

## Test Report

No. SHAEC2016314625

Date: 04 Sep 2020

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NINGBO KANGQIANG ELECTRONICS CO.,LTD

NO.988 JINYUAN ROAD YINZHOU INVESTMENT & BUSINESS INCUBATION.NINGBO.CHINA

The following sample(s) was/were submitted and identified on behalf of the clients as : Lead Frame  
(A194, Other name: C194)

SGS Job No. : SP20-026434 - SH  
Model No. : SOP  
Client Ref. Information : SOP、SIP、SDIP、HDIP、SOIC、DIP、SSOP、SOT、TSOP、TSSOP、MS OP、ESOP、HSOP、TO、SMD、PD、LQFP、LF、SOD、GBU、SCMA、PM SOP、EMSOP、QFN、DFN、PDFN、Power DI、LED、MFP、QT、TSOT、HAL、MCS、SM、SOL、ST、TMP、MLF、FBP、ELP、QLMP、OCSSOP、T /SLP、LPCC、QFP、MISPP、MPAQ、CMD、SW93、SME\EMC Lead Frame  
Date of Sample Received : 19 Aug 2020  
Testing Period : 19 Aug 2020 - 04 Sep 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).  
Conclusion : Based on the performed tests on submitted sample(s), the results of Cadmium, Lead, Mercury, 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 (Shanghai) Co., Ltd.

Lucy Yu

Lucy Yu  
Approved Signatory



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Test Results :

Test Part Description :

| Specimen No. | SGS Sample ID    | Description  |
|--------------|------------------|--------------|
| SN1          | SHA20-163146.001 | Copper metal |

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+AMD1:2017, IEC62321-5:2013, IEC62321-7-1:2015, IEC 62321-6:2015 and IEC62321-8:2017, analyzed by ICP-OES, AAS, UV-Vis and GC-MS.

| Test Item(s)                  | Limit | Unit               | MDL  | 001 |
|-------------------------------|-------|--------------------|------|-----|
| Cadmium (Cd)                  | 100   | mg/kg              | 2    | ND  |
| Lead (Pb)                     | 1000  | mg/kg              | 2    | ND  |
| Mercury (Hg)                  | 1000  | mg/kg              | 2    | ND  |
| Hexavalent Chromium (Cr(VI))▼ | -     | µg/cm <sup>2</sup> | 0.10 | 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  |
| Tribromodiphenyl ether        | -     | mg/kg              | 5    | ND  |
| Tetrabromodiphenyl 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> |
|-----------------------------------|--------------|-------------|------------|------------|
| 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         |
| Di-butyl Phthalate (DBP)          | 1000         | mg/kg       | 50         | ND         |
| Benzyl Butyl Phthalate (BBP)      | 1000         | mg/kg       | 50         | ND         |
| Di-2-Ethyl Hexyl 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](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/cm<sup>2</sup>. 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/cm<sup>2</sup>). The coating is considered a non-CrVI 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.

### 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 : With reference to US EPA 3540C: 1996, analysis was performed by GC-MS.



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| <u>Test Item(s)</u>            | <u>Unit</u> | <u>MDL</u> | <u>001</u> |
|--------------------------------|-------------|------------|------------|
| Tetrabromobisphenol A (TBBP-A) | mg/kg       | 10         | ND         |

### Phthalates Content

Test Method : With reference to IEC 62321-8:2017, determination of phthalates 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                  | mg/kg       | 50         | ND         |
| Diisononyl Phthalate (DINP) | 28553-12-0<br>/68515-48-0 | mg/kg       | 50         | ND         |
| Diisodecyl Phthalate (DIDP) | 26761-40-0<br>/68515-49-1 | mg/kg       | 50         | ND         |

### Polycyclic aromatic hydrocarbons (PAHs)

Test Method : With reference to AfPS GS 2019:01 PAK, analysis was performed by GC-MS.

| <u>Test Item(s)</u>  | <u>Unit</u> | <u>MDL</u> | <u>001</u> |
|--|-------------|------------|------------|
| Benzo(a)pyrene(BaP)  | mg/kg       | 0.1        | ND         |
| Benzo(e)pyrene(BeP)  | mg/kg       | 0.1        | ND         |
| Benzo(a)anthracene(BaA)  | mg/kg       | 0.1        | ND         |
| Benzo(b)fluoranthene(BbF)  | mg/kg       | 0.1        | ND         |
| Benzo(j)fluoranthene(BjF)  | mg/kg       | 0.1        | ND         |
| Benzo(k)fluoranthene(BkF)  | mg/kg       | 0.1        | ND         |
| Chrysene(CHR)  | mg/kg       | 0.1        | ND         |
| Dibenzo(a,h)anthracene(DBA)  | mg/kg       | 0.1        | ND         |
| Benzo(g,h,i)perylene(BPE)  | mg/kg       | 0.1        | ND         |
| Indeno(1,2,3-c,d)pyrene(IPY)   | mg/kg       | 0.1        | ND         |
| Phenanthrene(PHE)  | mg/kg       | 0.1        | ND         |
| Pyrene(PYR)  | mg/kg       | 0.1        | ND         |
| Anthracene(ANT)  | mg/kg       | 0.1        | ND         |
| Fluoranthene(FLT)  | mg/kg       | 0.1        | ND         |
| Sum of Phenanthrene(PHE), Pyrene(PYR), Anthracene(ANT),<br>Fluoranthene(FLT) | mg/kg       | -          | ND         |
| Naphthalene(NAP)   | mg/kg       | 0.1        | ND         |
| Sum of 15 PAHs   | mg/kg       | -          | ND         |



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**AfPS ( German commission for Product Safety ) : PAHs requirements**

| Parameter<br>Unit : mg/kg  | Category 1   | Category 2         |                            | Category 3         |                            |
|--|--|--------------------|----------------------------|--------------------|----------------------------|
|  | Materials intended to be placed in the mouth, or materials coming into long-term contact with skin (more than 30s) during the intended use -in toys according to Directive 2009/48/EC or -for the use by children <sup>a,b</sup> up to 3 years of age. | a. use by children | b. other consumer products | a. use by children | b. other consumer products |
| Benzo(a)pyrene (BaP)   | < 0.2  | < 0.2              | < 0.5                      | < 0.5              | < 1                        |
| Benzo(e)pyrene (BeP)   | < 0.2  | < 0.2              | < 0.5                      | < 0.5              | < 1                        |
| Benzo(a)anthracene (BaA)   | < 0.2  | < 0.2              | < 0.5                      | < 0.5              | < 1                        |
| Benzo(b)fluoranthene (BbF)   | < 0.2  | < 0.2              | < 0.5                      | < 0.5              | < 1                        |
| Benzo(j)fluoranthene (BjF)   | < 0.2  | < 0.2              | < 0.5                      | < 0.5              | < 1                        |
| Benzo(k)fluoranthene (BkF)   | < 0.2  | < 0.2              | < 0.5                      | < 0.5              | < 1                        |
| Chrysene (CHR)   | < 0.2  | < 0.2              | < 0.5                      | < 0.5              | < 1                        |
| Dibenzo(a,h)anthracene (DBA)   | < 0.2  | < 0.2              | < 0.5                      | < 0.5              | < 1                        |
| Benzo(g,h,i)perylene (BPE)   | < 0.2  | < 0.2              | < 0.5                      | < 0.5              | < 1                        |
| Indeno(1,2,3-cd)pyrene (IPY)   | < 0.2  | < 0.2              | < 0.5                      | < 0.5              | < 1                        |
| Phenanthrene (PHE), pyrene (PYR), anthracene (ANT), fluoranthene (FLT) | < 1 Sum  | < 5 Sum            | < 10 Sum                   | < 20 Sum           | < 50 Sum                   |
| Naphthalene (NAP)  | < 1  | < 2                |                            | < 10               |                            |
| <b>Sum of 15 PAHs</b>  | < 1  | < 5                | < 10                       | < 20               | < 50                       |

Note:

<sup>a</sup> A "Child" is legally defined as a person before reaching the age of 14 years.

<sup>b</sup> Use by children includes both active and passive contact by children.

<sup>c</sup> Definition "short-term repetitive contact" taken from REACH Annex XVII entry 50 amendment (Regulation (EC) No. 1272/2013)

<sup>d</sup> According to the definition of the German Product Safety Act (ProdSG) (chapter 1 Article 2 No. 28) "foreseeable use" shall mean the use of a product in a manner that the person placing it on the market, has not intended, but which could be reasonably foreseeable.

**Remark:** The German committee on Product Safety (AfPS) published a new PAHs document (AfPS GS 2019:01 PAK) on April 10, 2020, which will be binding for the issue of GS mark certificate from July 1, 2020.

**Perfluorooctanesulfonate (PFOS) and its derivatives and Perfluorooctanoic Acid (PFOA)**

Test Method : With reference to CEN/TS 15968:2010, analysis was performed by LC-MS or LC-MS-MS and GC-MS

| Test Item(s)                                   | CAS NO.   | Unit  | MDL  | 001 |
|--|-----------|-------|------|-----|
| Perfluorooctane Sulfonates (PFOS) <sup>^</sup> | 1763-23-1 | mg/kg | 0.01 | ND  |
| Perfluorooctanoic Acid (PFOA) and its salts+   |           | mg/kg | 0.01 | ND  |

Notes :

(1) + PFOA refer to 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



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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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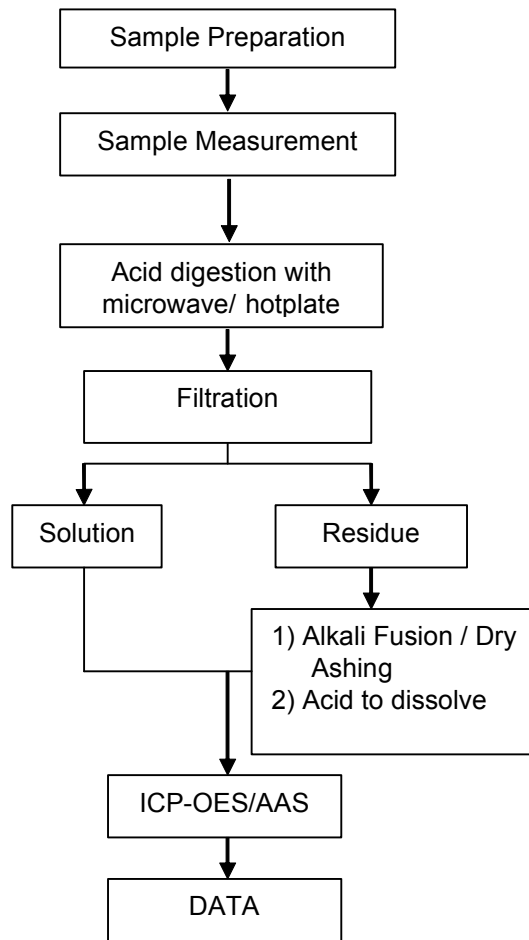
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ATTACHMENTS

Elements (IEC62321) Testing Flow Chart

- 1) Name of the person who made testing: Meria Jin/Sielina Song
- 2) Name of the person in charge of testing: Luna Xu/Bob Zhang
- 3) These samples were dissolved totally by pre-conditioning method according to below flow chart.



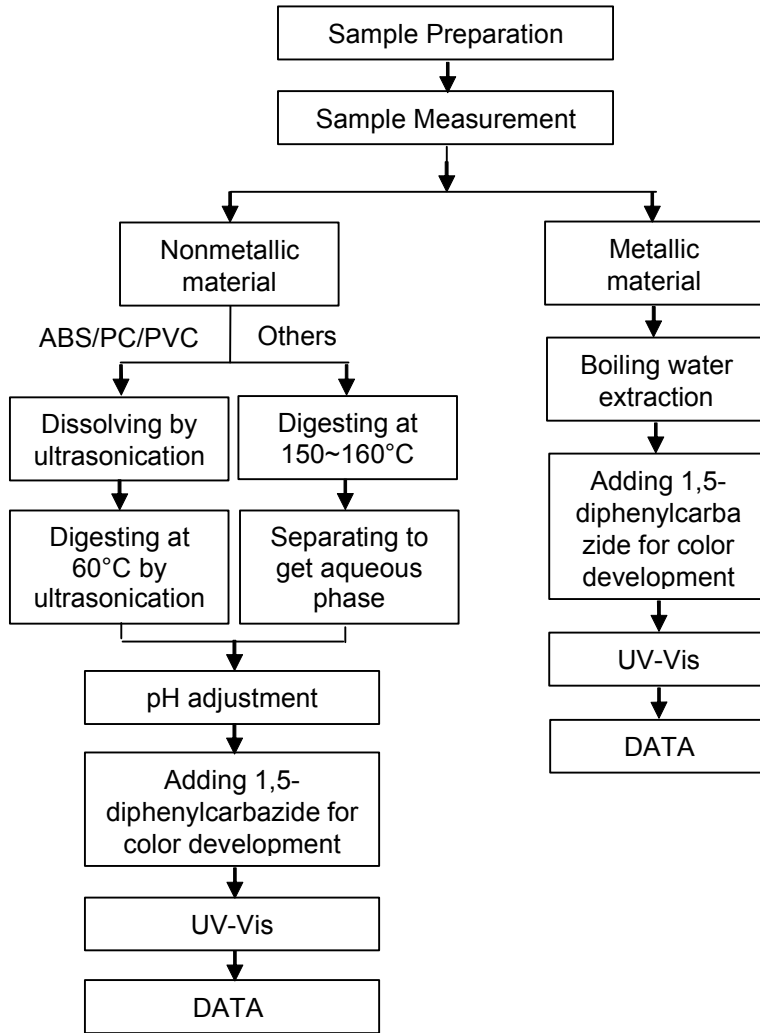
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ATTACHMENTS

Hexavalent Chromium (Cr(VI)) Testing Flow Chart

- 1) Name of the person who made testing: Alex Wang
- 2) Name of the person in charge of testing: Xiaolong Yang



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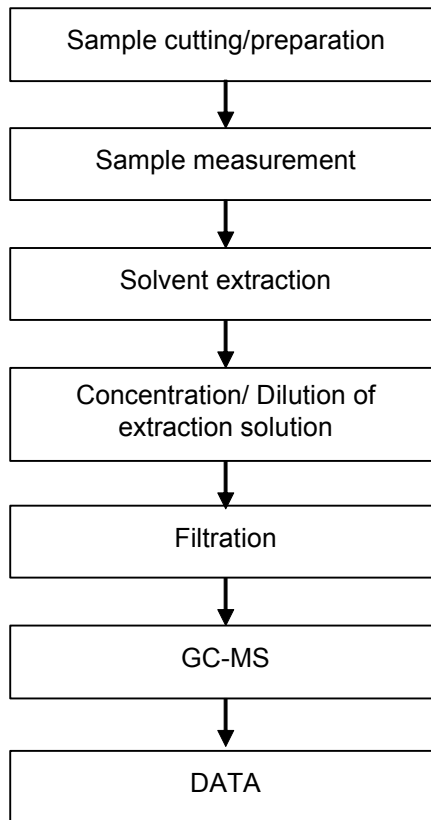
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PBBs/PBDEs Testing Flow Chart

- 1) Name of the person who made testing: Gary Xu
- 2) Name of the person in charge of testing: Myra Ma



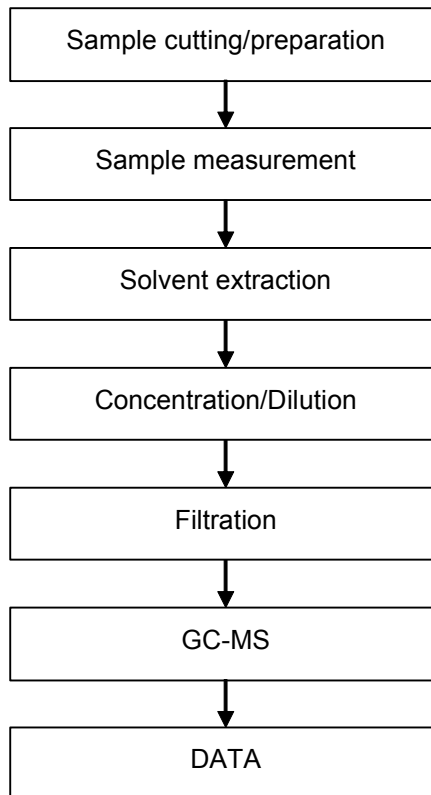
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### Phthalates Testing Flow Chart

- 1) Name of the person who made testing: Alina Li
- 2) Name of the person in charge of testing: Jason Zhang



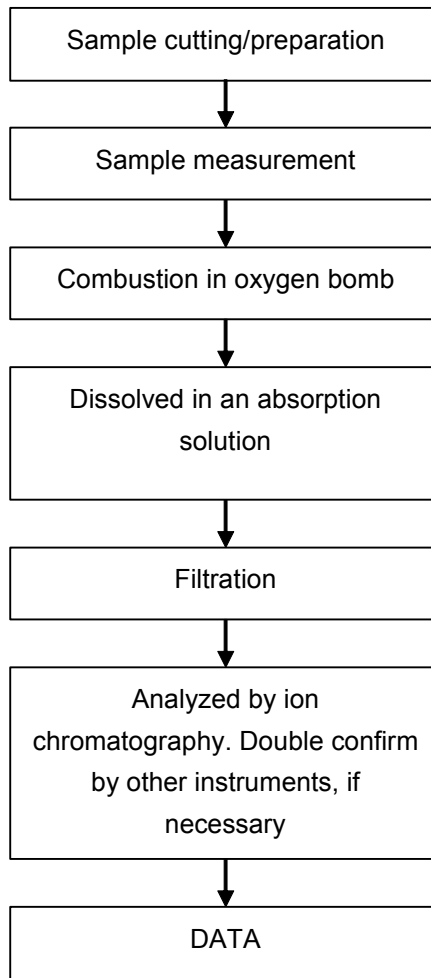
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**Halogen Testing (oxygen bomb) Flow Chart**

- 1) Name of the person who made testing: Kevin Xu
- 2) Name of the person in charge of testing: Allen Chen



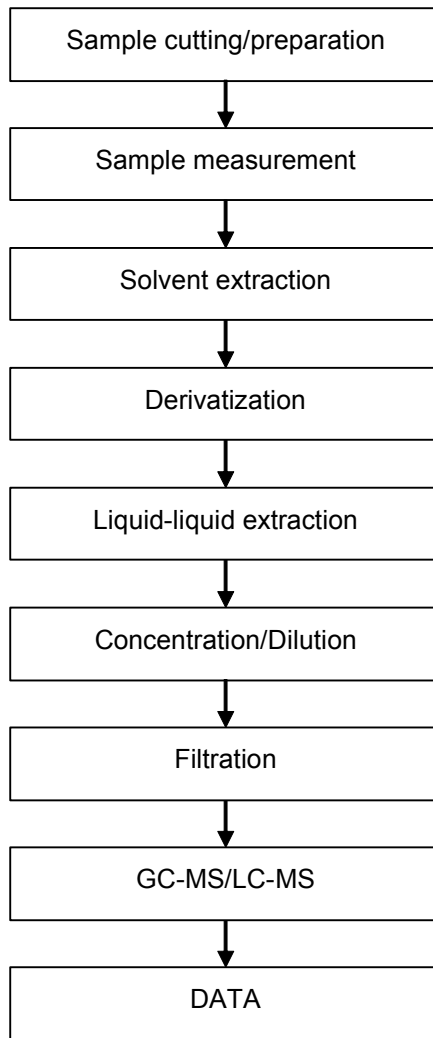
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TBBP-A Testing Flow Chart

- 1) Name of the person who made testing: Gary Xu
- 2) Name of the person in charge of testing: Myra Ma



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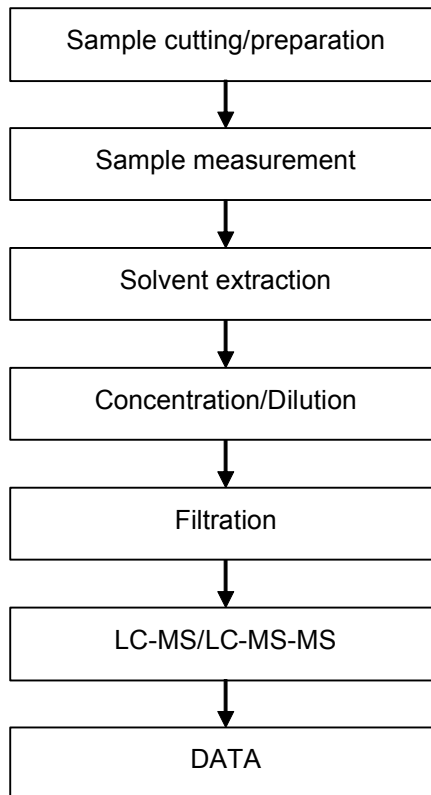
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PFOS/PFOA Testing Flow Chart

- 1) Name of the person who made testing: Joe Qiao
- 2) Name of the person in charge of testing: Richer Yu



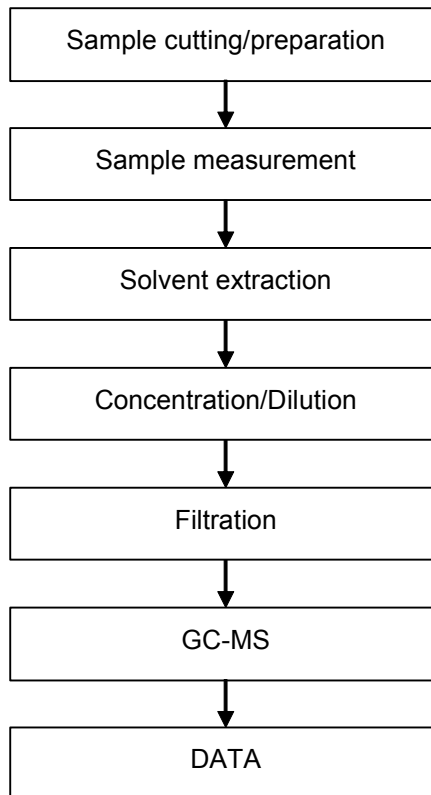
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### PAHs Testing Flow Chart

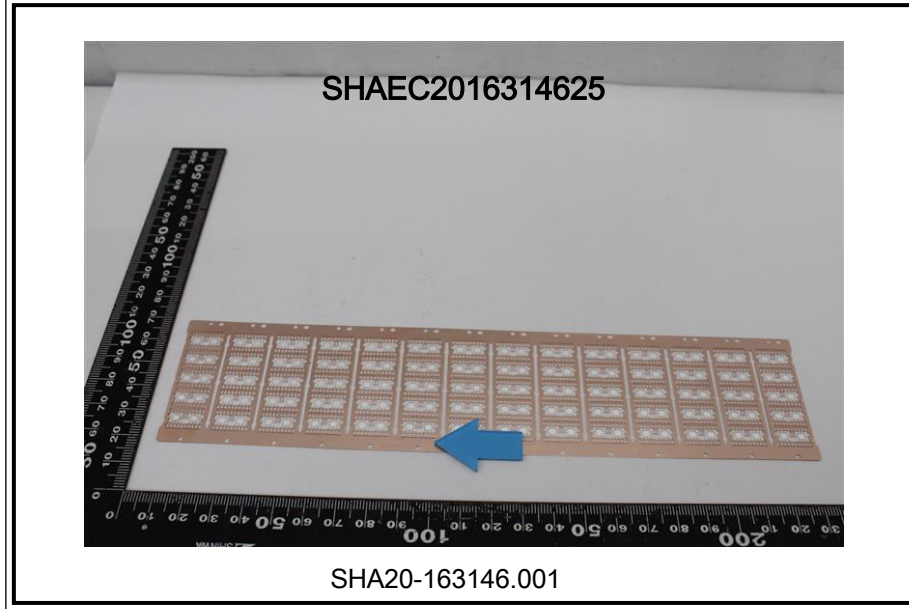
- 1) Name of the person who made testing: Nina Fang
- 2) Name of the person in charge of testing: Jessy Huang



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