

# Test Report

No.: CANEC23009158804

Date: Sep 26, 2023

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Client Name: QPL LIMITED

Client Address: NO. 9 MU LIN ROAD, CHANG AN TOWN, DONGGUAN, GUANGDONG, PEOPLE'S REPUBLIC OF CHINA

Sample Name: Ni Pd Au Plating

Client Ref. Information: Sample may cover PDIP, PLCC, QFN, DFN, LPCC, QFP, LQFP, TQFP, SIP, SOIC, SOP, SSOP, TSOP TSSOP, SOT, SOD, TO, ZIP, FBP, LED, LFGA/ELP, HD-BU, HD-EB, HDL Leadframes Heatsink and Stiffeners

The above sample(s) and information were provided by the client.

SGS Job No.: SZP23-017214

Sample Receiving Date: Aug 31, 2023

Testing Period: Aug 31, 2023 ~ Sep 08, 2023

Test Requested: Select test(s) as requested by the client.

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

Test Result(s): Please refer to next page(s).

Test Requirement	Conclusion
EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU- Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)	Pass
EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU- Lead, Mercury, Cadmium and Hexavalent chromium	Pass
European Regulation POPs (EU) 2020/784 amending to Regulation (EU) 2019/1021 - Perfluorooctanoic acid (PFOA) and its salts, PFOA-Related Substances, Perfluorooctane sulfonates (PFOS) and its derivatives	Pass
Tetrabromobisphenol A (TBBP-A)	See Results
Alkanes C14-C17, chloro (medium- chain chlorinated paraffins) (MCCPs)	See Results
European Regulation POPs (EU) 2019/1021– Alkanes C <sub>10</sub> -C <sub>13</sub> , chloro (short chain-chlorinated paraffins) (SCCPs)	Pass
Halogen	See Results

Signed for and on behalf of  
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Jessie Li

Jessie-JX Li  
Approved Signatory

scan to see the report



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Guangzhou Branch Standards Technical Services Co., Ltd. Guangzhou Branch

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Test Requirement	Conclusion
Element(s)	See Results
Phthalates	See Results
Polychlorinated Biphenyls (PCBs)	See Results
Polychlorinated Naphthalenes (PCNs)	See Results
Polychlorinated Terphenyls (PCTs)	See Results
Dimethyl fumarate (DMFu)	See Results
Flame Retardants	See Results
Organic-Tin compounds	See Results
Polyvinyl chloride (PVC)	See Results

**Test Result(s):**

**Test Part Description:**

SN ID	Sample No.	SGS Sample ID	Description
SN1	A4	CAN23-0091588-0001.C004	Golden plated metal
SN2	A5	CAN23-0091588-0001.C005	Golden plating on metal

**Remarks:**

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

**EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU- Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs), Bis(2-ethylhexyl) phthalate (DEHP), Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) and Diisobutyl phthalate (DIBP)**

**Test Method:** With reference to IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013, IEC 62321-7-1:2015, IEC 62321-6:2015 and IEC62321-8:2017, analysis was performed by ICP-OES, UV-Vis and GC-MS.

Test Item(s)	Limit	Unit(s)	MDL	A4
Cadmium(Cd)	100	mg/kg	2	ND
Lead(Pb)	1000	mg/kg	2	23
Mercury(Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI)) ▼	-	µg/cm <sup>2</sup>	0.10	ND
Polybromobiphenyl (PBBs)	1000	mg/kg	-	ND
Monobromobiphenyl (MonoBB)	-	mg/kg	5	ND
Dibromobiphenyl (DiBB)	-	mg/kg	5	ND
Tribromobiphenyl (TriBB)	-	mg/kg	5	ND
Tetrabromobiphenyl (TetraBB)	-	mg/kg	5	ND



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Test Item(s)	Limit	Unit(s)	MDL	A4
Pentabromobiphenyl (PentaBB)	-	mg/kg	5	ND
Hexabromobiphenyl (HexaBB)	-	mg/kg	5	ND
Heptabromobiphenyl (HeptaBB)	-	mg/kg	5	ND
Octabromobiphenyl (OctaBB)	-	mg/kg	5	ND
Nonabromobiphenyl (NonaBB)	-	mg/kg	5	ND
Decabromobiphenyl (DecaBB)	-	mg/kg	5	ND
Polybromodiphenyl ether(PBDEs)	1000	mg/kg	-	ND
Monobromodiphenylether (MonoBDE)	-	mg/kg	5	ND
Dibromodiphenylether (DiBDE)	-	mg/kg	5	ND
Tribromodiphenylether (TriBDE)	-	mg/kg	5	ND
Tetrabromodiphenylether (TetraBDE)	-	mg/kg	5	ND
Pentabromodiphenylether (PentaBDE)	-	mg/kg	5	ND
Hexabromodiphenylether (HexaBDE)	-	mg/kg	5	ND
Heptabromodiphenylether (HeptaBDE)	-	mg/kg	5	ND
Octabromodiphenylether (OctaBDE)	-	mg/kg	5	ND
Nonabromodiphenylether (NonaBDE)	-	mg/kg	5	ND
Decabromodiphenylether (DecaBDE)	-	mg/kg	5	ND
Dibutyl Phthalate(DBP)	1000	mg/kg	50	ND
Benzyl Butyl Phthalate(BBP)	1000	mg/kg	50	ND
Bis-(2-ethylhexyl) Phthalate(DEHP)	1000	mg/kg	50	ND
Diisobutyl Phthalate(DIBP)	1000	mg/kg	50	ND

**Notes:**

- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
  - (2) IEC 62321 series is equivalent to EN 62321 series.
  - (3) ▼ = a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 µg/cm². The sample coating is considered to contain Cr(VI)
  - b. The sample is negative for Cr(VI) if Cr(VI) is ND (concentration less than 0.10 µg/cm²). The coating is considered a non-Cr(VI) based coating
  - c. The result between 0.10 µg/cm² and 0.13 µg/cm² is considered to be inconclusive-unavoidable coating variations may influence the determination.
- Information on storage conditions and production date of the tested sample is unavailable and thus Cr(VI) results represent status of the sample at the time of testing.

**EU RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU- Lead, Mercury, Cadmium and Hexavalent chromium**

Test Method: With reference to IEC 62321-4:2013+AMD1:2017, IEC 62321-5:2013 and IEC 62321-7-1:2015, analysis was performed by ICP-OES and UV-Vis.

Test Item(s)	Limit	Unit(s)	MDL	A5
Cadmium(Cd)	100	mg/kg	2	ND
Lead (Pb)	1000	mg/kg	2	10
Mercury (Hg)	1000	mg/kg	2	ND
Hexavalent Chromium (Cr(VI)) ▼	-	µg/cm²	0.10	ND

**Notes:**



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- (1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863.
- (2) IEC 62321 series is equivalent to EN 62321 series.
- (3) ▽ =
  - a. The sample is positive for Cr(VI) if the Cr(VI) concentration is greater than 0.13 µg/cm<sup>2</sup>. The sample coating is considered to contain Cr(VI)
  - b. The sample is negative for Cr(VI) if Cr(VI) is ND (concentration less than 0.10 µg/cm<sup>2</sup>). The coating is considered a non-Cr(VI) based coating
  - c. The result between 0.10 µg/cm<sup>2</sup> and 0.13 µg/cm<sup>2</sup> is considered to be inconclusive - unavoidable coating variations may influence the determination

Information on storage conditions and production date of the tested sample is unavailable and thus Cr(VI) results represent status of the sample at the time of testing.

**European Regulation POPs (EU) 2020/784 amending to Regulation (EU) 2019/1021 - Perfluorooctanoic acid (PFOA) and its salts, PFOA-Related Substances, Perfluorooctane sulfonates (PFOS) and its derivatives**

Test Method: With reference to CEN/TS15968:2010, analysis was performed by LC-MS or LC-MS/MS and GC-MS.

Test Item(s)	CAS No.	Limit	Unit(s)	MDL	A4
Perfluorooctanoic acid (PFOA) and its salts*	335-67-1	0.025	mg/kg	0.010	ND
PFOA-related substances	-	1.0	mg/kg	-	ND
1H,1H,2H,2H-Perfluoro-1-decanol (8:2 FTS)	39108-34-4	-	mg/kg	0.010	ND
Methyl perfluorooctanoate (Me-PFOA)	376-27-2	-	mg/kg	0.1	ND
Ethyl perfluorooctanoate (Et-PFOA)	3108-24-5	-	mg/kg	0.1	ND
1H,1H,2H,2H-Perfluoro-1-decanol (8:2 FTOH)	678-39-7	-	mg/kg	0.1	ND
1H,1H,2H,2H-Perfluorodecyl acrylate (8:2 FTA)	27905-45-9	-	mg/kg	0.1	ND
1H,1H,2H,2H-Perfluorodecyl methacrylate (8:2 FTMA)	1996-88-9	-	mg/kg	0.1	ND
Perfluoro-1-iodooctane (PFOI)	507-63-1	-	mg/kg	0.1	ND
Perfluorooctane sulfonates (PFOS) and its derivatives	-	1000	mg/kg	-	ND
Perfluorooctane sulfonates (PFOS) and its salts*	-	-	mg/kg	0.010	ND
N-ethylperfluoro-1-octanesulfonamide (N-EtFOSA)	4151-50-2	-	mg/kg	0.010	ND
N-methylperfluoro-1-octanesulfonamide (N-MeFOSA)	31506-32-8	-	mg/kg	0.010	ND
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol (N-EtFOSE)	1691-99-2	-	mg/kg	0.010	ND



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Test Item(s)	CAS No.	Limit	Unit(s)	MDL	A4
2-(N-methylperfluoro- 1-octanesulfonamido) -ethanol (N-MeFOSE)	24448-09-7	-	mg/kg	0.010	ND
Perfluorooctane sulfonamide (PFOSA)	754-91-6	-	mg/kg	0.010	ND
<b>Conclusion</b>					<b>Pass</b>

**Notes:**

- (1) Perfluorooctanoic acid (PFOA) and its salts\* including PFOA (CAS No. 335-67-1), APFO (CAS No. 3825-26-1), PFOA-Na (CAS No. 335-95-5), PFOA-K (CAS No. 2395-00-8), PFOA-Ag (CAS No. 335-93-3) and PFOA-F (CAS No. 335-66-0). The result of PFOA is used to represent PFOA and its salts.
- (2) Perfluorooctane sulfonates (PFOS) and its salts\* including PFOS (CAS No. 1763-23-1), POSF(CAS No. 307-35-7), PFOS-K (CAS No. 2795-39-3), PFOS-NH<sub>4</sub> (CAS No. 29081-56-9), PFOS-N(C<sub>10</sub>H<sub>21</sub>)<sub>2</sub>(CH<sub>3</sub>)<sub>2</sub> (CAS No. 251099-16-8), PFOS-NH<sub>2</sub>(C<sub>2</sub>H<sub>4</sub>OH)<sub>2</sub> (CAS No. 70225-14-8), PFOS-Li (CAS No. 29457-72-5), PFOS-N(C<sub>2</sub>H<sub>5</sub>)<sub>4</sub> (CAS No. 56773-42-3) and PFOS-Na (CAS No. 4021-47-0). The result of PFOS is used to represent PFOS and its salts.

**Tetrabromobisphenol A (TBBP-A)**

Test Method: SGS In-house method (GZTC CHEM-TOP-065,with reference to EPA 3540C:1996 & EPA 8270E:2017), analysis was performed by GC-MS or LC-MS or LC-MS/MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A4
Tetrabromobisphenol A(TBBP-A)	79-94-7	mg/kg	5	ND

**Alkanes C14-C17, chloro (medium- chain chlorinated paraffins) (MCCPs)**

Test Method: With reference to ISO 22818:2021,analysis was performed by GC-NCI-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A4
Alkanes C <sub>14</sub> -C <sub>17</sub> , chloro (medium- chain chlorinated paraffins) (MCCPs)	85535-85-9 and others	mg/kg	50	ND

**European Regulation POPs (EU) 2019/1021– Alkanes C<sub>10</sub>-C<sub>13</sub>, chloro (short chain-chlorinated paraffins) (SCCPs)**

Test Method: With reference to ISO 22818:2021, analysis was performed by GC-NCI-MS.

Test Item(s)	CAS No.	Limit	Unit(s)	MDL	A4
Alkanes, C <sub>10</sub> -C <sub>13</sub> , chloro (short chain-chlorinated paraffins) (SCCPs)	85535-84-8 and others	1500	mg/kg	50	ND
<b>Conclusion</b>					<b>Pass</b>

**Halogen**



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Test Method: With reference to EN 14582:2016, analysis was performed by IC.

Test Item(s)	Unit(s)	MDL	A4
Fluorine(F)	mg/kg	20	ND
Chlorine(Cl)	mg/kg	50	ND
Bromine(Br)	mg/kg	50	ND
Iodine(I)	mg/kg	50	ND

### Element(s)

Test Method: With reference to US EPA 3050B:1996, analysis was performed by ICP-OES/AAS.

Test Item(s)	Unit(s)	MDL	A4
Arsenic(As)	mg/kg	10	ND
Beryllium(Be)	mg/kg	5	ND
Antimony(Sb)	mg/kg	10	ND
Tin(Sn)	mg/kg	5	193
Antimony Trioxide(Sb <sub>2</sub> O <sub>3</sub> ) ◆	mg/kg	12	ND

### Notes:

(1) ◆ Calculated concentration of Sb<sub>2</sub>O<sub>3</sub> is based on the identified Sb.

### Phthalates

Test Method: With reference to IEC 62321-8:2017, analysis was performed by GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A4
Diisononyl Phthalate (DINP)	28553-12-0 /68515-48-0	mg/kg	50	ND
Di-n-Octyl Phthalate(DNOP)	117-84-0	mg/kg	50	ND
Diisodecyl Phthalate (DIDP)	26761-40-0 /68515-49-1	mg/kg	50	ND
Bis(2-methoxyethyl)phthalate(DMEP)	117-82-8	mg/kg	50	ND
Di-n-Hexyl Phthalate(DnHP)	84-75-3	mg/kg	50	ND
Dipentyl Phthalate (DPENP/DnPP)	131-18-0	mg/kg	50	ND
1,2-Benzenedicarboxylic Acid, di-C6-8-branched alkyl esters, C7-rich(DIHP)	71888-89-6	mg/kg	50	ND
1,2-Benzenedicarboxylic Acid, Di-C7-11-Branched and Linear Alkyl Esters(DHNUP)	68515-42-4	mg/kg	50	ND

### Polychlorinated Biphenyls (PCBs)

Test Method: SGS In-house method (GZTC CHEM-TOP-032-01, with reference to EPA 8082A:2007), analysis was performed by GC-ECD/GC-MS.



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Test Item(s)	CAS No.	Unit(s)	MDL	A4
2,4,4'-Trichlorobiphenyl(PCB28)	7012-37-5	mg/kg	0.5	ND
2,2',5,5'-Tetrachlorobiphenyl(PCB52)	35693-99-3	mg/kg	0.5	ND
2,2',4,5,5'-Pentachlorobiphenyl(PCB101)	37680-73-2	mg/kg	0.5	ND
2,3',4,4',5-Pentachlorobiphenyl(PCB118)	31508-00-6	mg/kg	0.5	ND
2,2',3,4,4',5'-Hexachlorobiphenyl(PCB138)	35065-28-2	mg/kg	0.5	ND
2,2',4,4',5,5'-Hexachlorobiphenyl(PCB153)	35065-27-1	mg/kg	0.5	ND
2,2',3,4,4',5,5'-Heptachlorobiphenyl(PCB180)	35065-29-3	mg/kg	0.5	ND

## Polychlorinated Naphthalenes (PCNs)

Test Method: SGS In-house method (GZTC CHEM-TOP-032-01, with reference to EPA 8082A:2007), analysis was performed by GC-ECD/GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A4
1-Chlorinated Naphthalene	90-13-1	mg/kg	5	ND
2-Chlorinated Naphthalene	91-58-7	mg/kg	5	ND
1,4-Dichlorinated Naphthalene	1825-31-6	mg/kg	5	ND
1,5-Dichlorinated Naphthalene	1825-30-5	mg/kg	5	ND
1,2-Dichlorinated Naphthalene	2050-69-3	mg/kg	5	ND
1,8-Dichlorinated Naphthalene	2050-74-0	mg/kg	5	ND
1,2,3-Trichlorinated Naphthalene	50402-52-3	mg/kg	5	ND
1,2,3,4-Tetrachlorinated Naphthalene	20020-02-4	mg/kg	5	ND
1,2,3,4,6-Pentachlorinated Naphthalene	67922-26-3	mg/kg	5	ND
Octa-Chlorinated Naphthalene	2234-13-1	mg/kg	5	ND

## Polychlorinated Terphenyls (PCTs)

Test Method: SGS In-house method (GZTC CHEM-TOP-032-01, with reference to EPA 8082A:2007), analysis was performed by GC-ECD/GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A4
Aroclor 5432	63496-31-1	mg/kg	5	ND
Aroclor 5442	12642-23-8	mg/kg	5	ND
Aroclor 5460	11126-42-4	mg/kg	5	ND

## Dimethyl fumarate (DMFu)

Test Method: Solvent extraction, analysis was performed by GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A4
Dimethyl Fumarate (DMFu)	624-49-7	mg/kg	0.1	ND



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## Flame Retardants

Test Method: With reference to US EPA 3550C:2007 and US EPA 8270D:2014, analysis was performed by GC-MS.

Test Item(s)	CAS No.	Unit(s)	MDL	A4
Hexabromocyclododecane (HBCDD)	134237-50-6 /134237-51-7 /134237-52-8 /25637-99-4 /3194-55-6	mg/kg	5	ND

## Organic-Tin compounds

Test Method: SGS In-house method (GZTC CHEM-TOP-031, with reference to ISO 17353:2004), analysis was performed by GC-MS.

Test Item(s)	Unit(s)	MDL	A4
Dibutyl tin(DBT)	mg/kg	0.02	ND
Tributyl tin(TBT)	mg/kg	0.02	ND
Diocetyl tin(DOT)	mg/kg	0.02	ND
Triphenyl tin(TPhT)	mg/kg	0.02	ND
Tri-n-propyltin(TPT)	mg/kg	0.02	ND
Bis(tributyltin) oxide (TBTO) ◆	mg/kg	0.02	ND

### Notes:

(1)◆ = TBTO is back calculated based on the worst-case scenario of TBT.

## Polyvinyl chloride (PVC)

Test Method: SGS In-house method (SGS-CCL-TOP-066-01), analysis was performed by FTIR/HATR.

Test Item(s)	A4
Polyvinyl chloride (PVC)	Negative

### Notes:

(1) Negative=Undetectable, Positive=Detectable

Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019.



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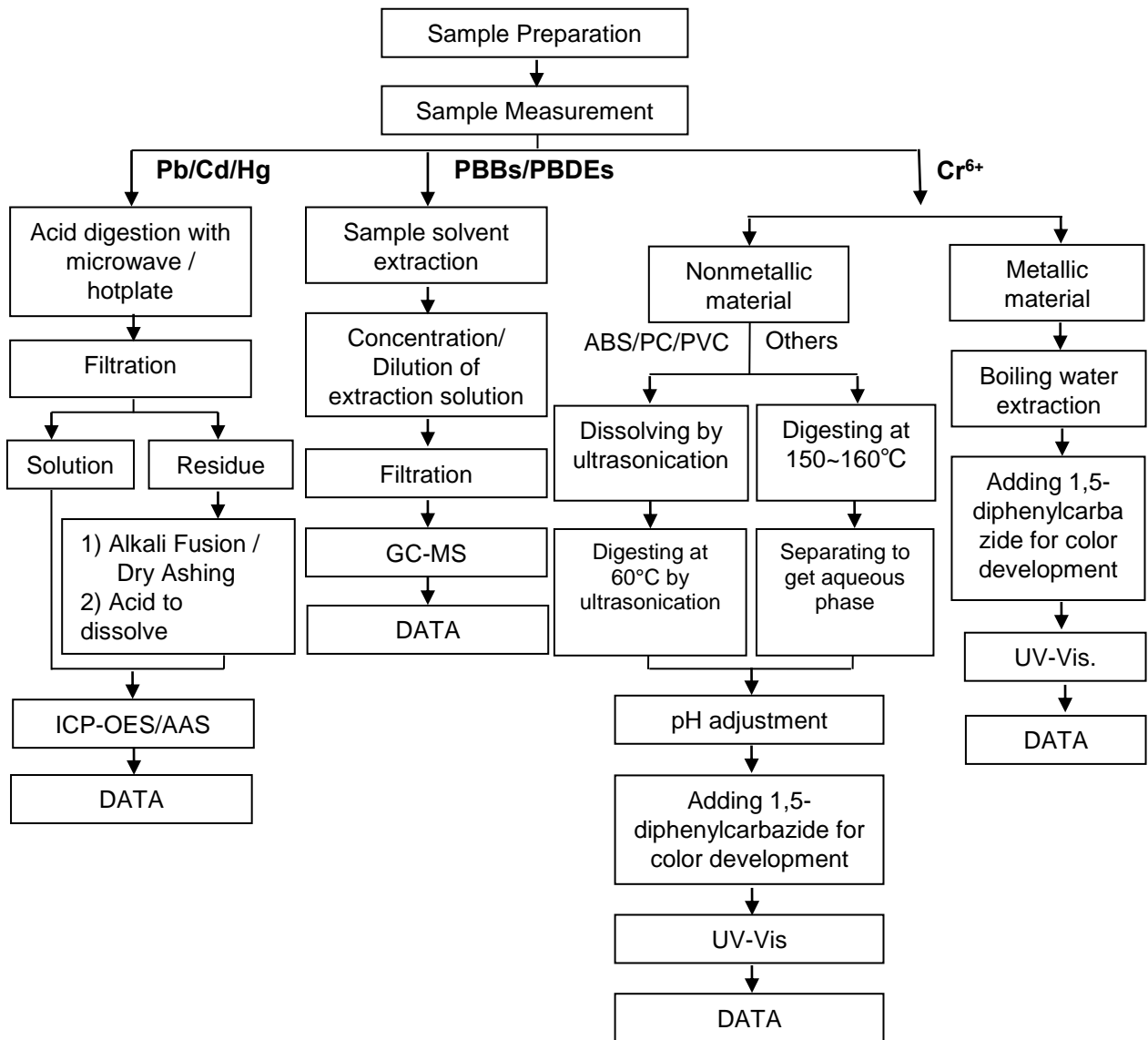
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Attachment:

## Pb/Cd/Hg/Cr<sup>6+</sup>/PBBs/PBDEs Testing Flow Chart

- 1) Name of the person who made testing: Edith Zhang/Yam Chen/Judy Chen
- 2) Name of the person in charge of testing: Bella Wang/Qiong Liu
- 3) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr<sup>6+</sup> and PBBs/PBDEs test method excluded).

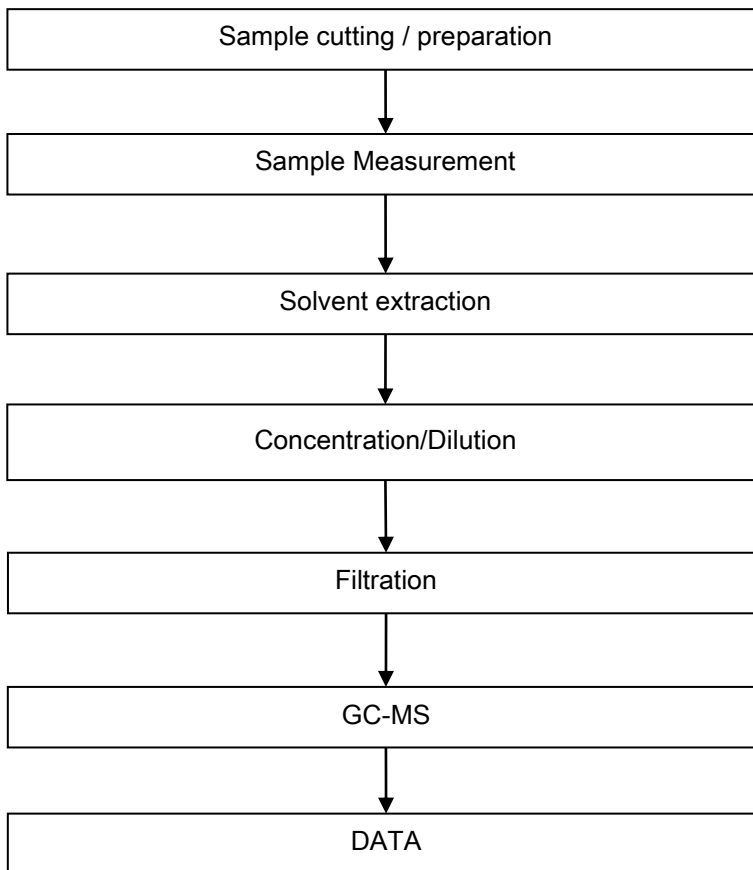


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### Phthalates Testing Flow Chart

- 1) Name of the person who made testing: Judy Chen
- 2) Name of the person in charge of testing: Qiong Liu

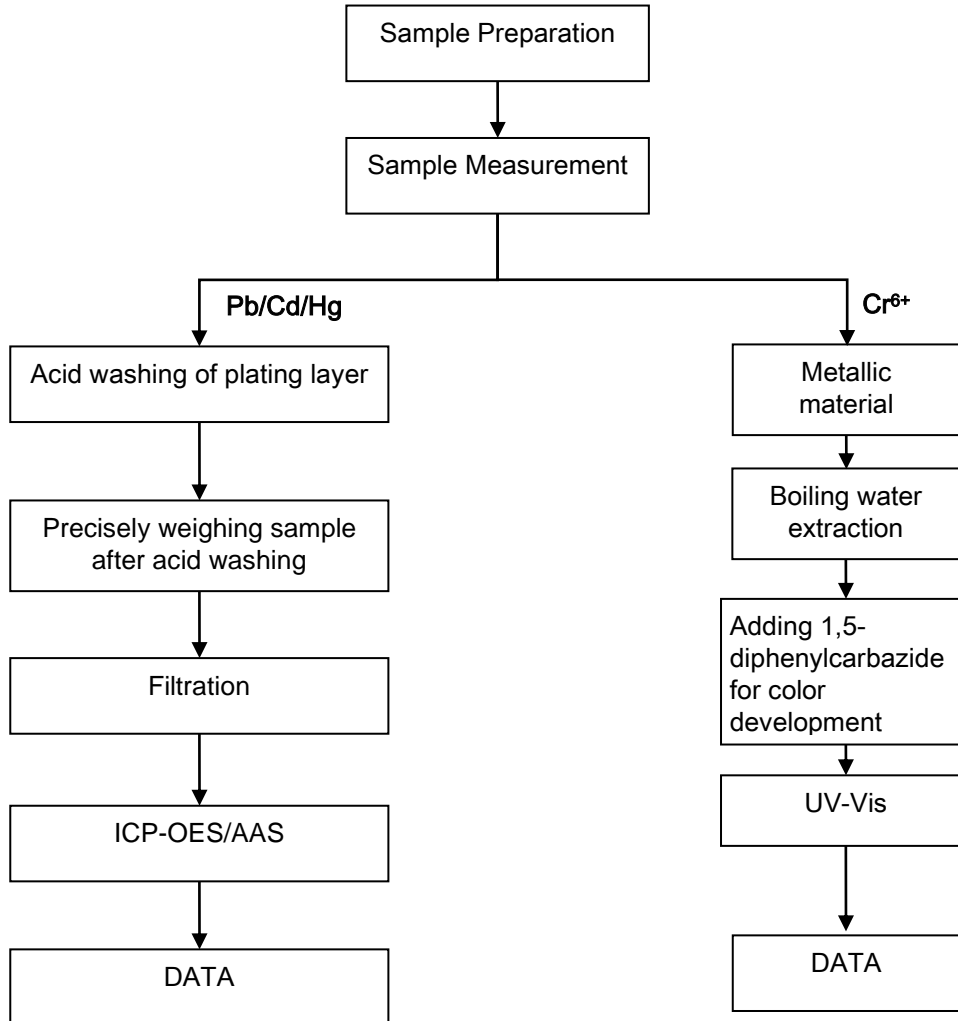


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## Plating Pb/Cd/Hg/Cr<sup>6+</sup> Testing Flow Chart

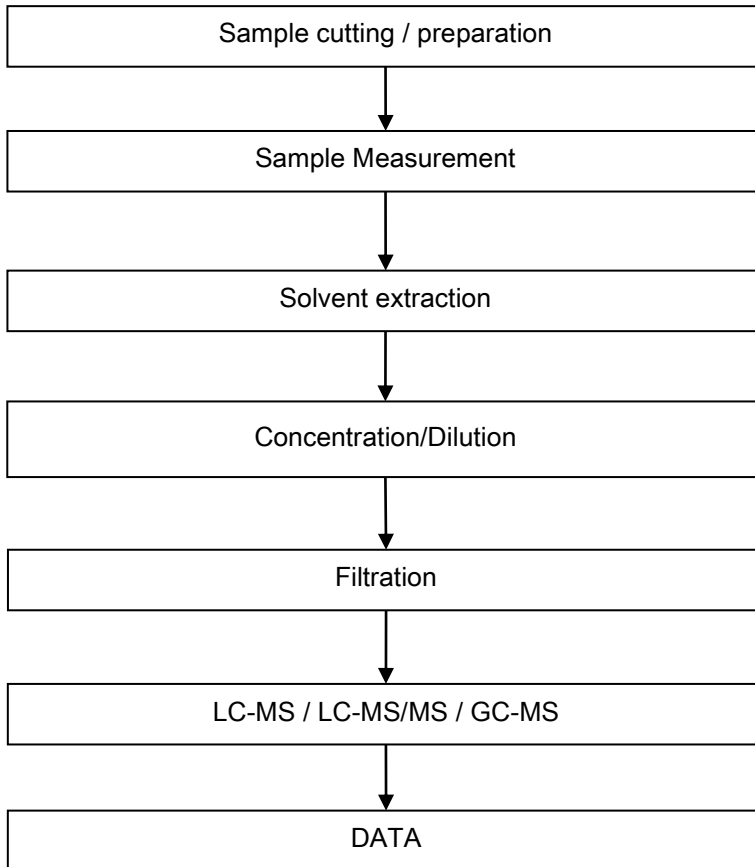
- 1) Name of the person who made testing: Edith Zhang//Yam Chen
- 2) Name of the person in charge of testing: Bella Wang



Attachment:

**PFAS ( POPS - PFOA&PFOS) Testing Flow Chart**

- 1) Name of the person who made testing: Olivia Li
- 2) Name of the person in charge of testing: Qiong Liu



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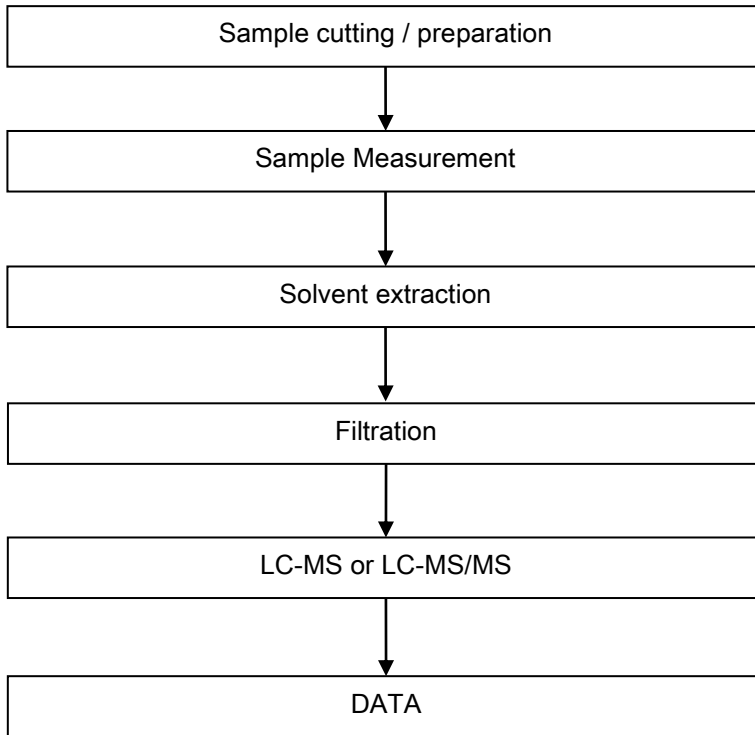
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Attachment:

### TBBP-A Testing Flow Chart

- 1) Name of the person who made testing: Olivia Li
- 2) Name of the person in charge of testing: Qiong Liu

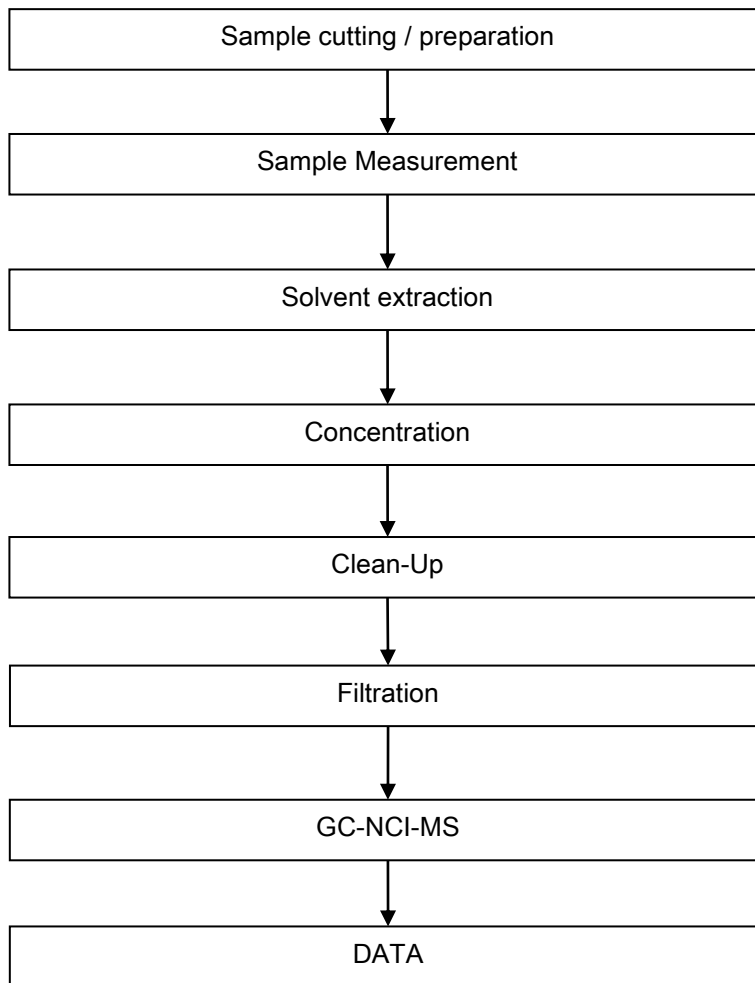


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## SCCP/MCCP/LCCP Testing Flow Chart

- 1) Name of the person who made testing: Mina Chan
- 2) Name of the person in charge of testing: Qiong Liu

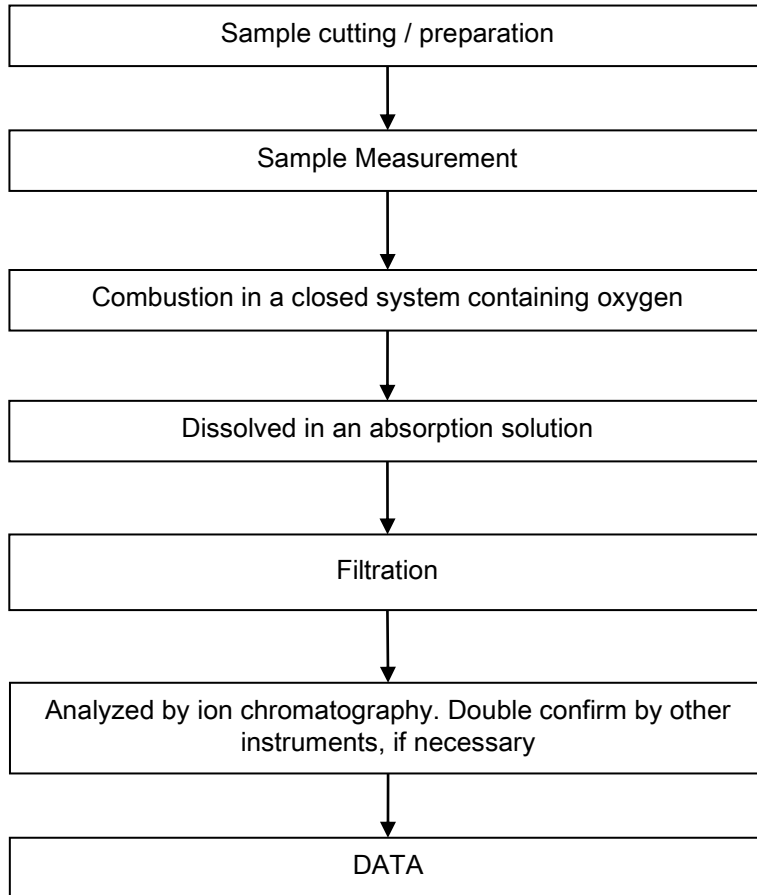


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## Halogen Testing Flow Chart

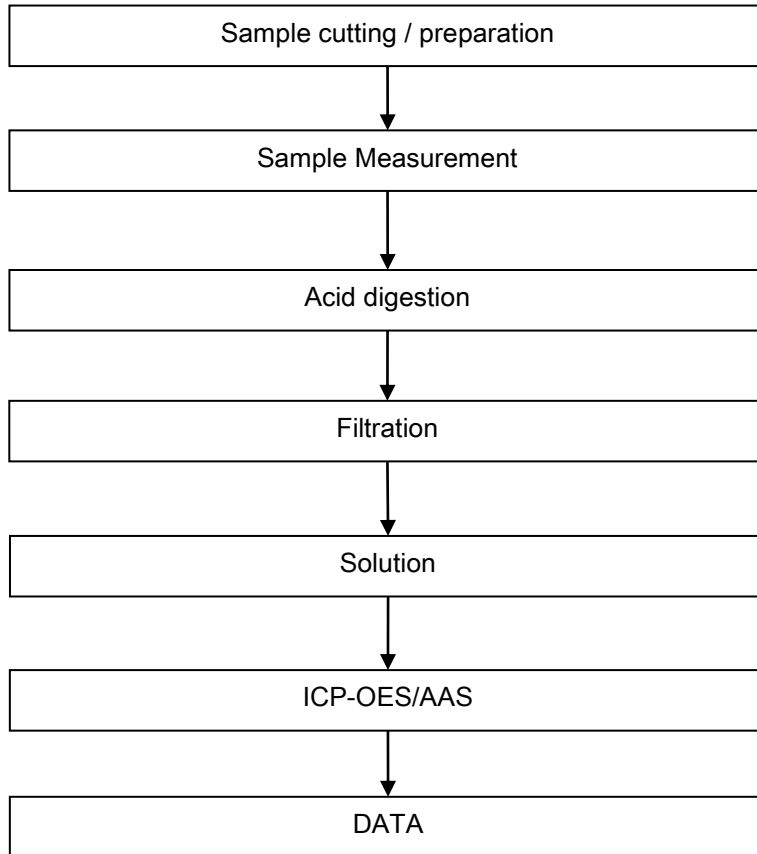
- 1) Name of the person who made testing: Allen Shi
- 2) Name of the person in charge of testing: Bella Wang



Attachment:

## Elementary Testing Flow Chart

- 1) Name of the person who made testing: Edith Zhang
- 2) Name of the person in charge of testing: Bella Wang

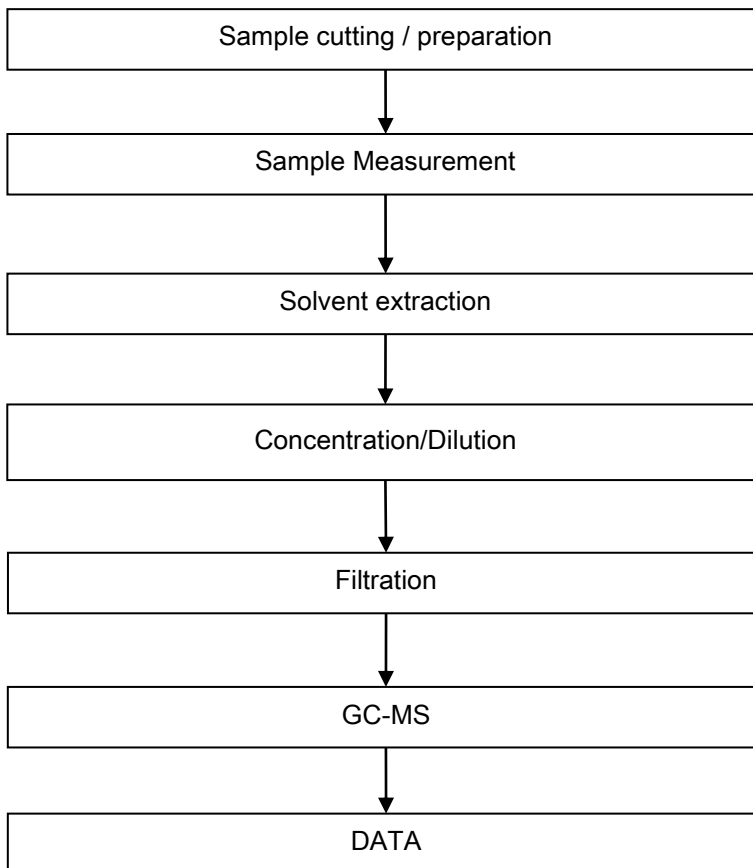




Attachment:

### Dimethyl Fumarate Testing Flow Chart

- 1) Name of the person who made testing: Sunny Hu
- 2) Name of the person in charge of testing: Qiong Liu

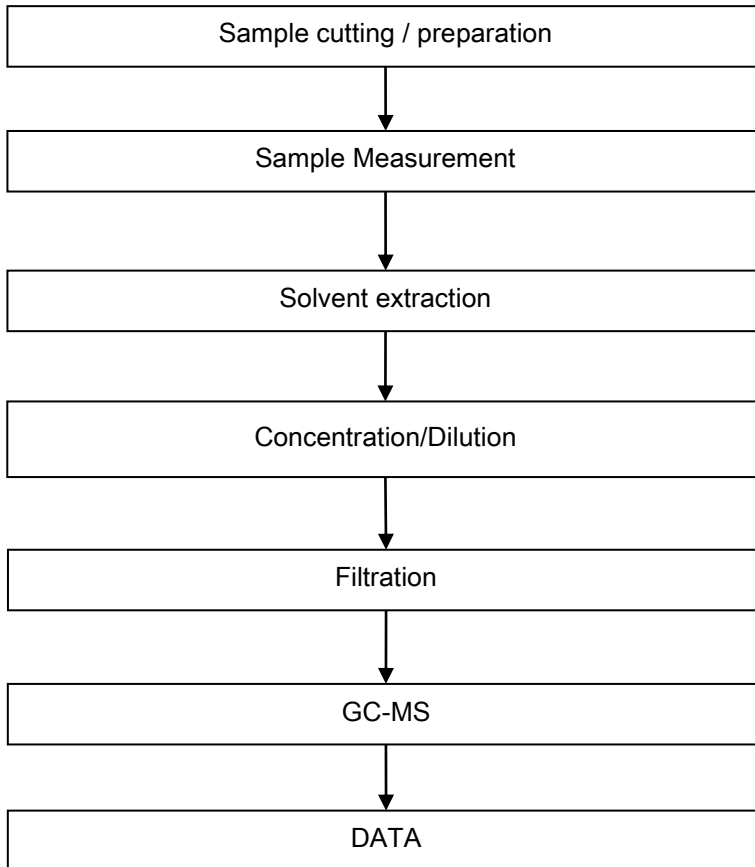


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### HBCDD Testing Flow Chart

- 1) Name of the person who made testing: Judy Chen
- 2) Name of the person in charge of testing: Qiong Liu

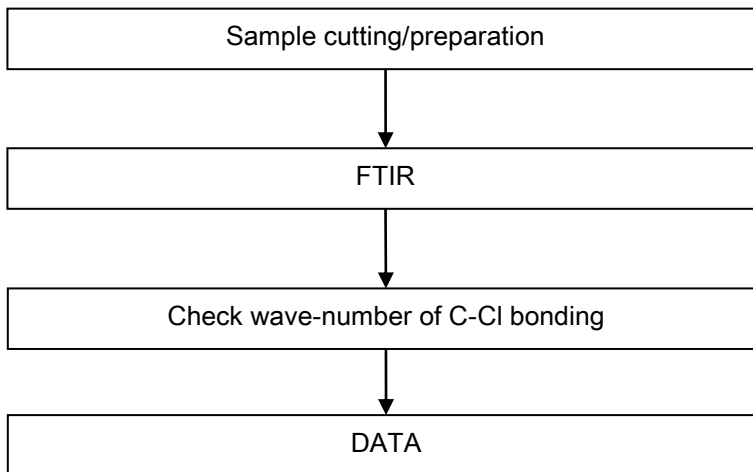


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### PVC Testing Flow Chart

- 1) Name of the person who made testing: Sunny Hu
- 2) Name of the person in charge of testing: Qiong Liu



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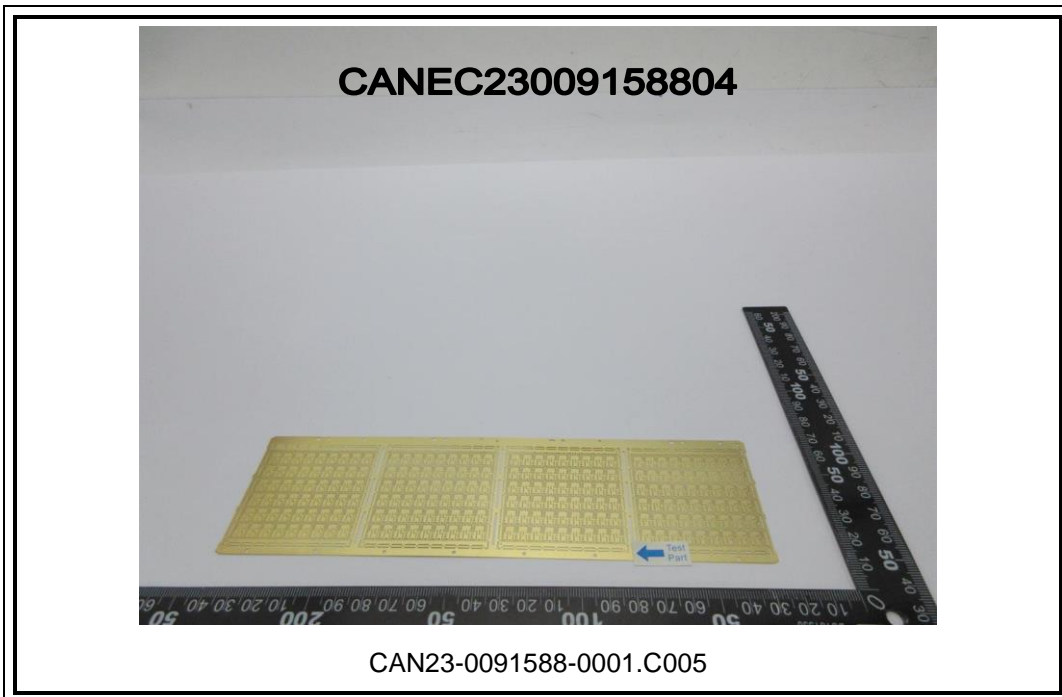
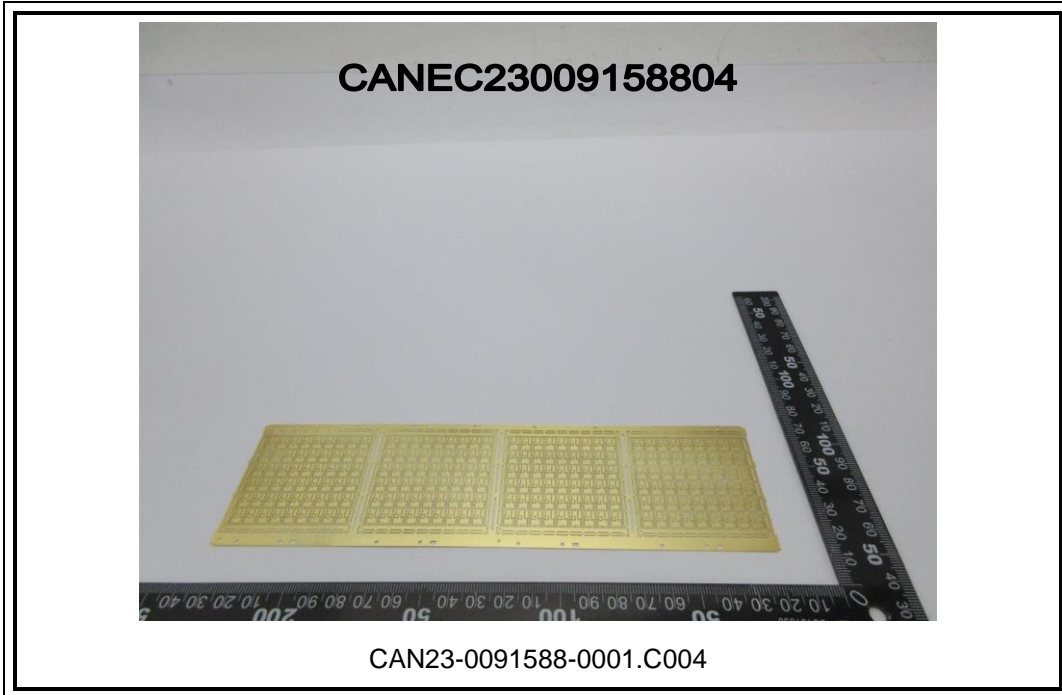
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