

CERTIFICATE OF COMPLIANCE



PolySorb

116430-420

Certificate Number

06/25/2018 - 09/25/2024

Certificate Period

Certified

Status

UL 2818 - 2022 Gold Standard for Chemical Emissions for Building Materials, Finishes and Furnishings

Building products and interior finishes are determined compliant in accordance with California Department of Public Health (CDPH) Standard Method V1.2-2017 using an Office and Classroom Environment.

Product tested in accordance with UL 2821 test method to show compliance to emission limits on UL 2818. Section 7.1 and 7.2.



UL investigated representative samples of the identified Product(s) to the identified Standard(s) or other requirements in accordance with the agreements and any applicable program service terms in place between UL and the Certificate Holder (the "Agreement"). The Certificate Holder is authorized to use the UL Mark for the identified Product(s) manufactured at the production site(s) covered by the UL Test Report, in accordance with the terms of the Agreement. This Certificate is valid for the dates unless there is non-compliance with the Agreement.

GREENGUARD Gold Certification Criteria for Building Products and Interior Finishes

Criteria	CAS Number	Maximum Allowable Predicted Concentration	Units
TVOC ^(A)	-	0.22	mg/m ³
Formaldehyde	50-00-0	9 (7.3 ppb)	µg/m ³
Total Aldehydes ^(B)	-	0.043	ppm
4-Phenylcyclohexene	4994-16-5	6.5	µg/m ³
Particle Matter less than 10 µm ^(C)	-	20	µg/m ³
1-Methyl-2-pyrrolidinone ^(D)	872-50-4	160	µg/m ³
Individual VOCs ^(E)	-	1/2 CREL or 1/100th TLV	-

- (A) Defined to be the total response of measured VOCs falling within the C₆ – C₁₆ range, with responses calibrated to a toluene surrogate. Maximum allowable predicted TVOC concentrations for GREENGUARD Gold (0.22 mg/m³) fall in the range of 0.5 mg/m³ or less, as specified in CDPH Standard Method v1.2.
- (B) The sum of all measured normal aldehydes from formaldehyde through nonanal, plus benzaldehyde, individually calibrated to a compound specific standard. Heptanal through nonanal are measured via TD/GC/MS analysis and the remaining aldehydes are measured using HPLC/UV analysis.
- (C) Particle emission requirement only applicable to HVAC Duct Products with exposed surface area in air streams (a forced air test with specific test method) and for wood finishing (sanding) systems.
- (D) Based on the CA Prop 65 Maximum Allowable Dose Level for inhalation of 3,200 µg/day and an inhalation rate of 20 m³/day
- (E) Allowable levels for chemicals not listed are derived from the lower of 1/2 the California Office of Environmental Health Hazard Assessment (OEHHA) Chronic Reference Exposure Level (CREL) as required per the CDPH/EHLB/Standard Method v1.2 and BIFMA level credit 7.6.2 and 1/100th of the Threshold Limit Value (TLV) industrial work place standard (Reference: American Conference of Government Industrial Hygienists, 6500 Glenway, Building D-7, and Cincinnati, OH 45211-4438).





GREENGUARD CERTIFICATION TEST REPORT					
Customer Information	POLYSORB 96 SOUTH ALASKA STREET SEATTLE, WASHINGTON 98134 UNITED STATES of AMERICA				
Product Description	PolySorb Open Cell				
Test Group	Rigid Foam Products - 01				
Category	Insulation				
Test Type	Certification		Year 4		
Test Method	UL 2821 "GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions From Building Materials, Finishes and Furnishings Using Dynamic Environmental Chambers"				
	Environment	TVOC	Formaldehyde	Total Aldehydes	CREL/TLV
GREENGUARD	Office	✓	✓	✓	✓
GREENGUARD Gold	Office	✓	✓	✓	✓
	Classroom	✓	✓	✓	✓
✓ - meets criteria; X - over criteria					
Authorized by	 Allyson M. McFry Chemistry Laboratory Director				

MODELING FOR PREDICTED AIR CONCENTRATION					
Certification Program	Environment Basis	Modeling Basis	Surface Area (m ²)	Room Volume (m ³)	ACH (1/hr)
GREENGUARD and GREENGUARD Gold Office	CDPH/EHLB/Standard Method	wall	33.4	30.6	0.68
GREENGUARD Gold Classroom	CDPH/EHLB/Standard Method	wall	94.6	231	0.82

Note that certain environments and/or modeling scenarios may prevent assessment of low level CREL and TLV analytes due to the emissions being below the lower LOQ (0.04 µg). For example, benzene ½ CREL is 1.5 µg/m³.

PHOTOGRAPH OF SAMPLE



GREENGUARD RESULTS SUMMARY

Product Description		PolySorb Open Cell	
GREENGUARD Acceptable IAQ Criteria		168 Hour Product Measurement	Product Compliance for IAQ
TVOC ^a	≤ 0.5 mg/m ³	< 0.003 mg/m ³	Yes
Formaldehyde	≤ 0.05 ppm	< 0.003 ppm	Yes
Total Aldehydes ^b	≤ 0.10 ppm	< 0.003 ppm	Yes
4-Phenylcyclohexene	≤ 0.0065 mg/m ³	< 0.003 mg/m ³	Yes
Individual VOCs	all ≤ 1/10 TLV	----- ^c	Yes
^a "TVOC" is the sum of all VOCs measured via TD/GC/MS which elute between n-hexane (C ₆) and n-hexadecane (C ₁₆) quantified using calibration to a toluene surrogate. ^b "Total Aldehydes" is the sum of all measured normal aldehydes from formaldehyde to nonanal, plus benzaldehyde. Heptanal through nonanal are analyzed using TD/GC/MS. The remaining aldehydes are analyzed using HPL/UV methodology. All aldehydes are quantified to authentic standards. ^c All individual VOCs detected met the criteria of less than 1/10 the ACGIH established threshold limit values (TLVs).			

PROJECT DESCRIPTION

This study was conducted using a UL Environment's GREENGUARD test method following the requirements of GREENGUARD Certification program. The product was monitored for emissions of total volatile organic compounds (TVOC), formaldehyde, target list aldehydes, and other individual volatile organic compounds (VOCs) over a 168 hour exposure period. These emissions were measured and the resultant air concentrations were determined for each of the potential pollutants. Determination of compliance is based on predicted air concentrations modeled using the GREENGUARD program room loading.

Report Outline:

Table 1	Environmental Chamber Study Parameters
Table 2	Emission Factors and Predicted Air Concentrations
Table 3	Chamber Concentrations of Identified VOCs
Table 4	Emission Factors of Identified VOCs
Table 5	Chamber Concentrations of Target List Aldehydes
Table 6	Emission Factor of Target List Aldehydes
Table 7	Supplemental Emissions Information
Chain of Custody	Chain of Custody
Appendix 1	GREENGUARD Gold Results Summary

Download more information regarding UL's technical references and resources, product evaluation methodologies information, quality control program, and environmental chamber evaluations from our website [click here](#) or <https://www.ul.com/offerings/greenguard-certification>

For RSD, Quality Assurance Report or other quality documents, [Request](#) here or contact ULE.

TABLE 1

ENVIRONMENTAL CHAMBER STUDY PARAMETERS			
Product Description	PolySorb Open Cell		
Product Manufacture Date	April 28, 2021		
Product Collection Date	April 29, 2021		
Product Shipping Date	April 29, 2021		
Date Received	April 30, 2021		
Test Description	The product was received as packaged and shipped by the customer. Just prior to loading, the product was unpackaged and prepared for the required loading. The sample was placed inside the environmental chamber, and tested according to the GREENGUARD protocol.		
Test Period	May 10, 2021 - May 17, 2021		
Area	one-sided area = 0.0578 m ²		
Environmental Chamber ID and Volume	KSA - 0.0597 m ³		
Product Loading	0.97 m ² /m ³		
Test Conditions	1.00 ± 0.05 ACH 50% RH ± 5% RH 23.0°C ± 2 °C		
*Accredited Laboratory Locations	Testing Laboratory	Analytical Laboratory	Technical Reporting Location
	KCL	KCL	ULE - Marietta

The temperature range specification is 23°C ± 1°. The actual temperature range listed above may vary slightly. If the range is outside this specification, data was reviewed to ensure a negative impact did not occur.

*Accredited Laboratory Locations	
Location	Address
ULE - Marietta	UL Environment 2211 Newmarket Parkway, Marietta, GA 30067-9399 USA
ULE - Guangzhou	UL Verification Services (Guangzhou) 1-3F & Room 501, Building 2 (R&D Center A1), No. 25, South Huanshi Avenue, Nansha District, Guangzhou 511458, China
ULE - Cabiato	UL International Italia S.r.l ATTN: IAQ Laboratory Via Europa, 9, I – 22060 – Cabiato (Como), Italia
ULE - Vietnam	UL VS (VIET NAM) CO. LTD., Lot C5, Conurbation 2, Street K1, Cat Lai Industrial Zone, Thanh My Loi Ward, District 2, Ho Chi Minh City, Vietnam
UL - Shimadzu	Shimadzu Techno-Research, Inc. 1, Nishinokyo-Shimoaicho Nakagyo-ku, Kyoto 604-8436 Japan
KCL	Korea Conformity Laboratories #805, I-Valley, 149 Gongdan-ro Gunpo-si, Gyeonggi-do, 15849 Korea
Servaco	Servaco Product Testing N.V. Boertang 200 2400 MOL Belgium

This test is accredited and meets the requirements of ISO/IEC 17025 as verified by ANSI National Accreditation Board. Refer to certificate and scope of accreditation AT-1297.

TABLE 2

Product Description		PolySorb Open Cell		
TVOC CHAMBER CONCENTRATIONS, EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS				
Elapsed Exposure Hour*	Chamber Concentration $\mu\text{g}/\text{m}^3$	Emission Factor $\mu\text{g}/\text{m}^2\cdot\text{hr}$	Predicted Air Concentration** $\mu\text{g}/\text{m}^3$	
0 (Background)	BQL	BQL	---	
6	49.6	51.4	83	
24	24.3	25.1	42	
48	18.6	19.2	30	
72	12.6	13.0	21	
96	7.3	7.5	14	
168	BQL	BQL	< 3	
1 st Order Exponential Decay Constant = $k_T = 0.015$				
FORMALDEHYDE CHAMBER CONCENTRATIONS, EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS				
Elapsed Exposure Hour*	Chamber Concentration $\mu\text{g}/\text{m}^3$	Emission Factor $\mu\text{g}/\text{m}^2\cdot\text{hr}$	Predicted Air Concentration**	
			$\mu\text{g}/\text{m}^3$	ppm
0 (Background)	BQL	BQL	---	---
6	BQL	BQL	< 3	< 0.003
24	BQL	BQL	< 3	< 0.003
48	BQL	BQL	< 3	< 0.003
72	BQL	BQL	< 3	< 0.003
96	BQL	BQL	< 3	< 0.003
168	BQL	BQL	< 3	< 0.003
TARGET LIST ALDEHYDES CHAMBER CONCENTRATIONS, EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS				
Elapsed Exposure Hour*	Chamber Concentration $\mu\text{g}/\text{m}^3$	Emission Factor $\mu\text{g}/\text{m}^2\cdot\text{hr}$	Predicted Air Concentration**	
			$\mu\text{g}/\text{m}^3$	ppm
0 (Background)	BQL	BQL	---	---
6	BQL	BQL	< 3	< 0.003
24	BQL	BQL	< 3	< 0.003
48	BQL	BQL	< 3	< 0.003
72	BQL	BQL	< 3	< 0.003
96	BQL	BQL	< 3	< 0.003
168	BQL	BQL	< 3	< 0.003

*Exposure hours are nominal (± 1 hour).

BQL = Below quantifiable level of 0.04 μg based on a standard 18 L air collection volume for VOCs and 0.1 μg based on a standard 45 L air collection volume for aldehydes.

**Predicted Air Concentrations are based on GREENGUARD modeling predicted concentration parameters. For more information [click here](#).

TABLE 3

Product Description		PolySorb Open Cell						
CHAMBER CONCENTRATIONS OF IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS								
CAS Number	Compound	Elapsed Exposure Hour (µg/m³)						
		0 (BG)	6	24	48	72	96	168
13065-07-1	Naphthalene, 1,2,3,4-tetrahydro-2,7-dimethyl	BQL	35.3	24.3	18.6	12.6	7.3	
5989-54-8	Cyclohexene, 1-methyl-4-(1-methylethenyl)-, (S)	BQL	4.7					
100319-40-2	Benzene, 1-ethyl-4-(2-methylpropyl)-	BQL	3.1					
105-05-5	Benzene, 1,4-diethyl	BQL	2.3					
55669-88-0	Benzene, 1,4-dimethyl-2-(2-methylpropyl)	BQL	2.1					
108-88-3	Toluene (Methylbenzene)†	BQL	2.1					

TABLE 4

Product Description		PolySorb Open Cell					
EMISSION FACTORS OF IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS							
CAS Number	Compound	Elapsed Exposure Hour (µg/m²•hr)					
		6	24	48	72	96	168
13065-07-1	Naphthalene, 1,2,3,4-tetrahydro-2,7-dimethyl	36.5	25.1	19.2	13.0	7.5	
5989-54-8	Cyclohexene, 1-methyl-4-(1-methylethenyl)-, (S)	4.9					
100319-40-2	Benzene, 1-ethyl-4-(2-methylpropyl)-	3.2					
105-05-5	Benzene, 1,4-diethyl	2.4					
55669-88-0	Benzene, 1,4-dimethyl-2-(2-methylpropyl)	2.2					
108-88-3	Toluene (Methylbenzene)†	2.2					

*Indicates NIST/EPA/NIH best library match only based on retention time and mass spectral characteristics.

[†]Denotes quantified using multipoint authentic standard curve. Other VOCs quantified relative to toluene.

Quantifiable level is 0.04 µg based on a standard 18 L air collection volume.

TABLE 5

Product Description		PolySorb Open Cell						
CHAMBER CONCENTRATIONS OF TARGET LIST ALDEHYDES								
CAS Number	Compound	Elapsed Exposure Hour (µg/m³)						
		0 (BG)	6	24	48	72	96	168
4170-30-3	2-Butenal	BQL						
75-07-0	Acetaldehyde	BQL						
100-52-7	Benzaldehyde	BQL						
5779-94-2	Benzaldehyde, 2,5-dimethyl	BQL						
529-20-4	Benzaldehyde, 2-methyl	BQL						
620-23-5 / 104-87-0	Benzaldehyde, 3- and/or 4-methyl	BQL						
123-72-8	Butanal	BQL						
590-86-3	Butanal, 3-methyl	BQL						
50-00-0	Formaldehyde	BQL						
66-25-1	Hexanal	BQL						
110-62-3	Pentanal	BQL						
123-38-6	Propanal	BQL						

TABLE 6

Product Description		PolySorb Open Cell					
EMISSION FACTORS OF TARGET LIST ALDEHYDES							
CAS Number	Compound	Elapsed Exposure Hour (µg/m²•hr)					
		6	24	48	72	96	168
4170-30-3	2-Butenal						
75-07-0	Acetaldehyde						
100-52-7	Benzaldehyde						
5779-94-2	Benzaldehyde, 2,5-dimethyl						
529-20-4	Benzaldehyde, 2-methyl						
620-23-5 / 104-87-0	Benzaldehyde, 3- and/or 4-methyl						
123-72-8	Butanal						
590-86-3	Butanal, 3-methyl						
50-00-0	Formaldehyde						
66-25-1	Hexanal						
110-62-3	Pentanal						
123-38-6	Propanal						

Quantifiable level is 0.1 µg is based on a standard 45 L air collection volume.

TABLE 7

SUPPLEMENTAL EMISSIONS INFORMATION

The table below represents this product's identified chemical emissions found on certain regulatory lists. This list only provides a statement regarding possible health effects associated with this compound and not the relative risks of exposure. Proper interpretation of the risks associated with exposure to a given regulated compound requires a more detailed evaluation of toxicological activity. Certain purchasing programs may require this information be submitted.

Product Description		PolySorb Open Cell					
CAS Number	Compound	✓() = FOUND IN LISTING (CLASS)					
		CAL PROP. 65	NTP	IARC	CAL AIR TOXICS	CREL	TLV
108-88-3	Toluene (Methylbenzene) [†]	✓(2)		✓(3)	✓(IIA)	✓	✓

[†]Denotes quantified using multipoint authentic standard curve

CAL Prop. 65: California Health and Welfare Agency, Proposition 65 Chemicals

1 = known to cause cancer

2 = known to cause reproductive toxicity

NTP: National Toxicology Program

2A = known to be carcinogenic to humans

2B = reasonably anticipated to be carcinogenic to humans

IARC: International Agency on Research of Cancer

1 = carcinogenic to humans

3 = unclassifiable as to carcinogenicity to humans

2A = probably carcinogenic to humans

4 = probably not carcinogenic to humans

2B = possibly carcinogenic to humans

California Air Toxics

I = Substances identified as Toxic Air Contaminants, known to be emitted in California, with a full set of health values reviewed by the Scientific Review Panel.

IIA = Substances identified as Toxic Air Contaminants, known to be emitted in California, with one or more health values under development by the Office of Environmental Health Hazard Assessment for review by the Scientific Review Panel.

IIB= Substances NOT identified as Toxic Air Contaminants, known to be emitted in California, with one or more health values under development by the Office of Environmental Health Hazard Assessment for review by the Scientific Review Panel.

III = Substances known to be emitted in California and are NOMINATED for development of health values or additional health values.

IVA = Substance identified as Toxic Air Contaminants, known to be emitted in California and are TO BE EVALUATED for entry into Category III.

IVBA =Substance NOT identified as Toxic Air Contaminants, known to be emitted in California and are TO BE EVALUATED for entry into Category III.

V = Substance identified as Toxic Air Contaminants, and NOT KNOWN TO BE EMITTED from stationary source facilities in California based on information from the AB 2588 Air Toxic "Hot Spots" Program and the California Toxic Release Inventory.

VI = Substances identified as Toxic Air Contaminants, NOT KNOWN TO BE EMITTED from stationary source facilities in California, and are active ingredients in pesticides in California.

CREL: California Office of Environmental Health's Hazard Assessment (OEHHA), Chronic Reference Exposure Levels

✓ = Found in Listing

ACGIH TLV American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical Substances and Physical Agents.

✓ = Found in Listing.

CHAIN OF CUSTODY

INTERNAL Use Only			
Project #	91079	4789912409	
Product #	A0060AA		
Order #	13797497		
Task Line	1.1	UL BU	E&S
_____ of _____			

검사번호: CT21-052039(2104-20220)

처리부서: 건축유해성센터 처리구분: 보통

접수일자: 2021-04-30 발급예정일: 2021-06-02

접수자: 김현진

업제명: UL Environment (HUNTER FAC)

기타: 사람부화, 사향, 사람시인

시료명: PolySorb Open Cell (TM) (POTR 4789912409)

시료: 빈, 완, 처리, 보관

분류: 기한

☐ Rush Request – Subject to upcharge. Customer must confirm with UL prior to submitting product.

GREENGUARD Test Information			
Test Type	☒ Certification Test • Annual/Initial Year 4		☐ Out-of-Scope Test
	☐ Quarterly Test • Year Quarter		☐ Profile Study Test
Service Line	☒ GREENGUARD ☒ GREENGUARD GOLD ☐ Other		
Test Group	Boards and Rigid Foam Products - 01		
Product Category	Ceiling Systems	Subcategory	Ceiling Tiles
Application	☐ Floor/Ceiling ☐ Panel ☐ Wall ☐ Work Surface ☐ Other:		
Wet Products Only	Coverage Rate	Density	Specific Gravity

Product and Company Information			
Product Description PolySorb Open Cell			
Manufacture ID#			
Company Name PolySorb, LLC		Date Manufactured 4/28/2021	
		Contact Name	
		Job Title	
Address		Contact Phone	
		Contact Email	

Collection Information			
Collector Name		Date Collected 4/29/2021	
Collector Phone		Time Collected	
Collector Signature		Collection Location	

Shipping Information			
Carrier			
Shipper Name		Date Shipped 4/29/2021	
Shipper Phone		Time Shipped	
Shipper Signature		Air Bill #	

Sample Submitted to			
☐ UL Environment (Marietta) 2211 Newmarket Pkwy Suite 105 Marietta, GA 30067, USA	☐ UL Verification Services (Guangzhou) Building A1, 3F, Nansha Science and Technology Innovation Ctr. No. 25, South Huanan Avenue, Nansha District, Guangzhou 511458, China	☐ UL International Italia S.r.l. ATTN: IAQ Laboratory Via Europa, 9 I-22060 - Cabiote (Como), Italia	☐ UL VS (Vietnam) Co., Ltd. Lot C5, Conurbation 2, Street K1, Cat Lai Industrial Zone Thuan My Loi Ward, District 2 Ho Chi Minh City, Vietnam

Post Testing Sample Disposition			
(Sample will be disposed of 30 days after report is issued if information below is not provided)			
Return Shipping Co.		Customer Shipping Acct #	

Internal Use Only – Receiving Information			
Receiver Name <u>Hyun Jih Eun</u>		Receiver Signature <u>Hyun Jih Eun</u>	
Condition Upon Arrival ☒ Acceptable ☐ Not Acceptable		Receive Date <u>2021. 4. 30</u>	
Condition Notes		Receive Time <u>14:00</u>	
Completed By <u>ULE Hyun Jih Eun</u>	Based On	Program Testing Schedule	2021. 5. 20 Date 03/29/2021

00-EN-F0853 – Issue 6.0

APPENDIX 1

GREENGUARD GOLD RESULTS SUMMARY

Product Description		PolySorb Open Cell		
COMPLIANCE WITH GREENGUARD GOLD STANDARD				
GREENGUARD Gold Acceptable IAQ Criteria		168 Hour Predicted Concentration**		Product Compliance for IAQ
		Office	Classroom	
TVOC	≤ 0.22 mg/m³	< 0.003 mg/m³	< 0.001 mg/m³	Yes
Formaldehyde	≤ 0.0073 ppm	< 0.003 ppm	< 0.001 ppm	Yes
Total Aldehydes	≤ 0.043 ppm	< 0.003 ppm	< 0.001 ppm	Yes
1-Methyl-2-Pyrrolidinone	≤ 0.16 mg/m³	< 0.003 mg/m³	< 0.001 mg/m³	Yes
Individual VOCs	≤ 1/100 TLV and ≤ ½ chronic REL	See Below		

**Predicted Air Concentrations are based on GREENGUARD Gold modeling predicted concentration parameters.

TOP TEN MOST ABUNDANT IDENTIFIED VOCs, INCLUDING ALDEHYDES					
CAS Number	Compound	168 Hour Chamber Concentration (µg/m ³)	168 Hour Emission Factor (µg/m ² ·hr)	Predicted Air Concentration** (µg/m ³)	
				Office	Classroom
---	none	---	---	---	---

CHEMICALS OF CONCERN WITH EXISTING TLV, CREL, CA PROP 65 OR CAL TOXIC AIR CONTAMINANT VALUES									
CAS Number	Compound	168 Hour Chamber Concentration (µg/m³)	168 Hour Emission Factor (µg/m²·hr)	168 Hour Predicted Concentration** (µg/m³)		✓ INDICATES PRESENCE ON LIST			
				Office	Classroom	CA PROP 65	CA TAC	CA CREL	ACGIH TLV
---	none	---	---	---	---	---	---	---	---

COMPARISON OF COMPOUNDS FOUND WITH EXISTING TLV AND/OR CHRONIC REL						
CAS Number	Compound	1/100 TLV ^a (µg/m ³)	½ CA Chronic REL ^b (µg/m ³)	168 Hour Predicted Concentration** (µg/m ³)		Product Compliance
				Office	Classroom	
---	none	---	---	---	---	---

^aAmerican Conference of Governmental Industrial Hygienists. Threshold Limit Values for Chemical Substances and Physical Agents. Cincinnati, OH: ACGIH.

^bChronic Reference Exposure Levels (CRELs) adopted by the State of California Office of Environmental Health Hazard Assessment (OEHHA).

[†]Denotes quantified using multipoint authentic standard curve. Other VOCs quantified relative to toluene.

[‡]Indicates compound identified and quantified by DNPH derivitization and HPLC/UV analysis with multipoint authentic standard.

*Identification based on NIST mass spectral database only.

**Predicted Air Concentrations are based on modeling predicted concentration parameters shown [above](#).