Test Report

Applicant	:	Mid Ocean Brands B.V.
Address	:	Unit 201, 2/F, Laford Centre, 838 Lai Chi Kok, Cheung Sha Wan, Kowloon, Hong Kong
Sample Name	:	Keyring torch with token
Tested Model	:	MO8466
Sample Receiving date	:	2018-03-27
Test period	:	2018-03-27 – 2018-03-28
Test Requirement	:	The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, 2011/65/EU.
Test Method	:	Please refer to next page(s).
Test result	:	Please refer to next page(s).
Conclusion	:	**PASS** Based on the verification results of the submitted sample(s), the results of Lead, Cadmium, Mercury, Hexavalent chromium, Polybrominated biphenyls (PBBs) and Polybrominated diphenyl ethers (PBDEs) comply with the limits as set by RoHS Directive 2011/65/EU—The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment.
Note	:	The test results are related only to the tested items.

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Lab Manager: Gavin Zhou

2018-04-17

Test Method:

1. Disassembly, disjointment and mechanical sample preparation
   －Ref. to IEC 62321-2: 2013, Disassembly, disjointment and mechanical sample preparation.
2. With reference to IEC 62321-1: 2013, tests were performed for the samples indicated by the photos in this report.

(1) Screening – Lead, mercury, cadmium, total chromium and total bromine
   －Ref. to IEC 62321-3-1: 2013, Screening for Lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry.

(2) Wet chemical test method
   a. Total Lead, Cadmium, Chromium and Mercury content
   －Ref. to IEC 62321-4: 2013, determination of Mercury in polymers, metals and electronics by ICP-OES.
   －Ref. to IEC 62321-5: 2013, determination of Cadmium, lead and chromium in polymers and electronics and cadmium and lead in metals by ICP-OES.
   b. Chromium (VI) content
   －For Colourless and coloured corrosion-protected coatings on metals, Ref. to IEC 62321-7-1: 2015, determination of presence of hexavalent chromium (Cr(VI)) in colourless and coloured corrosion-protected coatings on metals by the colorimetric method.
   －For polymers and electronics, Ref. to IEC 62321-7-2: 2017, determination of hexavalent chromium (Cr(VI)) in polymers and electronics by the colorimetric method.
   c. PBBs, PBDEs
   －Ref. to IEC 62321-6: 2015, determination of polybrominated biphenyls and polybrominated diphenyl ethers in polymers by gas chromatograhy -mass spectrometry (GC-MS).

Test result(s):

Part No.	Part Description	Results of EDXRF					Chemical confirmation results (mg/kg)	Conclusion
		Pb	Cd	Hg	Cr	Br		
1	Blue plastic	BL	BL	BL	BL	BL	---	Pass
2	White plastic	BL	BL	BL	BL	BL	---	Pass
3	Transparent plastic (insulation sheet)	BL	BL	BL	BL	BL	---	Pass
4	LED light (body)	BL	BL	BL	BL	IN	PBBs: N.D. PBDEs: N.D.	Pass
5	Soldering tin	136 (BL)	BL	BL	BL	---	---	Pass
6	Soldering tin (wiring)	248 (BL)	BL	BL	BL	---	---	Pass
7	PCB board	BL	BL	BL	BL	IN	PBBs: N.D. PBDEs: N.D.	Pass
8-1	Blue plastic button (switch)	BL	BL	BL	BL	BL	---	Pass
8-2	White plastic (shell)	BL	BL	BL	BL	BL	---	Pass
8-3	Black plastic (shell)	BL	BL	BL	BL	BL	---	Pass
8-4	Metal (spring)	BL	BL	BL	IN	---	Cr(VI): Negative	Pass
8-5	Metal (contact chip)	BL	BL	BL	BL	---	---	Pass
8-6	Metal (wire hook)	BL	BL	BL	IN	---	Cr(VI): Negative	Pass
8-7	Metal (pins)	BL	BL	BL	BL	---	---	Pass
9	Soldering tin	155 (BL)	BL	BL	BL	---	---	Pass
10	Silvery metal	BL	BL	BL	BL	---	---	Pass
11	Metal (copper sheet)	BL	BL	BL	BL	---	---	Pass
12	Soldering tin	250 (BL)	BL	BL	BL	---	---	Pass
13-1	Blue wire sheath	BL	BL	BL	BL	BL	---	Pass
13-2	Copper wire	BL	BL	BL	BL	---	---	Pass
14	Metal (screw)	BL	BL	BL	IN	---	Cr(VI): Negative	Pass
15	metal (key ring)	BL	BL	BL	IN	---	Cr(VI): Negative	Pass
16	Metal (O-ring)	BL	BL	BL	IN	---	Cr(VI): Negative	Pass
17	Metal (D-buckle)	BL	BL	BL	BL	---	---	Pass
18	Black plastic	BL	BL	BL	BL	BL	---	Pass
19	Red plastic	BL	BL	BL	BL	BL	---	Pass
20	Green plastic	BL	BL	BL	BL	BL	---	Pass

Remark:

(^1) "---" = Not Applicable;

(^2) (a) It is the result on total Br while test item on restricted substances is PBBs/PBDEs. It is the result on total Cr while test item on restricted substances is Cr(VI).

(b) The XRF screening test for RoHS elements-The reading may be different to the actual content in the sample be of non-uniformity composition.

(c) Results are obtained by EDXRF for primary screening, and further chemical testing by ICP-OES (for Pb, Cd, Hg), UV-VIS (for Cr(VI)) and GC/MSD (for PBBs, PBDEs) is recommended to be performed, if the concentration exceeds the below warming value according to IEC 62321-3-1: 2013.

Attached table 1, XRF screening limits in mg/kg for regulated elements in various matrices:

Element	Polymer Materials	Metallic Materials	Electronics
Cd	BL≤(70-3σ)< X < (130+3σ) ≤OL	BL≤(70-3σ)< X < (130+3σ) ≤OL	LOD< X < (250+3σ) ≤OL
Pb	BL≤(700-3σ)< X < (1300+3σ) ≤OL	BL≤(700-3σ)< X < (1300+3σ) ≤OL	BL≤(500-3σ)< X < (1500+3σ) ≤OL
Hg	BL≤(700-3σ)< X < (1300+3σ) ≤OL	BL≤(700-3σ)< X < (1300+3σ) ≤OL	BL≤(500-3σ)< X < (1500+3σ) ≤OL
Br	BL≤(300-3σ)< X	N.A.	BL≤(250-3σ)< X
Cr	BL≤(700-3σ)< X	BL≤(700-3σ)< X	BL≤(500-3σ)< X

Note: ① BL "below limit" = the result less than the limit.

② OL "over limit" = the result greater than the limit.

③ IN = inconclusive, the region where need further chemical testing by ICP-OES (for Pb, Cd, Hg), UV-VIS (for Cr(VI)) and GC/MSD (for PBBs, PBDEs).

④ 3σ = Repeability of the analyser at the action level.

⑤ LOD = Limit of detection.

(^3) (a) mg/kg = ppm = 0.0001%; (b) N.D. = Not detected (lower than RL);

(c) Reporting Limit (RL) and Limit of Directive 2011/65/EU.

Parameter	Unit	Limit	Reporting Limit (RL)
Lead (Pb)	mg/kg	1000	10
Cadmium (Cd)	mg/kg	100	10
Mercury (Hg)	mg/kg	1000	10
Chromium VI (Cr VI)	mg/kg	1000	R1
Group PBBs	mg/kg	1000	R2
Group PBDEs	mg/kg	1000	R2

R1: Cr(VI) for metal sample, the reporting limit (RL) = Method Detection Limit (MDL) = 0.10 ug/cm^2.
The reporting limit (RL) of Cr(VI) for polymers and electronics is 10mg/kg.

R2: The reporting limit (RL) for single compound of PBBs & PBDEs is 50mg/kg.

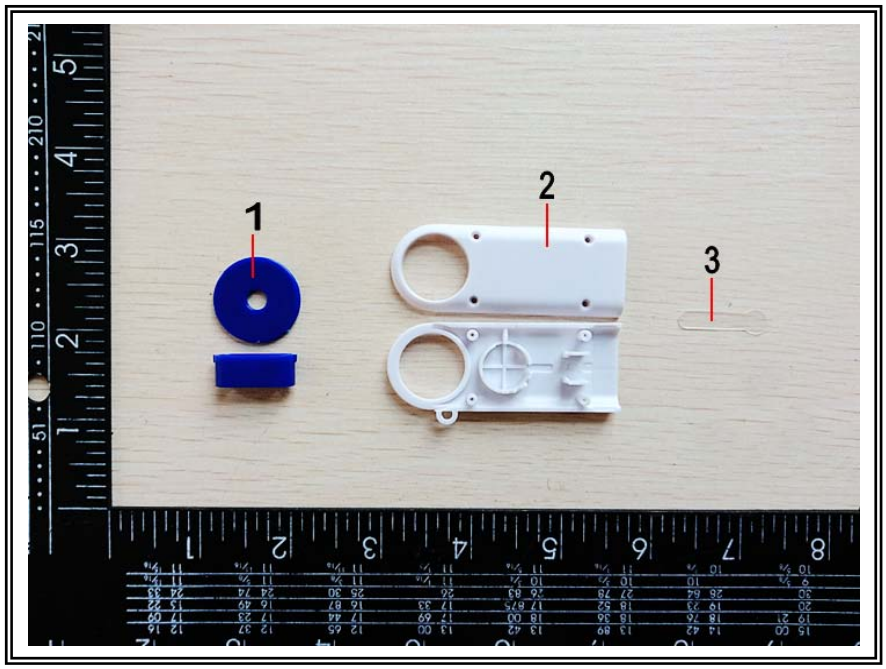
(d) According to IEC 62321-7-1: 2015, result on Cr(VI) for metal sample is shown as Negative, Inconclusive or Positive: Negative = Absence of Cr(VI), Inconclusive = Maybe exist Cr(VI), Positive = Presence of Cr(VI).

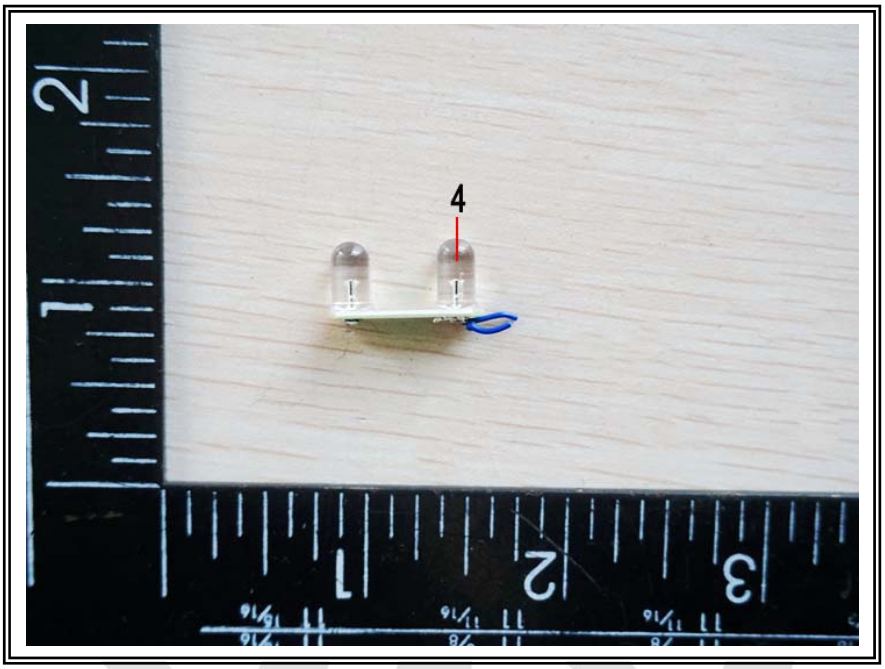
Colorimetric result (Cr(VI) concentration)	Qualitative result
The sample solution is < the 0.10 ug/cm^2 equivalent comparison standard solution	The sample is negative for Cr(VI)_The Cr(VI) concentration is below the limit of quantification. The coating is considered a non-Cr(VI) based coating.
The sample solution is ≥ the 0.10 ug/cm^2 and ≤ the 0.13 ug/cm^2 equivalent comparison standard solutions	The result is considered to be inconclusive – Unavoidable coating variations may influence the determination. Recommendation: if addition samples are available, perform a total of 3 trials to increase sampling surface area. Use the averaged result of the 3 trials for the final determination.
The sample solution is > the 0.13 ug/cm^2 equivalent comparison standard solution	The sample is positive for Cr(VI)_The Cr(VI) concentration is above the limit of quantification and the statistical margin of error. The sample coating is considered to contain Cr(VI).

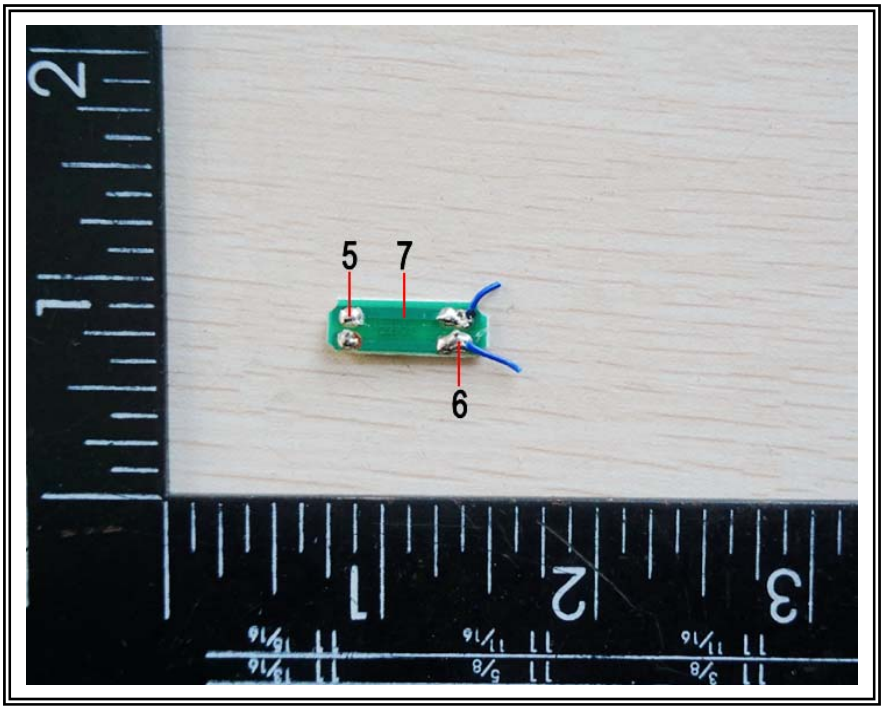
Sample photo(s):

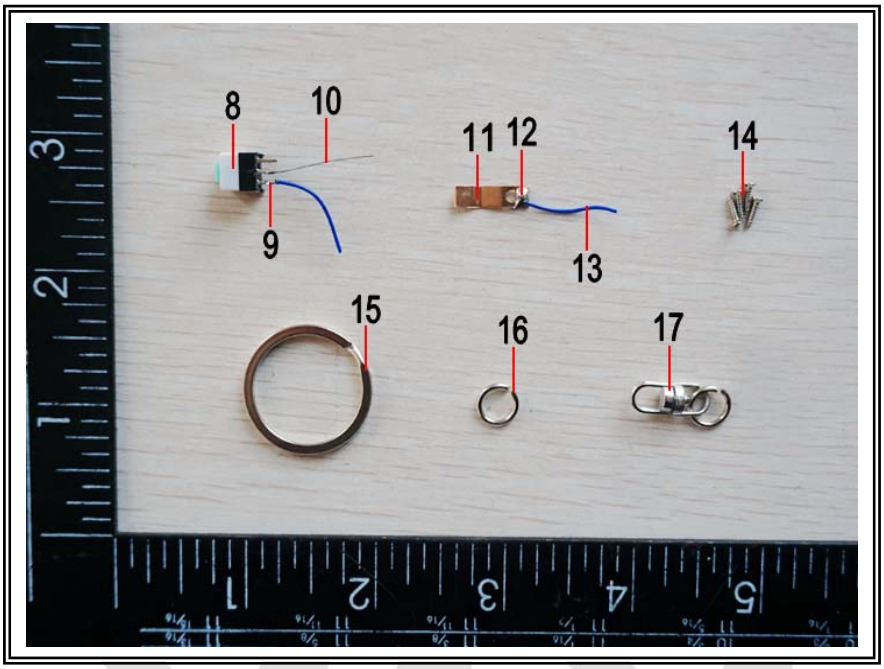
Test item: Keyring torch with token

Tested Model: MO8466









GIG authenticate the photo(s) on original report only

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