


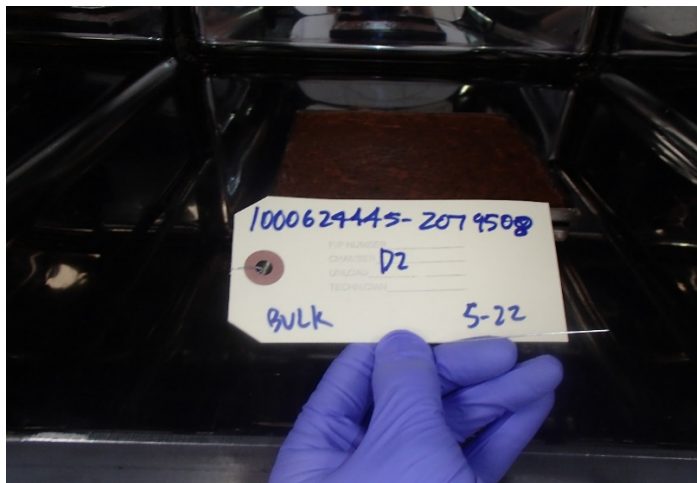


GREENGUARD CERTIFICATION TEST REPORT					
Customer Information	MP GLOBAL PRODUCTS DUANE REIMER PO BOX 2283 NORFOLK NE 68702-2283 UNITED STATES				
Product Description	Best				
Test Group	Flooring Underlayment - 01				
Category	Flooring				
Test Type	Certification	Year 2			
Test Method	UL 2821 "GREENGUARD 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					
Laboratory Approval	 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	floor	11.1	30.6	0.68	
GREENGUARD Gold Classroom	CDPH/EHLB/Standard Method	floor	89.2	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	Best		
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	< 0.002 ppm	Yes
Total Aldehydes ^b	≤ 0.10 ppm	< 0.002 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 (C₆) and n-hexadecane (C₁₆) 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

For UL Environment's technical references and resources [click here](#) or <https://industries.ul.com/wp-content/uploads/sites/2/2018/02/Technical-references-and-resources.pdf>

For Product Evaluation Methodologies information [click here](#) or <https://industries.ul.com/wp-content/uploads/sites/2/2018/02/Product-Evaluation-Methodologies-GG.pdf>

For Quality Control Program or Environmental Chamber Evaluations information [click here](#) or <https://industries.ul.com/wp-content/uploads/sites/2/2018/02/Quality-Control-Procedures.pdf>

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

TABLE 1

ENVIRONMENTAL CHAMBER STUDY PARAMETERS	
Product Description	Best
Product Manufacture Date	May 13, 2019
Product Collection Date	May 13, 2019
Product Shipping Date	May 13, 2019
Date Received	May 14, 2019
Accredited Laboratory Location*	ULE - Marietta
Test Description	The product was received by UL Environment as packaged and shipped by the customer. The package was visually inspected and stored in a controlled environment immediately following sample check-in. Just prior to loading, the product was unpackaged, prepared for the required loading, and placed in a tray to expose the top surface side only. The sample was placed inside the environmental chamber, and tested according to the specified protocol.
Test Period	5/15/2019 - 5/22/2019
Area	one-sided area = 0.0361 m ²
Chamber Volume	0.0874 m ³
Product Loading	0.41 m ² /m ³
Test Conditions	1.00 ± 0.05 ACH 50% RH ± 5% RH 22.6°C - 23.1°C

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
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

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		Best		
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	BQL	BQL	< 3	
24	BQL	BQL	< 3	
48	BQL	BQL	< 3	
72	BQL	BQL	< 3	
96	BQL	BQL	< 3	
168	BQL	BQL	< 3	
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	2.6	6.3	3	0.003
24	BQL	BQL	< 3	< 0.002
48	BQL	BQL	< 3	< 0.002
72	BQL	BQL	< 3	< 0.002
96	BQL	BQL	< 3	< 0.002
168	BQL	BQL	< 3	< 0.002
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	5.3	12.8	7	0.005
24	BQL	BQL	< 3	< 0.002
48	BQL	BQL	< 3	< 0.002
72	BQL	BQL	< 3	< 0.002
96	BQL	BQL	< 3	< 0.002
168	BQL	BQL	< 3	< 0.002

*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		Best						
CHAMBER CONCENTRATIONS OF IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS								
CAS Number	Compound	Elapsed Exposure Hour ($\mu\text{g}/\text{m}^3$)						
		0 (BG)	6	24	48	72	96	168
---	none	---	---	---	---	---	---	---

TABLE 4

Product Description		Best						
EMISSION FACTORS OF IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS								
CAS Number	Compound	Elapsed Exposure Hour ($\mu\text{g}/\text{m}^2\cdot\text{hr}$)						
		6	24	48	72	96	168	
---	none	---	---	---	---	---	---	---

*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		Best						
CHAMBER CONCENTRATIONS OF TARGET LIST ALDEHYDES								
CAS Number	Compound	Elapsed Exposure Hour (µg/m ³)						
		0 (BG)	6	24	48	72	96	168
4170-30-3	2-Butenal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
75-07-0	Acetaldehyde	BQL	2.7	BQL	BQL	BQL	BQL	BQL
100-52-7	Benzaldehyde	BQL	BQL	BQL	BQL	BQL	BQL	BQL
5779-94-2	Benzaldehyde, 2,5-dimethyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
529-20-4	Benzaldehyde, 2-methyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
620-23-5 /104-87-0	Benzaldehyde, 3- and/or 4-methyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
123-72-8	Butanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
590-86-3	Butanal, 3-methyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
50-00-0	Formaldehyde	BQL	2.6	BQL	BQL	BQL	BQL	BQL
66-25-1	Hexanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
110-62-3	Pentanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
123-38-6	Propanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL

TABLE 6

Product Description		Best						
EMISSION FACTORS OF TARGET LIST ALDEHYDES								
CAS Number	Compound	Elapsed Exposure Hour (µg/m ² ·hr)						
		6	24	48	72	96	168	
4170-30-3	2-Butenal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
75-07-0	Acetaldehyde	6.5	BQL	BQL	BQL	BQL	BQL	BQL
100-52-7	Benzaldehyde	BQL	BQL	BQL	BQL	BQL	BQL	BQL
5779-94-2	Benzaldehyde, 2,5-dimethyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
529-20-4	Benzaldehyde, 2-methyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
620-23-5 /104-87-0	Benzaldehyde, 3- and/or 4-methyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
123-72-8	Butanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
590-86-3	Butanal, 3-methyl	BQL	BQL	BQL	BQL	BQL	BQL	BQL
50-00-0	Formaldehyde	6.3	BQL	BQL	BQL	BQL	BQL	BQL
66-25-1	Hexanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
110-62-3	Pentanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL
123-38-6	Propanal	BQL	BQL	BQL	BQL	BQL	BQL	BQL

BQL = Below quantifiable level of 0.1 µg 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		Best					
CAS Number	Compound	√() = FOUND IN LISTING (CLASS)					
		CAL PROP. 65	NTP	IARC	CAL AIR TOXICS	CREL	TLV
75-07-0	Acetaldehyde	√(1)	√(2B)	√(2B)	√(IIA)	✓	✓
50-00-0	Formaldehyde	√(1)	√(2A)	√(1)	√(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.




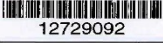
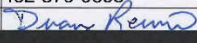
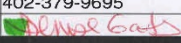
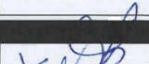
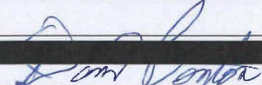
CREL: California Office of Environmental Health's Hazard Assessment (OEHA), Chronic Reference Exposure Levels

✓ = 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		2079508			
Project #	 1000624445	Description	Best		
Product #	 2079508	Customer:	MP Global Products		
Order #	 12729092	Received Date:	Aurora Project No.: 1000624445 Order No.: 12729092 2019-MAY-14 09:31:05 AM Oracle Project No.:		
Task Line	1.1	UL BU	1 of 4		
_____ of _____					
<input type="checkbox"/> Rush Request - Subject to upcharge. Customer must confirm with UL prior to submitting product.					
GREENGUARD Test Information					
Test Type	<input checked="" type="checkbox"/> Certification Test • Annual/Initial Year 2		<input type="checkbox"/> Out-of-Scope Test		
	<input type="checkbox"/> Quarterly Test • Year Quarter		<input type="checkbox"/> Profile Study Test		
Service Line	<input checked="" type="checkbox"/> GREENGUARD <input checked="" type="checkbox"/> GREENGUARD GOLD		<input type="checkbox"/> Other		
Test Group	Flooring Underlayment-01				
Product Category	Flooring		Subcategory Underlayment		
Application	<input checked="" type="checkbox"/> Floor/Ceiling	<input type="checkbox"/> Panel	<input type="checkbox"/> Wall	<input type="checkbox"/> Work Surface	<input type="checkbox"/> Other:
Wet Products Only	Coverage Rate		Density		Specific Gravity
Product and Company Information					
Product Description	Best				
Manufacture ID#	QW100N1HD				
Company Name	MP Global Products	Date Manufactured	5/13/2019		
	2500 Old Hadar Rd.	Contact Name	D Reimer		
Address	Norfolk, NE 68701	Job Title	T e c h n i c a l D i r e c t o r		
		Contact Phone	402-379-9695		
		Contact Email	DReimer@MPGlobalProducts.com		
Collection Information					
Collector Name	Duane Reimer		Date Collected	5/13/2019	
Collector Phone	402-379-9695		Time Collected	8:10	
Collector Signature			Collection Location	Production line	
Shipping Information					
Carrier	FedEx				
Shipper Name	Denise Gates	Date Shipped	5/13/2019		
Shipper Phone	402-379-9695	Time Shipped	10:28am		
Shipper Signature			Air Bill #	95167907970	
Sample Submitted to					
<input checked="" type="checkbox"/> UL Environment (Marietta) 2211 Newmarket Pkwy Suite 106 Marietta, GA 30067, USA	<input type="checkbox"/> UL Verification Services (Guangzhou) Building A1, 3F, Nansha Science and Technology Innovation Ctr. No. 25, South Huanshi Avenue, Nansha District, Guangzhou 511458, China	<input type="checkbox"/> UL International Italia S.r.l ATTN: IAQ Laboratory Via Europa, 9 I - 22060 - Cabiato (Como), Italia	<input type="checkbox"/> Other		
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			Receiver Signature		
Condition Upon Arrival	<input checked="" type="checkbox"/> Acceptable <input type="checkbox"/> Not Acceptable		Receive Date	5-14-19	
Condition Notes			Receive Time	9:06 AM	
Completed By	ULE	Based On	Program Testing Schedule	Date	02/12/2019

APPENDIX 1

GREENGUARD GOLD RESULTS SUMMARY

Product Description		Best		
COMPLIANCE WITH GREENGUARD GOLD STANDARD				
GREENGUARD Gold Acceptable IAQ Criteria		168 Hour Predicted Concentration**		Product Compliance for IAQ
		Office	Classroom	
TVOC	≤ 0.22 mg/m ³	< 0.003 mg/m ³	< 0.002 mg/m ³	Yes
Formaldehyde	≤ 0.0073 ppm	< 0.002 ppm	< 0.002 ppm	Yes
Total Aldehydes	≤ 0.043 ppm	< 0.002 ppm	< 0.002 ppm	Yes
1-Methyl-2-Pyrrolidinone	≤ 0.16 mg/m ³	< 0.003 mg/m ³	< 0.002 mg/m ³	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/m ³)	168 Hour Emission Factor (µg/m ² •hr)	168 Hour Predicted Concentration** (µg/m ³)		✓ 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 (OEHH).

[†]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](#).