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Client: China Pneumatic Corporation
No. 16, Ziqiang 1st Rd., Zhongli Dist., Taoyuan City 32063, Taiwan, R.O.C.

Test item(s): Wireless Torque Transducer

Identification/Model No(s): TTES Series / TTAS Series / TTEH Series / TTAH Series / TTEP Series / TTAP Series / TTEB Series/ STA Series

Sample obtaining method: Sending by customer

Condition at delivery: Test item complete and undamaged.

Sample receiving date: 2024-02-05, 2024-03-06, 2024-03-08, 2024-03-11, 2024-06-25

Testing period: 2024-02-05 – 2024-03-20; 2024-06-25 – 2024-07-11

Place of testing: TÜV Rheinland Hong Kong Ltd.

Test specification:

According to RoHS (recast): Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, 2011/65/EU Annex II and its amendment Directive (EU) 2015/863: Total Content of Lead, Cadmium, Mercury, Chromium VI, Polybrominated Biphenyls, Polybrominated Diphenyl Ethers; and Benzylbutyl phthalate (BBP), Dibutyl phthalate (DBP), Bis(2-ethylhexyl) phthalate (DEHP), Diisobutyl phthalate (DIBP)

Test result:

Pass

Other information: According to the client's email declaration dated on 21.03.2024 and 10.07.2024, the only differences between individual series are the dimensions of the metal shaft and outer casing, with this part being consistent in color and material.

For and on behalf of
TÜV Rheinland Taiwan Ltd.


Arthur Cheng/Project Manager
Name/Position



2024-08-08
Date

Sample information is provided by customer. Test result is drawn according to the kind and extent of tests performed. This test report relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products. "Decision Rule" document announced in our website (<https://www.tuv.com/landingpage/en/qm-gcn/>) describes the statement of conformity and its rule of enforcement for test results are applicable throughout this test report..

Material List:

Lab no.: TCL240205-03A~C

Mat. No.	Material	Color	Location	Remark
1	Plastic + adhesive	red/black/white	Photo1	A/B/C
2	Plastic	black	Photo1	A/B/C
3	Metal	metal	Photo1	A/B/C
4	Metal	black	Photo1	A/B
5	Plastic + adhesive	pink	Photo2	A/B/C
6	Metal	metallic	Photo2	A
7	Plastic	black	Photo2	A/B/C
8	Plastic	red	Photo3	A
9	Metal	metallic	Photo3	A
10	Plastic	red	Photo3	A/B/C
11	Plastic	light green	Photo3	A/B/C
12	Elastomer	blue	Photo3	A/B/C
13	Plastic	black	Photo4	A/B
14	PCB board	green	Photo5	A/B
15	Electronic components	black	Photo5	A
16	Electronic components	black	Photo5	A
17	Electronic components	black	Photo6	A/B/C
18	Electronic components	black	Photo6	A/B/C
19	Electronic components	black	Photo6	A/B/C
20	Electronic components	golden	Photo7	A/B/C
21	Elastomer	black	Photo7	A/B
22	Plastic	white	Photo8	B
23	Plastic	black	Photo8	B
24	Metal	golden	Photo9	B/C
25	Electronic components	metallic	Photo9	B
26	Electronic components	black	Photo9	B
27	Metal	metallic	Photo10	C
28	Metal	black	Photo10	C
29	Metal	black	Photo11	C
30	Metal	black	Photo11	C
31	Metal	black	Photo12	C
32	Electronic components	metallic	Photo13	C
33	Electronic components	black	Photo13	C
34	Metal	metallic	Photo14	C
35	Plastic	black	Photo15	accessories
36	Metal	metallic	Photo15	accessories
37	Elastomer	black	Photo16	accessories
38	Plastic	black	Photo16	accessories
39	Plastic	white	Photo16	accessories
40	Plastic	red	Photo16	accessories
41	Plastic	yellow	Photo16	accessories
42	Magnet	metallic	Photo16	accessories
43	Plastic	black	Photo17	accessories
44	Metal	metallic	Photo17	accessories
45	Plastic	white	Photo17	accessories
46	Plastic	black	Photo17	accessories
47	Metal	metallic	Photo18	TCL240308-47

Mat. No.	Material	Color	Location	Remark
48	Metal	metallic	Photo19	TCL240308-47
49	Plastic	black	Photo20	TCL240306-13 (retest for mat.13)
50	Plastic	white	Photo20	TCL240306-12 (retest for mat.22)
51	Plastic	black	Photo21	TCL240311-02 (retest for mat.43)
52	Plastic	black	Photo21	TCL240311-02 (retest for mat.46)
53	Plastic+printing+adhesive	red/black/white	Photo22	TCL240625-02

Remark:

1. Component(s)/ materials(s) with an area of less than 2mm x 2mm or insufficient weight will not be selected for testing according to RoHS Directive 2011/65/EU due to technical reason.
2. For the test sample does not have detail materials information provided by client, visually identical materials (e.g. wire insulation, solder points, etc.) will be considered as the same material.
3. Solder points on a printing circuit board will be examined several times based on optical anomalies or discoloration of the solder point(s) unless the solder point(s) is obviously generated automatically during production.
4. All other materials will be sampled and tested at one test point representatively.

Test sample



TCL240205-03A



TCL240205-03B



TCL240205-03C



accessories



accessories



TCL240308-47



TCL240625-02

Material Photo



Photo1



Photo2

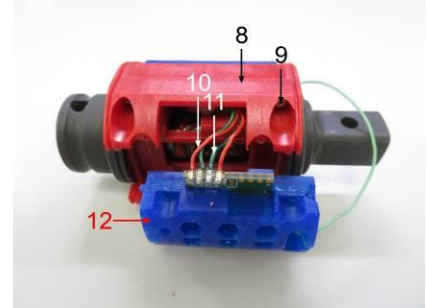


Photo3



Photo4

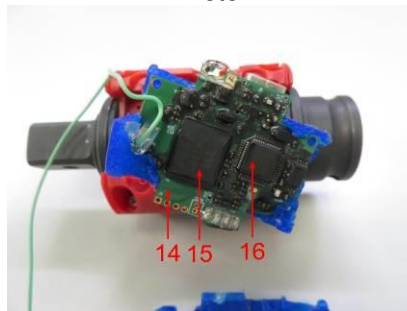


Photo5

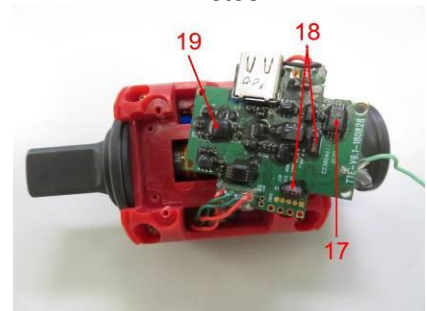


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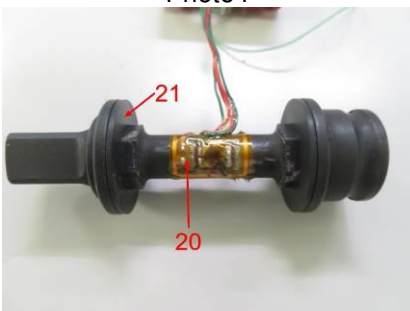


Photo7

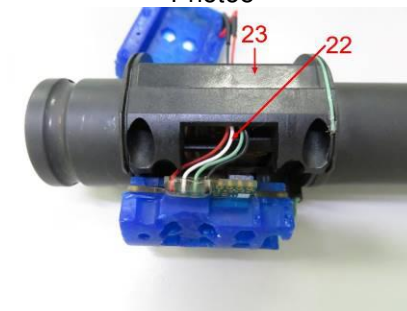


Photo8

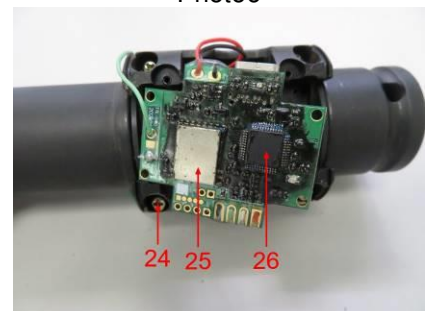


Photo9



Photo10



Photo11



Photo12

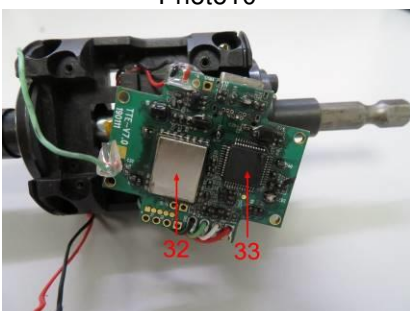


Photo13

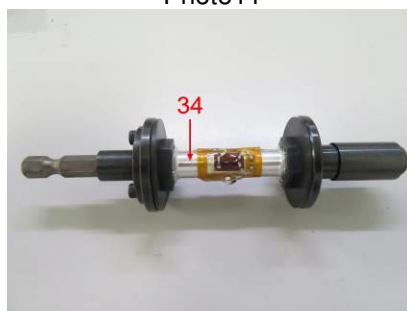


Photo14



Photo15



Photo16



Photo17

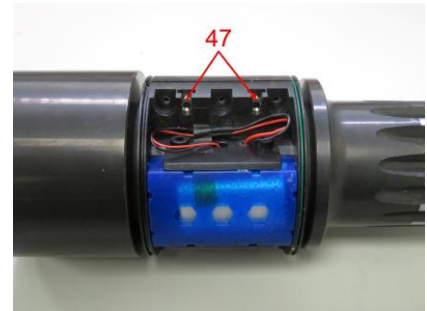


Photo18



Photo19

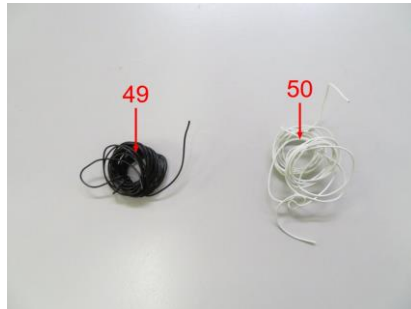


Photo20



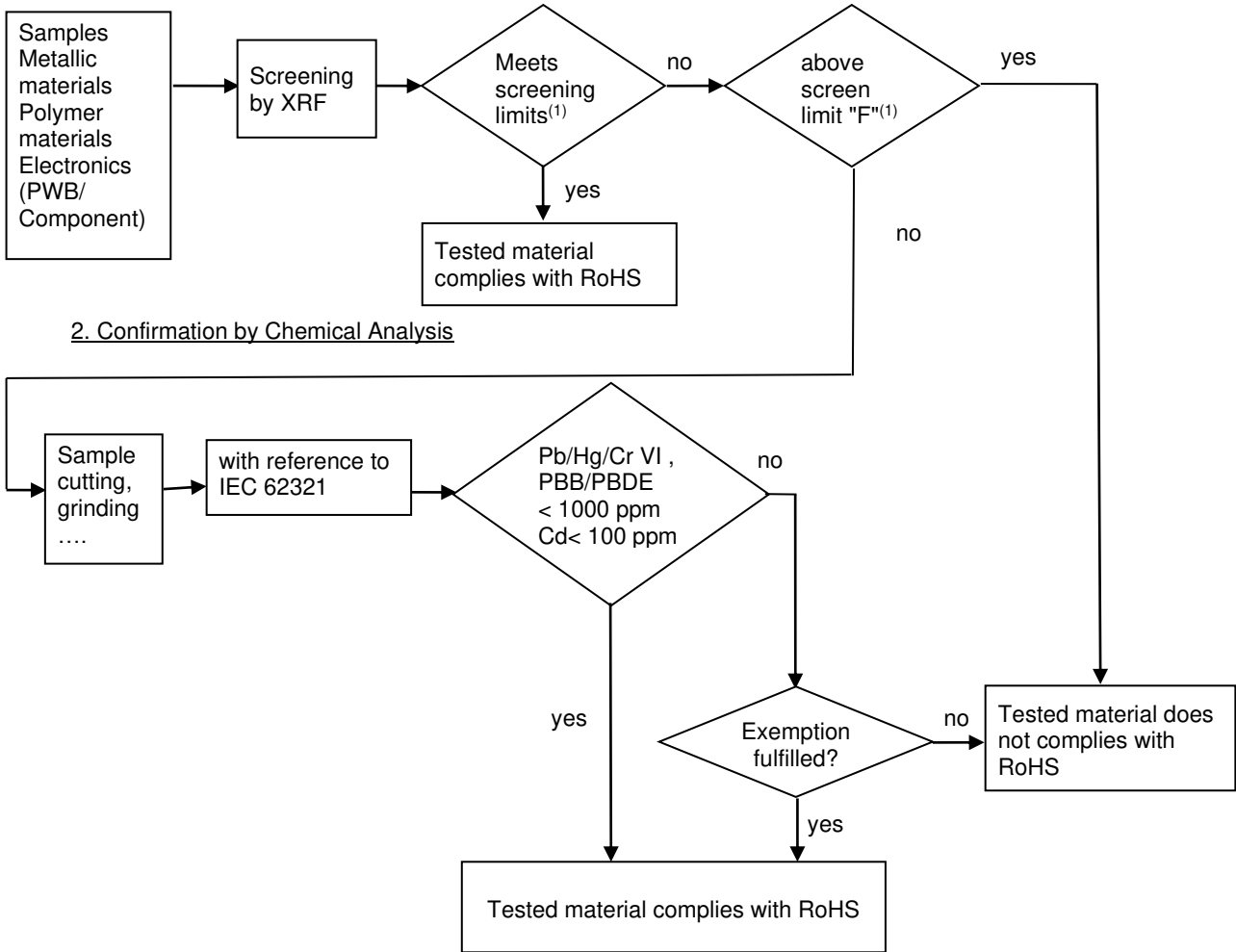
Photo21



Photo22

Testing procedure:

1. Screening by X-RAY Fluorescence Spectrometry (XRF)



Test Method : Cadmium, Lead, Mercury, Chromium, Bromine
 With reference to IEC 62321-3-1:2013

1. Screening by X-Ray Fluorescence Spectrometry (XRF)

Sample No.		1	2	3	4
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	d(*1)	d(*1)
Bromine (Br)	[mg/kg]	BL	BL	n.a.	n.a.

Sample No.		5	6	7	8
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	BL	BL
Bromine (Br)	[mg/kg]	BL	n.a.	BL	BL

Sample No.		9	10	11	12
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	BL	BL
Bromine (Br)	[mg/kg]	n.a.	BL	BL	BL

Sample No.		13	14	15	16
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	BL	BL
Bromine (Br)	[mg/kg]	BL	d(*1)	BL	BL

Sample No.		17	18	19	20
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	d(*1)	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	BL	BL
Bromine (Br)	[mg/kg]	BL	BL	BL	BL

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Sample No.		21	22	23	24
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	BL	d(*1)
Bromine (Br)	[mg/kg]	BL	BL	BL	n.a.

Sample No.		25	26	27	28
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	d(*1)	BL
Bromine (Br)	[mg/kg]	BL	BL	n.a.	n.a.

Sample No.		29	30	31	32
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	d(*1)	d(*1)	d(*1)	BL
Bromine (Br)	[mg/kg]	n.a.	n.a.	n.a.	BL

Sample No.		33	34	35	36
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	BL	d(*1)
Bromine (Br)	[mg/kg]	BL	n.a.	BL	n.a.

Sample No.		37	38	39	40
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	BL	BL
Bromine (Br)	[mg/kg]	BL	BL	BL	BL

Sample No.		41	42	43	44
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	BL	BL
Bromine (Br)	[mg/kg]	BL	n.a.	BL	n.a.

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Sample No.		45	46	47	48
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	BL	d(*1)
Bromine (Br)	[mg/kg]	BL	BL	n.a.	n.a.

Sample No.		49	50	51	52
Cadmium (Cd)	[mg/kg]	BL	BL	BL	BL
Lead (Pb)	[mg/kg]	BL	BL	BL	BL
Mercury (Hg)	[mg/kg]	BL	BL	BL	BL
Chromium (Cr)	[mg/kg]	BL	BL	BL	BL
Bromine (Br)	[mg/kg]	BL	BL	BL	BL

Sample No.		53
Cadmium (Cd)	[mg/kg]	BL
Lead (Pb)	[mg/kg]	BL
Mercury (Hg)	[mg/kg]	BL
Chromium (Cr)	[mg/kg]	BL
Bromine (Br)	[mg/kg]	BL

Notes:

- BL = Below limit
- OL = Over limit
- d. = detected
- n.a. = Not applicable
- mg/kg = milligram per kilogram
- ¹⁾ The screening result was detected in the inconclusive region or over limits, thus the further wet chemistry tests are suggested.

Remark:

XRF Screening limits for different matrices :

Materials	Concentration (mg/kg)				
	Cd	Cr	Pb	Hg	Br
Polymeric	BL≤60<X<140≤OL	BL≤640<X	BL≤670<X<1330≤OL	BL≤660<X<1340≤OL	BL≤290<X
Metallic	BL≤60<X<140≤OL	BL≤640<X	BL≤670<X<1330≤OL	BL≤660<X<1340≤OL	n.a.
Composite materials	BL≤40<X<160≤OL	BL≤440<X	BL≤470<X<1530≤OL	BL≤460<X<1540≤OL	BL≤240<X

* The symbol "X" marks the region where further investigation is necessary.

Test Method : Total Cadmium, Lead, Mercury, Chromium
 - Ref. to IEC 62321-4:2013 and IEC 62321-5:2013
 Chromium (VI)
 - For Metal material - Ref. to IEC 62321-7-1:2015
 - For Polymer, Electronic material or others materials - Ref. to IEC 62321-7-2:2017
 PBBs, PBDEs - Ref. to IEC 62321-6:2015

2. Confirmation by Chemical Analysis

Sample No.	RL	3	4	24	27
Chromium VI (Cr VI)* [$\mu\text{g}/\text{cm}^2$]	0.1	< RL	< RL	< RL	< RL

Sample No.	RL	29	30	31	36
Chromium VI (Cr VI)* [$\mu\text{g}/\text{cm}^2$]	0.1	< RL	< RL	< RL	< RL

Sample No.	RL	48
Chromium VI (Cr VI)* [$\mu\text{g}/\text{cm}^2$]	0.1	< RL

Material No.	RL	18
Lead (Pb) [mg/kg]	2	256000 ¹⁾

Sample No.	RL	14
PBBs [mg/kg]	5	< RL
PBDEs [mg/kg]	5	< RL

Notes:

- < = less than
- RL = Reporting Limit
- mg/kg = milligram per kilogram
- ¹⁾ According to (EU) 2018/736, 2012/50/EU and Annex III 7(c)-I of directive 2011/65/EU, Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectric devices, or in a glass or ceramic matrix compound is exempted from requirement. This exemption is declared by the report owner and shall be responsible for the future disputes if any.
- * Once the total Cr content in metal/ plastic or electronic sample is found to be exceeded the limit, the Cr (VI) content will be confirmed with reference to IEC 62321-7-1:2015/ IEC 62321-7-2:2017

Chromium (VI) concentration	Qualitative result
<0.1 $\mu\text{g}/\text{cm}^2$	The sample is negative (-ve) for Cr(VI). The Cr(VI) concentration is below the limit of quantification. The coating is considered a non-Cr(VI) based coating.
$\geq 0.1\mu\text{g}/\text{cm}^2$ and $\leq 0.13\mu\text{g}/\text{cm}^2$	The result is considered to be inconclusive. Unavoidable coating variations may influence the determination. Recommendation: if additional samples are available, perform a total of 3 trials to increase sampling surface area. Use the averaged result of the 3 trails for the final determination.
>0.13 $\mu\text{g}/\text{cm}^2$	The sample is positive (+ve) for Cr(VI). Concentration is above the limit of quantification and the statistical margin of error. The sample coating is considered to contain Cr(VI).

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	Cd	Cr(VI)	Pb	Hg	PBBs	PBDEs
Maximum permissible Limit acc. to 2011/65/EU (mg/kg)	100	1000	1000	1000	1000	1000

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Test Method : BBP/DBP/DEHP/DIBP - Ref. to IEC 62321-8:2017

Sample No.	RL	1+7+8	10+11	12	14
Benzylbutylphthalate (BBP) mg/kg	50	< RL	< RL	< RL	< RL
Dibutylphthalate (DBP) mg/kg	50	< RL	< RL	< RL	< RL
Diethylhexylphthalate (DEHP) mg/kg	50	< RL	100	60	< RL
Diisobutylphthalate (DIBP) mg/kg	50	< RL	< RL	< RL	< RL

Sample No.	RL	21	23	35	37
Benzylbutylphthalate (BBP) mg/kg	50	< RL	< RL	< RL	< RL
Dibutylphthalate (DBP) mg/kg	50	< RL	< RL	< RL	< RL
Diethylhexylphthalate (DEHP) mg/kg	50	< RL	110	< RL	< RL
Diisobutylphthalate (DIBP) mg/kg	50	< RL	< RL	< RL	< RL

Sample No.	RL	38+39+40	41	49+50	51+52
Benzylbutylphthalate (BBP) mg/kg	50	< RL	< RL	< RL	< RL
Dibutylphthalate (DBP) mg/kg	50	< RL	< RL	< RL	< RL
Diethylhexylphthalate (DEHP) mg/kg	50	< RL	< RL	< RL	< RL
Diisobutylphthalate (DIBP) mg/kg	50	< RL	< RL	< RL	< RL

Sample No.	RL	53
Benzylbutylphthalate (BBP) mg/kg	50	< RL
Dibutylphthalate (DBP) mg/kg	50	< RL
Diethylhexylphthalate (DEHP) mg/kg	50	< RL
Diisobutylphthalate (DIBP) mg/kg	50	< RL

Notes:

- < = less than
- RL = Reporting Limit
- mg/kg = milligram per kilogram

	BBP	DBP	DEHP	DIBP
Maximum permissible Limit acc. to (EU) 2015/863 (mg/kg)	1000	1000	1000	1000

--- End of Test-Report ---