



TEST REPORT

5001 East Philadelphia Street
Ontario, California – USA 91761-2816
Ph: 909.472.4100 | Fax: 909.472.4243
<http://www.iapmortl.org>

Report Number: 2295-20367 **Project No.:** 33382

Report Issued: January 13, 2020

Report To: ASSE International

Tested for: Hifil, Tech Inc.
12-33, Garwol-ro 49beon-gil, Mohyeon-eup,
Cheoin-gu, Yongin-si, Gyeonggi-do,
17035, South Korea
Contact: Edward Jeong

Source of Samples: The samples were shipped to IAPMO R&T Lab from Hifil, Tech Inc. and received in good condition on November 22, 2019.

Date of Evaluation: December 17, 2019 to January 13, 2020

Location of testing: IAPMO R&T Lab, 5001 East Philadelphia St, Ontario, CA 91761

Sample Description: Model HF-EX3-(U) POU Filter (with Media)

Scope of Evaluation: The purpose of this testing was to determine if the Hifil, Tech Inc. HF-EX3-(U) POU Filter (with Media) met the requirements of NSF/ANSI NSF 42-2017, Section 4

Conclusion: **Samples tested of the Hifil, Tech Inc. Model HF-EX3-(U) POU Filter (with Media) COMPLIED with NSF/ANSI 42-2017, section 4 following the test battery requested in the Initial Toxicological Evaluation of Point of Use (POU) Filter Models HF-EX1, HF-EX3-(U), HF-EX4(U), and HF-EX5 for HIFIL (Project File #W-11633, P-136939). Please refer to pages 2 to 8 for more detailed findings.**

Evaluated/Tested by,

Lin Nguyen, Senior Chemist/ Supervisor

Reviewed by,

Michael N. Briggs, Director, Analytical Lab

Primary Standards: NSF/ANSI 42-2017, Section 4

Section 4: Materials:

Sample Preparation:

Samples were flushed for five (5) minutes according to the manufacture instruction. One (1) sample with a volume of 262ml were exposed to exposure water for metals and organic evaluation

Conditioning and Exposure

Conditioning and exposure were conducted as described in NSF/ANSI 42-2017, section 4.2.3. The samples were exposed to extraction water for conditioning and exposure for metal and organic evaluations.

Normalization

Normalized Concentration = Lab Concentration

Extraction Water

The extraction water was prepared as described in NSF/ANSI 42-2017, section 4.2.2

Collection/preservation of extraction water

Immediately following the exposure period, extraction waters collected for analysis were poured into previously prepared sample containers for storage until analysis, as specified in annex B, Section B.6 and Table B8.

Extracts for metal analysis were acidified with nitric acid as specified in EPA protocols.

Samples for volatile organic contaminants were preserved with sodium thiosulfate and HCl as outlined in EPA 524.2 protocol.

Samples for semi-volatile organic contaminants were preserved with sodium thiosulfate sulfuric acid as described in EPA 525.2 and SW-846 protocol.

Evaluation of Contaminant Concentrations

Metal and organic contaminants, were determined as single point determinations. The normalized results were compared to MCL, TAC, or action level as applicable.

Analytical methodology

Metal determinations:	EPA 200.8, Metal determinations by iCAPQ ICP/MS
Volatile organic contaminants:	EPA 524.2, Volatile organic determinations by Purge and Trap, GCMS
Semi-volatile contaminants:	EPA 525.2 SW-846 8270, Semi-volatile organic determinations by liquid/liquid extraction followed by GC/MS determinations.
Terephthalic acid:	In house method

Analytical Instrumentation

Metal determinations: Thermo Electron iCAP Q ICP/MS

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Volatile organic determinations: Thermo Electron ISQ 7000 GC/MS with Tekmar Lumin/Aquatek Purge and Trap system.

Semi-volatile organic determinations: Thermo Electron ISQ 7000 GC/MS with AI/AS1310 auto sampler

Terephthalic acid: Thermo Fisher Ultimate 3000 LCMS Electro ESI interface

Discussion:

To verify the compliance of the samples, regulated metal, volatile and semi-volatile organics were monitored on the appropriate water.

The normalized metals concentrations of all the analytes are well below the MCL, TAC or AL set in the standard.

VOCs were measured by GC/MS. MEK, chloroform, mp-xylene were the only target analyte observed in the resulting volatile GC/MS analysis at normalised concentrations well below the MCL, TAC or AL set in the standard. No non-target analytes were observed in the resulting volatile GC/MS chromatogram. 2,2'-Methylene dianiline (CAS #unknown), 2,4'-Methylene dianiline (CAS #1208-52-2), 2,4-Toluene diisocyanate (CAS #584-84-9), 4,4'-Methylene dianiline (CAS #101-77-9) Dimethyl terephthalate (CAS #120-61-6) were not seen in the TIC analyses.

Semi-volatile organic compounds were monitored by GC/MS. 2,4,6-Trichlorophenol, 2,6-Dichlorophenol, 2-Phenyl 2-Propanol were the only target analyte observed in the resulting semi-volatile GC/MS analysis at normalized concentrations well below MCL, TAC or AL set in the standard. No non-target analytes were observed in the resulting semi-volatile GC/MS chromatogram.

Metal Evaluation:

		Analytical Data	Static Normalized	Test Methods
Metal	MCL (ug/L)	(ug/L)	(ug/L)	
Antimony	6	0.26	0.26	EPA 200.8
Arsenic	10	ND (< 0.08)	ND (< 0.08)	EPA 200.8
Barium	2000	3.70	3.70	EPA 200.8
Beryllium	4	ND (< 0.19)	ND (< 0.19)	EPA 200.8
Cadmium	5	ND (< 0.05)	ND (< 0.05)	EPA 200.8
Chromium	20	ND (< 0.07)	ND (< 0.07)	EPA 200.8
Copper	1300	0.96	0.96	EPA 200.8
Mercury	2	ND (< 0.01)	ND (< 0.01)	EPA 200.8
Selenium	50	ND (< 0.14)	ND (< 0.14)	EPA 200.8
Thallium	2	ND (< 0.05)	ND (< 0.05)	EPA 200.8
Lead	5	0.41	0.41	EPA 200.8

Test Result of Organics:

Target Analyte	Test Method	Result	Normalized
	EPA 524.2		
Volatile Organic Compounds:	C.A.S Number	(ug/L)	Result (ug/L)
Difluorodichloromethane	75-71-8	ND < 0.3	ND < 0.3000
Chloromethane	74-87-3	ND < 0.2	ND < 0.2000
Vinylchloride	75-01-4	ND < 0.2	ND < 0.2000
1,3-Butadiene	106-99-0	ND < 0.3	ND < 0.3000
Bromomethane	74-83-9	ND < 0.3	ND < 0.3000
Chloroethane	75-00-3	ND < 2.0	ND < 2.0000
Trichlorofluoromethane	75-69-4	ND < 0.3	ND < 0.3000
1,1-Dichloro-1-fluorethane	1717-00-6	ND < 0.3	ND < 0.3000
1,1-Dichloroethene	75-35-4	ND < 0.3	ND < 0.3000
Acetone	67-64-1	ND < 5.0	ND < 5.0000
Carbon disulfide	75-15-0	ND < 0.3	ND < 0.3000
Dichloromethane	75-09-2	ND < 0.2	ND < 0.2000
t-Butanol	75-65-0	ND < 6.0	ND < 6.0000
trans-1,2-Dichloroethene	156-60-5	ND < 0.3	ND < 0.3000
Methyl Tert Butyl Ether	1634-04-4	ND < 0.3	ND < 0.3000
Acrylonitrile	107-13-1	ND < 0.3	ND < 0.3000
1,1-Dichloroethane	75-34-3	ND < 0.3	ND < 0.3000
Chloroprene	126-99-8	ND < 0.3	ND < 0.3000
Vinyl Acetate	108-05-4	ND < 0.3	ND < 0.3000
2,2-Dichloropropane	594-20-7	ND < 0.3	ND < 0.3000
cis-1,2-Dichloroethene	156-59-2	ND < 0.3	ND < 0.3000
2-Butanone	78-93-3	2.47	2.470
Methyl Acrylate	96-33-3	ND < 0.3	ND < 0.3000
Bromochloromethane	74-97-5	ND < 0.3	ND < 0.3000
Tetrahydrofuran	109-99-9	ND < 0.3	ND < 0.3000
Chloroform	67-66-3	0.56	0.560
1,1,1-Trichloroethane	71-55-6	ND < 0.3	ND < 0.3000
Carbon tetrachloride	56-23-5	ND < 0.3	ND < 0.3000
1,1-Dichloropropene	563-58-3	ND < 0.3	ND < 0.3000
Benzene	71-43-2	ND < 0.3	ND < 0.3000
1,2-Dichloroethane	107-06-2	ND < 0.3	ND < 0.3000
isopropylacetate	108-21-4	ND < 0.3	ND < 0.3000
Trichloroethene	79-01-6	ND < 0.3	ND < 0.3000
Ethyl-acrylate	140-88-5	ND < 0.1	ND < 0.1000
1,2-Dichloropropane	78-87-5	ND < 0.2	ND < 0.2000
Dibromomethane	74-95-3	ND < 0.3	ND < 0.3000
Methyl Methacrylate	80-62-6	ND < 0.2	ND < 0.2000
Bromodichloromethane	75-27-4	ND < 0.1	ND < 0.1000
cis-1,3-Dichloropropene	10061-01-5	ND < 0.1	ND < 0.1000
4-methyl-2-pentanone	108-10-1	ND < 0.3	ND < 0.3000
Toluene	108-88-3	ND < 0.3	ND < 0.3000
trans-1,3-Dichloropropene	10061-02-6	ND < 0.1	ND < 0.1000
Ethyl Methacrylate	97-63-2	ND < 0.3	ND < 0.3000

Test Result of Organics:

Target Analyte	Test Method	Result	Normalized
Volatile Organic Compounds:	EPA 524.2	(ug/L)	Result (ug/L)
Tetrachloroethylene	127-18-4	ND < 0.3	ND < 0.3000
1,1,2-Trichloroethane	79-00-5	ND < 0.2	ND < 0.2000
1,3-Dichloropropane	142-28-9	ND < 0.3	ND < 0.3000
Dibromochloromethane	124-48-1	ND < 0.3	ND < 0.3000
Butyl-acetate	123-86-4	ND < 0.2	ND < 0.2000
1,2-Dibromoethane	106-93-4	ND < 0.2	ND < 0.2000
Chlorobenzene	108-90-7	ND < 0.3	ND < 0.3000
Ethylbenzene	100-41-4	ND < 0.3	ND < 0.3000
1,1,1,2-Tetrachloroethane	630-20-6	ND < 0.3	ND < 0.3000
m,p-Xylene	108-38-3/106-42-3	0.98	0.980
o-Xylene	95-47-6	ND < 0.3	ND < 0.3000
Styrene	100-42-5	ND < 0.3	ND < 0.3000
n-Butyl acrylate	141-32-2	ND < 0.3	ND < 0.3000
Tribromomethane	75-25-2	ND < 0.1	ND < 0.1000
Isopropylbenzene	98-82-8	ND < 0.3	ND < 0.3000
Cyclohexanone	108-94-1	ND < 20.0	ND < 20.0000
Bromobenzene	108-86-1	ND < 0.3	ND < 0.3000
1,1,2,2-Tetrachloroethane	79-34-5	ND < 0.3	ND < 0.3000
propylbenzene	103-65-1	ND < 0.3	ND < 0.3000
1,2,3-Trichloropropane	96-18-4	ND < 0.3	ND < 0.3000
2-Chlorotoluene	95-49-8	ND < 0.3	ND < 0.3000
1,3,5-Trimethylbenzene	108-67-8	ND < 0.3	ND < 0.3000
4-Chlorotoluene	106-43-4	ND < 0.3	ND < 0.3000
tert-Butylbenzene	98-06-6	ND < 0.3	ND < 0.3000
1,2,4-Trimethylbenzene	95-63-6	ND < 0.3	ND < 0.3000
sec-Butylbenzene	135-98-8	ND < 0.3	ND < 0.3000
1,3-Dichlorobenzene	541-73-1	ND < 0.3	ND < 0.3000
bis(2-chloroethyl)ether	111-44-4	ND < 0.3	ND < 0.3000
p-Isopropyltoluene	99-87-6	ND < 0.3	ND < 0.3000
1,4-Dichlorobenzene	106-46-7	ND < 0.3	ND < 0.3000
2-Ethyl-1-hexanol	104-76-7	ND < 0.3	ND < 0.3000
n-Butylbenzene	104-51-8	ND < 0.3	ND < 0.3000
1,2-Dichlorobenzene	90-50-1	ND < 0.2	ND < 0.2000
1,2-Dibromo-3-chloropropane	96-12-8	ND < 0.3	ND < 0.3000
1,2,4-Trichlorobenzene	120-82-1	ND < 0.3	ND < 0.3000
Hexachlorobutadiene	87-68-3	ND < 0.3	ND < 0.3000
Naphthalene	91-20-3	ND < 0.3	ND < 0.3000
1,2,3-Trichlorobenzene	87-61-6	ND < 0.3	ND < 0.3000

No non-target analytes observed in the chromatogram

Test Result of Organics :

Target Analyte	EPA 8270/EPA 625	Result	Normalized
Semi-Volatile Organics	C.A.S. Number	(ug/L)	Result (ug/L)
1,1-(1,4-Phenylene)bis-ethanone	1009-61-6	ND < 0.50	ND < 0.500
1,2,4-Trichlorobenzene	110-88-3	ND < 0.50	ND < 0.500
1,2-Dichlorobenzene	95-50-1	ND < 0.50	ND < 0.500
1,3,5-Trioxane	120-82-1	ND < 0.50	ND < 0.500
1,3-Dichlorobenzene	541-73-1	ND < 0.50	ND < 0.500
1,4-Dichlorobenzene	106-46-7	ND < 0.50	ND < 0.500
2,3,4,6-Tetrachlorophenol	58-90-2	ND < 0.20	ND < 0.200
2,4,5-Trichlorophenol	95-95-4	ND < 1.00	ND < 1.000
2,4,6-Trichlorophenol	88-06-2	1.35	1.350
2,4-Dichlorobenzoic acid	50-84-0	ND < 20.00	ND < 20.000
2,4-Dichlorophenol	120-83-2	ND < 0.50	ND < 0.500
2,4-Dimethylphenol	105-67-9	ND < 0.50	ND < 0.500
2,4-Dinirophenol	51-28-5	ND < 0.50	ND < 0.500
2,4-Dinitrotoluene	121-14-2	ND < 0.50	ND < 0.500
2,6-Dichlorophenol	87-65-0	0.75	0.746
2,6-Dinitrotoluene	606-20-2	ND < 0.80	ND < 0.800
2,6-Di-tert-butyl-4-methoxyphenol	489-01-0	ND < 0.50	ND < 0.500
2-Chlorophenol	95-57-8	ND < 0.50	ND < 0.500
2-Cloronaphthalene	91-58-7	ND < 0.50	ND < 0.500
2-Ethylhexylmethacrylate	688-84-6	ND < 2.00	ND < 2.000
2-Methylnaphthalene	91-57-6	ND < 0.50	ND < 0.500
2-Methylphenol	95-48-7	ND < 1.00	ND < 1.000
2-Nitrophenol	88-75-5	ND < 1.00	ND < 1.000
2-Phenyl 2-Propanol	617-94-7	0.71	0.710
3,3'Dichlorobenzidine	91-94-1	ND < 0.50	ND < 0.500
3,4--Methylphenol	108-39-4, 106-44-5	ND < 0.50	ND < 0.500
4,6-Dinitro-2-methylphenol	534-52-1	ND < 10.00	ND < 10.000
4-Bromophenylpheyether	101-55-3	ND < 0.50	ND < 0.500
4-Chloro-3-methylphenol	59-50-7	ND < 0.50	ND < 0.500
4-Chlorophenyphenylether	7005-72-3	ND < 0.50	ND < 0.500
4-Nitrophenol	100-02-7	ND < 0.90	ND < 0.900
4-tert-butylphenol	98-54-4	ND < 0.50	ND < 0.500
7,9-Di-tert-butyl-1-oxaspiro(4,5)deca-6,9-diene-2,8-dione	82304-66-3	ND < 0.50	ND < 0.500
a,a,a',a'-Tetramethyl-1,3-benzenedimethanol	1999-85-5	ND < 0.50	ND < 0.500
a,a,a',a'-Tetramethyl-1,4-benzenedimethanol	2948-46-1	ND < 0.50	ND < 0.500
Acenaphthene	83-32-9	ND < 0.50	ND < 0.500
Acenaphthylene	208-96-8	ND < 0.20	ND < 0.200
Acetophenone	98-86-2	ND < 0.50	ND < 0.500
Anthracene	120-12-7	ND < 0.20	ND < 0.200
Azobenene	103-33-3	ND < 0.50	ND < 0.500
Benzo(a)anthracene	56-55-3	ND < 0.50	ND < 0.500
Benzo(a)pyrene	50-32-8	ND < 0.20	ND < 0.200
Benzo(b)fluroranthene	205-99-2	ND < 0.50	ND < 0.500

Test Result of Organics:

Target Analyte	EPA 8270/EPA 625	Result	Normalized
Semi-Volatile Organics	C.A.S.Number	(ug/L)	Result (ug/L)
Benzo(ghi)perylene	191-24-2	ND < 0.50	ND < 0.500
Benzo(k)fluoranthene	207-08-9	ND < 0.50	ND < 0.500
Benzoic_acid	65-85-0	ND < 20.00	ND < 20.000
Benzothiazole	95-16-9	ND < 1.00	ND < 1.000
Benzyl_Alcohol	100-51-6	ND < 0.50	ND < 0.500
Benzylbutylphthalate	85-68-7	ND < 0.50	ND < 0.500
Bis(2-choroethoxy) methane	111-91-1	ND < 0.50	ND < 0.500
Bis(2-choroethyl) ether	111-44-4	ND < 0.50	ND < 0.500
Bis(2-choroisopropyl) ether	108-60-1	ND < 0.50	ND < 0.500
Bis(2-ethylhexyl)adipate	103-23-1	ND < 0.50	ND < 0.500
Bis-2-ethylhexylphthate	117-81-7	ND < 0.60	ND < 0.600
Bisphenol A	80-05-7	ND < 0.50	ND < 0.500
Caprolactam	105-60-2	ND < 1.00	ND < 1.000
Carbaryl	63-25-2	ND < 0.50	ND < 0.500
Carbazole	86-74-8	ND < 0.50	ND < 0.500
Chrysene	218-01-9	ND < 0.50	ND < 0.500
Dibenz(ah)anthracene	53-70-3	ND < 0.50	ND < 0.500
Dibutoxyethoxyethyl adipate	141-17-3	ND < 2.00	ND < 2.000
Diethylphthalate	84-66-2	ND < 0.50	ND < 0.500
Dimethylphthalate	131-11-3	ND < 0.50	ND < 0.500
Di-n-butylphthalate	84-74-2	ND < 3.00	ND < 3.000
Di-n-octylphthalate	117-84-0	ND < 0.50	ND < 0.500
Dinoseb	88-85-7	ND < 0.50	ND < 0.500
Fluoranthene	206-44-0	ND < 0.20	ND < 0.200
Fluorene	86-73-7	ND < 0.50	ND < 0.500
Hexachlorobenzene	118-74-1	ND < 0.70	ND < 0.700
Hexachlorobutadiene	87-68-3	ND < 0.50	ND < 0.500
Hexachlorocyclopentadiene	77-47-4	ND < 0.50	ND < 0.500
Hexachloroethane	67-72-1	ND < 0.50	ND < 0.500
Indene(123cd)pyrene	193-39-5	ND < 0.50	ND < 0.500
isophorone	78-59-1	ND < 0.50	ND < 0.500
Methyl-4-methoxysalicylate	5446-02-6	ND < 0.50	ND < 0.500
Naphthalene	91-20-3	ND < 0.50	ND < 0.500
Nitrobenzene	98-95-3	ND < 0.50	ND < 0.500
N-Nitrosodimethylamine	62-75-9	ND < 0.72	ND < 0.720
N-Nitrosodi-n-butylamine	924-16-3	ND < 0.50	ND < 0.500
N-Nitrosodi-n-propylamine	621-64-7	ND < 0.50	ND < 0.500
N-Nitrosodiphenylamine	86-30-6	ND < 0.50	ND < 0.500
Pentachlorophenol	87-86-5	ND < 0.50	ND < 0.500
Phenanthrene	85-01-8	ND < 0.30	ND < 0.300
Phenol	108-95-2	ND < 0.50	ND < 0.500
Phenyl sulfone	127-63-9	ND < 0.50	ND < 0.500
Pyrene	129-00-0	ND < 0.50	ND < 0.500
Solfolane	126-33-0	ND < 2.00	ND < 2.000
Tributylacetylctrate	77-90-7	ND < 0.50	ND < 0.500

No non-target analytes observed in the chromatogram

TPA < 1ppm

Attachments

