



Test Report

No. [REDACTED]

Date: May 18, 2020

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[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

The following sample(s) was/were submitted and identified by/on behalf of the client as:

TI Wafer
Model/Part No.: N/A
Country of Destination: US

Sample Received Date:

5/5/2020

Testing Period:

5/5/2020 – 5/18/2020

Test Requested : Please refer to the result summary.

Test Method & Results : Please refer to next page(s).

Result Summary :

Test Requested	Conclusion
1. RoHS Directive 2011/65/EU Annex II	PASS
2. Directive (EU) 2015/863 of amending RoHS Directive 2011/65/EU	PASS
3. Halogen Content (Cl, Br) of the submitted sample(s) with reference to BS EN 14582:2016	See Test Results
4. Beryllium Content	See Test Results
5. Antimony Content	See Test Results
6. Arsenic Content	See Test Results

Signed for and on behalf of SGS North America, Inc.

Prepared By:

Shaina Gibbons
Technical Report Writer, Chemistry Laboratory

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1. RoHS Directive 2011/65/EU Annex II

Test Item(s):	Unit	Test Method	Results	MDL	Limit
			1		
Cadmium (Cd)	mg/kg	With reference to IEC 62321-5:2013 (Determination of Cd and Pb by ICP-OES and /or ICP-MS)	ND	2	100
Lead (Pb)	mg/kg		74.8	2	1000
Mercury (Hg)	mg/kg	With reference to IEC 62321-4:2013 (Determination of Hg by ICP-OES and/ or ICP-MS)	ND	2	1000
Hexavalent Chromium (CrVI)	mg/kg	With reference to IEC 62321-7-2:2017 (Determination of CrVI by UV-Vis)	ND*	2	1000
Sum of PBBs	mg/kg	With reference to IEC 62321-6:2015 (Determination of PBB and PBDE by GC-MS)	ND	-	1000
Monobromobiphenyl	mg/kg		ND	5	-
Dibromobiphenyl	mg/kg		ND	5	-
Tribromobiphenyl	mg/kg		ND	5	-
Tetrabromobiphenyl	mg/kg		ND	5	-
Hexabromobiphenyl	mg/kg		ND	5	-
Pentabromobiphenyl	mg/kg		ND	5	-
Heptabromobiphenyl	mg/kg		ND	5	-
Octabromobiphenyl	mg/kg		ND	5	-
Nonabromobiphenyl	mg/kg		ND	5	-
Decabromobiphenyl	mg/kg		ND	5	-
Sum of PBDEs	mg/kg		ND	-	1000
Monobromodiphenyl ether	mg/kg		ND	5	-
Dibromodiphenyl ether	mg/kg		ND	5	-
Tribromodiphenyl ether	mg/kg		ND	5	-
Tetrabromodiphenyl ether	mg/kg		ND	5	-
Pentabromodiphenyl ether	mg/kg		ND	5	-
Hexabromodiphenyl ether	mg/kg		ND	5	-
Heptabromodiphenyl ether	mg/kg		ND	5	-
Octabromodiphenyl ether	mg/kg		ND	5	-
Nonabromodiphenyl ether	mg/kg		ND	5	-
Decabromodiphenyl ether	mg/kg		ND	5	-
Conclusion	/		PASS	/	/

Sample Description:

1. TI Wafer

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Note :

- (a) mg/kg = ppm ; 0.1wt% = 1000ppm
- (b) ND= not detected
- (c) MDL = Method Detection Limit
- (d) - = not regulated
- (e) * = Total Chromium analysis by ICP-MS and/or ICP-OES was not detected in submitted sample.
Therefore, Hexavalent Chromium determination using UV-Visible Spectroscopy was not performed.
- (f) IEC 62321 series is equivalent to EN 62321 series
http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25

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2. Directive (EU) 2015/863 of amending RoHS Directive 2011/65/EU

Test Item(s):	Unit	Test Method	Results	MDL	Limit
			1		
Bis (2-ethylhexyl) Phthalate (DEHP)	mg/kg	IEC 62321-8:2017 (Determination of DEHP, BBP, DBP and DIBP by GC-MS)	ND	50	1000
Butyl Benzyl Phthalate (BBP)	mg/kg		ND	50	1000
Dibutyl Phthalate (DBP)	mg/kg		ND	50	1000
Diisobutyl Phthalate (DIBP)	mg/kg		ND	50	1000
Conclusion	/	/	PASS	/	/

Sample Description:

1. TI Wafer

Note :

- (a) mg/kg = ppm ; 0.1wt% = 1000ppm
- (b) ND= not detected
- (c) MDL = Method Detection Limit
- (d) - = not regulated
- (e) IEC 62321 series is equivalent to EN 62321 series

http://www.cenelec.eu/dyn/www/f?p=104:30:1742232870351101:::FSP_ORG_ID,FSP_LANG_ID:1258637,25

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3. Halogen Content (Cl, Br) of the submitted sample(s) with reference to BS EN 14582:2016

With reference to **BS EN 14582:2016** "Characterization of waste – Halogen and sulfur content – Oxygen Combustion in closed systems and determination methods". Analysis was performed by Ion Chromatography and/or HD-XRF.

Test Items	Unit	Method Detection Limit	1
Halogen – Chlorine (Cl) CAS # 007782-50-5	mg/kg	50	ND
Halogen – Bromine (Br) CAS # 007726-95-6	mg/kg	50	ND

Sample Description:

1. TI Wafer

Note: 1. mg/kg = milligram per kilogram

2. mg/kg = ppm

3. ND = Not Detected, reported when the reading is less than the detection limit value.

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4. Beryllium Content

Test Method: With reference to US EPA Method 3052 followed by analysis using ICP-OES and/or ICP-MS.

Test Item	Result (mg/kg)	Detection Limit (mg/kg)
	1	
Beryllium (Be)	ND	2

Sample Description:

1. TI Wafer

Note: 1. mg/kg = milligram per kilogram

2. mg/kg = ppm

3. ND = Not Detected, reported when the reading is less than the detection limit value.

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5. Antimony Content

Test Method: With reference to US EPA Method 3052 followed by analysis using ICP-OES and/or ICP-MS.

Test Item	Result (mg/kg)	Detection Limit (mg/kg)
	1	
Antimony (Sb)	34.4	2

Sample Description:

1. TI Wafer

Note: 1. mg/kg = milligram per kilogram

2. mg/kg = ppm

3. ND = Not Detected, reported when the reading is less than the detection limit value.

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6. Arsenic Content

Test Method: With reference to US EPA Method 3052 followed by analysis using ICP-OES and/or ICP-MS.

Test Item	Result (mg/kg)	Detection Limit (mg/kg)
	1	
Arsenic (As)	3.03	2

Sample Description:

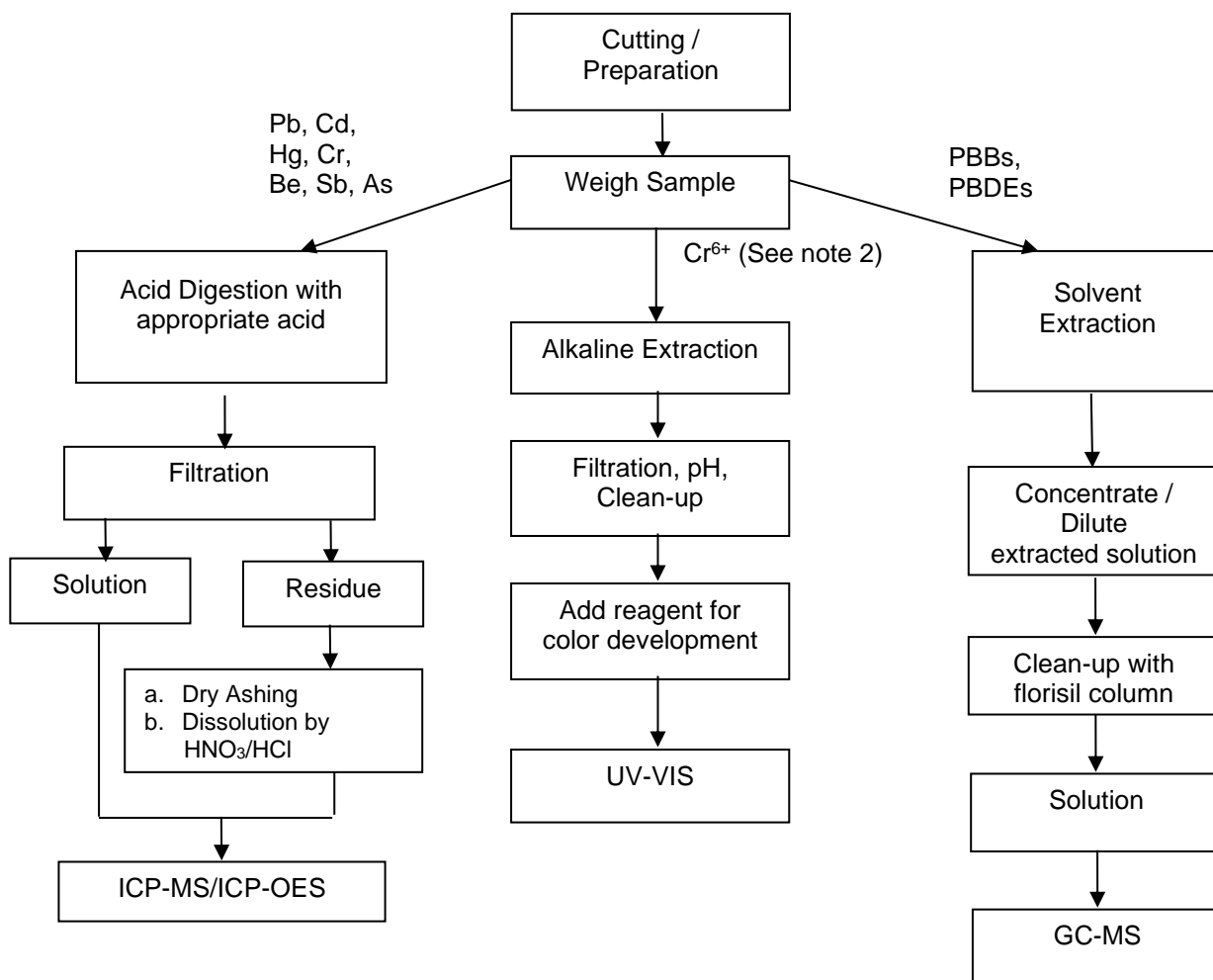
1. TI Wafer

Note: 1. mg/kg = milligram per kilogram

2. mg/kg = ppm

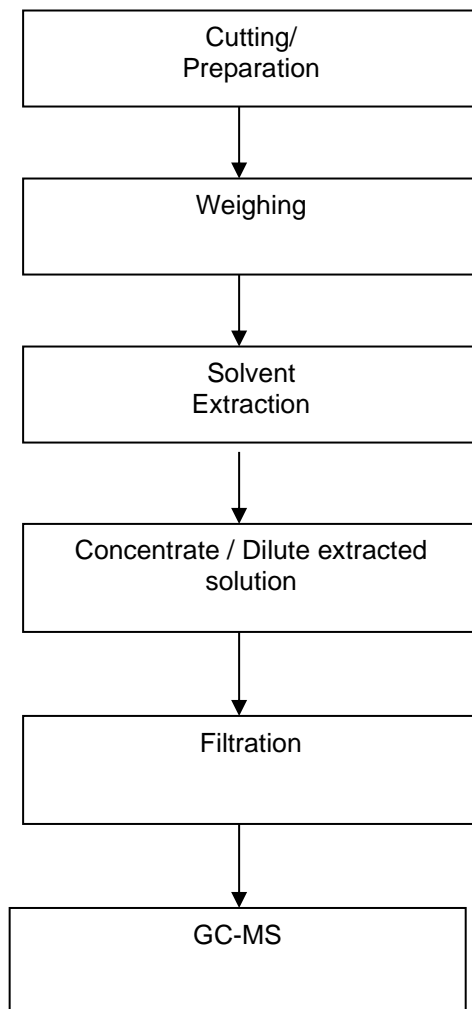
3. ND = Not Detected, reported when the reading is less than the detection limit value.

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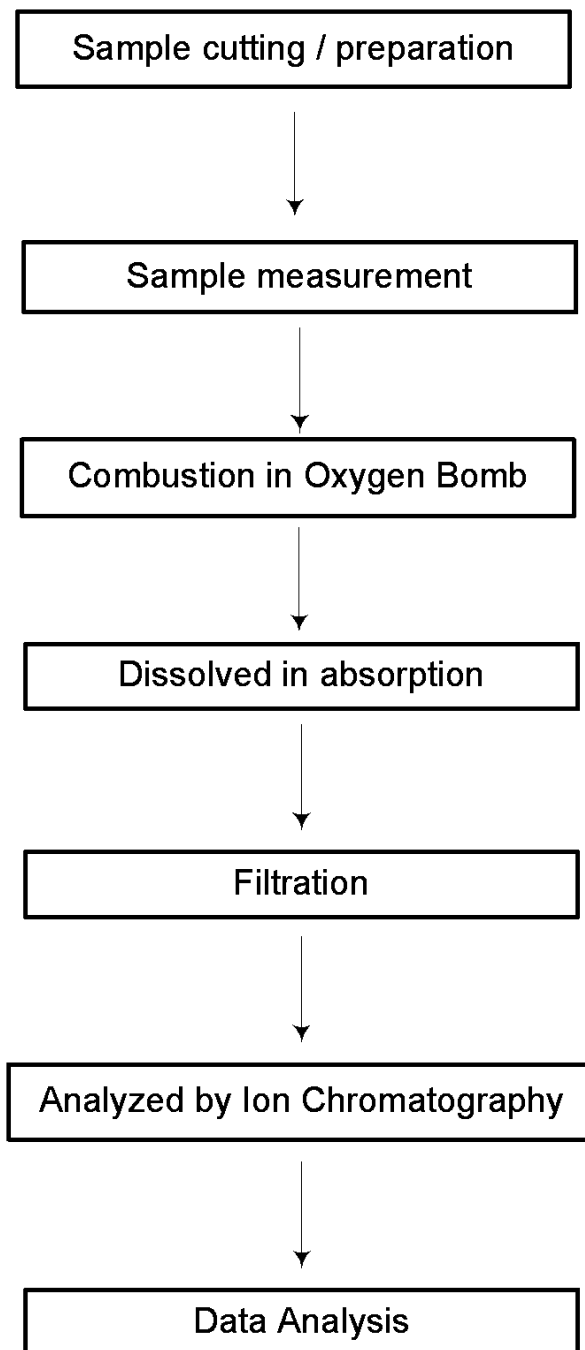
Flowchart for ROHS Testing:


- Note : 1. The Be, Sb, As, Cd, Pb, Hg contents test on polymeric samples were dissolved totally by pre-conditioning method according to above flow chart.
2. Cr⁶⁺ is performed only when total Cr is detected

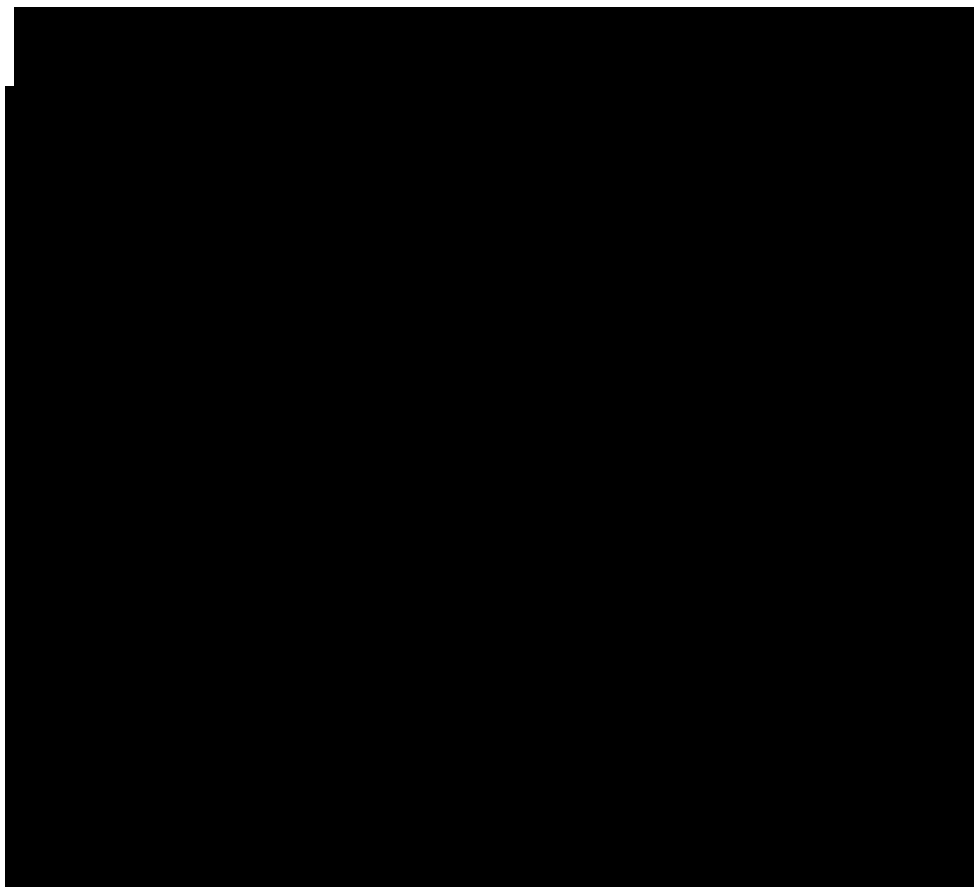
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Flowchart for Phthalates


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Halogen Testing Flow Chart


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Sample Photo(s):


SGS authenticates the photo(s) on the original report only

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