Lead with PbBiSn-Hg and PbInSn-Hg in specific compositions as main amalgam and with PbSn-Hg as auxiliary amalgam in very compact energy saving lamps (ESL)	Expires on 1 June 2011
20	Lead oxide in glass used for bonding front and rear substrates of flat fluorescent lamps used for Liquid Crystal Displays (LCDs)	Expires on 1 June 2011
21	Lead and cadmium in printing inks for the application of enamels on glasses, such as borosilicate and soda lime glasses	
23	Lead in finishes of fine pitch components other than connectors with a pitch of 0,65 mm and less	May be used in spare parts for EEE placed on the market before 24 September 2010
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	
26	Lead oxide in the glass envelope of black light blue lamps	Expires on 1 June 2011
27	Lead alloys as solder for transducers used in high-powered (designated to operate for several hours at acoustic power levels of 125 dB SPL and above) loudspeakers	Expired on 24 September 2010
29	Lead bound in crystal glass as defined in Annex I (Categories 1, 2, 3 and 4) of Council Directive 69/493/EEC ( 1 )	
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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Exemption		Scope and dates of applicability
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 um diameter and less in power transformers	
34	Lead in cermet-based trimmer potentiometer elements	
36	Mercury used as a cathode sputtering inhibitor in DC plasma displays with a content up to 30 mg per display	Expired on 1 July 2010
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 ug Cd per mm <sup>2</sup> of light-emitting area) for use in solid state illumination or display systems	Expires on 1 July 2014
40	Cadmium in photoresistors for analogue optocouplers applied in professional audio equipment	Expires on 31 December 2013
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 (1))	Expires on 31 December 2018

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