Title: VOC Test Results

Product: Sound Silencer (1" White)

Application: Acoustical Absorption

Testing Standard: CDPH Standard Method V1.2-2017

Test Date: September 21, 2018 to October 5, 2018

Why this test: This test identifies volatile organic compounds (VOCs), such as formaldehyde, released into the air by products. Samples are put into an environmental chamber and the air is tested at 11-, 12- and 14-days. VOC levels are then used to predict office and school room concentrations and then compared to maximum allowable levels.

Test Result Summary:

MODELING SCENARIO	RESULT (PASS/FAIL)	TVOC (mg m^{-3})
Private Office (PO)	PASS	0.1
School Classroom (SC)	PASS	< 0.1
Single Family Residence (R)	PASS	0.2

Test ID: 103632425GRR-002b

Note: Product sampled from ASI warehouse and tested according to the CDPH standard.

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ASI
TEST REPORT

SCOPE OF WORK
Standard Method Version 1.2 for CDPH 01350 on Sound Silencer

REPORT NUMBER
103632425GRR-002b

ISSUE DATE
19-October-2018

PAGES
13

DOCUMENT CONTROL NUMBER
Per GFT-OP-10 (6-March-2017)

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TEST REPORT FOR ASI

Report No.: 103632425GRR-002b
Date: 19-October-2018
P.O.: 00065831

SECTION 1

CLIENT INFORMATION

Attention: Conor Cook
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Amanda Tongen
Project Engineer

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Project Reviewer

SECTION 2
SUMMARY AND CONCLUSION

Test Method:	Standard Method Version 1.2 for CDPH 01350
Modeling Scenario:	Private office (PO), school classroom (SC) and single family residence (R)
Method Deviations:	Testing performed without deviation unless noted below. The acetaldehyde blank was above 2.0 µg m^{-3}. There is not expected to be an effect on testing.

DESCRIPTION OF SAMPLES

Manufacturer / Location	ASI / Chaska, MN
Product Name	Sound Silencer
Product Number	Not Specified
Date of Manufacture	19-September-2018
Date of Collection	19-September-2018
Date of Shipment	19-September-2018
Date Received by Lab	20-September-2018
Date of Test Start and Duration	21-September-2018 / 336 hours
As Received Sample Condition	Good Condition
Lab Sample ID	GRR180920000E

WORK REQUESTED/APPLICABLE DOCUMENTS

VOC Emissions Analysis:	CDPH Standard Method v1.2
Intertek Quote:	Qu-00901125

TEST RESULTS

MODELING SCENARIO	RESULT (PASS/FAIL)	TVOC (mg m^{-3})
Private Office (PO)	**PASS**	0.1
School Classroom (SC)	**PASS**	< 0.1
Single Family Residence (R)	**PASS**	0.2

SAMPLE DISPOSITION

At the completion of testing, samples were disposed of in a routine manner.

SECTION 3
CDPH STANDARD METHOD V1.2

Date Received:	20-September-2018
Dates Tested:	21-September-2018 to 05-October-2018

DESCRIPTION OF SAMPLES:

Part Description:	Acoustical Panel for Absorption
Material Submitted:	Four (4) Polypropylene/Ethylene copolymer, Carbon Black, Antimony Trioxide, Tetrabromobisphenol A Bis(2,3-dibromopropyl ether) Panels

ACCEPTANCE CRITERIA:

Referencing:	CDPH Standard Method v1.2, Table 4.1 LEED v4 - Low Emitting Materials
LEED v4 - TVOC Ranges:	≤ 0.5 mg m^{-3} 0.5 to 5.0 mg m^{-3} ≥ 5.0 mg m^{-3}

TEST NOTES OR DEVIATIONS:

Testing performed without deviation unless noted below.

TEST SUMMARY:

The emissions testing was performed according to “Standard Method for the Evaluation of Volatile Organic Chemical Emissions from Indoor Sources using Environmental Chambers Version 1.2”. A photograph of the tested sample is included herein. The sample was cut to an appropriate size to achieve the desired loading factor. The edges were sealed with aluminized tape. The sample was placed in conditioning in the chamber for 10 days with top and bottom surfaces exposed, before testing was initiated. Air samples were collected prior to the sample being placed in the test chamber (0 hours) and at 264, 288, and 336 hours after placement in the test chamber. Samples analyzed for individual VOCs and TVOC were collected on multi-sorbent tubes containing glass wool, Tenax TA 35/60 and Carbograph 5 TD 40/60. These VOC samples were analyzed by thermal desorption-gas chromatography/mass-spectrometry, TD-GC/MS. TVOC was calculated through integration of the chromatogram from n-pentane through n-heptadecane using toluene as a surrogate. Individual VOCs were calculated using calibration curves based on pure standards unless otherwise noted. Samples analyzed for low molecular weight aldehydes were collected on cartridges treated with 2,4-di-nitrophenylhydrazine (DNPH). Low molecular weight aldehydes were analyzed using high performance liquid chromatography, HPLC.

RESULTS:

Table 1: Sample and Chamber Conditions during Test Period

PARAMETER		SYMBOL	VALUE	UNITS
Sample Dimensions	Length	-	0.248	m
	Width	-	0.249	m
	Thickness	-	-	m
Exposed Sample Surface Area		*A*	0.062	m^2
Chamber Volume		*V*	0.116	m^3
Chamber Loading Factor		*L*	0.53	$m^2\ m^{-3}$
Inlet Air Flow Rate		*Q*	0.116	$m^3\ h^{-1}$
Air Change Rate		N_{ACH}	1.00	h^{-1}
Area Specific Flow Rate		q_A	1.88	$m\ h^{-1}$
Chamber Pressure (Range)		P	17.0 (13.2-21.4)	Pa
Average Temperature (Range)		T	22.8 (22.7-23.0)	°C
Average Humidity (Range)		RH	49.8 (48.1-51.0)	% RH
Testing Duration		t	336	h

Table 2: Test chamber background VOC concentrations in µg m^{-3}.

COMPOUND	CAS No.	C_{i0}
Formaldehyde	50-00-0	0.8
TVOC	-	4.9

Table 3: Test chamber TVOC and formaldehyde concentrations in µg m^{-3}.

COMPOUND	CAS No.	264 H	288 H	336 H
Formaldehyde	50-00-0	1.1	1.0	1.2
TVOC	-	26.8	23.1	23.6

Table 4: Test chamber TVOC and formaldehyde emission factors in µg $m^{-2}\ h^{-1}$.

COMPOUND	CAS No.	264 H	288 H	336 H
Formaldehyde	50-00-0	0.6	0.4	0.9
TVOC	-	41.1	34.2	35.0

*BB – Below Blank

Individual emitted VOCs identified above the lower limits of quantitation are listed in Table 7; VOCs which are listed on chemical of concern lists or have CRELs are indicated.

The measured chamber concentrations and corresponding emission factors of identified individual VOCs and TVOCs are listed in Table 8.
In Tables 6, 8 and 9, emission factors were calculated using equation 3.1 in CDPH Standard Method V1.2:

$$EF_{Ai} = \frac{Q \times (C_{it} - C_{i0})}{A_C}$$

The inlet flow rate, Q ($m^3\ h^{-1}$), is the measured flow rate of air into the chamber. The chamber concentration, C_{it} (µg m^{-3}), is the concentration of a target VOC_i, formaldehyde and other carbonyl compounds measured at time t. The chamber background concentration, C_{i0} (µg m^{-3}), is the corresponding concentration measured with the chamber operating without a test specimen. The exposed projected surface area of the test specimen in the chamber, A_C (m^2), is determined from the measurements made at the time of specimen preparation.

Table 5: VOCs detected above lower limits of quantitation in air samples at 336 hours.

VOC	CAS No.	SURROGATE[1]	CREL[2] (µg m^{-3})	CARB TAC[3]	PROP 65 LIST[4]
Formaldehyde	50-00-0		9	Yes	Yes
Butylated Hydroxytoluene	67-66-3	X	NA	No	No

[1]Indicates which non-listed VOCs were quantified using surrogate compounds, all other compounds were quantified using pure compounds.
[2]Chronic Reference Exposure Level (CREL) as defined by California Office of Environmental Health Hazard Assessment.
[3]Substance is listed on California Air Resource Board's (CARB) Toxic Air Contaminate (TAC) identification list.
[4]Substance known to the state of California to cause cancer or reproductive toxicity according to California's Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65).

Table 6: Measured chamber concentrations and corresponding emission factors of individual VOCs listed in Table 4-1 of CDPH 01350 V1.2. at 336 hours.

VOC	CAS No.	CHAMBER CONCENTRATION ($\mu g\ m^{-3}$)	EMISSION FACTOR ($\mu g\ m^{-2}\ h^{-1}$)
Formaldehyde	50-00-0	1.2	0.9
Acetaldehyde	75-07-0	< 4.5	< 8.5
Vinyl acetate	108-05-4	< 0.4	< 0.7
Epichlorohydrin	106-89-8	< 0.2	< 0.4
Ethanol, 2-methoxy-, acetate	110-49-6	< 0.3	< 0.6
Isopropyl Alcohol	67-63-0	< 0.2	< 0.3
Ethene, 1,1-dichloro-	75-35-4	< 0.2	< 0.3
Methylene chloride	75-09-2	< 0.3	< 0.5
Carbon disulfide	75-15-0	< 0.5	< 0.9
Methyl tert-butyl ether	1634-04-4	< 0.5	< 0.9
n-Hexane	110-54-3	< 0.3	< 0.5
Trichloromethane (Chloroform)	67-66-3	< 0.3	< 0.5
Ethanol, 2-methoxy-	109-86-4	< 0.4	< 0.7
Ethane, 1,1,1-trichloro-	71-55-6	< 0.2	< 0.3
Benzene	71-43-2	< 0.3	< 0.5
Carbon Tetrachloride	56-23-5	< 0.2	< 0.4
2-Propanol, 1-methoxy-	107-98-2	< 0.2	< 0.4
Ethylene glycol	107-21-1	< 8	< 15.1
Trichloroethylene	79-01-6	< 0.2	< 0.3
1,4-Dioxane	123-91-1	< 0.2	< 0.3
Ethanol, 2-ethoxy-	110-80-5	< 0.4	< 0.8
Toluene	108-88-3	< 0.2	< 0.4
Formamide, N,N-dimethyl-	68-12-2	< 0.4	< 0.8
Tetrachloroethylene	127-18-4	< 0.2	< 0.3
Benzene, chloro-	108-90-7	< 0.2	< 0.3
Ethylbenzene	100-41-4	< 0.2	< 0.3
Xylene (-m, -p, & -o)	108-38-3, 95-47-6, 106-42-3	< 0.6	< 1.2
Styrene	100-42-5	< 0.1	< 0.2
2-Ethoxyethyl acetate	111-15-9	< 0.5	< 0.9
Phenol	108-95-2	< 0.5	< 1
Benzene, 1,4-dichloro-	106-46-7	< 0.1	< 0.2
Isophorone	78-59-1	< 0.2	< 0.3
Naphthalene	91-20-3	< 0.2	< 0.4

Table 7: Measured chamber concentrations and corresponding emission factors of identified individual VOCs and TVOC at 336 hours.

VOC	CAS No.	CHAMBER CONCENTRATION (µg m^{-3})	EMISSION FACTOR (µg m^{-2} h^{-1})
Butylated Hydroxytoluene	67-66-3	6.3	11.7
TVOC	-	23.6	35.0

Exposure Scenario Modeling and Evaluation:

Estimated building concentrations for the private office, school classroom, and single-family residence scenarios were calculated using equation 3.2a of CDPH Standard Method V1.2:

$$C_{Bi} = \frac{EF_{Ai} \times A_B}{Q_B}$$

The area specific emission rate EF_A at 336 hours (14 days) total exposure time is multiplied by the ratio of the exposed surface area of the installed material in the building, A_B (m^2), to the flow rate of outside ventilation air, Q_B (m^3 h^{-1}).

The modeling parameters used for private office, school classroom, and single-family residence scenarios are listed in Table 10.

The modeled concentrations of identified individual VOCs for private office, school classroom, and single-family residence scenarios are listed in Tables 11 & 12. Whether the modeled concentrations meet the maximum allowable concentration requirements specified in Table 4.1 of CDPH Standard Method V1.2 are also indicated.

Table 8: Standard modeling parameters for wallcovering.

PARAMETER	SYMBOL	VALUE	UNITS
Exposed Surface Area Installed in *Private Office (PO)*	A_B	33.4	m^2
Air flow rate of *Private Office (PO)*	Q_B	20.7	m^3 h^{-1}
Exposed Surface Area Installed in *Classroom (SC)*	A_B	94.6	m^2
Air flow rate of *Classroom (SC)*	Q_B	191	m^3 h^{-1}
Exposed Surface Area Installed in *Residence (R)*	A_B	562	m^2
Air flow rate of *Residence (R)*	Q_B	127	m^3 h^{-1}

Table 9: Projected concentrations of individual VOCs specified in Table 4-1 of CDPH 01350 V1.2.

VOC	CAS NO.	PROJECTED CONCENTRATION ($\mu g\ m^{-3}$)			CONC. LIMIT ($\mu g\ m^{-3}$)	RESULT Pass (P) /Fail (F)		
		PO	SC	R		PO	SC	R
Formaldehyde	50-00-0	1.5	0.4	4.0	9	P	P	P
Acetaldehyde	75-07-0	< 13.7	< 4.2	< 37.6	70	P	P	P
Vinyl acetate	108-05-4	< 1.2	< 0.4	< 3.2	100	P	P	P
Epichlorohydrin	106-89-8	< 0.6	< 0.2	< 1.8*	1.5	P	P	P
Ethanol, 2-methoxy-, acetate	110-49-6	< 0.9	< 0.3	< 2.5	45	P	P	P
Isopropyl Alcohol	67-63-0	< 0.6	< 0.2	< 1.5	3,500	P	P	P
Ethene, 1,1-dichloro-	75-35-4	< 0.5	< 0.2	< 1.4	35	P	P	P
Methylene chloride	75-09-2	< 0.8	< 0.3	< 2.3	200	P	P	P
Carbon disulfide	75-15-0	< 1.5	< 0.5	< 4.2	400	P	P	P
Methyl tert-butyl ether	1634-04-4	< 1.5	< 0.5	< 4	4,000	P	P	P
n-Hexane	110-54-3	< 0.8	< 0.3	< 2.3	3,500	P	P	P
Trichloromethane (Chloroform)	67-66-3	< 0.9	< 0.3	< 2.4	150	P	P	P
Ethanol, 2-methoxy-	109-86-4	< 1.2	< 0.4	< 3.2	30	P	P	P
Ethane, 1,1,1-trichloro-	71-55-6	< 0.5	< 0.2	< 1.5	500	P	P	P
Benzene	71-43-2	< 0.8	< 0.2	< 2.1*	1.5	P	P	P
Carbon Tetrachloride	56-23-5	< 0.6	< 0.2	< 1.7	20	P	P	P
2-Propanol, 1-methoxy-	107-98-2	< 0.7	< 0.2	< 1.9	3,500	P	P	P
Ethylene glycol	107-21-1	< 24.3	< 7.5	< 66.6	200	P	P	P
Trichloroethylene	79-01-6	< 0.5	< 0.2	< 1.4	300	P	P	P
1,4-Dioxane	123-91-1	< 0.5	< 0.1	< 1.3	1,500	P	P	P
Ethanol, 2-ethoxy-	110-80-5	< 1.2	< 0.4	< 3.3	35	P	P	P
Toluene	108-88-3	< 0.6	< 0.2	< 1.6	150	P	P	P
Formamide, N,N-dimethyl-	68-12-2	< 1.2	< 0.4	< 3.3	40	P	P	P
Tetrachloroethylene	127-18-4	< 0.5	< 0.2	< 1.5	17.5	P	P	P
Benzene, chloro-	108-90-7	< 0.5	< 0.2	< 1.5	500	P	P	P
Ethylbenzene	100-41-4	< 0.6	< 0.2	< 1.5	1,000	P	P	P
Xylene (-m, -p, & -o)	108-38-3, 95-47-6, 106-42-3	< 1.9	< 0.6	< 5.1	350	P	P	P
Styrene	100-42-5	< 0.4	< 0.1	< 1	450	P	P	P
2-Ethoxyethyl acetate	111-15-9	< 1.5	< 0.5	< 4.1	150	P	P	P
Phenol	108-95-2	< 1.5	< 0.5	< 4.2	100	P	P	P
Benzene, 1,4-dichloro-	106-46-7	< 0.4	< 0.1	< 1.1	400	P	P	P
Isophorone	78-59-1	< 0.5	< 0.1	< 1.3	1,000	P	P	P
Naphthalene	91-20-3	< 0.7	< 0.2	< 1.9	4.5	P	P	P

*Individual VOC of concern is below lower LOQ for modeled scenario.

Table 10: Projected concentrations of identified non-listed individual VOCs.

VOC	CAS NO.	PROJECTED CONCENTRATION (µg m^{-3})			CONC. LIMIT (µg m^{-3})	Result Pass (P) /Fail (F)		
		PO	SC	R		PO	SC	R
Butylated Hydroxytoluene	67-66-3	18.9	5.8	51.9	-	-	-	-
$TVOC_{Toluene}$	-	56.5	17.4	155	-	-	-	-

PHOTOGRAPHS:

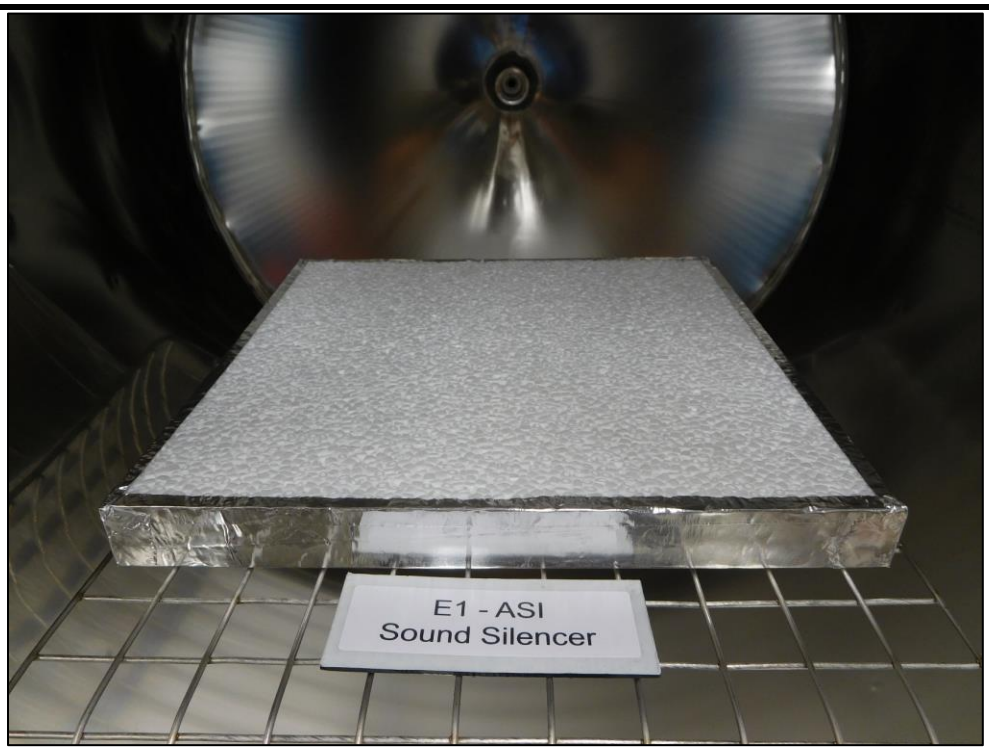

Figure 1: Photograph of sample in test chamber

SECTION 4

FACILITIES AND EQUIPMENT:

GCMS	
INSTRUMENTATION USED:	Markes TD-100 Thermal Desorption Agilent 7890A GC Agilent 5975C MS
COLUMN USED:	Agilent HP-Ultra 2 (GC)
HPLC	
INSTRUMENTATION USED:	Agilent 1260 Infinity Series
COLUMN USED:	Poroshell 120 EC-C18

SECTION 5
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ASI 65831	

Customer Information	
Company:	ASI
Street Address:	123 Columbia Court N.
City/State/Postal code:	Chaska, MN 55318
Country:	USA
Contact Name & Title (for reporting):	
Conor Cook, Resource Specialist	
Contact Phone/Fax Numbers:	952-466-8261
Contact E-mail Address:	ccook@acousticalsurfaces.com
Financially Responsible Co. :	Acoustical Surfaces Inc.

Shipping Details	
Packed & Shipped By:	Conor Cook
Shipping Date:	9/19/18
Carrier/Airbill Number:	

Requested Testing	
Test to be performed:	CDPH 01350 V1.2

Customer Request for Certification	
ETL Environmental VOC™ Certification:	☐ YES
ETL Environmental VOC+™ Certification:	☑ YES
SCS's Indoor Advantage™ Certification:	☐ YES
SCS's Indoor Advantage™ Gold Certification:	☐ YES
SCS's FloorScore® Certification:	☐ YES

Manufacturer Information (If Different)
Company:
City/State/Country:
Contact Name/Title:
Phone Number/E-mail Address:

Special Customer Instructions

Sample Details	
Product Commercial Name*:	Sound Silencer
Product Commercial Part No.(if not part of the name)*:	
Manufacturer Sample Tracking ID:	01350V12-3
Date Manufactured*:	9.19.18
Product Category & Use*:	Acoustical Panel for absorption
Sample Construction Materials*:	Polypropylene/ethylene Copolymer, Carbon Black, Antimony Trioxide, Tetrabromobisphenol A.Bis (2,3-dibromopropyl ether)
Plant Name & Location*:	ASI Peavey, Chaska, MN
Collection Location within Plant:	
Date & Time Collected* :	9.19.18 2:10P
Number of Sample Pieces*:	4
Sample Collected by*:	Conor Cook
Phone/Fax Numbers*:	952.466.8261
E-mail Address*:	ccook@acousticalsurfaces.com

Customer Authorizes Laboratory to Submit Copies of Test Reports To:
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Email Address:
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Condition of Sample:	Good
Sample ID:	G RK 180970000E
GIN:	G10 3632425

Sample Handling*

	Printed Name*	Signature*	Date*	Company*
Relinquished By:	Conor Cook	Conor P. Cook	9.19.18	ASI
Received by:	Amanda Tonyes	Amanda Tonyes	9/21/18	Intertek