

# FACT DESIGN TEST REPORT

**SCOPE OF WORK**

CDPH 01350 Standard Method Version 1.2 on CALM Branches

**REPORT NUMBER**

105443773GRR-002

**ISSUE DATE**

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12

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## TEST REPORT FOR FACT DESIGN, LLC

Report No.: 105443773GRR-002

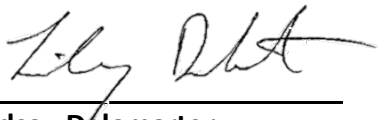
Date: 26-June-2023

P.O.: N/A

### SECTION 1

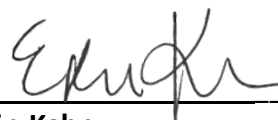
#### CLIENT INFORMATION

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**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)

**DESCRIPTION OF SAMPLES**

Manufacturer / Location: FACT Design/ Sweetwater, TN USA  
 Product Name: CALM Branches  
 Product Number: Not Specified  
 Date of Manufacture: 15-May-2023  
 Date of Collection: 15-May-2023  
 Date of Shipment: 15-May-2023  
 Date Received by Lab: 17-May-2023  
 Date of Test Start: 25-May-2023  
 As Received Sample Condition: Good Condition  
 Lab Sample ID: GRR2305170009

**WORK REQUESTED/APPLICABLE DOCUMENTS**

VOC Emissions Analysis: CDPH Standard Method v1.2  
 Intertek Quote: Qu-01329023

**TEST RESULTS**

**CDPH Standard Method v1.2, Table 4.1**

MODELING SCENARIO	RESULT (PASS/FAIL)
Private Office (PO)	PASS
School Classroom (SC)	PASS
Single Family Residence (R)*	PASS

\*Note: The single family residence scenario is not yet a CDPH requirement. It is provided for informational purposes only.

**LEED v4 Total Volatile Organic Compounds (TVOC)**

MODELING SCENARIO	TVOC (mg m <sup>-3</sup> )
Private Office (PO)	< 0.1
School Classroom (SC)	< 0.1
Single Family Residence (R)*	0.1

\*Note: The single family residence scenario is not yet a CDPH requirement. It is provided for informational purposes only.

**SAMPLE DISPOSITION**

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

**SECTION 3**

**CDPH STANDARD METHOD V1.2**

Date Received: 17-May-2023  
 Dates Tested: 25-May-2023 to 08-June-2023

**DESCRIPTION OF SAMPLES:**

Product Description: CALM branches acoustical tile  
 Material Submitted: Four (4) acoustical ceiling tiles

**ACCEPTANCE CRITERIA:**

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

**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 taped on three edges and placed into the test chamber with all other surfaces exposed. The sample was conditioned outside of the test chamber at  $23 \pm 3^\circ\text{C}$  and  $50 \pm 10\% \text{ RH}$ . Air samples were collected prior to the sample being placed in the test chamber (0 hours) and at 264, 288, and 336 hours after preparation. 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-dinitrophenylhydrazine (DNPH). Low molecular weight aldehydes were analyzed using high performance liquid chromatography, HPLC.

**Table 1: Conditioning and test timing**

EXPERIMENT PHASE	START DATE	DURATION
Conditioning	25-May-2023	7 Days
Chamber Testing	01-June-2023	7 Days

**RESULTS:****Table 2: Sample and Chamber Conditions during Test Period**

PARAMETER		SYMBOL	VALUE	UNITS
Sample Dimensions	Length	-	0.336	m
	Width	-	0.243	m
	Thickness	-	0.010	m
Exposed Sample Surface Area		A	0.082	m <sup>2</sup>
Chamber Volume		V	0.116	m <sup>3</sup>
Chamber Loading Factor		L	0.70	m <sup>2</sup> m <sup>-3</sup>
Inlet Air Flow Rate		Q	0.116	m <sup>3</sup> h <sup>-1</sup>
Air Change Rate		N <sub>ACH</sub>	1.00	h <sup>-1</sup>
Area Specific Flow Rate		q <sub>A</sub>	1.42	m h <sup>-1</sup>
Chamber Pressure (Range)		P	17.3 (16.2-19.4)	Pa
Average Temperature (Range)		T	23.3 (22.8-23.5)	°C
Average Humidity (Range)		RH	50.0 (48.9-51.6)	% RH
Testing Duration		t	336	h

**Table 3: Test chamber background VOC concentrations in µg m<sup>-3</sup>.**

COMPOUND	CAS No.	C <sub>10</sub>
Formaldehyde	50-00-0	< 2.0
TVOC	-	< 20.0

**Table 4: Test chamber TVOC and formaldehyde concentrations in µg m<sup>-3</sup>.**

COMPOUND	CAS No.	264 H	288 H	336 H
Formaldehyde	50-00-0	< 2.0	< 2.0	< 2.0
TVOC	-	< 20.0	< 20.0	< 20.0

**Table 5: Test chamber TVOC and formaldehyde emission factors in µg m<sup>-2</sup> h<sup>-1</sup>.**

COMPOUND	CAS No.	264 H	288 H	336 H
Formaldehyde	50-00-0	< 2.2	< 2.2	< 2.2
TVOC	-	< 28.4	< 28.4	< 28.4

Individual emitted VOCs identified above the lower limits of quantitation are listed in Table 5; 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 6.

In Tables 4, 6 and 7, 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,  $C_{it}$  ( $\mu g m^{-3}$ ), is the concentration of a target VOC<sub>i</sub>, formaldehyde and other carbonyl compounds measured at time  $t$ . The chamber background concentration,  $C_{i0}$  ( $\mu g m^{-3}$ ), is the corresponding concentration measured with the chamber operating without a test specimen. The exposed 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 6: VOCs detected above lower limits of quantitation in air samples at 336 hours.**

VOC	CAS No.	SURROGATE <sup>1</sup>	CREL <sup>2</sup> ( $\mu g m^{-3}$ )	CARB TAC <sup>3</sup>	PROP 65 LIST <sup>4</sup>
Butylated Hydroxytoluene <sup>5</sup>	128-37-0	Yes	-	No	No

<sup>1</sup>Indicates which non-listed VOCs were quantified using surrogate compounds, all other compounds were quantified using pure compounds.

<sup>2</sup>Chronic Reference Exposure Level (CREL) as defined by California Office of Environmental Health Hazard Assessment.

<sup>3</sup>Substance is listed on California Air Resource Board’s (CARB) Toxic Air Contaminant (TAC) identification list.

<sup>4</sup>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).

<sup>5</sup>Compound was detected but may be due to the aluminized tape.

**Table 7: 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 ( $\mu\text{g m}^{-3}$ )	EMISSION FACTOR ( $\mu\text{g m}^{-2} \text{h}^{-1}$ )
Formaldehyde	50-00-0	< 2.0	< 2.2
Acetaldehyde	75-07-0	< 3.9	< 5.6
Vinyl acetate	108-05-4	< 0.4	< 0.6
Epichlorohydrin	106-89-8	< 0.4	< 0.5
Ethanol, 2-methoxy-, acetate	110-49-6	< 0.4	< 0.5
Isopropyl Alcohol	67-63-0	< 0.3	< 0.4
Ethene, 1,1-dichloro-	75-35-4	< 0.3	< 0.4
Methylene chloride	75-09-2	< 0.3	< 0.4
Carbon disulfide	75-15-0	< 0.3	< 0.4
Methyl tert-butyl ether	1634-04-4	< 0.3	< 0.4
n-Hexane	110-54-3	< 1.2	< 1.7
Trichloromethane (Chloroform)	67-66-3	< 0.3	< 0.4
Ethanol, 2-methoxy-	109-86-4	< 0.4	< 0.5
Ethane, 1,1,1-trichloro-	71-55-6	< 0.3	< 0.4
Benzene	71-43-2	< 0.3	< 0.4
Carbon Tetrachloride	56-23-5	< 0.3	< 0.4
2-Propanol, 1-methoxy-	107-98-2	< 0.4	< 0.5
Ethylene glycol	107-21-1	< 20.0	< 28.4
Trichloroethylene	79-01-6	< 0.3	< 0.4
1,4-Dioxane	123-91-1	< 0.3	< 0.4
Ethanol, 2-ethoxy-	110-80-5	< 0.3	< 0.4
Toluene	108-88-3	< 0.3	< 0.4
Formamide, N,N-dimethyl-	68-12-2	< 6.0	< 8.5
Tetrachloroethylene	127-18-4	< 0.3	< 0.4
Benzene, chloro-	108-90-7	< 0.3	< 0.4
Ethylbenzene	100-41-4	< 0.3	< 0.4
Xylene (-m, -p, & -o)	108-38-3, 95-47-6, 106-42-3	< 0.4	< 0.5
Styrene	100-42-5	< 0.3	< 0.4
2-Ethoxyethyl acetate	111-15-9	< 0.4	< 0.6
Phenol	108-95-2	< 0.3	< 0.4
Benzene, 1,4-dichloro-	106-46-7	< 0.3	< 0.4
Isophorone	78-59-1	< 0.3	< 0.4
Naphthalene	91-20-3	< 0.3	< 0.4

**Table 8: Measured chamber concentrations and corresponding emission factors of identified non-listed individual VOCs and TVOC at 336 hours.**

VOC	CAS No.	CHAMBER CONCENTRATION ( $\mu\text{g m}^{-3}$ )	EMISSION FACTOR ( $\mu\text{g m}^{-2} \text{h}^{-1}$ )
Butylated Hydroxytoluene	128-37-0	4.9	7.0
TVOC	-	< 20.0	< 28.4

**Exposure Scenario Modeling and Evaluation:**

Estimated building concentrations for the listed 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,  $A_B$  ( $\text{m}^2$ ), to the flow rate of outside ventilation air,  $Q_B$  ( $\text{m}^3 \text{h}^{-1}$ ).

The modeling parameters used for the given scenarios are listed in Table 8. The modeled concentrations of identified individual VOCs are listed in Tables 9 & 10. 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 9: Standard modeling parameters for Wallcovering + Ceiling.**

PARAMETER	SYMBOL	VALUE	UNITS
Exposed Surface Area Installed in <i>Private Office (PO)</i>	$A_B$	44.5	$\text{m}^2$
Air flow rate of <i>Private Office (PO)</i>	$Q_B$	20.7	$\text{m}^3 \text{h}^{-1}$
Exposed Surface Area Installed in <i>Classroom (SC)</i>	$A_B$	184	$\text{m}^2$
Air flow rate of <i>Classroom (SC)</i>	$Q_B$	191	$\text{m}^3 \text{h}^{-1}$
Exposed Surface Area Installed in <i>Residence (R)</i>	$A_B$	779	$\text{m}^2$
Air flow rate of <i>Residence (R)</i>	$Q_B$	127	$\text{m}^3 \text{h}^{-1}$



Table 10: Modeled concentrations of individual VOCs specified in Table 4-1 of CDPH 01350 V1.2.

VOC	CAS NO.	MODELED CONCENTRATION ( $\mu\text{g m}^{-3}$ )			CONC. LIMIT ( $\mu\text{g m}^{-3}$ )	RESULT Pass (P) /Fail (F)		
		PO	SC	R		PO	SC	R
Formaldehyde	50-00-0	< 6.1	< 2.7	< 17.4*	9	P	P	P
Acetaldehyde	75-07-0	< 11.9	< 5.3	< 34.1	70	P	P	P
Vinyl acetate	108-05-4	< 1.3	< 0.6	< 3.9	100	P	P	P
Epichlorohydrin	106-89-8	< 1.1	< 0.5	< 3.1*	1.5	P	P	P
Ethanol, 2-methoxy-, acetate	110-49-6	< 1.1	< 0.5	< 3.3	45	P	P	P
Isopropyl Alcohol	67-63-0	< 0.8	< 0.3	< 2.2	3,500	P	P	P
Ethene, 1,1-dichloro-	75-35-4	< 0.8	< 0.3	< 2.2	35	P	P	P
Methylene chloride	75-09-2	< 0.8	< 0.3	< 2.2	200	P	P	P
Carbon disulfide	75-15-0	< 0.8	< 0.3	< 2.2	400	P	P	P
Methyl tert-butyl ether	1634-04-4	< 0.8	< 0.3	< 2.2	4,000	P	P	P
n-Hexane	110-54-3	< 3.7	< 1.7	< 10.6	3,500	P	P	P
Trichloromethane (Chloroform)	67-66-3	< 0.8	< 0.3	< 2.2	150	P	P	P
Ethanol, 2-methoxy-	109-86-4	< 1.2	< 0.5	< 3.4	30	P	P	P
Ethane, 1,1,1-trichloro-	71-55-6	< 0.8	< 0.3	< 2.2	500	P	P	P
Benzene	71-43-2	< 0.8	< 0.3	< 2.2*	1.5	P	P	P
Carbon Tetrachloride	56-23-5	< 0.8	< 0.3	< 2.2	20	P	P	P
2-Propanol, 1-methoxy-	107-98-2	< 1.1	< 0.5	< 3.1	3,500	P	P	P
Ethylene glycol	107-21-1	< 61.0	< 27.3	< 174	200	P	P	P
Trichloroethylene	79-01-6	< 0.8	< 0.3	< 2.2	300	P	P	P
1,4-Dioxane	123-91-1	< 0.8	< 0.3	< 2.2	1,500	P	P	P
Ethanol, 2-ethoxy-	110-80-5	< 0.8	< 0.4	< 2.4	35	P	P	P
Toluene	108-88-3	< 0.8	< 0.3	< 2.2	150	P	P	P
Formamide, N,N-dimethyl-	68-12-2	< 18.3	< 8.2	< 52.2*	40	P	P	P
Tetrachloroethylene	127-18-4	< 0.8	< 0.3	< 2.2	17.5	P	P	P
Benzene, chloro-	108-90-7	< 0.8	< 0.3	< 2.2	500	P	P	P
Ethylbenzene	100-41-4	< 0.8	< 0.3	< 2.2	1,000	P	P	P
Xylene (-m, -p, & -o)	108-38-3, 95-47-6, 106-42-3	< 1.2	< 0.5	< 3.3	350	P	P	P
Styrene	100-42-5	< 0.8	< 0.3	< 2.2	450	P	P	P
2-Ethoxyethyl acetate	111-15-9	< 1.3	< 0.6	< 3.8	150	P	P	P
Phenol	108-95-2	< 0.9	< 0.4	< 2.7	100	P	P	P
Benzene, 1,4-dichloro-	106-46-7	< 0.8	< 0.3	< 2.2	400	P	P	P
Isophorone	78-59-1	< 0.8	< 0.3	< 2.2	1,000	P	P	P
Naphthalene	91-20-3	< 0.8	< 0.3	< 2.2	4.5	P	P	P

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

Table 11: Modeled concentrations of identified non-listed individual VOCs.

VOC	CAS NO.	MODELED CONCENTRATION ( $\mu\text{g m}^{-3}$ )		
		PO	SC	R
Butylated Hydroxytoluene	128-37-0	15.0	6.7	42.8
TVOC <sub>Toluene</sub>	-	< 61.0	< 27.3	< 174

**PHOTOGRAPHS:**

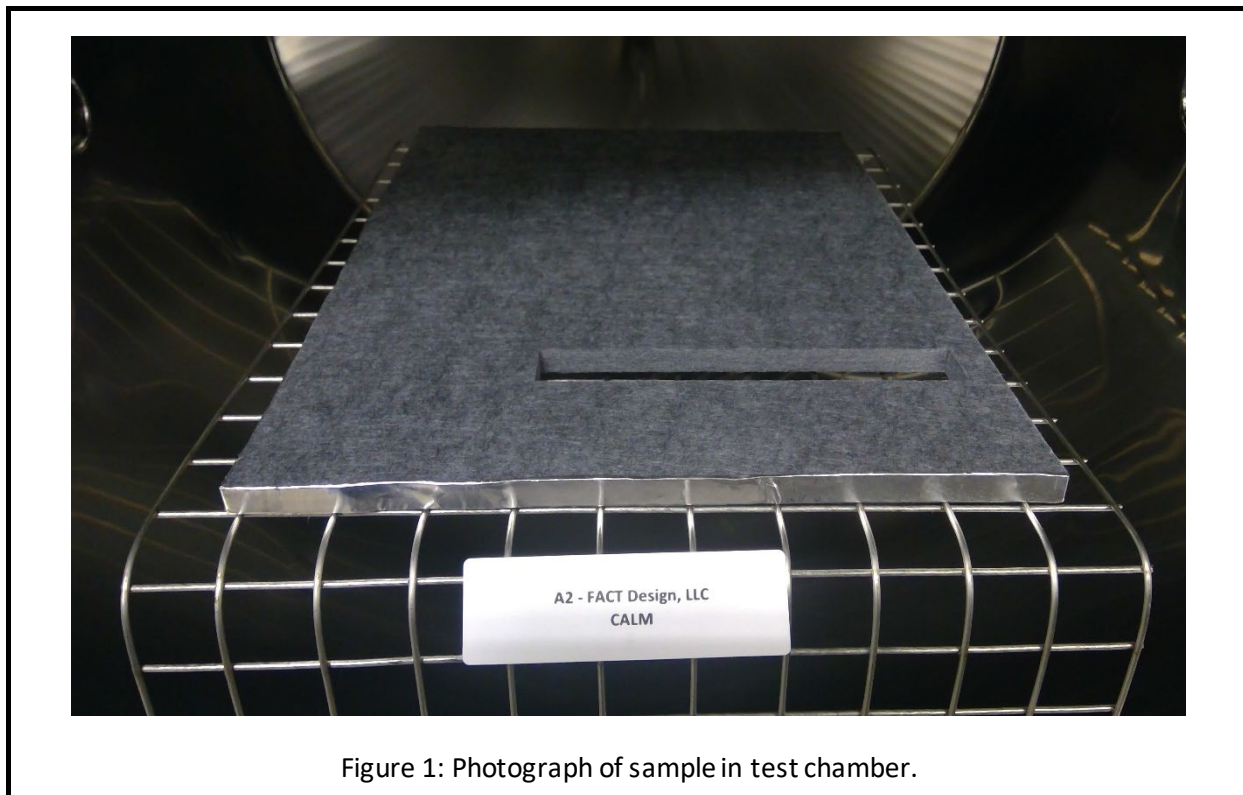


Figure 1: Photograph of sample in test chamber.


**SECTION 4**

**FACILITIES AND EQUIPMENT:**

<b>GCMS</b>	
INSTRUMENTATION USED:	Markes TD-100 Thermal Desorption Agilent 7890A GC Agilent 5975C MS
COLUMN USED:	AGILENT HP-5MS(GC)
<b>HPLC</b>	
INSTRUMENTATION USED:	Agilent 1260 Infinity Series
COLUMN USED:	Poroshell 120 EC-C18

**SECTION 5**

**CHAIN OF CUSTODY**

	<b>Ship To:</b>		<b>Chain of Custody for Chemical Testing</b>	
	Attn: VOC Laboratory 4700 Broadmoor Ave SE Suite 200 Kentwood, MI 49512 Phone: 616-656-7401		Intertek Quotation Number: <b>Qu-01329023-0</b> Purchase Order (enter Company and Number): <b>FACT design</b>	
<b>Customer Information</b>			<b>Shipping Details</b>	
Company: <b>FACT design</b>			Packed & Shipped By: <b>Troy Jones</b>	
Street Address: <b>138 Frontier Rd</b>			Shipping Date: <i>May 15, 2023</i>	
City/State/Postal code: <b>Sweetwater, TN 37874</b>			Carrier/Airbill Number: [REDACTED]	
Country: <b>USA</b>			<b>Requested Testing</b>	
Contact Name & Title (for reporting): <b>Daniel Monier</b>			Test to be performed:	
Contact Phone/Fax Numbers: <b>917-443-3839</b>			<b>Customer Request for Certification</b>	
Contact E-mail Address: <b>daniel@fact.design</b>			Clean Air™ Certification: <input type="checkbox"/> YES	
Financially Responsible Co. :				
<b>Manufacturer Information (If Different)</b>			<b>Special Customer Instructions</b>	
Company:				
City/State/Country:				
Contact Name/Title:				
Phone Number/E-mail Address:				
<b>Sample Details</b>			<b>Customer Authorizes Laboratory to Submit Copies of Test Reports To:</b>	
Product Commercial Name*: <b>CALM branches</b>			Contact: <b>Daniel Monier</b>	
Product Commercial Part No.(if not part of the name)*:			Email Address: <b>daniel@fact.design</b>	
Manufacturer Sample Tracking ID:			Organization: <b>FACT design</b>	
Date Manufactured*: <i>May 15, 2023</i>			Contact:	
Product Category & Use*: <b>Interior Architectural Product</b>			Email Address:	
Sample Construction Materials*:			Organization:	
Plant Name & Location*: <b>FACT design, Sweetwater, TN 37874</b>			<b>Intertek Use Only</b>	
Collection Location within Plant: <i>of Cottageville 1</i>			Condition of Shipping Package: <i>Good</i>	
Date & Time Collected*: <i>May 15, 2023 7:00 AM</i>			Condition of Sample: <i>Good</i>	
Number of Sample Pieces*: <i>4</i>			Sample ID: GRR2305170009	
Sample Collected by*: <b>Troy Jones</b>			GIN: <i>G105443773</i>	
Phone/Fax Numbers*: <b>847-346-6524</b>			*Indicates required field	
E-mail Address*: <b>troy@fact.design</b>				
<b>Sample Handling*</b>				
	<b>Printed Name*</b>	<b>Signature*</b>	<b>Date*</b>	<b>Company*</b>
Relinquished By:	Troy Jones	<i>[Signature]</i>	<i>May 15, 2023</i>	FACT design
Received by:	Lindsay Delamarter	<i>[Signature]</i>	<i>5/17/2023</i>	Intertek