

Test Report

No. CANEC2017599001

Date: 22 Oct 2020

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QPL LIMITED

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

The following sample(s) was/were submitted and identified on behalf of the clients as : Silver (Ag) Plating

SGS Job No. : CP20-051911 - SZ

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

Date of Sample Received : 12 Oct 2020

Testing Period : 12 Oct 2020 - 22 Oct 2020

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

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

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

Result Summary :

Test Requested	Conclusion
RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU	PASS
Elementary Analysis	See Results
Halogen	See Results
Tetrabromobisphenol A (TBBP-A)	See Results
Dimethyl Fumarate (DMF)	See Results
PVC (Polyvinyl chloride)	See Results
Phthalates	See Results
European Regulation POPs (EU) 2019/1021 – Alkanes C10-C13, chloro (short-chain chlorinated paraffins) (SCCPs)	PASS
Hexabromocyclododecane (HBCDD)	See Results
Organic-tin compounds	See Results
Polychlorinated Biphenyls (PCBs)	See Results
Polychlorinated Terphenyls (PCTs)	See Results
Polychlorinated Naphthalenes (PCNs)	See Results



European Regulation POPs (EU) 2020/784 amending to Regulation (EU) 2019/1021 - PFOA and its salts, PFOS and its derivatives, PFOA-Related Substances	PASS
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Signed for and on behalf of
SGS-CSTC Standards Technical Services Co., Ltd. Guangzhou Branch

Violet Shi

Violet, Shi
Approved Signatory



Test Results :

Test Part Description :

Specimen No.	SGS Sample ID	Description
SN1	CAN20-175990.001	Silver-white plated metal
SN2	CAN20-175990.002	Silver-white plating on metal

Remarks :

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

RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU

Test Method : With reference to IEC 62321-4:2013+A1:2017, IEC 62321-5:2013, IEC 62321-7-1:2015, IEC 62321-6:2015 and IEC 62321-8:2017, analyzed by ICP-OES, UV-Vis and GC-MS.

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>	<u>002</u>
Cadmium (Cd)	100	mg/kg	2	ND	
Lead (Pb)	1000	mg/kg	2	14	
Mercury (Hg)	1000	mg/kg	2	ND	
Hexavalent Chromium (Cr(VI))▼	-	µg/cm ²	0.10	ND	ND
Cadmium (Cd)	100	mg/kg	2		ND
Lead (Pb)	1000	mg/kg	2		8
Mercury (Hg)	1000	mg/kg	2		ND
Sum of PBBs	1000	mg/kg	-	ND	
Monobromobiphenyl	-	mg/kg	5	ND	
Dibromobiphenyl	-	mg/kg	5	ND	
Tribromobiphenyl	-	mg/kg	5	ND	
Tetrabromobiphenyl	-	mg/kg	5	ND	
Pentabromobiphenyl	-	mg/kg	5	ND	
Hexabromobiphenyl	-	mg/kg	5	ND	
Heptabromobiphenyl	-	mg/kg	5	ND	
Octabromobiphenyl	-	mg/kg	5	ND	
Nonabromobiphenyl	-	mg/kg	5	ND	
Decabromobiphenyl	-	mg/kg	5	ND	
Sum of PBDEs	1000	mg/kg	-	ND	
Monobromodiphenyl ether	-	mg/kg	5	ND	
Dibromodiphenyl ether	-	mg/kg	5	ND	



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<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>	<u>002</u>
Tribromodiphenyl ether	-	mg/kg	5	ND	
Tetrabromodiphenyl ether	-	mg/kg	5	ND	
Pentabromodiphenyl ether	-	mg/kg	5	ND	
Hexabromodiphenyl ether	-	mg/kg	5	ND	
Heptabromodiphenyl ether	-	mg/kg	5	ND	
Octabromodiphenyl ether	-	mg/kg	5	ND	
Nonabromodiphenyl ether	-	mg/kg	5	ND	
Decabromodiphenyl ether	-	mg/kg	5	ND	
Dibutyl phthalate (DBP)	1000	mg/kg	50	ND	
Butyl benzyl phthalate (BBP)	1000	mg/kg	50	ND	
Bis (2-ethylhexyl) phthalate (DEHP)	1000	mg/kg	50	ND	
Diisobutyl Phthalates (DIBP)	1000	mg/kg	50	ND	

Notes :

(1) The maximum permissible limit is quoted from RoHS Directive (EU) 2015/863. IEC 62321 series is equivalent to EN 62321 series

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

(2) ▽= a. The sample is positive for CrVI if the CrVI concentration is greater than 0.13 µg/cm². The sample coating is considered to contain CrVI

b. The sample is negative for CrVI if CrVI is ND (concentration less than 0.10 µg/cm²). The coating is considered a non-CrVI 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.

Elementary Analysis

Test Method : SGS In-house method (GZTC CHEM-TOP-009-01, with reference to EPA 3050B:1996), analysis was performed by ICP-OES.

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Tin (Sn)	mg/kg	5	213
Arsenic (As)	mg/kg	10	ND
Beryllium (Be)	mg/kg	5	ND
Antimony (Sb)	mg/kg	10	ND
Antimony trioxide(Sb ₂ O ₃)	mg/kg	12	ND

Notes :



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(1) Sb₂O₃: Calculate from Antimony content.

Halogen

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

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Fluorine (F)	mg/kg	50	ND
Chlorine (Cl)	mg/kg	50	ND
Bromine (Br)	mg/kg	50	ND
Iodine (I)	mg/kg	50	ND

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&LC-MS.

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Tetrabromobisphenol A (TBBP-A)	mg/kg	5	ND

Dimethyl Fumarate (DMF)

Test Method : SGS In-house method(GZTC CHEM-TOP-095), analysis was performed by GC-MS.

<u>Test Item(s)</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Dimethyl fumarate(DMF)	mg/kg	0.1	ND

PVC (Polyvinyl chloride)

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

<u>Test Item(s)</u>	<u>CAS NO.</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Polyvinyl Chloride (PVC)	9002-86-2	-	-	Negative

Notes :

(1) Negative=Undetectable,Positive=Detectable

Phthalates



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

<u>Test Item(s)</u>	<u>CAS NO.</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Di-n-octyl Phthalate (DNOP)	117-84-0	%(w/w)	0.005	ND
Diisononyl Phthalate (DINP)	28553-12-0 / 68515-48-0	%(w/w)	0.005	ND
Diisodecyl Phthalate (DIDP)	26761-40-0 / 68515-49-1	%(w/w)	0.005	ND
Di-n-hexyl Phthalate (DnHP)	84-75-3	%(w/w)	0.005	ND
Bis(2-methoxyethyl) Phthalate (DMEP)	117-82-8	%(w/w)	0.005	ND
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP)	68515-42-4	%(w/w)	0.005	ND
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP)	71888-89-6	%(w/w)	0.005	ND
Dipentyl Phthalates (DPENP/DnPP)	131-18-0	%(w/w)	0.005	ND

European Regulation POPs (EU) 2019/1021– Alkanes C10-C13, chloro (short-chain chlorinated paraffins) (SCCPs)

Test Method : With reference to ISO 18219: 2015, analysis was performed by GC-NCI-MS / GC-ECD.

<u>Test Item(s)</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Alkanes C10-C13, chloro (short-chain chlorinated paraffins) (SCCPs)	1500	mg/kg	50	ND
Comment				PASS
Alkanes C14-C17, chloro (medium -chain chlorinated paraffins) (MCCPs)	-	mg/kg	50	ND

Hexabromocyclododecane (HBCDD)

Test Method : SGS in house method (GZTC CHEM-TOP-073, with reference to EPA 3550C:2007 & EPA 8270E:2017), analysis was performed by GC-MS.

<u>Test Item(s)</u>	<u>CAS NO.</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α -HBCDD, β -HBCDD, γ -HBCDD)	25637-99-4 3194-55-6 134237-50-6 134237-51-7 134237-52-8	mg/kg	5	ND

Organic-tin compounds



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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	MDL	001
Tributyl tin (TBT)	mg/kg	0.02	ND
Tri-n-propyl tin(TPT)	mg/kg	0.02	ND
Bis(tributyltin)oxide (TBTO)♦	mg/kg	0.02	ND
Dibutyl tin (DBT)	mg/kg	0.02	ND
Diocetyl tin (DOT)	mg/kg	0.02	ND
Triphenyl tin (TPhT)	mg/kg	0.02	ND

Notes :

(1) ♦Bis(tributyltin)oxide (TBTO) is calculated by the test result of Tributyltin (TBT)

Polychlorinated Biphenyls (PCBs)

Test Method : SGS In-house method (GZTC CHEM-TOP-032-01, with reference to EPA 8082A:2007 & EPA 8270E:2017), analysis was performed by GC-ECD/GC-MS.

Test Item(s)	CAS NO.	Unit	MDL	001
2,4,4'-Trichlorobiphenyl (PCB 28)	7012-37-5	mg/kg	0.5	ND
2,2',5,5'-Tetrachloro-biphenyl (PCB 52)	35693-99-3	mg/kg	0.5	ND
2,2',4,5,5'-Pentachloro-biphenyl (PCB 101)	37680-73-2	mg/kg	0.5	ND
2,3',4,4',5-Pentachlorobiphenyl (PCB 118)	31508-00-6	mg/kg	0.5	ND
2,2',3,4,4',5'-Hexachloro-biphenyl (PCB 138)	35065-28-2	mg/kg	0.5	ND
2,2',4,4',5,5'-Hexachloro-biphenyl (PCB 153)	35065-27-1	mg/kg	0.5	ND
2,2',3,4,4',5,5'-Heptachlorobiphenyl (PCB 180)	35065-29-3	mg/kg	0.5	ND

Polychlorinated Terphenyls (PCTs)

Test Method : SGS In-house method (GZTC CHEM-TOP-032-01, with reference to EPA 8082A:2007 & EPA 8270E:2017), analysis was performed by GC-ECD/GC-MS.

Test Item(s)	CAS NO.	Unit	MDL	001
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

Polychlorinated Naphthalenes (PCNs)

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Test Method : SGS In-house method (GZTC CHEM-TOP-032-01, with reference to EPA 8082A:2007 & EPA 8270E:2017), analysis was performed by GC-ECD/GC-MS.

Test Item(s)	CAS NO.	Unit	MDL	001
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

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

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	MDL	001
Perfluorooctanoic acid (PFOA) and its salts+	335-67-1	0.025	mg/kg	0.010	ND
Perfluorooctane sulfonates (PFOS) ^	1763-23-1	-	mg/kg	0.010	ND
Perfluorooctane Sulfonamide (PFOSA)	754-91-6	-	mg/kg	0.010	ND
N-methylperfluoro-1-octanesulfonamide(MeFOSA)	31506-32-8	-	mg/kg	0.010	ND
N-ethylperfluoro-1-octanesulfonamide (EtFOSA)	4151-50-2	-	mg/kg	0.010	ND
2-(N-methylperfluoro-1-octanesulfonamido)-ethanol(MeFOSE)	24448-09-7	-	mg/kg	0.010	ND
2-(N-ethylperfluoro-1-octanesulfonamido)-ethanol(EtFOSE)	1691-99-2	-	mg/kg	0.010	ND
Perfluorooctane sulfonates (PFOS) and its derivatives	-	10	mg/kg	-	ND
PFOA related substances	-	1.0	mg/kg	-	ND
1H,1H,2H,2H-Perfluoro-1-decanol (8:2 FTS)	39108-34-4	-	mg/kg	0.2	ND
Methyl perfluorooctanoate (Me-PFOA)	376-27-2	-	mg/kg	0.2	ND
Ethyl perfluorooctanoate (Et-PFOA)	3108-24-5	-	mg/kg	0.2	ND
1H,1H,2H,2H-Perfluoro-1-decanol (8:2 FTOH)	678-39-7	-	mg/kg	0.2	ND
1H,1H,2H,2H-Perfluorodecyl acrylate (8:2 FTA)	27905-45-9	-	mg/kg	0.2	ND
1H,1H,2H,2H-Perfluorodecyl methacrylate (8:2 FTMA)	1996-88-9	-	mg/kg	0.2	ND



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<u>Test Item(s)</u>	<u>CAS NO.</u>	<u>Limit</u>	<u>Unit</u>	<u>MDL</u>	<u>001</u>
Perfluoro-1-iodooctane (PFOI)	507-63-1	-	mg/kg	0.2	ND
Comment					PASS

Notes :

- (1) + PFOA and its salts including PFOA-Na (CAS No.: 335-95-5), PFOA-K (CAS No.: 2395-00-8), PFOA-Ag (CAS No.: 335-93-3), PFOA-F (CAS No.: 335-66-0) and APFO (CAS No.: 3825-26-1);
- (2) ^ PFOS including PFOS-K (CAS No.: 2795-39-3), PFOS-Li (CAS No.: 29457-72-5), PFOS-NH4 (CAS No.: 29081-56-9), PFOS-NH(OH)2 (CAS No.: 70225-14-8), PFOS-N(C2H5)4 (CAS No.: 56773-42-3), PFOS-DDA(CAS No.:251099-16-8) and POSF (CAS No.: 307-35-7)



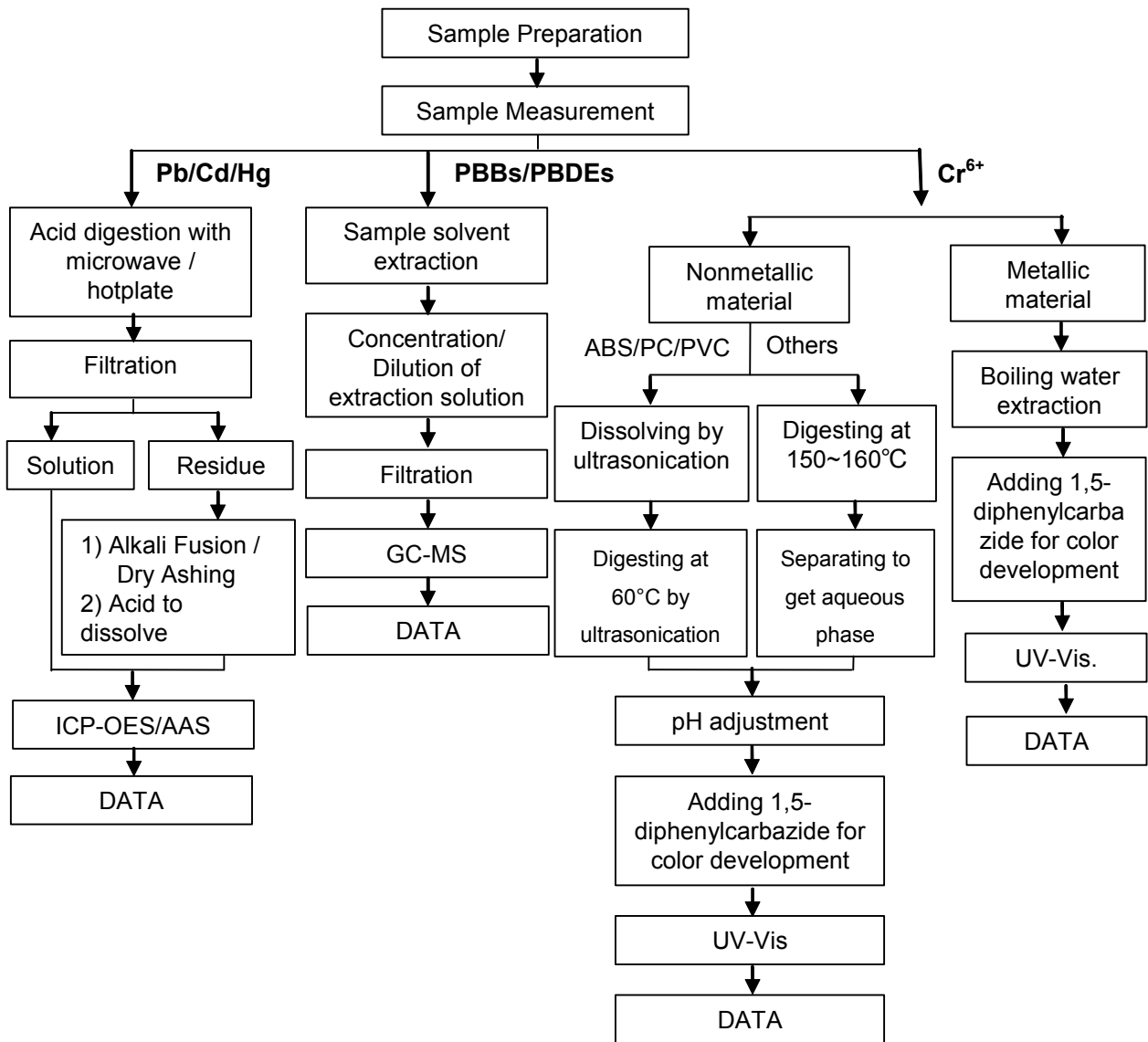
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Pb/Cd/Hg/Cr⁶⁺/PBBs/PBDEs Testing Flow Chart

- 1) Name of the person who made testing: Edith Zhang / Sunny Hu
- 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. (Cr⁶⁺ and PBBs/PBDEs test method excluded).



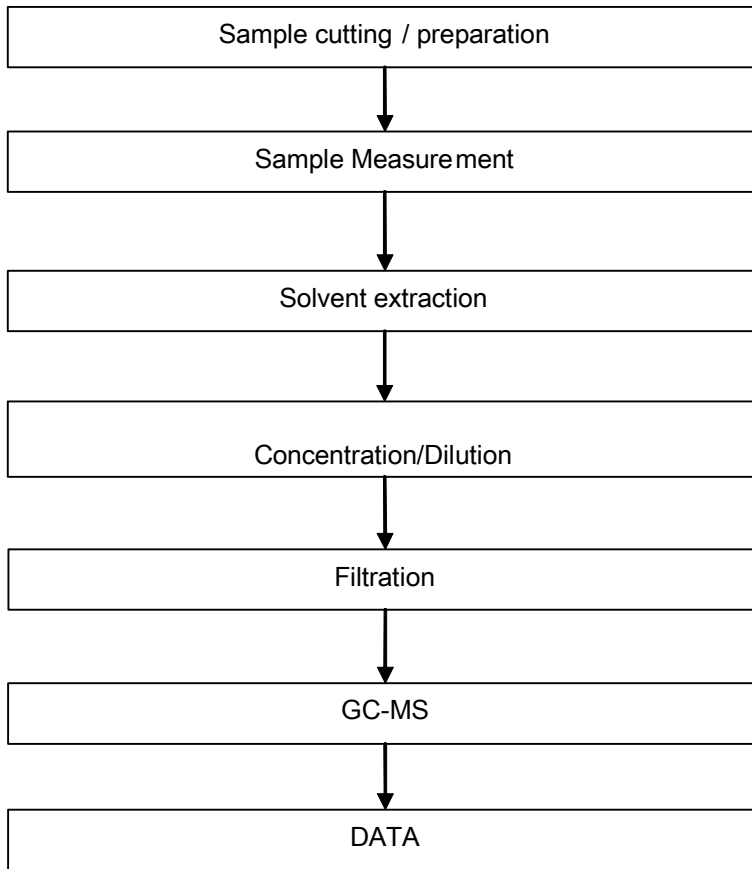
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Phthalates Testing Flow Chart

- 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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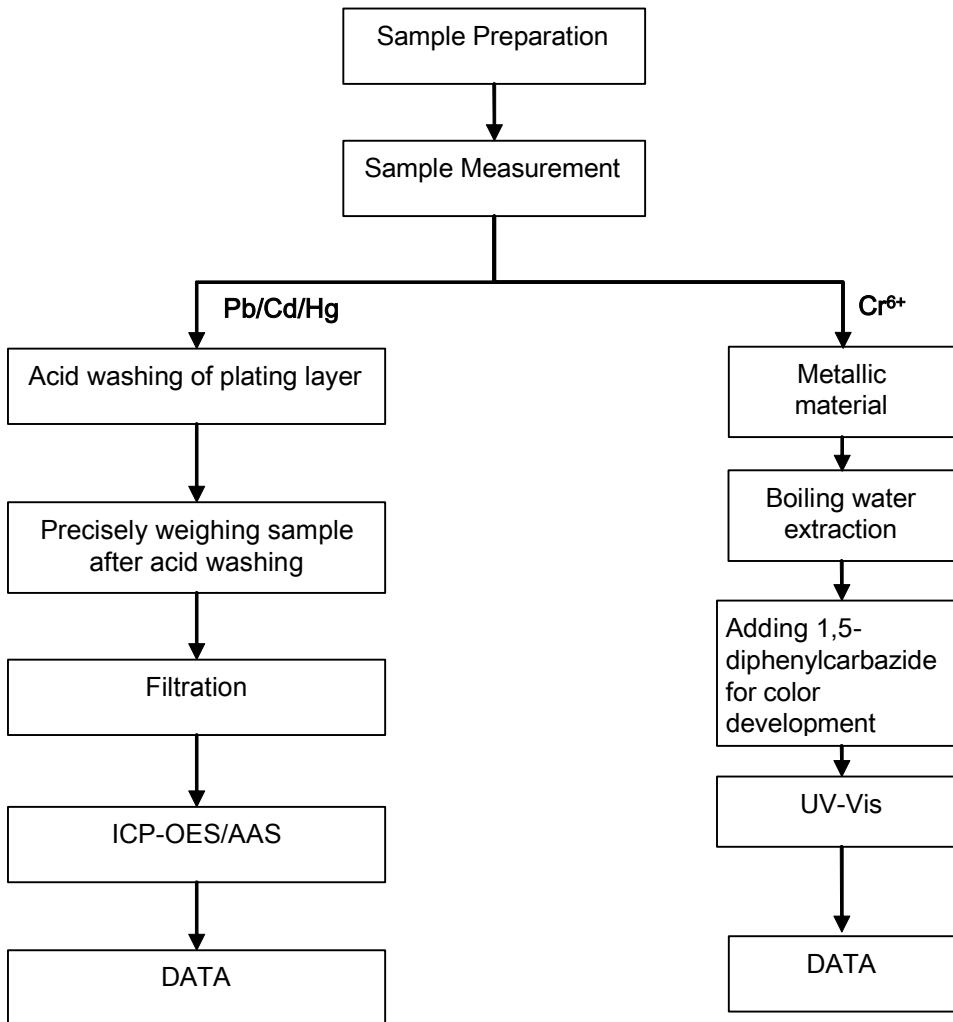
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Plating Pb/Cd/Hg/Cr⁶⁺ Testing Flow Chart

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



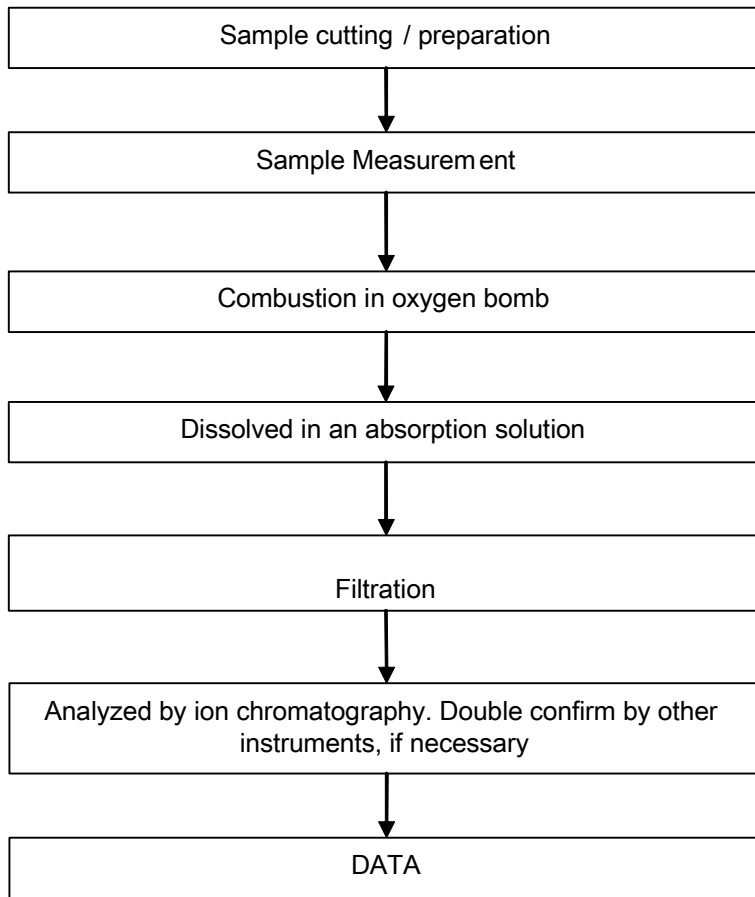
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Halogen Testing Flow Chart

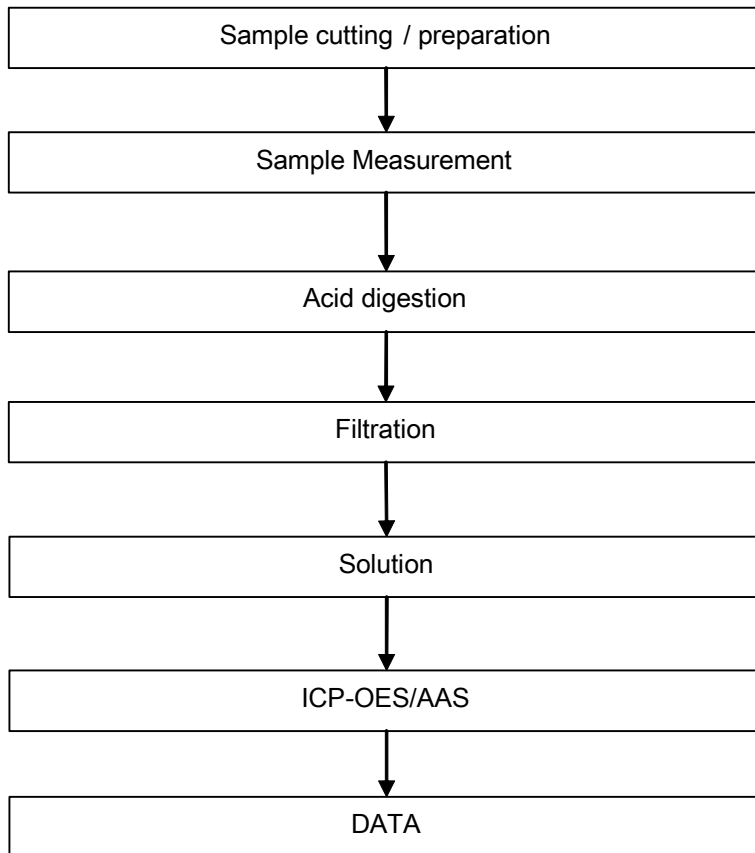
- 1) Name of the person who made testing: Bruce Xiao
- 2) Name of the person in charge of testing: Bella Wang



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Elementary Testing Flow Chart

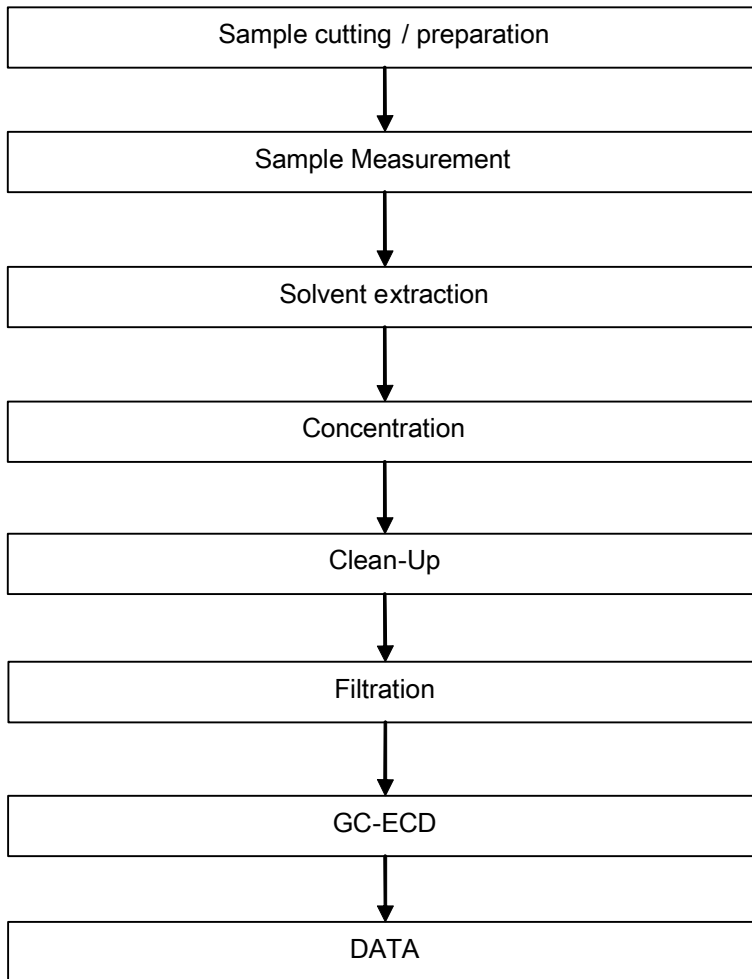
- 1) Name of the person who made testing : Edith Zhang
- 2) Name of the person in charge of testing : Bella Wang



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SCCP/MCCP/LCCP Testing Flow Chart

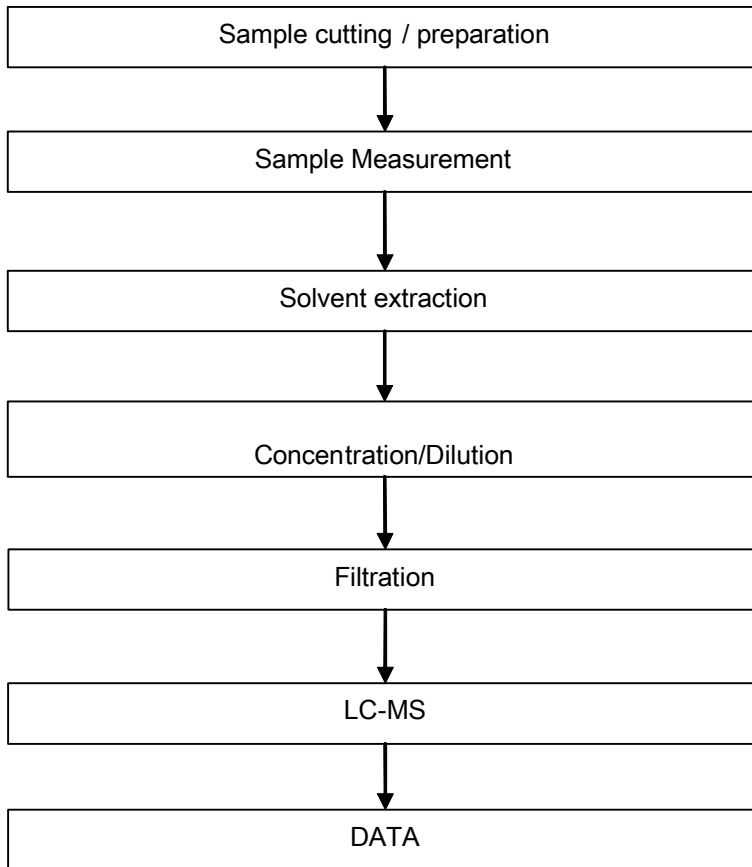
- 1) Name of the person who made testing: Mina Chan
- 2) Name of the person in charge of testing: Qiong Liu



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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



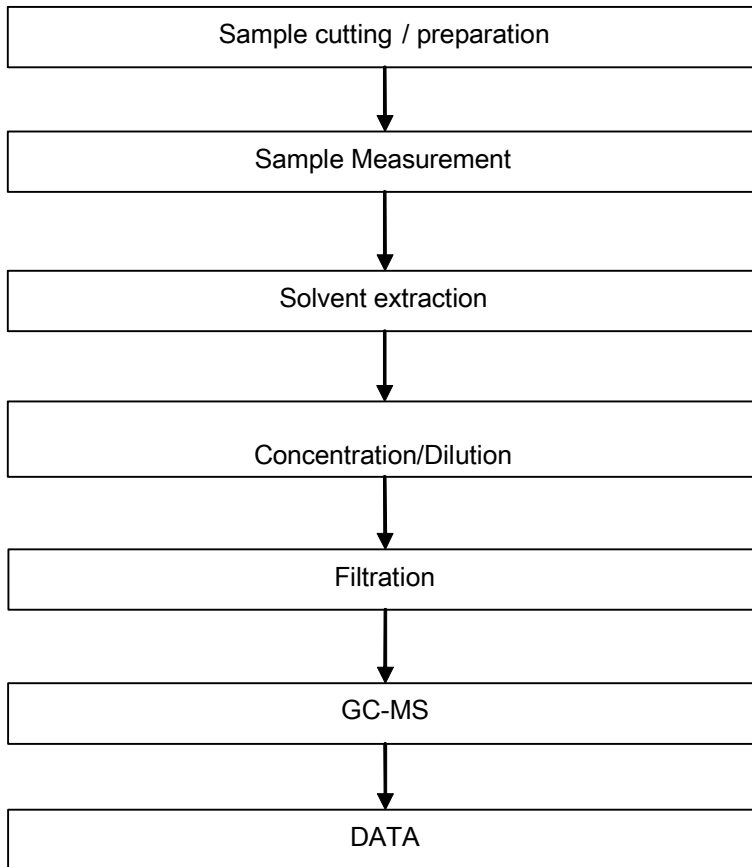
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HBCDD Testing Flow Chart

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



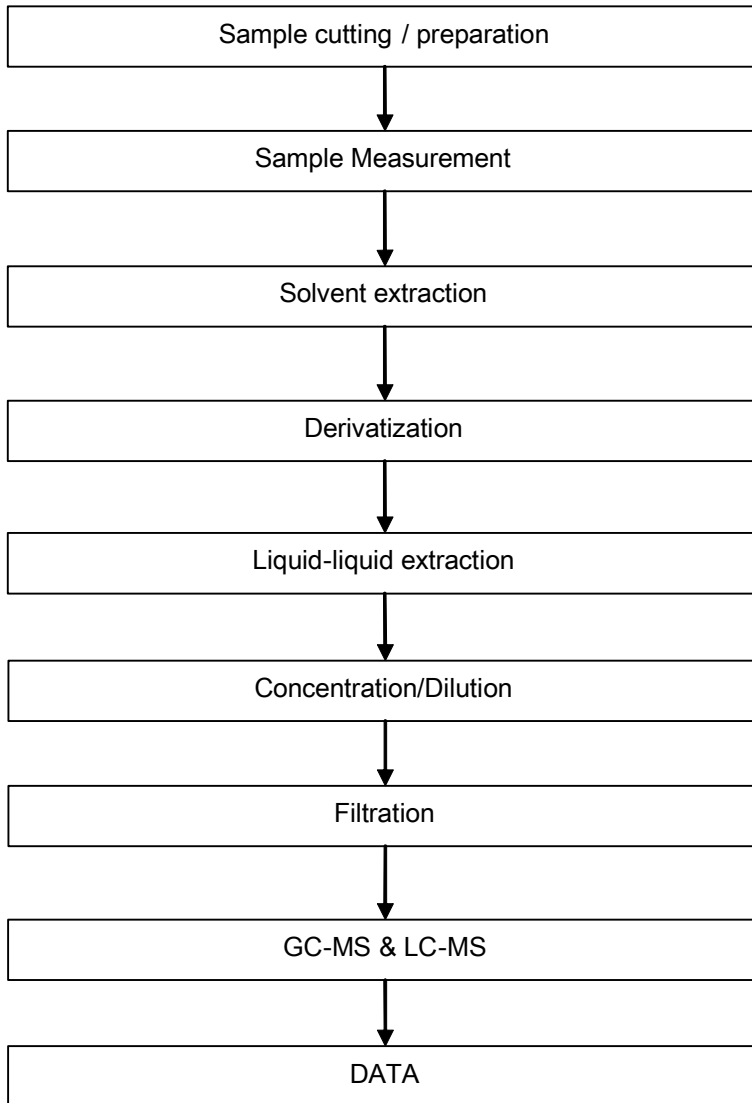
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TBBP-A Testing Flow Chart

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



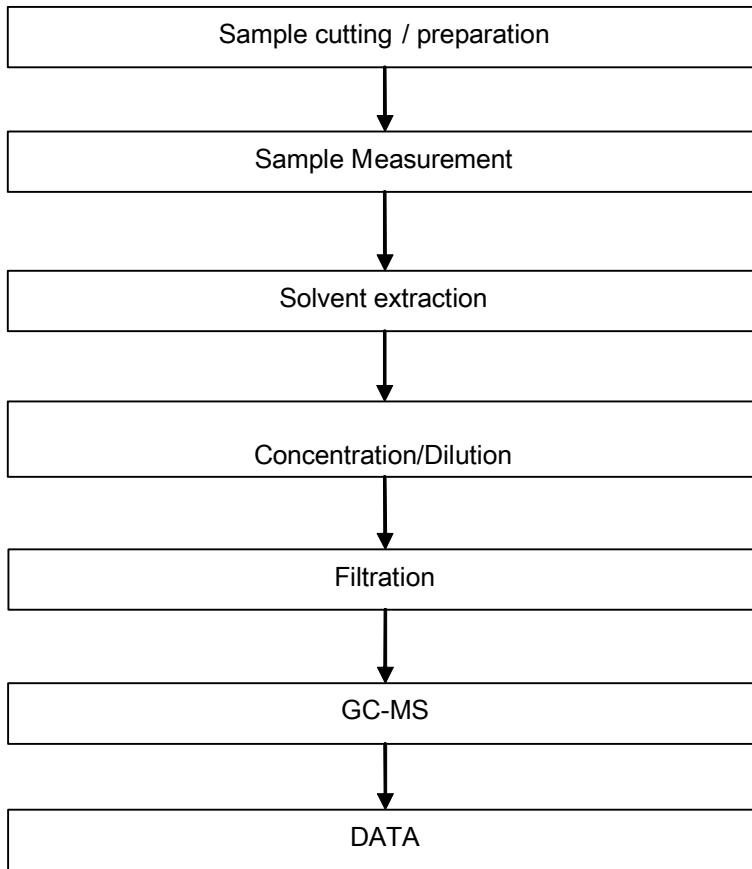
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Dimethyl Fumarate Testing Flow Chart

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



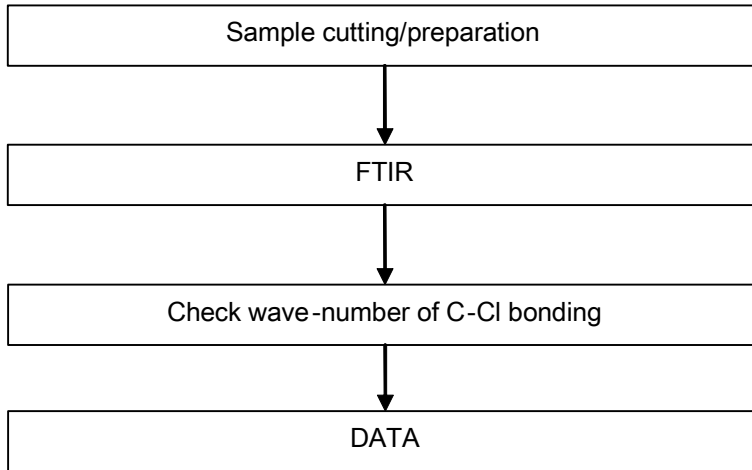
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PVC Testing Flow Chart

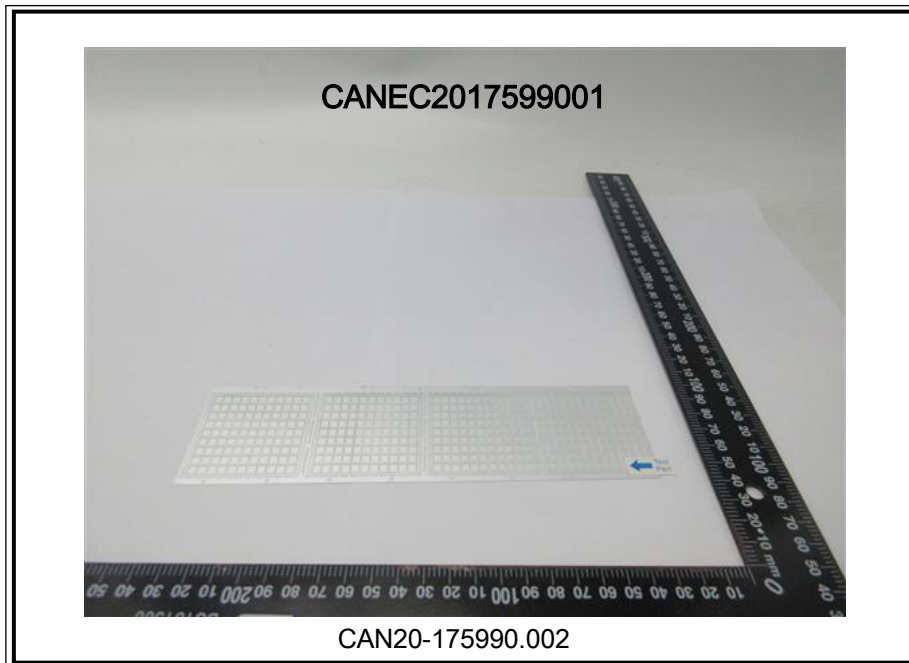
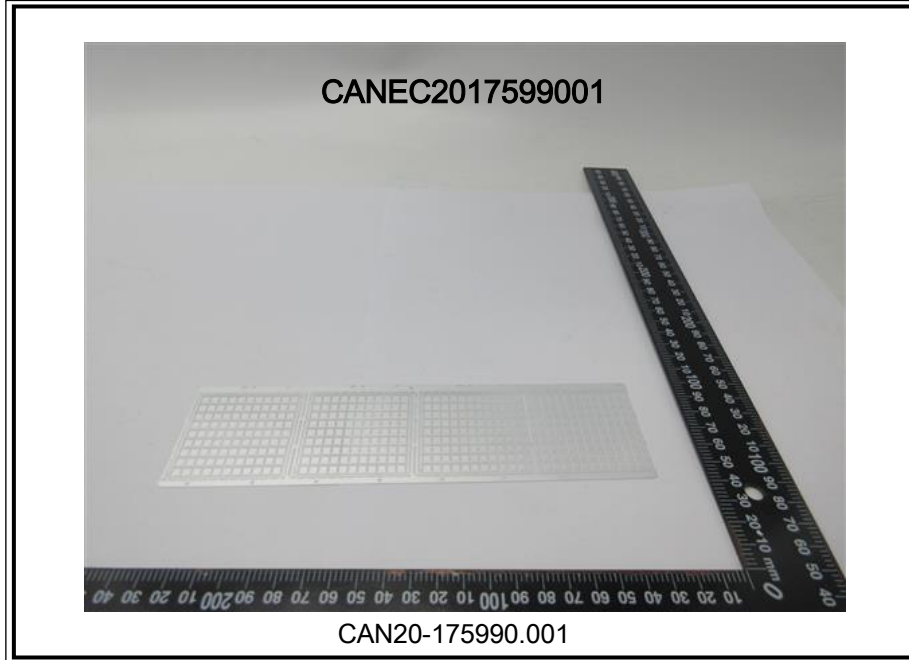
- 1) Name of the person who made testing: Krut Huang
- 2) Name of the person in charge of testing: Qiong Liu



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