



TEST REPORT

Report No. : WTA24F04099131A1C

Applicant..... : 

Address..... : 

Sample Name : LED SPOT DOWNLIGHT

Sample Model : DL86C

Reference Model No. : DL92/DL92P/DL98B/DL98B-PRO/DL160/DL161/DL164/DL165

Test Requested : Refer to next page (s)

Test Method..... : Refer to next page (s)

Test Conclusion : Refer to next page (s)

Date of Receipt sample : 2024-04-29 & 2024-05-13

Testing period : 2024-04-29 to 2024-05-11 & 2024-05-13 to 2024-05-16

Date of Issue..... : 2024-05-16

Test Result..... : Refer to next page (s)

Prepared By:

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Signed for and on behalf of
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Swing Liang

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Job No.: FSW20240430125434CJ

Summary:

Test Requested	Test Conclusion
In accordance with the RoHS Directive 2011/65/EU and its amendment (EU) No. 2015/863, to determine the 10 restricted substances content in the submitted sample.	Pass (Please refer to next pages for details)

Sample Photo(s):





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Test Results:**1. Lead, Mercury, Cadmium, Hexavalent Chromium, PBBs and PBDEs**

Test method:

- 1) With reference to IEC 62321-2:2021, disassembly, disjunction and mechanical sample preparation
- 2) With reference to IEC 62321-3-1:2013, screening –Lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry
- 3) With reference to IEC 62321-4:2013+AMD1:2017 CSV, determination of Mercury by ICP-OES
- 4) With reference to IEC 62321-5:2013, determination of Lead and Cadmium by ICP-OES
- 5) With reference to IEC 62321-7-2: 2017 and IEC 62321-7-1: 2015, determination of Hexavalent Chromium by UV-Vis
- 6) With reference to IEC 62321-6:2015, determination of PBBs and PBDEs by GC-MS

Part No.	Part Description	Result of XRF					Result of Wet Chemical Testing (mg/kg)
		Cd	Pb	Hg	Cr	Br	
1	Silvery metal screw	BL	BL	BL	BL	--	NA
2	Black plastic shell	BL	BL	BL	BL	IN	PBBs : ND PBDEs : ND
3	White plastic shell	BL	BL	BL	BL	BL	NA
4	White plastic shell	BL	BL	BL	BL	IN	PBBs : ND PBDEs : ND
5	Black plastic wire jacket	BL	BL	BL	BL	BL	NA
6	Black plastic jacket	BL	BL	BL	BL	BL	NA
7	White plastic block	BL	BL	BL	BL	BL	NA
8	Golden metal sheet	BL	BL	BL	BL	--	NA
9	Silvery metal sheet	BL	BL	BL	IN	--	Cr ⁶⁺ : Negative
10	Black plastic block	BL	BL	BL	BL	BL	NA
11	Silvery metal screw	BL	BL	BL	IN	--	Cr ⁶⁺ : Negative
12	Black plastic gasket	BL	BL	BL	BL	BL	NA
13	Silvery metal spring	BL	BL	BL	BL	--	NA
14	White coating	BL	BL	BL	BL	BL	NA
15	Silvery metal block without white coating	BL	BL	BL	BL	--	NA



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Part No.	Part Description	Result of XRF					Result of Wet Chemical Testing (mg/kg)
		Cd	Pb	Hg	Cr	Br	
16	Brown plastic wire covering	BL	BL	BL	BL	BL	NA
17	Coppery metal wire	BL	BL	BL	BL	--	NA
18(R1)	Solder	BL	BL	BL	BL	--	NA
19	Blue plastic wire covering	BL	BL	BL	BL	BL	NA
20	Red plastic wire covering	BL	BL	BL	BL	BL	NA
21	White plastic wire covering	BL	BL	BL	BL	BL	NA
22	Black plastic wire covering	BL	BL	BL	BL	BL	NA
23	Transparent glass shell	BL	BL	BL	BL	--	NA
24	Silvery metal shell with black coating	BL	IN	BL	BL	--	Pb : 389
25	White coating	BL	BL	BL	BL	BL	NA
26	Silvery metal sheet without white coating	BL	BL	BL	BL	--	NA
27	White wet glue	BL	BL	BL	BL	BL	NA
28	Chip LED(orange)	BL	BL	BL	BL	BL	NA
29	Chip LED(yellow)	BL	BL	BL	BL	BL	NA
30	White dry glue	BL	BL	BL	BL	BL	NA
31	White plastic sheet	BL	BL	BL	BL	BL	NA



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Remark:

- (1) Results are obtained by EDXRF for primary screening, and further chemical testing by ICP (for Cd, Pb, Hg), UV-VIS (for Cr⁶⁺) and GC-MS (for PBBs, PBDEs) is recommended to be performed, if the concentration exceeds the below warning value according to IEC 62321-3-1: 2013 (unit: mg/kg)

Element	Polymer	Metal	Composite Materials
Cd	$BL \leq (70-3\sigma) < IN < (130+3\sigma) \leq OL$	$BL \leq (70-3\sigma) < IN < (130+3\sigma) \leq OL$	$LOD < IN < (150+3\sigma) \leq OL$
Pb	$BL \leq (700-3\sigma) < IN < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < IN < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < IN < (1500+3\sigma) \leq OL$
Hg	$BL \leq (700-3\sigma) < IN < (1300+3\sigma) \leq OL$	$BL \leq (700-3\sigma) < IN < (1300+3\sigma) \leq OL$	$BL \leq (500-3\sigma) < IN < (1500+3\sigma) \leq OL$
Cr	$BL \leq (700-3\sigma) < IN$	$BL \leq (700-3\sigma) < IN$	$BL \leq (500-3\sigma) < IN$
Br	$BL \leq (300-3\sigma) < IN$	--	$BL \leq (250-3\sigma) < IN$

BL= Below Limit

OL= Over Limit

LOD = Limit of Detection

-- = Not Regulated

- (2) "IN" expresses the inconclusive region, and further chemical testing to confirm whether it complies with the requirement of RoHS Directive.
- (3) The XRF screening test for RoHS elements – the reading may be different to the actual content in the sample be of non-uniformity composition.
- (4) mg / kg =milligram per kilogram=ppm, $\mu\text{g}/\text{cm}^2$ = Micrograms per square centimetre.
- (5) ND = Not Detected or lower than limit of quantitation.
- (6) NA = Not Applicable, as the XRF screening test result was below the limit or as the XRF screening directly determine that test result was over the limit, it was not need to conduct the wet chemical testing.
- (7) LOQ = Limit of quantitation.

Test Items	Pb	Cd	Hg	Cr ⁶⁺		PBB	PBDE
Units	mg/kg	mg/kg	mg/kg	mg/kg	$\mu\text{g}/\text{cm}^2$	mg/kg	mg/kg
LOQ	2	2	2	8	0.1	5	5

The LOQ for single compound of PBBs and PBDEs is 5 mg/kg, LOQ of Cr⁶⁺ for polymer and composite sample is 8 mg/kg and LOQ of Cr⁶⁺ for metal sample is 0.1 $\mu\text{g}/\text{cm}^2$.

- (8) RoHS Requirement

Restricted Substances	Limits
Cadmium (Cd)	0.01% (100 mg/kg)
Lead (Pb)	0.1% (1000 mg/kg)
Mercury (Hg)	0.1% (1000 mg/kg)
Chromium (VI) (Cr ⁶⁺)	0.1% (1000 mg/kg)
Polybrominated Biphenyls (PBBs)	0.1% (1000 mg/kg)
Polybrominated Diphenyl Ethers (PBDEs)	0.1% (1000 mg/kg)



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- (9) According to IEC 62321-7-1:2015, determined of Cr^{6+} on metal sample by boiling water extraction test method, and result is shown as Positive/Negative.

Boiling water extraction:

Negative = Absence of Cr^{6+} coating, the detected concentration in boiling water extraction solution is less than 0.10 ug/cm^2 .

Positive = Presence of Cr^{6+} coating, the detected concentration in boiling water extraction solution is greater than 0.13 ug/cm^2 .

Information on storage conditions and production date of the tested sample is unavailable and thus Cr^{6+} results represent status of the sample at the time of testing.

- (10) Abbreviation:

"Pb" denotes Lead, "Cd" denotes Cadmium, "Hg" denotes Mercury, "Cr" denotes Chromium, "Cr (VI)" denotes Hexavalent Chromium, "Br" denotes Bromine, "PBBs" denotes Total Polybrominated Biphenyls, "PBDEs" denotes Total Polybrominated Diphenyl Ethers.

2. Phthalates:

Test method:

With reference to IEC 62321-8:2017, determination of Phthalates content by GC-MS.

Serial No.	Part No.	Result (mg/kg)			
		DBP	BBP	DEHP	DIBP
T01	1	--	--	--	--
T02	2+3+4+7+10 [△]	123	ND	ND	ND
T03	5+6+14 [△]	117	ND	ND	ND
T04	8	--	--	--	--
T05	9	--	--	--	--
T06	11	--	--	--	--
T07	12+31 [△]	ND	ND	ND	ND
T08	13	--	--	--	--
T09	15	--	--	--	--
T10	16+19+20 [△]	ND	ND	ND	ND
T11	17	--	--	--	--
T12	18(R1)	--	--	--	--
T13	21+22+25 [△]	ND	ND	ND	ND
T14	23	--	--	--	--
T15	24	--	--	--	--
T16	26	--	--	--	--
T17	27+30 [△]	ND	ND	ND	ND
T18	28+29 [△]	ND	ND	ND	ND

Note:

- (1) mg/kg = milligram per kilogram= ppm
(2) ND = Not Detected or lower than limit of quantitation.
(3) -- = Not Regulated.



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- (4) LOQ = Limit of quantitation.

Test Items	DBP	BBP	DEHP	DIBP
Units	mg/kg	mg/kg	mg/kg	mg/kg
LOQ	50	50	50	50

- (5) Abbreviation:

“DBP” denotes Dibutyl phthalate, “BBP” denotes Benzyl butyl phthalate (BBP), “DEHP” denotes Bis(2-ethylhexyl)-phthalate, “DIBP” denotes Diisobutyl phthalate, “PHT” denotes Phthalates.

- (6) RoHS requirement

Restricted Substances	Limits
Dibutyl phthalate (DBP)	0.1% (1000 mg/kg)
Benzyl butyl phthalate (BBP)	0.1% (1000 mg/kg)
Di(2-ethylhexyl) phthalate (DEHP)	0.1% (1000 mg/kg)
Di-iso-butyl phthalate (DIBP)	0.1% (1000 mg/kg)

- (7) “△”= As client’s requirement, the testing was conducted based on mixed components. Results are calculated by the minimum weight of mixed components.

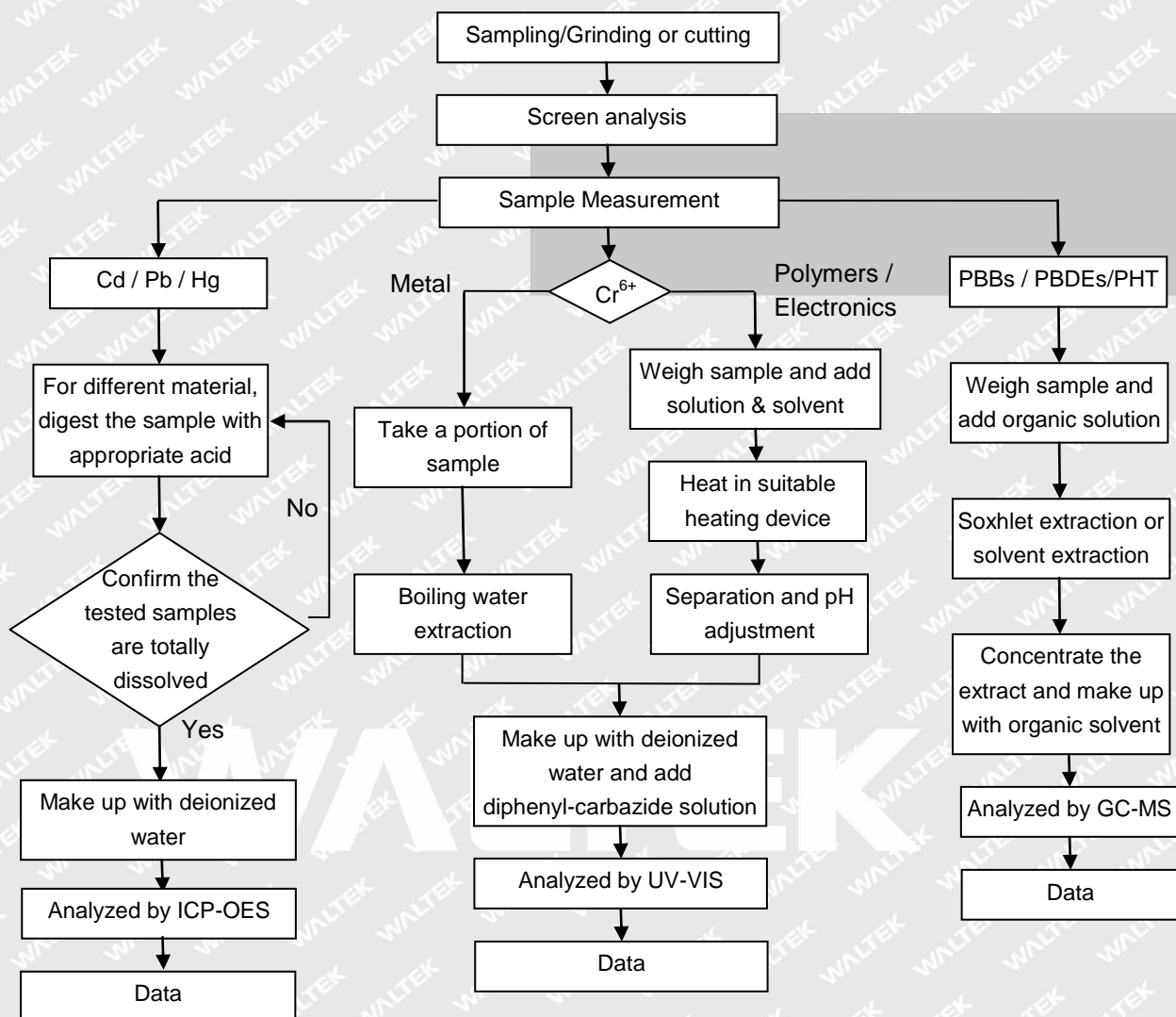
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Measurement Flowchart:

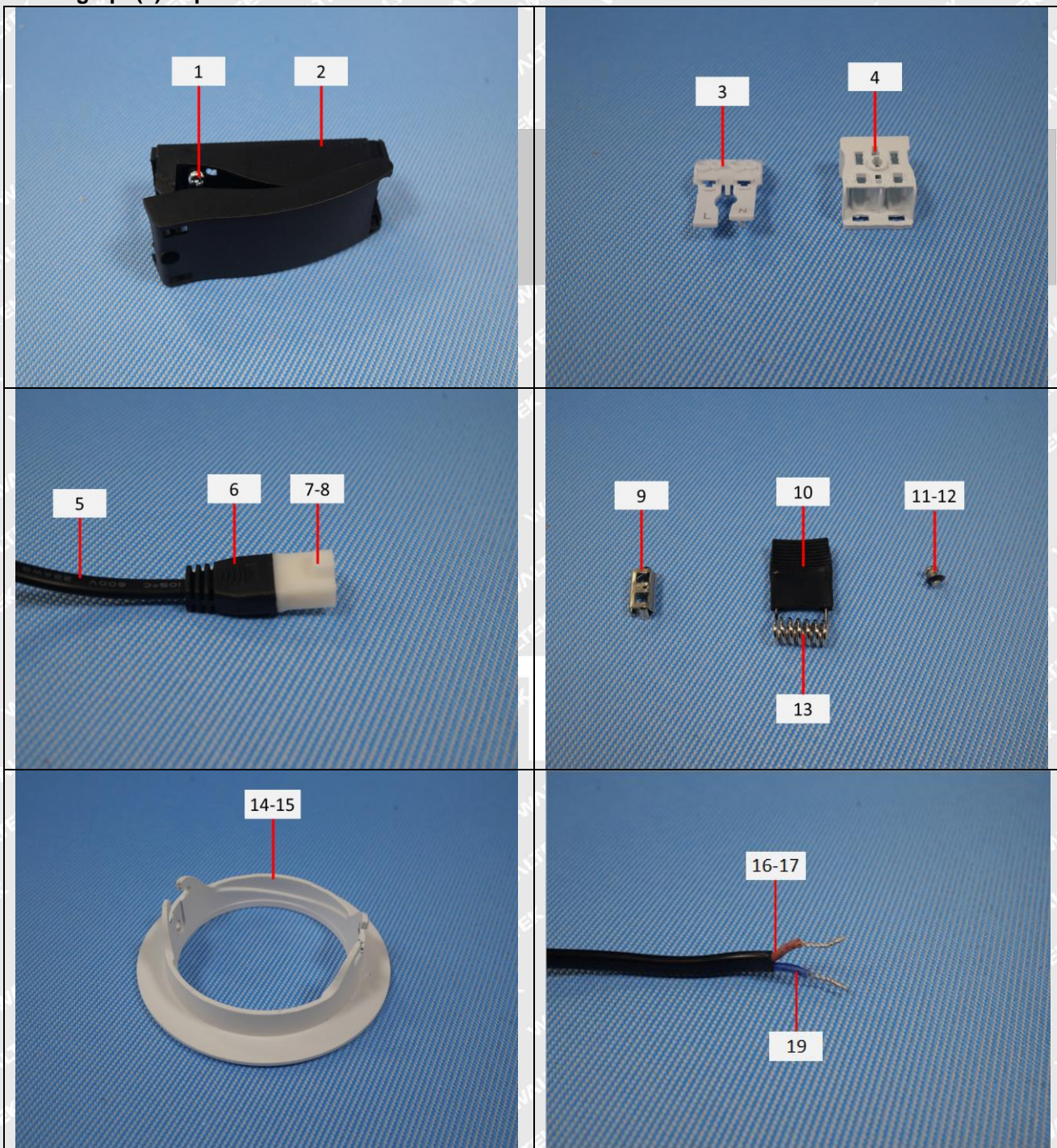




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Photograph(s) of parts tested:







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Remarks:

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===== End of Report =====

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