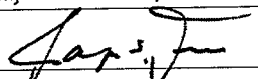
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VOC Emissions from Building Products

Customer & Building Product Sample Information

Report Certification	
Report number	388-016-01A-Oct0318
Report date	Oct 3, 2018
Certified by (Name/Title)	Raja S. Tannous, Laboratory Director
Signature	
Date	*October 3, 2018*

Standards	
Test method	CDPH/EHLB/Standard Method V1.2 (Sect. 01350)
Acceptance criteria	CDPH/EHLB/Standard Method V1.2
Modeling scenario(s)	CDPH/EHLB/Standard Method V1.2 Standard Classroom & Office
Product type	Upholstery - Seating

Customer Information	
Manufacturer or organization	[redacted]
City/State/Country	[redacted]
Contact name/Title	[redacted]
Phone number	[redacted]

Product Sample Information*	
Manufacturer (if not customer)	Same as above
Product name / Number	Tekloom
Product CSI category	Fabrics (12 05 13)
Customer sample ID	not provided
Manufacturing location	[redacted]
Date sample manufactured	Sep 7, 2018
Date sample collected	Sep 10, 2018
Date sample shipped	Sep 11, 2018
Date sample received by lab	Sep 13, 2018
Condition of received sample	No observed problems
Lab sample tracking number	**388-016-01A**
Conditioning start date & duration	Sep 14, 2018; 10 days
Chamber test start date & duration	Sep 24, 2018; 4 days (96 hours)
Total test start date & duration	Sep 14, 2018; 14 days (336 hours)

*Chain-of-custody (COC) form for product sample is attached to this report

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Conformity Assessment – CDPH VOC Concentration Criteria

VOC Emission Test Results – The product sample was tested for emissions of VOCs following California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017. The chamber test results were modeled to one or more scenario(s) defined in CDPH Standard Method V1.2. The modeled indoor VOC concentrations then were compared to the acceptance criteria defined in CDPH Standard Method V1.2 to determine compliance of the product sample to the standard. The modeling scenario(s) are detailed in Table 3, and the predicted indoor VOC concentrations at 336 hours are given in Table 6 of this report. The allowable concentrations used as acceptance criteria are reproduced in Appendix B of this report. Table 1 summarizes the pass/fail results based on the predicted indoor air concentrations of individual VOCs of concern in the modeled scenario(s).

TVOC Concentration Range – USGBC's LEED v4 rating systems for buildings include a requirement for reporting of the predicted TVOC concentration in one of three range categories, i.e., ≤0.5 mg/m^3, >0.5 to 4.9 mg/m^3, and ≥5.0 mg/m^3. Table 1 includes the TVOC concentration range in the modeled scenario(s).

Table 1. Pass/Fail results based on the test method and identified modeling scenarios. Only detected individual VOCs with defined acceptance criteria are listed. The TVOC concentration range also is shown

Chemical	CAS No	Allowable Concentration (µg/m^3)	Predicted Concentration (Pass/Fail)	
			Classroom	Office
Formaldehyde	50-00-0	9	**Pass**	**Pass**
TVOC[a]	--	--	≤ 0.5 mg/m^3	≤ 0.5 mg/m^3

[a] Reporting of TVOC range is for information only; TVOC is not a Pass/Fail criterion

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Test Method for Building Product Samples

Test Specimen Preparation – Cut a 17.8cm*17.8cm specimen from received upholstery fabric sample, placed it into chamber as cut. Exposed area is base one surface. Photographs of the tested specimen are shown later in this report. The test results presented herein are specific to this item.

Test Protocol Summary* – This VOC emission test was performed following California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017. This version of the standard is identical to CDPH/EHLB/Standard Method V1.1, 2010 except that the benzene allowable concentration is lower. Note: this standard derives from California architectural Specification 01350 and frequently is referred to as "Section 01350." The chamber test prescribed in the standard follows the guidance of ASTM Standard Guide D 5116. Chemical sampling and analyses were performed following U.S. EPA Compendium Method TO-17 and ASTM Standard Method D5197. The product specimen was prepared from the supplied product sample and was placed directly into the conditioning environment and maintained at controlled conditions of air flow rate, temperature and relative humidity for ten days. At the end of this period, the specimen was transferred directly to a small-scale chamber. The chamber conditions for the 96-h test period are summarized in Table 2. Air samples were collected from the chamber at 24 h, 48 h and 96 h elapsed time. Samples for the analysis of individual VOCs and TVOC were collected on multisorbent tubes containing Tenax-TA backed by a carbonaceous sorbent. Samples for the analysis of low molecular weight aldehydes were collected on treated DNPH cartridges. VOC samples were analyzed by thermal desorption GC/MS. TVOC was calculated using toluene as the calibration reference. Individual VOCs (iVOCs) were quantified using multi-point (4 or more points) with calibration curves prepared with pure standards, unless otherwise noted. iVOCs without pure standards were quantified based on their total-ion-current responses using toluene as the calibration reference. Formaldehyde and acetaldehyde were analyzed by HPLC and quantified using multi-point (4 or more points) calibration curves. The analytical instruments and their operating parameters are described in Appendix A.

Availability of Data – All data, including but not limited to raw instrument files, calibration files, and quality control checks used to generate the test results will be made available to the customer upon request subject to Berkeley Analytical's Services Agreement.

Table 2. Chamber conditions for test period

Parameter	Symbol	Units	Value
Tested specimen exposed area	A_S	m^2	0.032
Chamber volume	V_C	m^3	0.067
Loading ratio	L	m^2/m^3	0.473
Avg. Inlet gas flow rate & Range	Q_C	m^3/h	0.067 (0.064-0.070)
Avg Temperature & Range		°C	22.6 (22-24)
Avg Relative humidity & Range		%	53 (45-55)
Duration		h	96

*All standards identified in this section are included in Berkeley Analytical's scope of ISO/IEC17025 accreditation, Testing Laboratory TL-383, International Accreditation Service, www.iasonline.org

Modeling Parameters for Building Products

Modeling Parameters – CDPH/EHLB/Standard Method Version 1.2 describes the modeling procedures and parameters for estimating the impact of VOC emissions from a building product on indoor air concentrations in a standard classroom and a standard office space. The dimensions and ventilation of the spaces and the exposed surface areas of major materials are prescribed. The modeling scenario(s) and parameters applicable to this test are listed in Table 3.

Table 3. Parameters used for estimating VOC air concentrations at 336 hours for the modeling scenarios

Parameter	Symbol	Units	Value	
			Classroom	Office
Product exposed area*	A_{P_B}	m^2	27.0	2.0
Building volume	V_B	m^3	231	30.6
Floor/Ceiling Area	A_B	m^2	89.2	11.15
Ceiling height	H_B	m	2.59	2.74
Outdoor air (OA) flow rate	Q_B	m^3/h	191	20.7
Area-specific air flow rate	q_A	m^3/m^2-h	7.07	10.35

*The exposed area for upholstery were based on the use of one square meter per student seating for a total of 27 students per classroom. For private office, two seats with one square meter upholstery per seat.

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COMPLIANCE TESTED by berkeley analytical

VOC Emission Test Certificate

Product Name: Tekloom

Product Sample Information	
Company:	[redacted]
Company Website:	[redacted]
Product Type:	Seating - Upholstery
Date Produced:	9/7/2018

Certificate Information	
Certificate No:	181003-04
Certified By:	Raja S. Tannous, Laboratory Director
Date:	October 3, 2018

Reference Standard: California Department of Public Health CDPH/EHLB/Standard Method Version 1.2, 2017 (Emission testing method for CA Specification 01350)

Acceptance Criteria and Results Demonstrating Compliance of Product Sample to Referenced Standard:

Exposure Scenario[1]	Individual VOCs of Concern[2]		Formaldehyde[3]		TVOC[4]
	Criterion	Compliant?	Criterion	Compliant?	Range
School Classroom	≤½ Chronic REL	YES	≤9.0 µg/m³	YES	≤ 0.5 mg/m³
Private Office	≤½ Chronic REL	YES	≤9.0 µg/m³	YES	≤ 0.5 mg/m³

Product Coverage[5]: Not applicable

1. Exposure scenarios & product quantities for classroom & office are defined in Tables 4-2 – 4-5 (CDPH Std. Mtd. V1.2-2017)
2. Maximum allowable concentrations of individual target VOCs are specified in Table 4-1 (*ibid*.)
3. Maximum allowable formaldehyde concentration is ≤9 µg/m³, effective Jan 1, 2012; previous limit was ≤16.5 µg/m³ (ibid.)
4. Informative only; predicted TVOC Range in three categories, i.e., ≤0.5 mg/m³, >0.5 – 4.9 mg/m³, and ≥5.0 mg/m³
5. Informative and applicable only to tests of wet-applied products; grams of sample applied per square meter of substrate

Standards & Codes Recognizing CDPH Standard Method V1.2 (partial list)

- USGBC LEED Version 4, BD&C, ID&C
- The WELL Building Standard
- ANSI/GBI 01, Green Building Assessment Protocol
- Green Guide for Healthcare V2.2

Narrative: [redacted] selected a sample representative of its Tekloom coated upholstery textile for seating product and submitted it on 9/13/2018 for testing. Berkeley Analytical measured and evaluated the emissions of VOCs from this sample following CDPH/EHLB/Standard Method V1.2-2017. The results of the test are presented in Berkeley Analytical report, 388-016-01A-Oct0318.

Berkeley Analytical is an independent, third-party laboratory specializing in the analysis of organic chemicals emitted by and contained in building products, finishes, furniture, and consumer products. We are an ISO/IEC 17025 accredited laboratory (IAS, TL-383); all standards used in performing this test are in Berkeley Analytical's scope of accreditation.

DISCLAIMER: THIS CERTIFICATE OF COMPLIANCE AFFIRMS THAT: 1) A SAMPLE OF THE LISTED PRODUCT WAS TESTED ACCORDING TO THE REFERENCED STANDARD; 2) THE MEASURED VOC EMISSIONS FROM THE SAMPLE WERE EVALUATED FOR THE DEFINED EXPOSURE SCENARIO(S); AND 3) THE RESULTS MEET THE ACCEPTANCE CRITERIA OF THE REFERENCED STANDARD(S). BERKELEY ANALYTICAL IS NOT RESPONSIBLE FOR ANY CLAIMS REGARDING A PRODUCT OR PRODUCTS ENTERED INTO COMMERCE THAT MAY BE BASED ON THIS TEST. BERKELEY ANALYTICAL PROVIDES THIS CERTIFICATE OF COMPLIANCE "AS IS" WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE.