

## Test Report

No. CANEC2102976502

Date: 15 Mar 2021

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SHEN NAN CIRCUITS CO.,LTD.

LONG GANG BRANCH: GAO QIAO INDUSTRIAL PARK EAST, LONG GANG DISTRICT, SHENZHEN, CHINA

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

SGS Job No. : CP21-007982 - SZ  
Model No. : Ni&Au Plating  
Client Ref. Info. : Ni&Au Plating  
Date of Sample Received : 04 Mar 2021  
Testing Period : 04 Mar 2021 - 10 Mar 2021  
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).  
Conclusion : Based on the performed tests on submitted sample(s), the results of Lead, Mercury, Cadmium, Hexavalent chromium, Polybrominated biphenyls (PBBs), Polybrominated diphenyl ethers (PBDEs) and Phthalates such as Bis(2-ethylhexyl) phthalate (DEHP) , Butyl benzyl phthalate (BBP), Dibutyl phthalate (DBP) , and Diisobutyl phthalate (DIBP) comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.

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

Jessie Li

Jessie Li  
Approved Signatory

scan to see the report



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Test Results :

Test Part Description :

| Specimen No. | SGS Sample ID    | Description |
|--------------|------------------|-------------|
| SN1          | CAN21-029765.002 | Green "PCB" |

Remarks :

- (1) 1 mg/kg = 1 ppm = 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 62321-7-2:2017 , IEC 62321-6:2015 and IEC 62321-8:2017, analyzed by ICP-OES , UV-Vis and GC-MS .

| Test Item(s)               | Limit | Unit  | MDL | 002 |
|----------------------------|-------|-------|-----|-----|
| Cadmium (Cd)               | 100   | mg/kg | 2   | ND  |
| Lead (Pb)                  | 1,000 | mg/kg | 2   | ND  |
| Mercury (Hg)               | 1,000 | mg/kg | 2   | ND  |
| Hexavalent Chromium (CrVI) | 1,000 | mg/kg | 8   | ND  |
| Sum of PBBs                | 1,000 | 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               | 1,000 | mg/kg | -   | ND  |
| Monobromodiphenyl ether    | -     | mg/kg | 5   | ND  |
| Dibromodiphenyl ether      | -     | mg/kg | 5   | ND  |
| Tribromodiphenyl ether     | -     | mg/kg | 5   | ND  |
| Tetrabromodiphenyl ether   | -     | mg/kg | 5   | ND  |
| Pentabromodiphenyl ether   | -     | mg/kg | 5   | ND  |



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| <u>Test Item(s)</u>                 | <u>Limit</u> | <u>Unit</u> | <u>MDL</u> | <u>002</u> |
|-------------------------------------|--------------|-------------|------------|------------|
| 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)             | 1,000        | mg/kg       | 50         | ND         |
| Butyl benzyl phthalate (BBP)        | 1,000        | mg/kg       | 50         | ND         |
| Bis (2-ethylhexyl) phthalate (DEHP) | 1,000        | mg/kg       | 50         | ND         |
| Diisobutyl Phthalates (DIBP)        | 1,000        | 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

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(3) The restriction of DEHP, BBP, DBP and DIBP shall apply to medical devices, including in vitro medical devices, and monitoring and control instruments, including industrial monitoring and control instruments, from 22 July 2021.

### 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>002</u> |
|---------------------|-------------|------------|------------|
| Chlorine (Cl)       | mg/kg       | 50         | 79         |
| Bromine (Br)        | mg/kg       | 50         | ND         |

### Elementary Analysis

Test Method : SGS In-house method (GZTC CHEM-TOP-004-01, with reference to EPA 3052:1996), analysis was performed by ICP-OES.

| <u>Test Item(s)</u> | <u>Unit</u> | <u>MDL</u> | <u>002</u> |
|---------------------|-------------|------------|------------|
| Antimony (Sb)       | mg/kg       | 10         | ND         |
| Beryllium (Be)      | mg/kg       | 5          | ND         |



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**PVC (Polyvinyl chloride)**

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

| Test Item(s)             | CAS NO.   | Unit | MDL | 002      |
|--------------------------|-----------|------|-----|----------|
| Polyvinyl Chloride (PVC) | 9002-86-2 | -    | -   | Negative |

Notes :

(1) Negative=Undetectable,Positive=Detectable

**Perfluorooctanoic acid (PFOA) and its salts & Perfluorooctane sulfonates (PFOS) and its derivatives**

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

| Test Item(s)  | CAS NO.    | Unit  | MDL   | 002 |
|---|------------|-------|-------|-----|
| Perfluorooctanoic acid (PFOA) and its salts+              | 335-67-1   | 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     | -          | mg/kg | -     | ND  |

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-NH<sub>4</sub> (CAS No.: 29081-56-9), PFOS-NH(OH)<sub>2</sub> (CAS No.: 70225-14-8), PFOS-N(C<sub>2</sub>H<sub>5</sub>)<sub>4</sub> (CAS No.: 56773-42-3), PFOS-DDA(CAS No.:251099-16-8) and POSF (CAS No.: 307-35-7)

**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.

| Test Item(s)  | Limit | Unit  | MDL | 002 |
|---|-------|-------|-----|-----|
| Alkanes C10-C13, chloro (short-chain chlorinated paraffins) (SCCPs) | 1500  | mg/kg | 50  | ND  |



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| <u>Test Item(s)</u> | <u>Limit</u> | <u>Unit</u> | <u>MDL</u> | <u>002</u>  |
|---------------------|--------------|-------------|------------|-------------|
| <b>Comment</b>      |              |             |            | <b>PASS</b> |

### 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.

| <u>Test Item(s)</u>                            | <u>CAS NO.</u> | <u>Unit</u> | <u>MDL</u> | <u>002</u> |
|--|----------------|-------------|------------|------------|
| 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 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.

| <u>Test Item(s)</u>                    | <u>CAS NO.</u> | <u>Unit</u> | <u>MDL</u> | <u>002</u> |
|--|----------------|-------------|------------|------------|
| 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.

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| <u>Test Item(s)</u> | <u>CAS NO.</u> | <u>Unit</u> | <u>MDL</u> | <u>002</u> |
|---------------------|----------------|-------------|------------|------------|
| 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         |

### 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.

| <u>Test Item(s)</u>           | <u>Unit</u> | <u>MDL</u> | <u>002</u> |
|-------------------------------|-------------|------------|------------|
| 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         |

Notes :

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

### Hexabromocyclododecane (HBCDD)

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

| <u>Test Item(s)</u>  | <u>CAS NO.</u> | <u>Unit</u> | <u>MDL</u> | <u>002</u> |
|--|----------------|-------------|------------|------------|
| Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified ( $\alpha$ -HBCDD, $\beta$ -HBCDD, $\gamma$ -HBCDD) | 25637-99-4     | mg/kg       | 10         | ND         |
|  | 3194-55-6      |             |            |            |
|  | 134237-50-6    |             |            |            |
|  | 134237-51-7    |             |            |            |
|  | 134237-52-8    |             |            |            |

### Phthalate(s)

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

| <u>Test Item(s)</u>                 | <u>CAS NO.</u> | <u>Unit</u> | <u>MDL</u> | <u>002</u> |
|-------------------------------------|----------------|-------------|------------|------------|
| Dibutyl phthalate (DBP)             | 84-74-2        | %(w/w)      | 0.005      | ND         |
| Butyl benzyl phthalate (BBP)        | 85-68-7        | %(w/w)      | 0.005      | ND         |
| Bis (2-ethylhexyl) phthalate (DEHP) | 117-81-7       | %(w/w)      | 0.005      | ND         |
| Diisobutyl Phthalates (DIBP)        | 84-69-5        | %(w/w)      | 0.005      | ND         |



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|----------------------------------|----------------------------|-------------|------------|------------|
| Diisononyl Phthalate (DINP)      | 28553-12-0 /<br>68515-48-0 | %(w/w)      | 0.005      | ND         |
| Di-n-octyl Phthalate (DNOP)      | 117-84-0                   | %(w/w)      | 0.005      | ND         |
| Diisodecyl Phthalate (DIDP)      | 26761-40-0 /<br>68515-49-1 | %(w/w)      | 0.005      | ND         |
| Dimethyl Phthalate (DMP)         | 131-11-3                   | %(w/w)      | 0.005      | ND         |
| Diethyl Phthalate (DEP)          | 84-66-2                    | %(w/w)      | 0.005      | ND         |
| Dinonyl Phthalate (DNP)          | 84-76-4                    | %(w/w)      | 0.005      | ND         |
| Dipropyl Phthalate (DPrP)        | 131-16-8                   | %(w/w)      | 0.005      | ND         |
| Diisooctyl Phthalate (DIOP)      | 27554-26-3                 | %(w/w)      | 0.005      | ND         |
| Dicyclohexyl Phthalate (DCHP)    | 84-61-7                    | %(w/w)      | 0.005      | ND         |
| Dipentyl Phthalates (DPENP/DnPP) | 131-18-0                   | %(w/w)      | 0.005      | ND         |
| Diphenyl Phthalate (DPhP)        | 84-62-8                    | %(w/w)      | 0.005      | ND         |
| Dibenzyl Phthalate (DBzP)        | 523-31-9                   | %(w/w)      | 0.005      | ND         |
| Di-n-hexyl Phthalate (DnHP)      | 84-75-3                    | %(w/w)      | 0.005      | ND         |



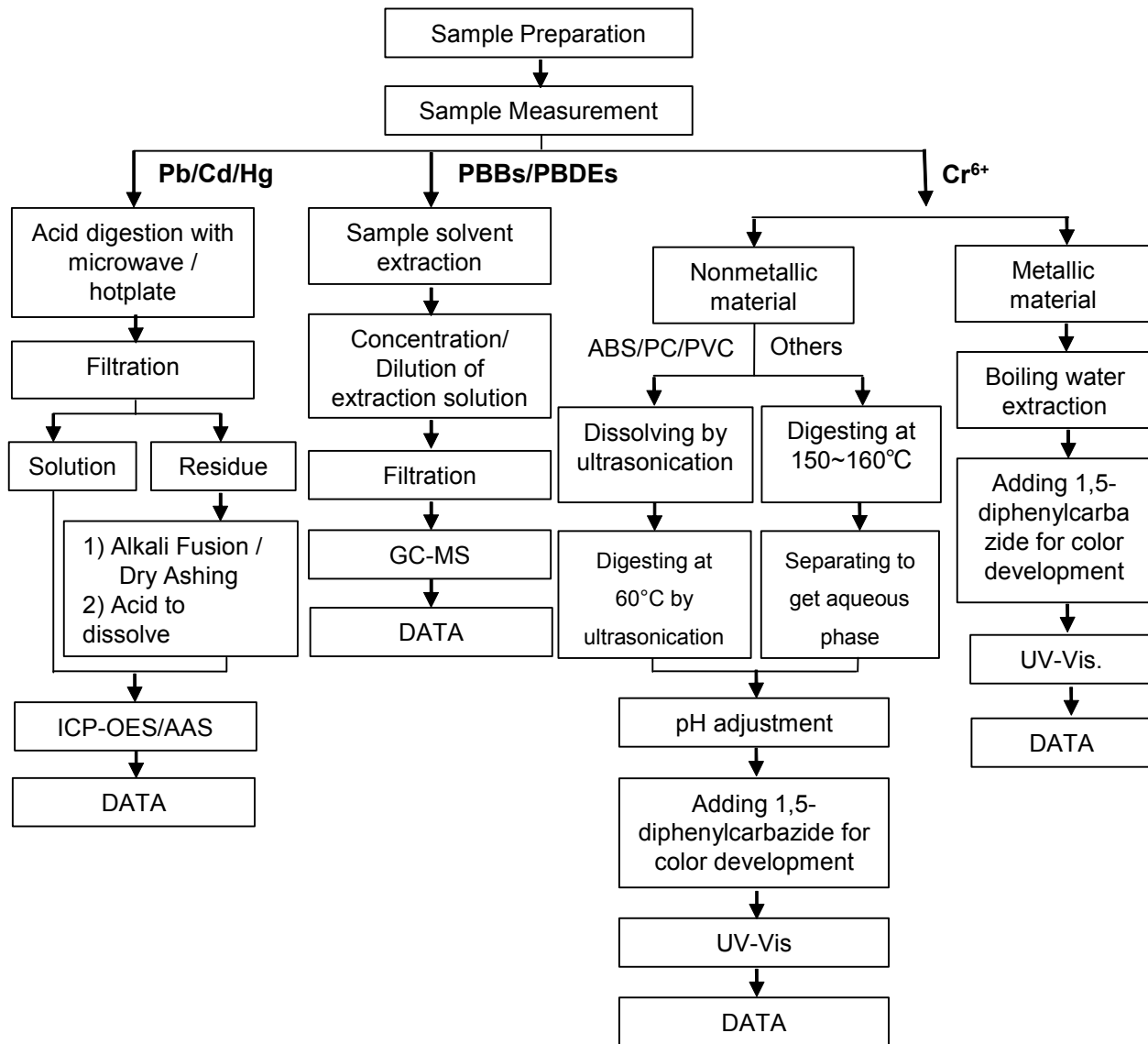
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**Pb/Cd/Hg/Cr<sup>6+</sup>/PBBs/PBDEs Testing Flow Chart**

1) These samples were dissolved totally by pre-conditioning method according to below flow chart. (Cr<sup>6+</sup> and PBBs/PBDEs test method excluded).

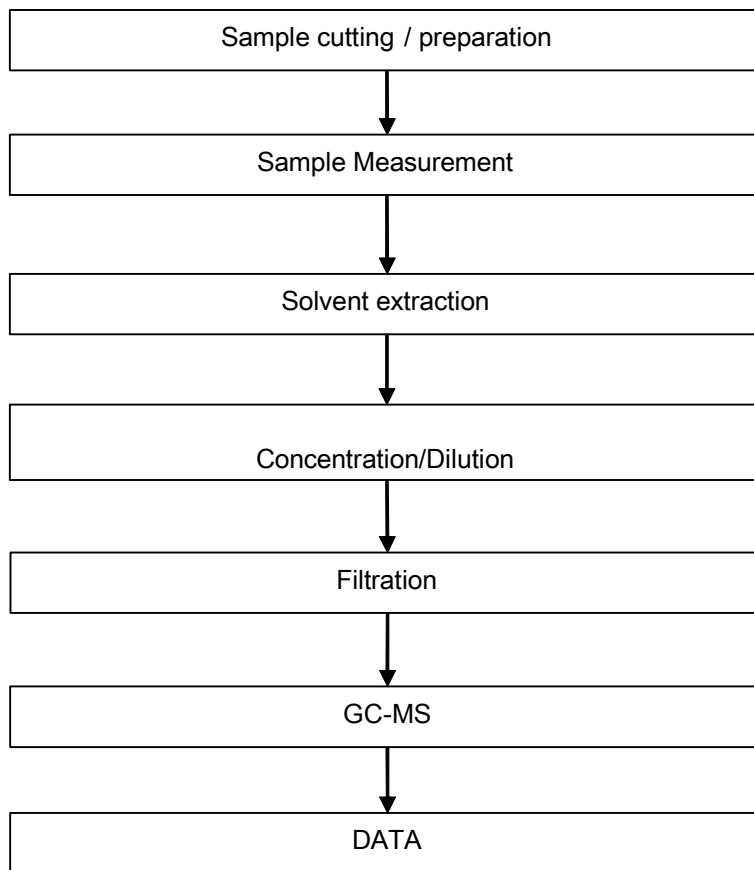


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Phthalates Testing Flow Chart

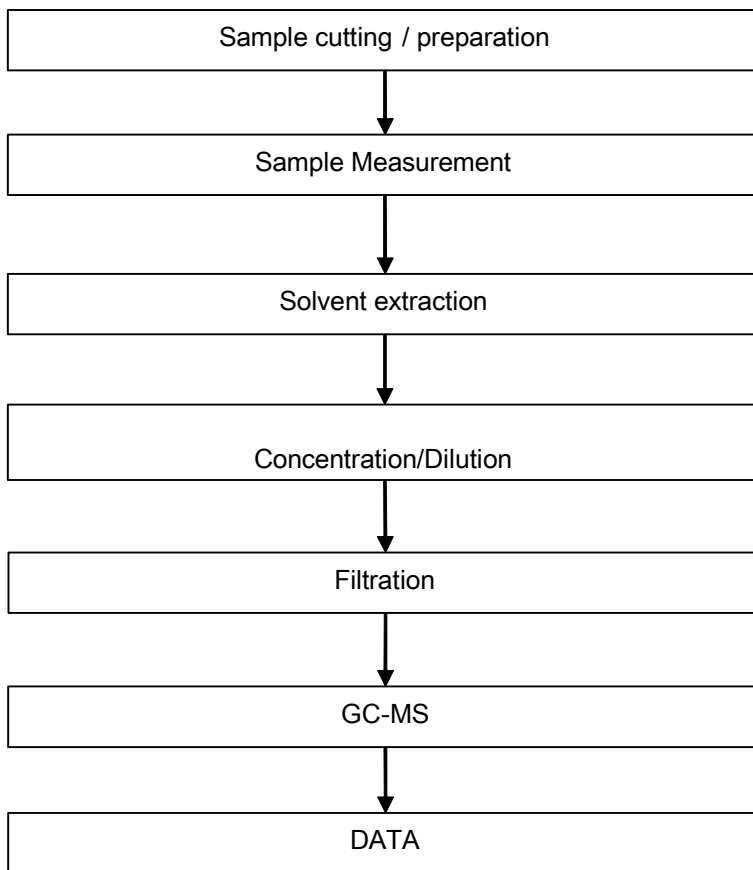


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### Phthalates Testing Flow Chart

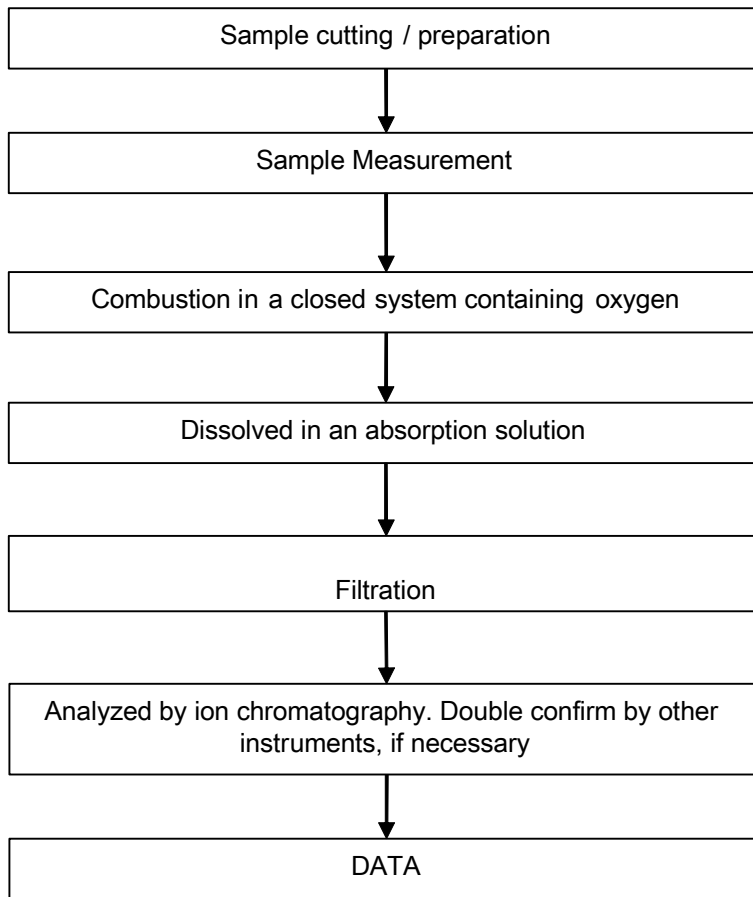


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Halogen Testing Flow Chart

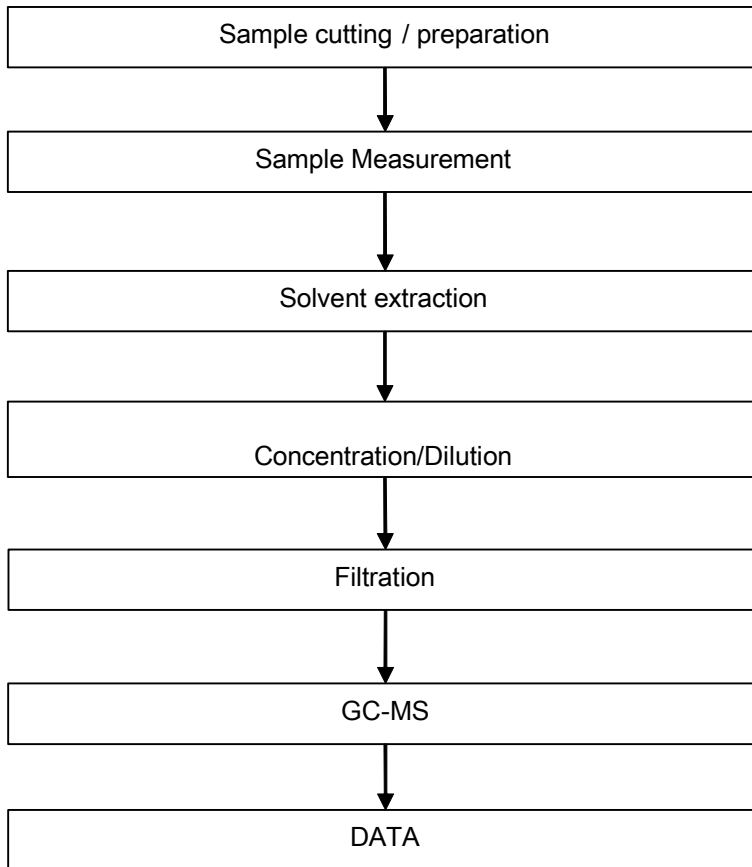


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HBCDD Testing Flow Chart

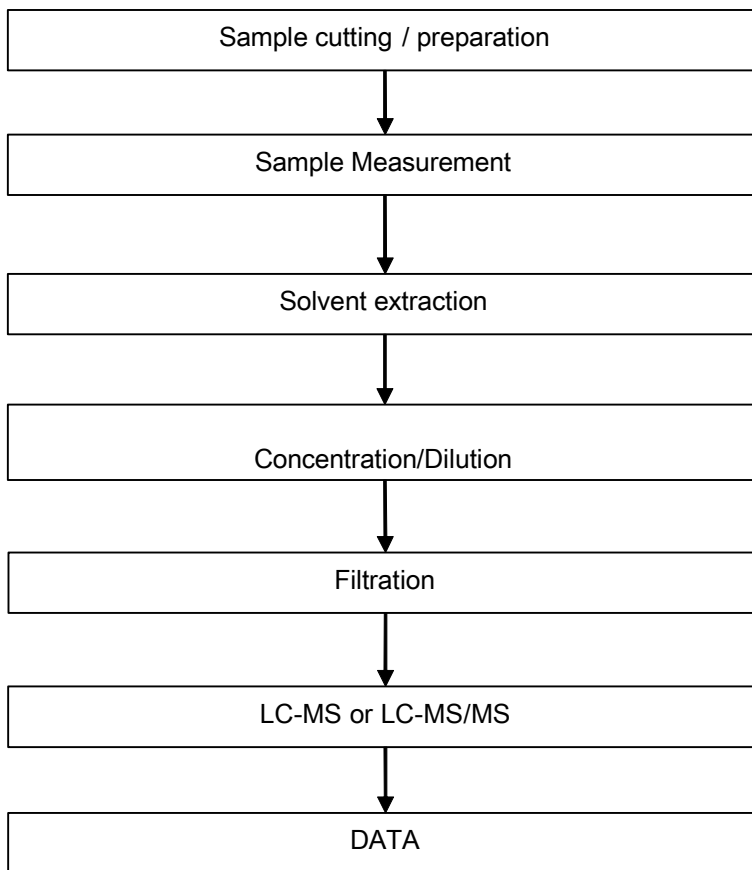


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PFOA / PFOS Testing Flow Chart

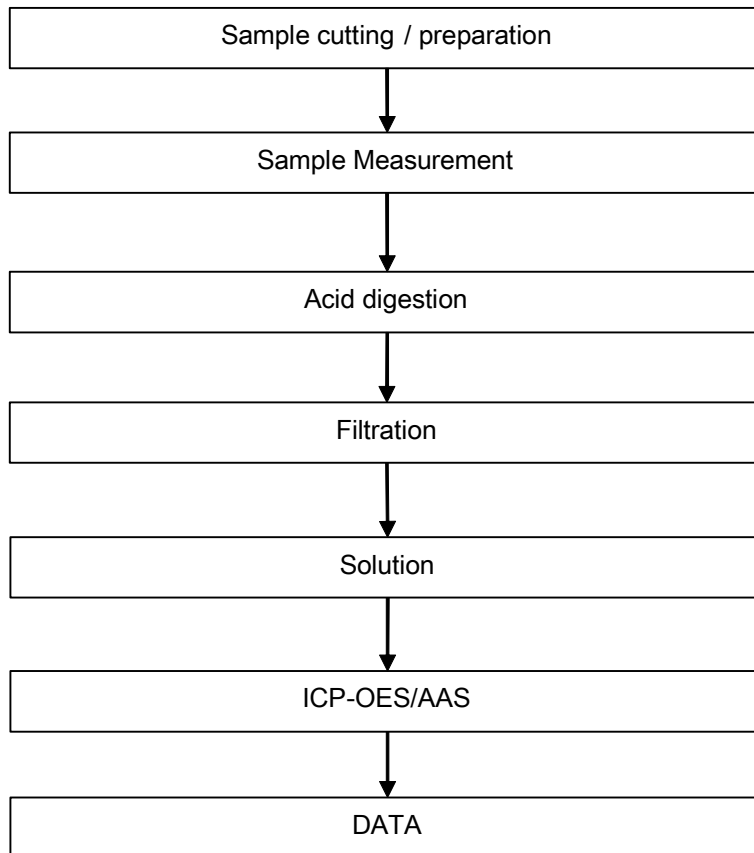


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### Elementary Testing Flow Chart

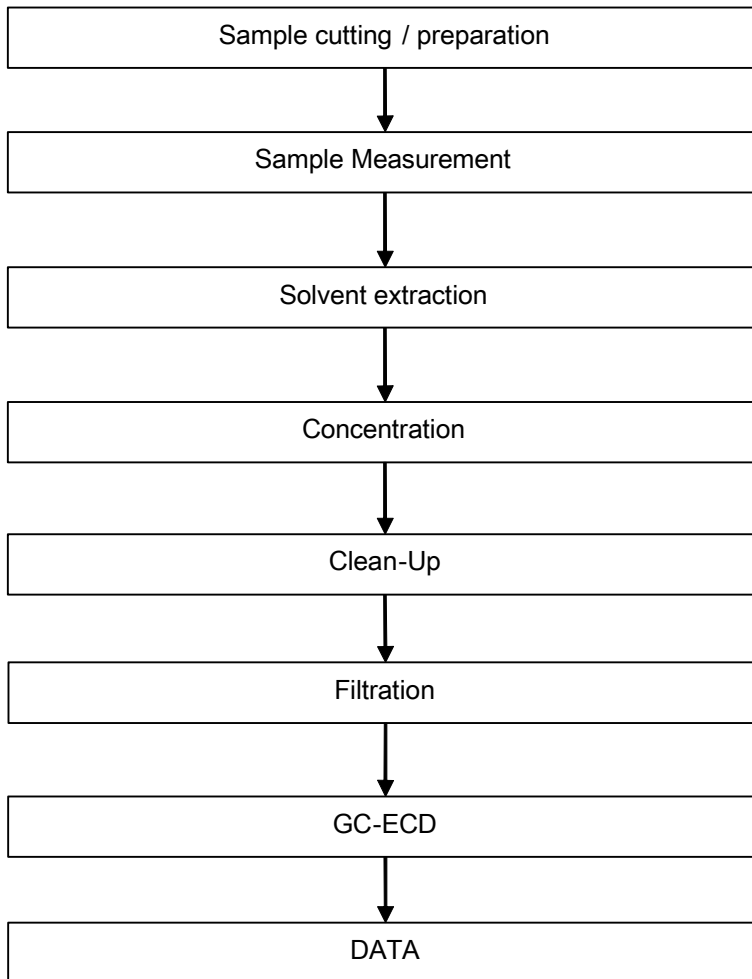


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SCCP/MCCP/LCCP Testing Flow Chart

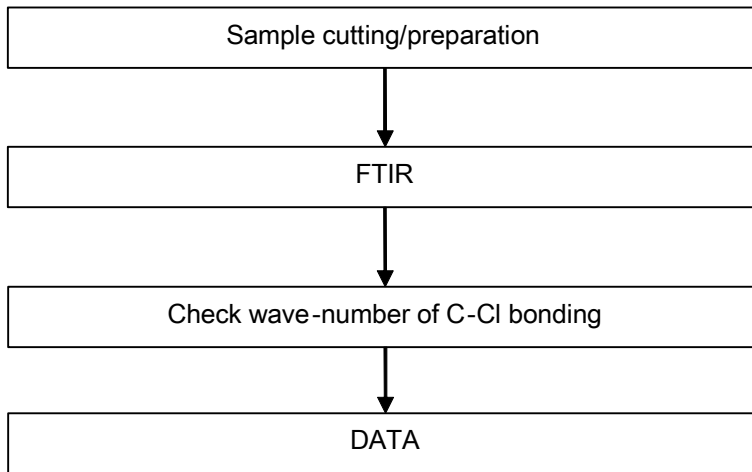


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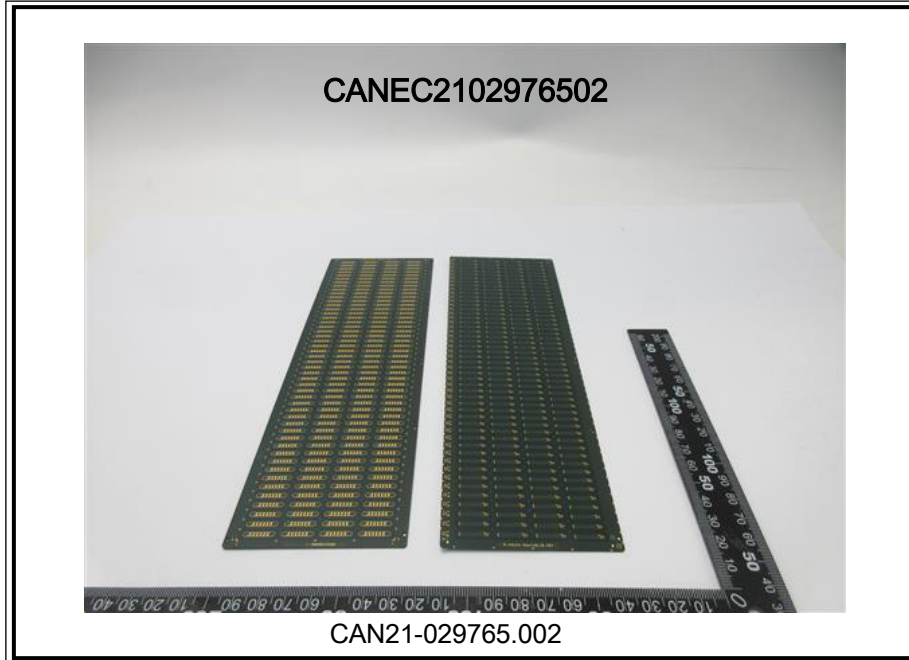
### PVC Testing Flow Chart



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