

Test Report

No.: ETR23100533

Date: 07-Jan-2023

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TOWER SEMICONDUCTOR LTD.
20 SHAUL AMOR ST. MIGDAL HAEMEK ISRAEL

The following sample(s) was/were submitted and identified by the applicant as:

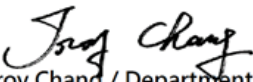
Sample Submitted By : TOWER SEMICONDUCTOR LTD.
Sample Name : SILICON WAFERS
Style/Item No. : 0.18 μ 8" TOWER SEMICONDUCTOR MH FAB9 (CA18, CS18)
Order No. : 4500370797


=====
Sample Receiving Date : 04-Jan-2023
Testing Period : 04-Jan-2023 to 07-Jan-2023

Test Requested : (1) As specified by client, with reference to RoHS 2011/65/EU Annex II and amending Directive (EU) 2015/863 to determine Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP contents in the submitted sample(s).
(2) Please refer to next pages for the other item(s).

Test Results : Please refer to following pages.

Conclusion : (1) Based on the performed tests on submitted sample(s), the test results of Cadmium, Lead, Mercury, Cr(VI), PBBs, PBDEs, DBP, BBP, DEHP, DIBP comply with the limits as set by RoHS Directive (EU) 2015/863 amending Annex II to Directive 2011/65/EU.


Troy Chang / Department Manager
Signed for and on behalf of
SGS TAIWAN LTD.
Chemical Laboratory - Taipei



PIN CODE: 04EA3758

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Test Part Description

No.1 : SILICON WAFERS

Test Result(s)

Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Cadmium (Cd) (CAS No.: 7440-43-9)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	100
Lead (Pb) (CAS No.: 7439-92-1)	With reference to IEC 62321-5: 2013, analysis was performed by ICP-OES.	mg/kg	2	n.d.	1000
Mercury (Hg) (CAS No.: 7439-97-6)	With reference to IEC 62321-4: 2013+AMD1: 2017, analysis was performed by ICP-OES.	mg/kg	2	n.d.	1000
Hexavalent Chromium Cr(VI) (CAS No.: 18540-29-9)	With reference to IEC 62321-7-2: 2017, analysis was performed by UV-VIS.	mg/kg	8	n.d.	1000
Monobromobiphenyl	With reference to IEC 62321-6: 2015, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Dibromobiphenyl		mg/kg	5	n.d.	-
Tribromobiphenyl		mg/kg	5	n.d.	-
Tetrabromobiphenyl		mg/kg	5	n.d.	-
Pentabromobiphenyl		mg/kg	5	n.d.	-
Hexabromobiphenyl		mg/kg	5	n.d.	-
Heptabromobiphenyl		mg/kg	5	n.d.	-
Octabromobiphenyl		mg/kg	5	n.d.	-
Nonabromobiphenyl		mg/kg	5	n.d.	-
Decabromobiphenyl		mg/kg	5	n.d.	-
Sum of PBBs		mg/kg	-	n.d.	1000
Monobromodiphenyl ether		mg/kg	5	n.d.	-
Dibromodiphenyl ether		mg/kg	5	n.d.	-
Tribromodiphenyl ether		mg/kg	5	n.d.	-
Tetrabromodiphenyl ether		mg/kg	5	n.d.	-
Pentabromodiphenyl ether		mg/kg	5	n.d.	-
Hexabromodiphenyl ether		mg/kg	5	n.d.	-
Heptabromodiphenyl ether		mg/kg	5	n.d.	-
Octabromodiphenyl ether		mg/kg	5	n.d.	-
Nonabromodiphenyl ether		mg/kg	5	n.d.	-
Decabromodiphenyl ether	mg/kg	5	n.d.	-	
Sum of PBDEs	mg/kg	-	n.d.	1000	

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Butyl benzyl phthalate (BBP) (CAS No.: 85-68-7)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Dibutyl phthalate (DBP) (CAS No.: 84-74-2)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Di-(2-ethylhexyl) phthalate (DEHP) (CAS No.: 117-81-7)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Diisobutyl phthalate (DIBP) (CAS No.: 84-69-5)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	1000
Diisodecyl phthalate (DIDP) (CAS No.: 26761-40-0, 68515-49-1)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Diisononyl phthalate (DINP) (CAS No.: 28553-12-0, 68515-48-0)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Di-n-octyl phthalate (DNOP) (CAS No.: 117-84-0)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Bis(2-methoxyethyl) phthalate (DMEP) (CAS No.: 117-82-8)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
1,2-Benzenedicarboxylic acid, di-C7-11-branched and linear alkyl esters (DHNUP) (CAS No.: 68515-42-4)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
1,2-Benzenedicarboxylic acid, di-C6-8-branched alkyl esters, C7-rich (DIHP) (CAS No.: 71888-89-6)	With reference to IEC 62321-8: 2017, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
Hexabromocyclododecane (HBCDD) and all major diastereoisomers identified (α - HBCDD, β - HBCDD, γ - HBCDD) (CAS No.: 25637-99-4, 3194-55-6 (134237-51-7, 134237-50-6, 134237-52-8))	With reference to IEC 62321: 2008, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Polychlorinated biphenyls (PCBs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	n.d.	-
Polychlorinated naphthalene (PCNs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	5	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Polychlorinated terphenyls (PCTs)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	n.d.	-
Short Chain Chlorinated Paraffins(C10-C13) (SCCP) (CAS No.: 85535-84-8)	With reference to ISO 18219-1: 2021, analysis was performed by GC/MS.	mg/kg	50	n.d.	-
AZO Dyes					
4-aminodiphenyl (CAS No.: 92-67-1)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
Benzidine (CAS No.: 92-87-5)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
4-chloro-o-toluidine (CAS No.: 95-69-2)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
2-naphthylamine (CAS No.: 91-59-8)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
o-aminoazotoluene (CAS No.: 97-56-3)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
5-nitro-o-toluidine (CAS No.: 99-55-8)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
4-chloroaniline (CAS No.: 106-47-8)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
2,4-diaminoanisole (CAS No.: 615-05-4)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
4,4'-diaminodiphenylmethane (MDA) (CAS No.: 101-77-9)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
3,3'-dichlorobenzidine (CAS No.: 91-94-1)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
3,3'-dimethoxybenzidine (CAS No.: 119-90-4)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
3,3'-dimethylbenzidine (CAS No.: 119-93-7)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
3,3'-dimethyl-4,4'-diaminodiphenylmethane (CAS No.: 838-88-0)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
2-methoxy-5-methylaniline (CAS No.: 120-71-8)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
4,4'-methylene-bis-(2-chloroaniline) (CAS No.: 101-14-4)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
4,4'-oxydianiline (CAS No.: 101-80-4)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
4,4'-thiodianiline (CAS No.: 139-65-1)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
o-toluidine (CAS No.: 95-53-4)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
2,4-diaminotoluene (CAS No.: 95-80-7)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
2,4,5-trimethylaniline (CAS No.: 137-17-7)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
o-anisidine (CAS No.: 90-04-0)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
4-aminoazobenzene (CAS No.: 60-09-3)	With reference to EN ISO 14362-1: 2017 or/and EN ISO 14362-3: 2017, analysis was performed by GC/MS & HPLC/DAD.	mg/kg	3	n.d.	-
2,4-xylidine (CAS No.: 95-68-1)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
2,6-xylidine (CAS No.: 87-62-7)	With reference to EN ISO 14362-1: 2017, analysis was performed by GC/MS and HPLC/DAD.	mg/kg	3	n.d.	-
Formaldehyde (CAS No.: 50-00-0)	With reference to ISO 17226-1: 2021, analysis was performed by LC/DAD.	mg/kg	3	n.d.	-
Asbestos					
Actinolite (CAS No.: 77536-66-4)	With reference to EPA 600/R-93/116: 1993, analysis was performed by Stereo Microscope (SM), Dispersion Staining Polarized Light Microscope (DS-PLM) and X-ray Diffraction Spectrometer (XRD).	-	-	Negative	-
Amosite (CAS No.: 12172-73-5)		-	-	Negative	-
Anthophyllite (CAS No.: 77536-67-5)		-	-	Negative	-
Chrysotile (CAS No.: 12001-29-5)		-	-	Negative	-
Crocidolite (CAS No.: 12001-28-4)		-	-	Negative	-
Tremolite (CAS No.: 77536-68-6)		-	-	Negative	-
Dimethyl fumarate (DMFu) (CAS No.: 624-49-7)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.1	n.d.	-
Polyvinyl chloride (PVC)	With reference to ASTM E1252: 2021, analysis was performed by FT-IR and Flame Test.	**	-	Negative	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Chlorofluorocarbons (CFCs)					
CFC-13 (CAS No.: 75-72-9)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-111 (CAS No.: 354-56-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-112 (CAS No.: 76-12-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-211 (CAS No.: 422-78-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-212 (CAS No.: 3182-26-1)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-213 (CAS No.: 2354-06-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-214 (CAS No.: 29255-31-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-215 (CAS No.: 4259-43-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-216 (CAS No.: 661-97-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-217 (CAS No.: 422-86-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-12 (CAS No.: 75-71-8)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
CFC-11 (CAS No.: 75-69-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-115 (CAS No.: 76-15-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-114 (CAS No.: 76-14-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
CFC-113 (CAS No.: 76-13-1)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Hydrochlorofluorocarbons (HCFCs)					
HCFC-21 (CAS No.: 75-43-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-22 (CAS No.: 75-45-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-31 (CAS No.: 593-70-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-121 (CAS No.: 354-14-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-122 (CAS No.: 354-21-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-123 (CAS No.: 306-83-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-124 (CAS No.: 2837-89-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
HCFC-131 (CAS No.: 359-28-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-132b (CAS No.: 1649-08-7)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-133a (CAS No.: 75-88-7)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-142b (CAS No.: 75-68-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-221 (CAS No.: 422-26-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-222 (CAS No.: 422-49-1)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-223 (CAS No.: 422-52-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-224 (CAS No.: 422-54-8)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-225ca (CAS No.: 422-56-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-225cb (CAS No.: 507-55-1)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-226 (CAS No.: 431-87-8)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-231 (CAS No.: 421-94-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
HCFC-232 (CAS No.: 460-89-9)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-233 (CAS No.: 7125-84-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-234 (CAS No.: 425-94-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-235 (CAS No.: 460-92-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-241 (CAS No.: 666-27-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-242 (CAS No.: 460-63-9)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-244	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-251 (CAS No.: 421-41-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-252 (CAS No.: 819-00-1)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-261 (CAS No.: 420-97-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-262 (CAS No.: 421-02-03)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-271 (CAS No.: 430-55-7)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
HCFC-141b (CAS No.: 1717-00-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-243 (CAS No.: 460-69-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-253 (CAS No.: 460-35-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-141	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-142	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-151	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HCFC-225	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Halons					
Halon-1211 (CAS No.: 353-59-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Halon-1301 (CAS No.: 75-63-8)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Halon-2402 (CAS No.: 124-73-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Methyl Bromide (CAS No.: 74-83-9)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Hydrobromofluorocarbons (HBFCs)					
HBFC-271B1 (C3H6FBr)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-262B1 (C3H5F2Br)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-261B2 (C3H5FBr2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-253B1 (C3H4F3Br)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-252B2 (C3H4F2Br2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-251B3 (C3H4FBr3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-244B1 (C3H3F4Br)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-243B2 (C3H3F3Br2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-242B3 (C3H3F2Br3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-241B4 (C3H3FBr4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-235B1 (C3H2F5Br)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
HBFC-234B2 (C3H2F4Br2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-233B3 (C3H2F3Br3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-232B4 (C3H2F2Br4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-231B5 (C3H2FBr5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-226B1 (C3HF6Br)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-225B2 (C3HF5Br2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-224B3 (C3HF4Br3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-223B4 (C3HF3Br4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-222B5 (C3HF2Br5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-221B6 (C3HFBr6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-151B1 (C2H4FBr)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-142B1 (C2H3F2Br)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
HBFC-141B2 (C2H3FBr2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-133B1 (C2H2F3Br)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-132B2 (C2H2F2Br2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-131B3 (C2H2FBr3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-124B1 (C2HF4Br)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-123B2 (C2HF3Br2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-122B3 (C2HF2Br3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-121B4 (C2HFBr4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-31B1 (CH2FBr) (CAS No.: 373-52-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-22B1 (CHF2Br) (CAS No.: 1511-62-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HBFC-21B2 (CHFBr2) (CAS No.: 1868-53-7)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Chlorinate hydrocarbon (CHCs)					
1,1-Dichloropropene (CAS No.: 563-58-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
1,2-Dichloroethane (CAS No.: 107-06-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
2,2-Dichloropropane (CAS No.: 594-20-7)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Carbon tetrachloride (CAS No.: 56-23-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Chloromethane (CAS No.: 74-87-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
cis-1,2-Dichloroethene (CAS No.: 156-59-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
cis-1,3-Dichloropropene (CAS No.: 10061-01-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Hexachlorobutadiene (CAS No.: 87-68-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
trans-1,2-Dichloroethene (CAS No.: 156-60-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
trans-1,3-Dichloropropene (CAS No.: 10061-02-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Dichloromethane, Methylene chloride (CAS No.: 75-09-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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				No.1	
1,2-Dichloropropane (CAS No.: 78-87-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
1,1,1,2-Tetrachloroethane (CAS No.: 630-20-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
1,1,1-Trichloroethane (CAS No.: 71-55-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
1,1,2-Trichloroethane (CAS No.: 79-00-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
1,1,2,2-Tetrachloroethane (CAS No.: 79-34-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
1,1-Dichloroethylene (CAS No.: 75-35-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
1,1-Dichloroethane (CAS No.: 75-34-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Chloroethane (CAS No.: 75-00-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Tetrachloroethene (CAS No.: 127-18-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Trichloroethylene (CAS No.: 79-01-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
1,3-Dichloropropane (CAS No.: 142-28-9)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Chloroform (CAS No.: 67-66-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
1,2,3-Trichloropropane (CAS No.: 96-18-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Hydrofluorocarbon (HFCs)					
HFC-23 (CHF3) (CAS No.: 75-46-7)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-32 (CH2F2) (CAS No.: 75-10-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-41 (CH3F) (CAS No.: 593-53-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-43-10mee (C5H2F10)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-125 (C2HF5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-134 (C2H2F4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-134a (CH2FCF3) (CAS No.: 811-97-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-143 (CH3F3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-143a (CH3F3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-152a (C2H4F2) (CAS No.: 75-37-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
HFC-227ea (C3HF7) (CAS No.: 431-89-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-236fa (CAS No.: 431-63-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-245ca (C3H3F5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-245fa (C3H3F5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-365mfc (C4H5F5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
HFC-236ea (C3H2F6) (CAS No.: 431-63-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Perfluorocarbon (PFCs)					
1,4-dihydrooctafluorobutane (CAS No.: 377-36-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
2-Perfluoromethylpentane (CAS No.: 355-04-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Decafluorobutane (CAS No.: 355-25-9)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
F14 (CAS No.: 75-73-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Fluorocarbon 116 (CAS No.: 76-16-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-

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TOWER SEMICONDUCTOR LTD.
20 SHAUL AMOR ST. MIGDAL HAEMEK ISRAEL

Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Freon 218 (CAS No.: 76-19-7)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Freon C318 (CAS No.: 115-25-3)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Nonafluor-2- (trifluoromethyl)butane (CAS No.: 594-91-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Perfluorisobutene (CAS No.: 382-21-8)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Perfluorohexane (CAS No.: 355-42-0)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Perfluoro-n-pentane (CAS No.: 678-26-2)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Perfluor-1-butene (CAS No.: 357-26-6)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Sulfur hexafluoride (CAS No.: 2551-62-4)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Bromochloromethan (CAS No.: 74-97-5)	With reference to US EPA 5021A: 2014, analysis was performed by GC/MS.	mg/kg	1	n.d.	-
Fluorine (F) (CAS No.: 14762-94-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-
Chlorine (Cl) (CAS No.: 22537-15-1)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-
Bromine (Br) (CAS No.: 10097-32-2)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-
Iodine (I) (CAS No.: 14362-44-8)	With reference to BS EN 14582: 2016, analysis was performed by IC.	mg/kg	50	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Triphenyl tin (TPT)	With reference to ISO 17353: 2004, analysis was performed by GC/FPD.	mg/kg	0.03	n.d.	-
Tributyl tin (TBT)	With reference to ISO 17353: 2004, analysis was performed by GC/FPD.	mg/kg	0.03	n.d.	-
Diocetyl tin (DOT)	With reference to ISO 17353: 2004, analysis was performed by GC/FPD.	mg/kg	0.03	n.d.	-
Dibutyl tin (DBT)	With reference to ISO 17353: 2004, analysis was performed by GC/FPD.	mg/kg	0.03	n.d.	-
Bis(tributyltin) oxide (TBTO) (CAS No.: 56-35-9)	Calculated from the result of Tributyl Tin (TBT).	mg/kg	0.03▲	n.d.	-
Hexabromobenzene (CAS No.: 87-82-1)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Brominated styrene	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
TBBP-A-bis (CAS No.: 21850-44-2)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Tetrabromobisphenol A (TBBP-A) (CAS No.: 79-94-7)	With reference to RSTS-E&E-121, analysis was performed by LC/MS.	mg/kg	10	n.d.	-
Monomethyl dibromodiphenyl methane (DBBT) (CAS No.: 99688-47-8)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	n.d.	-
Monomethyl dichlorodiphenyl methane (Ugilec121) (CAS No.: 81161-70-8)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	n.d.	-
Monomethyl tetrachlorodiphenyl methane (Ugilec141) (CAS No.: 76253-60-6)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	0.5	n.d.	-
Red Phosphorus	Analysis was performed by Pyrolyzer-GC/MS.	**	-	Negative	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Uranium (U) (Radioactive element) (CAS No.: 7440-61-1)	With reference to US EPA 3052: 1996 & 6020B: 2014, analysis was performed by ICP-MS.	mg/kg	1	n.d.	-
Thorium (Th) (Radioactive element) (CAS No.: 7440-29-1)	With reference to US EPA 3052: 1996 & 6020B: 2014, analysis was performed by ICP-MS.	mg/kg	1	n.d.	-
Strontium (Sr) (Radioactive element) (CAS No.: 7440-24-6)	With reference to US EPA 3052: 1996 & 6020B: 2014, analysis was performed by ICP-MS.	mg/kg	1	n.d.	-
Caesium (Cs) (Radioactive element) (CAS No.: 7440-46-2)	With reference to US EPA 3052: 1996 & 6020B: 2014, analysis was performed by ICP-MS.	mg/kg	1	n.d.	-
Perchlorate (CAS No.: 14797-73-0)	Analysis was performed by IC.	µg/g	0.006	n.d.	-
PFOS and its salts (CAS No.: 1763-23-1 and its salts)	With reference to CEN/TS 15968: 2010, analysis was performed by LC/MS/MS.	mg/kg	0.01	n.d.	-
2-benzotriazol-2-yl-4,6-di-tert-butylphenol (UV-320) (CAS No.: 3846-71-7)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Arsenic (As) (CAS No.: 7440-38-2)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Diarsenic trioxide (As ₂ O ₃) (CAS No.: 1327-53-3)	Calculated from the result of Arsenic.	mg/kg	2▲	n.d.	-
Diarsenic pentaoxide (As ₂ O ₅) (CAS No.: 1303-28-2)	Calculated from the result of Arsenic.	mg/kg	2▲	n.d.	-
Beryllium (Be) (CAS No.: 7440-41-7)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Boron (B) (CAS No.: 7440-42-8)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-
Cobalt (Co) (CAS No.: 7440-48-4)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	18.5	-
Cobalt dichloride (CoCl ₂) (CAS No.: 7646-79-9)	Analysis was performed by ICP-OES, IC. Calculated from the results of Cobalt, Chlorine.	mg/kg	50▲	n.d.	-

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Test Item(s)	Method	Unit	MDL	Result	Limit
				No.1	
Tris(2-chloroethyl) phosphate (TCEP) (CAS No.: 115-96-8)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	5	n.d.	-
Diethylene glycol dimethyl ether (DEGDME) (CAS No.: 111-96-6)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	10	n.d.	-
4-Tert-octylphenol (CAS No.: 140-66-9)	With reference to US EPA 3550C: 2007, analysis was performed by LC/MS.	mg/kg	10	n.d.	-
N,N-Dimethylacetamide (DMAC) (CAS No.: 127-19-5)	With reference to US EPA 3550C: 2007, analysis was performed by GC/MS.	mg/kg	10	n.d.	-
Antimony (Sb) (CAS No.: 7440-36-0)	With reference to US EPA 3052: 1996, analysis was performed by ICP-OES.	mg/kg	2	n.d.	-

Note :

1. mg/kg = ppm ; 0.1wt% = 0.1% = 1000ppm
2. MDL = Method Detection Limit
3. n.d. = Not Detected (Less than MDL)
4. "-" = Not Regulated
5. **= Qualitative analysis (No Unit)
6. Negative = Undetectable ; Positive = Detectable
7. Testing range of asbestos qualitative analysis is from less than 0.1% to 100%. The judgment criterion: asbestos fibers being found is shown as "Positive"; asbestos fibers not being found is shown as "Negative".
8. PFOS and its salts including :
CAS No.: 1763-23-1, 2795-39-3, 29457-72-5, 29081-56-9, 70225-14-8, 56773-42-3, 251099-16-8, 307-35-7, 91036-71-4, 4021-47-0 and others.
9. ▲ : The MDL was evaluated for element / tested substance.

Conversion Formula : $AX = A \times F$

AX	A	F
Diarsenic pentaoxide	Arsenic	1.5339
Diarsenic trioxide	Arsenic	1.3203
Bis(tributyltin)oxide (TBTO)	Tributyl Tin (TBT)	1.0276

Parameter Conversion Table : https://ecloud.sgs.com/Region_TW/DocDownload.aspx?name=Others

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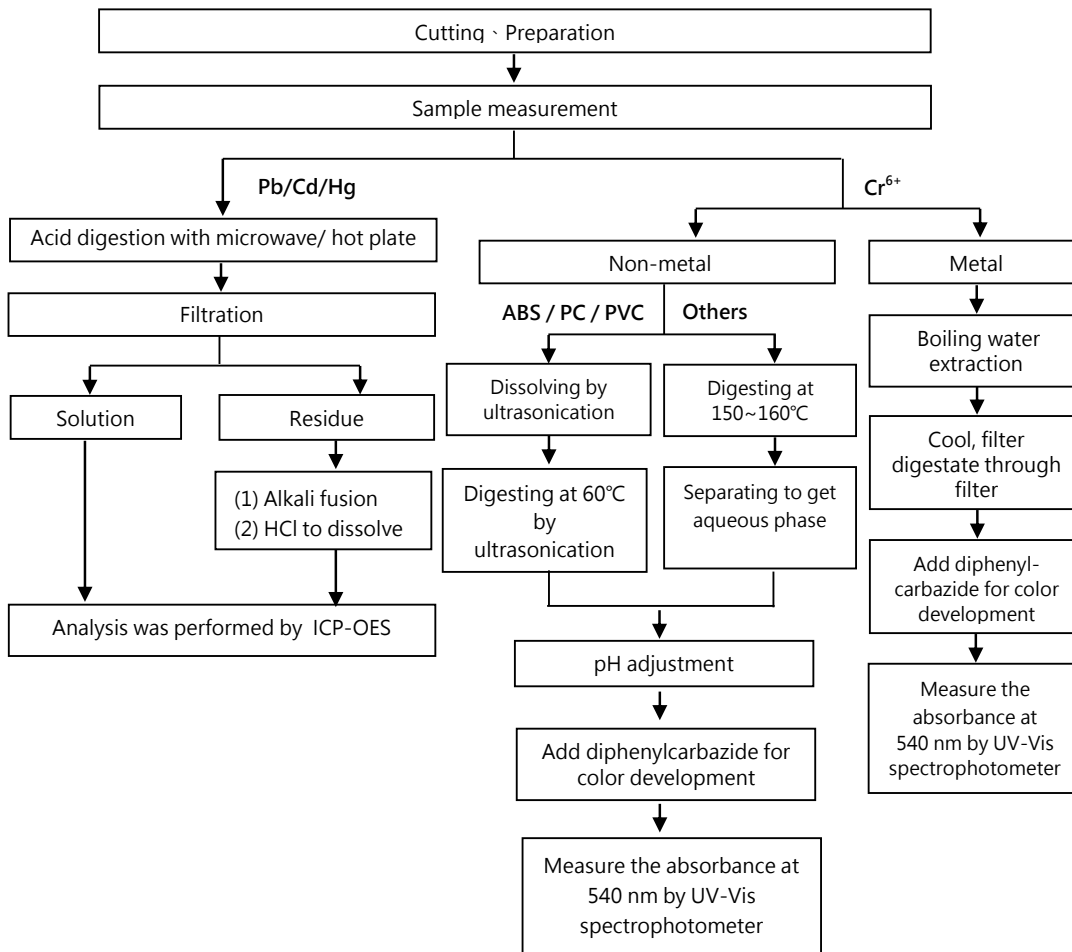
10. Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule ($w=0$) stated in ILAC-G8:09/2019. According to this rule, the judgement of conformity is based on the comparing test results with limits.

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Analytical flow chart of heavy metal

These samples were dissolved totally by pre-conditioning method according to below flow chart.

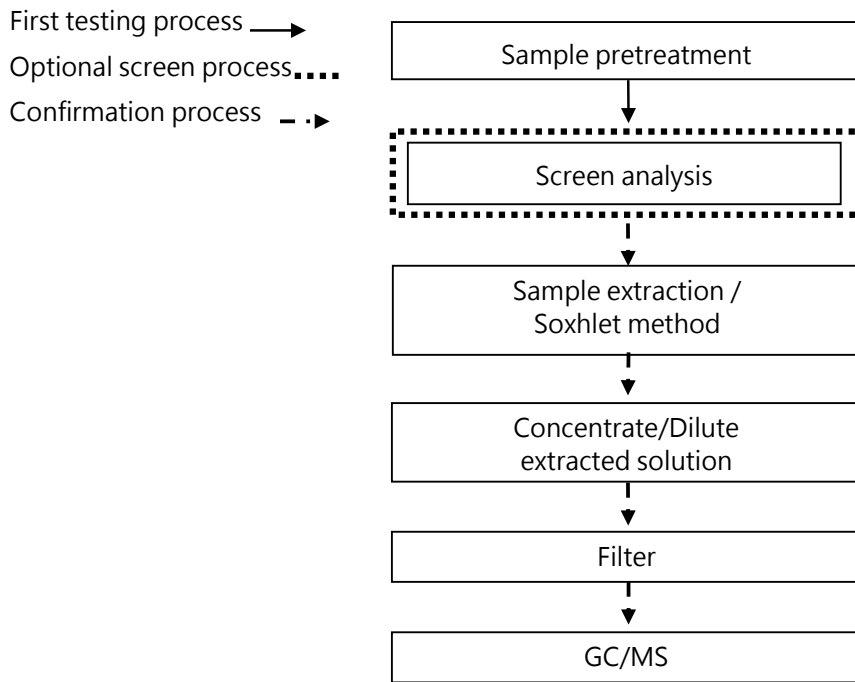
(Cr⁶⁺ test method excluded)



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Analytical flow chart – PBBs / PBDEs

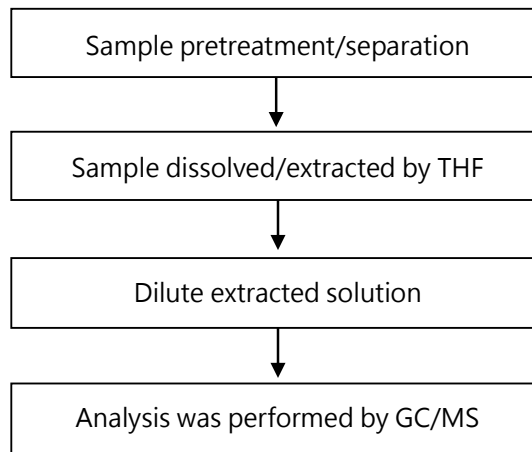


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Analytical flow chart - Phthalate

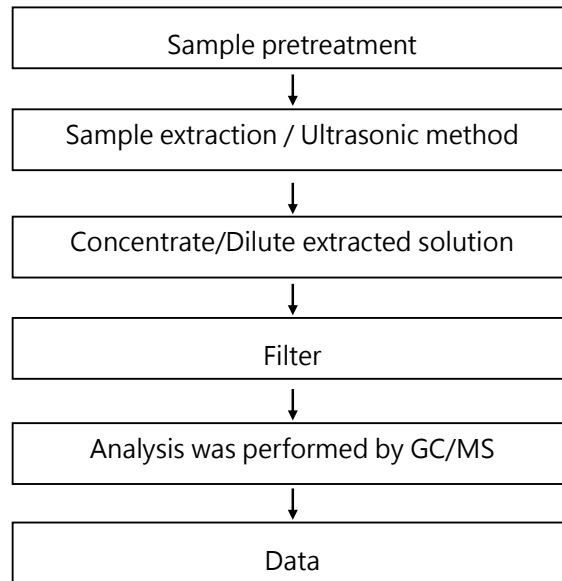
【Test method: IEC 62321-8】



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Analytical flow chart - HBCDD

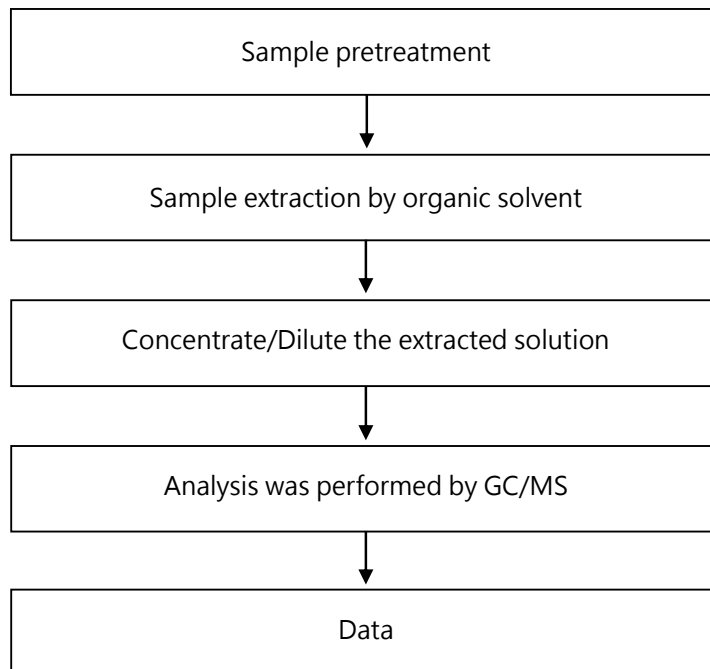


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Analytical flow chart

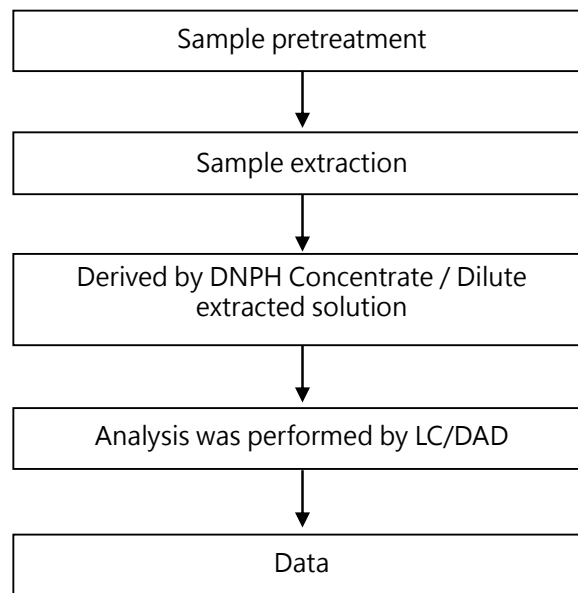
* Apply to: PCBs, PCNs, PCTs, Mirex, Chlorinated Paraffins, DBBT



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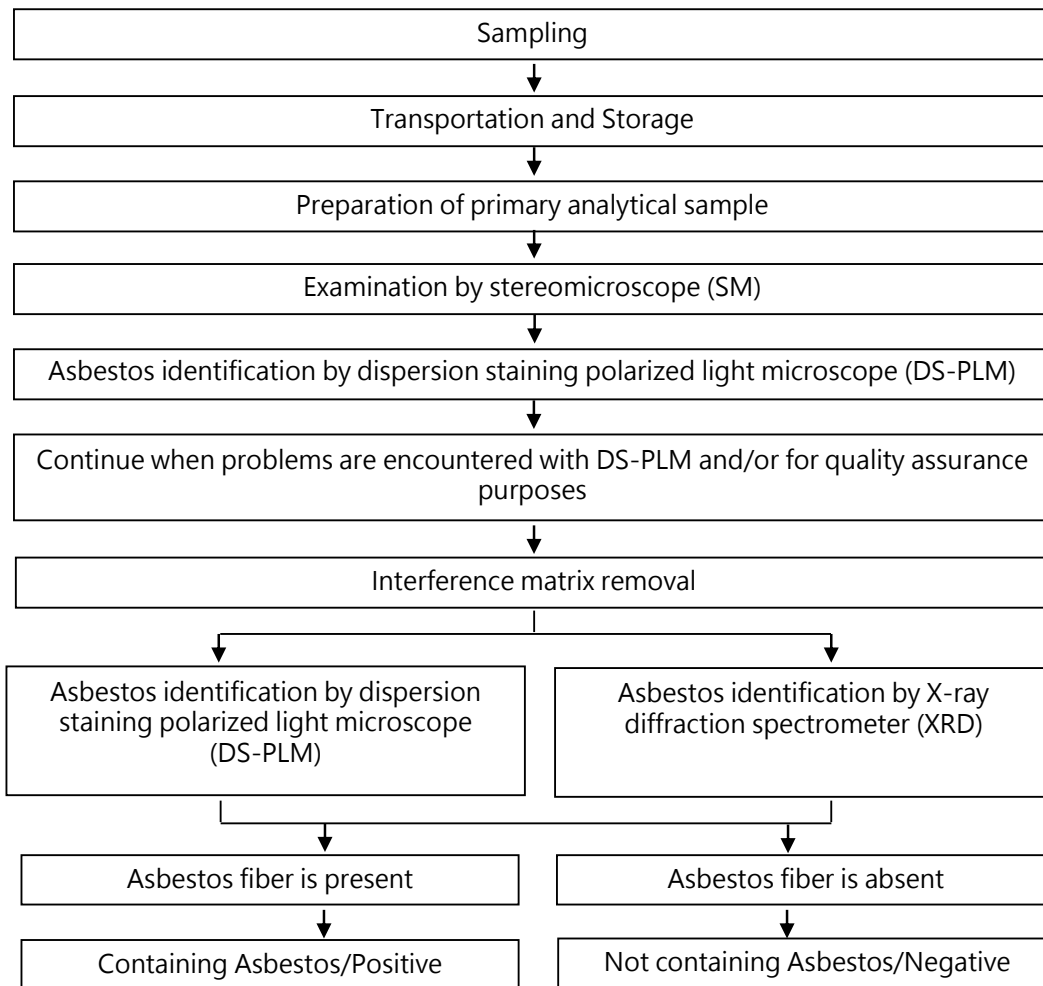
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Analytical flow chart - Formaldehyde



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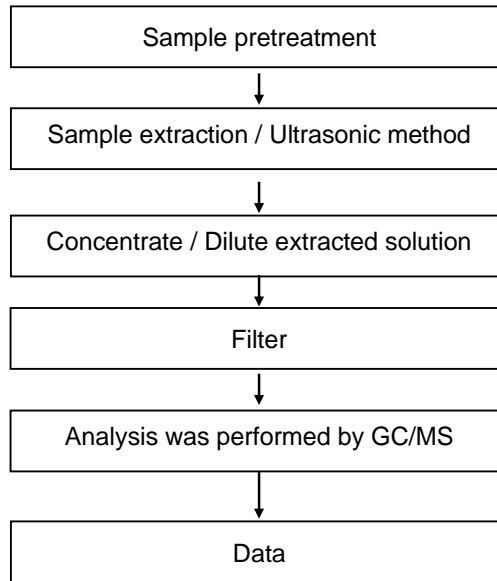
Analysis flow chart for determination of Asbestos
【 Reference method: EPA 600/R-93/116】



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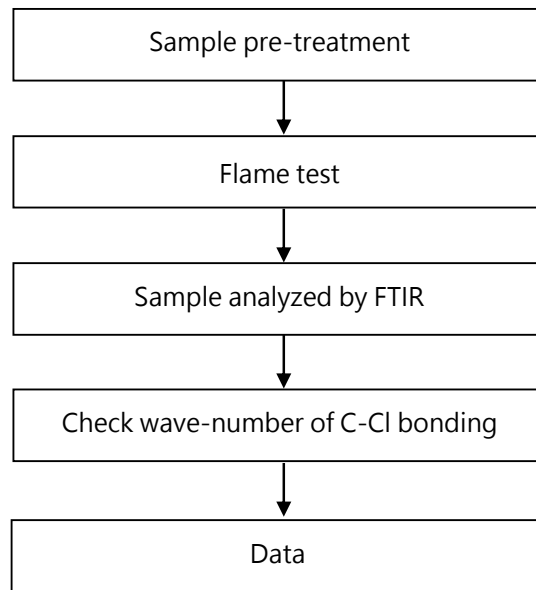
Analytical flow chart - Dimethyl Fumarate



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Analysis flow chart - PVC

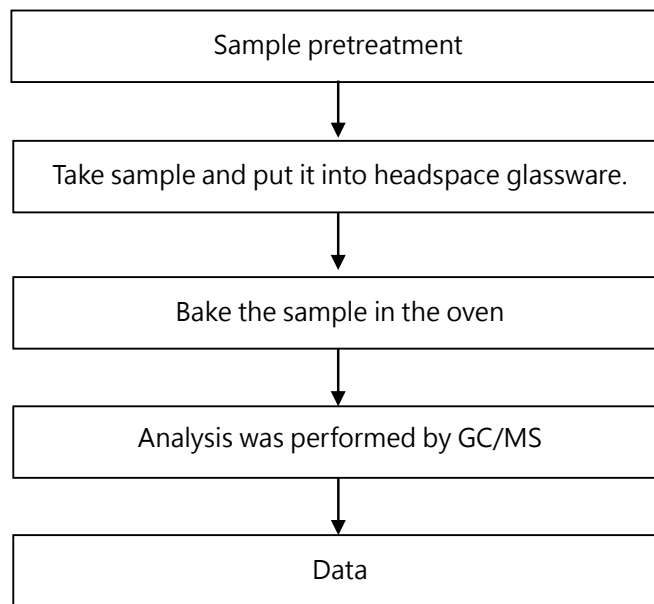


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Analytical flow chart of volatile organic compounds (VOCs)

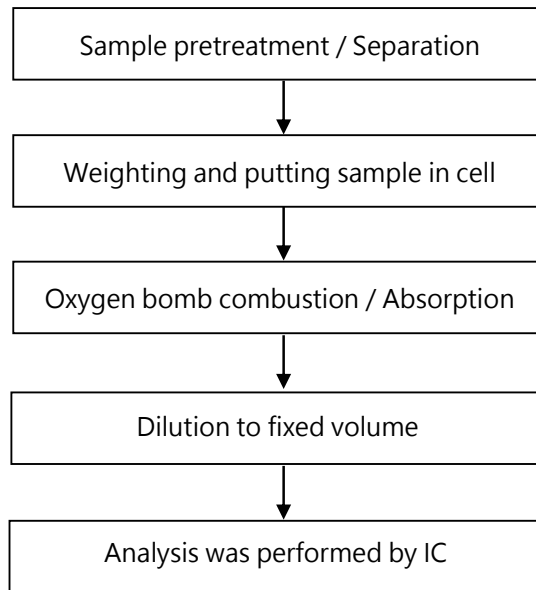
【Reference method : US EPA 5021A】



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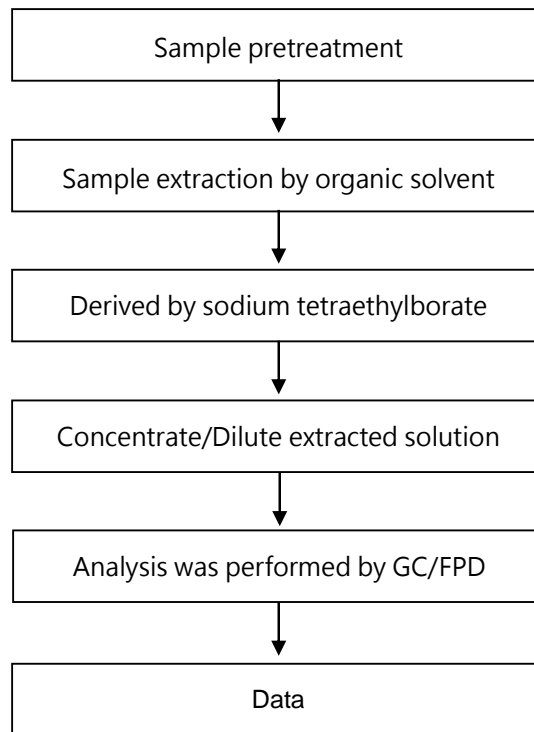
Analytical flow chart - Halogen



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Analytical flow chart - Organic-Tin

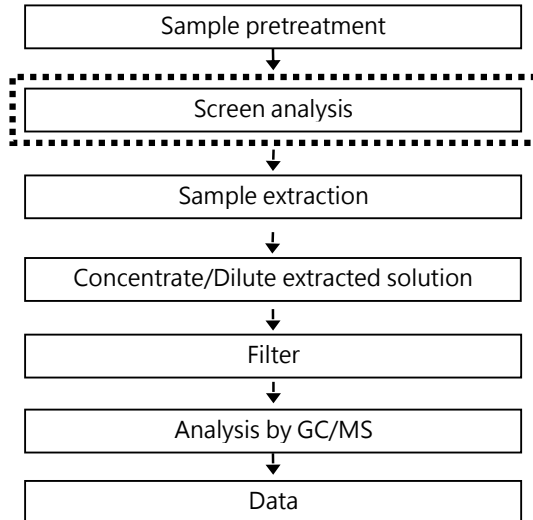


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Analytical flow chart - TBBP-A-bis

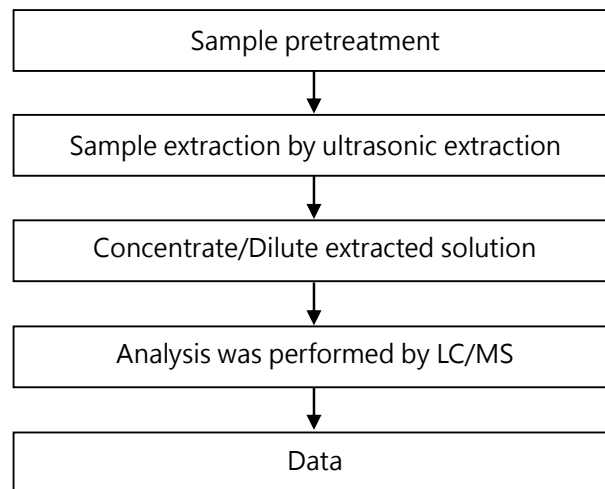
First testing process ———→
 Optional screen process ······→
 Confirmation process - - - - -→



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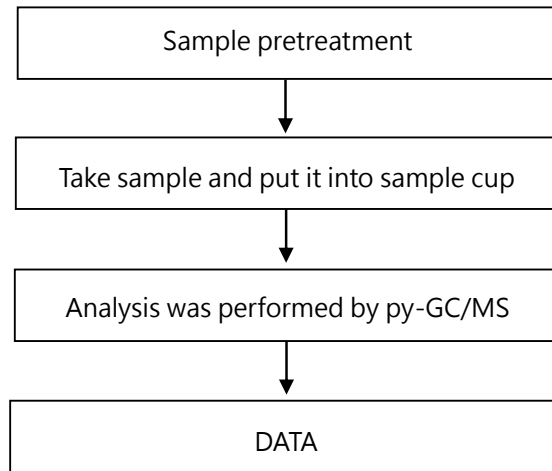
Analytical flow chart - TBBP-A



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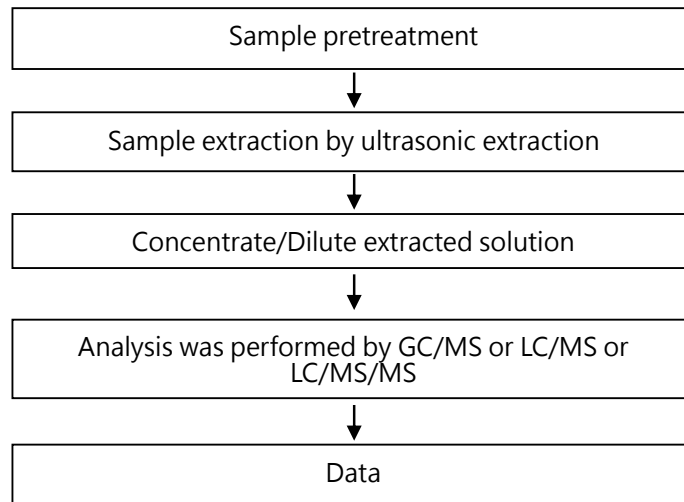
Analytical flow chart - Red phosphorus



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Analytical flow chart – PFAS (including PFOA/PFOS/its related compound, etc.)



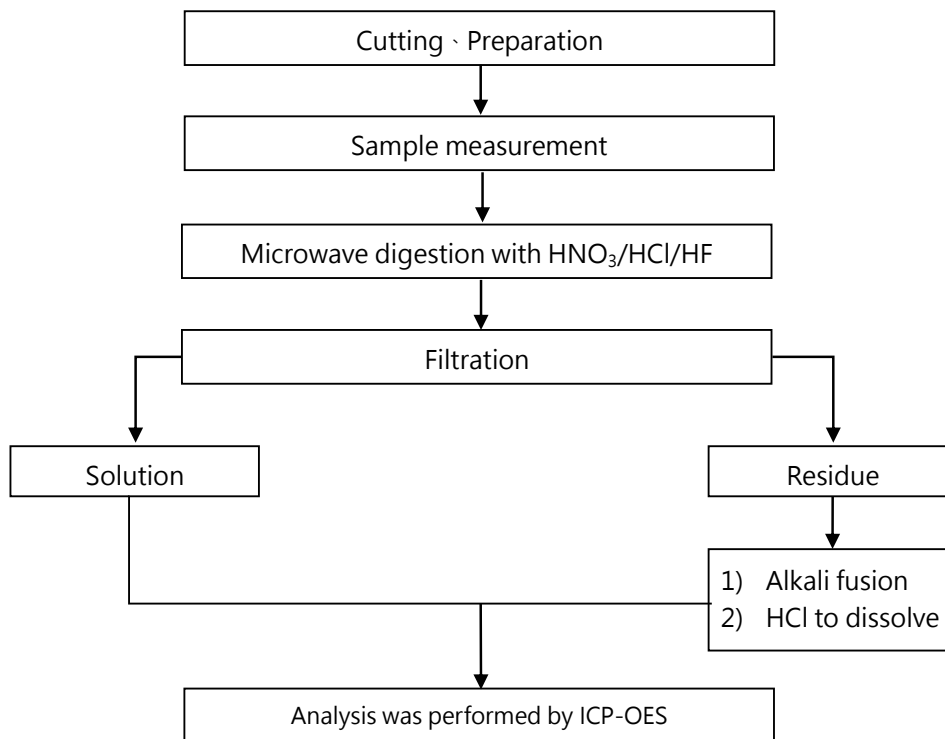
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Analytical flow chart of elements (Heavy metal included)

These samples were dissolved totally by pre-conditioning method according to below flow chart.

【 Reference method : US EPA 3051A · US EPA 3052 】

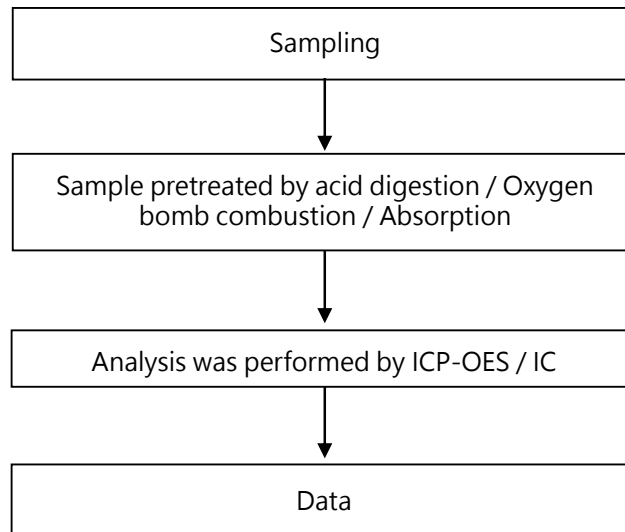


* US EPA 3051A method does not add HF.

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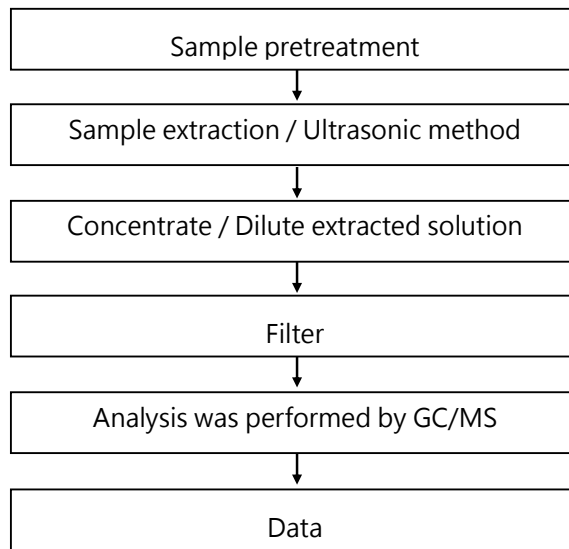
Analytical flow chart - Cobalt dichloride



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Analytical flow chart - Organic phosphorus compounds



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Test Report

No.: ETR23100533

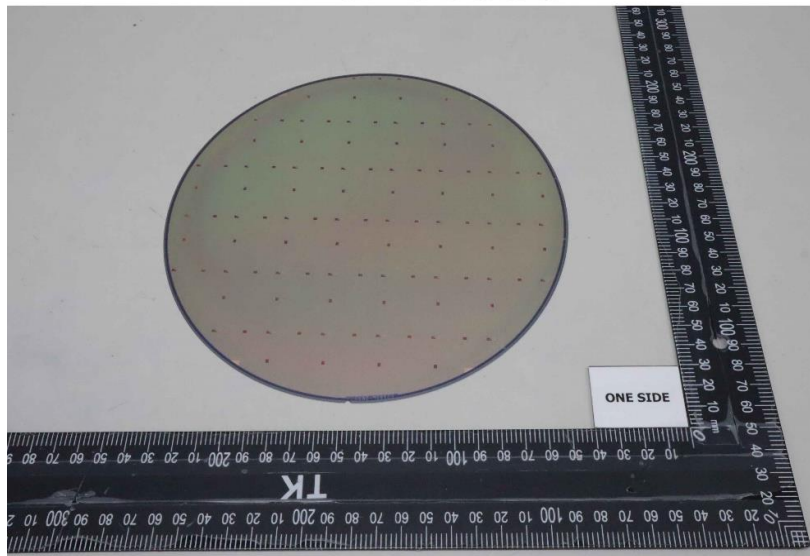
Date: 07-Jan-2023

Page: 43 of 43

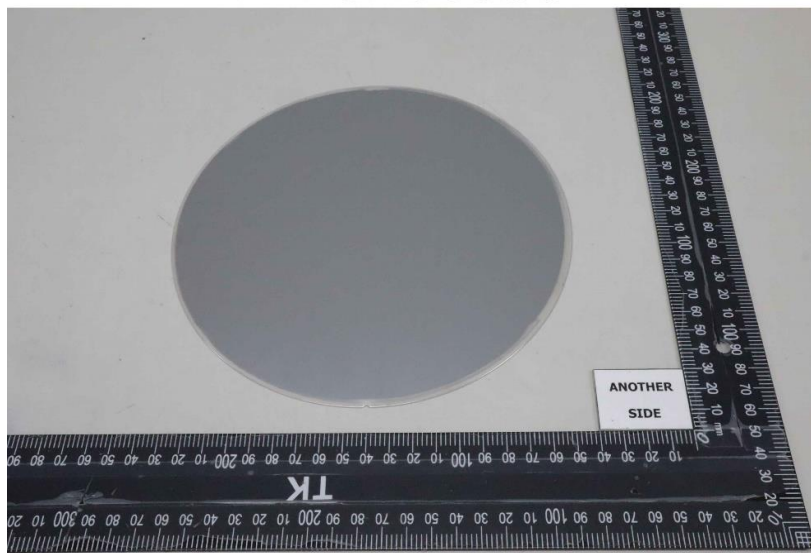
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* The tested sample / part is marked by an arrow if it's shown on the photo. *

ETR23100533



ETR23100533



** End of Report **

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