Released by UL Environment
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Product ID#: 1000621365-2070792
Test Report #: 1000621365-2070792
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BCM2

GREENGUARD CERTIFICATION TEST REPORT

Customer Information	FRP ARCHITECTURAL DOOR JOE PIASCIK 2424 STATE RD., BLDG. 8 BENSALEM PA 19090
Product Description	FD25
Test Group	Doors - 01
Category	Building Materials and Systems
Test Type	Initial
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

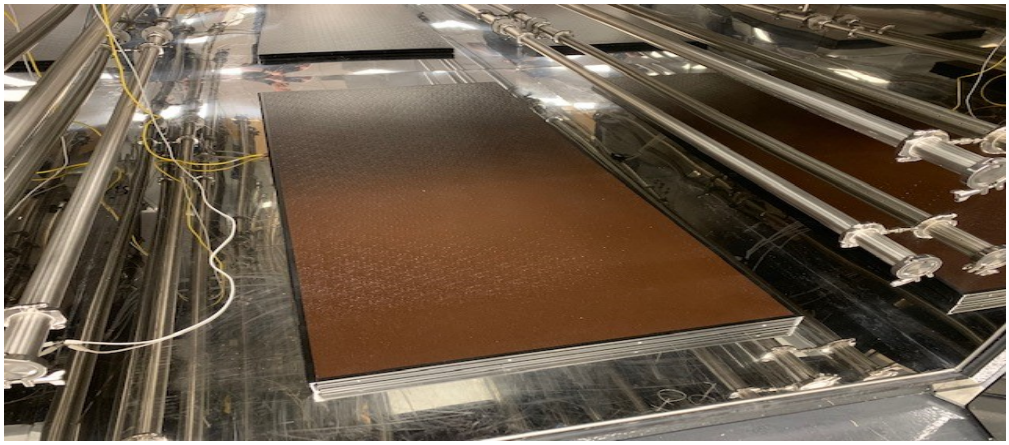
Allyson M. McFry
Chemistry Laboratory Director

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	door	1.89	30.6	0.68
GREENGUARD Gold Classroom	CDPH/EHLB/Standard Method	door	1.89	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/m^3.

PHOTOGRAPH OF SAMPLE



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GREENGUARD RESULTS SUMMARY

Product Description	FD25		
GREENGUARD Acceptable IAQ Criteria		**168 Hour Product Measurement**	**Product Compliance for IAQ**
TVOC[a]	≤ 0.5 mg/m³	0.011 mg/m³	Yes
Formaldehyde	≤ 0.05 ppm	< 0.001 ppm	Yes
Total Aldehydes[b]	≤ 0.10 ppm	< 0.001 ppm	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

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.

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TABLE 1

ENVIRONMENTAL CHAMBER STUDY PARAMETERS	
Product Description	FD25
Product Manufacture Date	March 27, 2019
Product Collection Date	March 28, 2019
Product Shipping Date	March 28, 2019
Date Received	April 1, 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 and prepared for the required loading to expose the finished surfaces only. The sample was placed inside the environmental chamber, and tested according to the specified protocol.
Test Period	4/9/2019 - 4/16/2019
Area	one-sided area = 1.923 m^2
Chamber Volume	5.96 m^3
Product Loading	0.32 m^2/m^3
Test Conditions	1.00 ± 0.05 ACH 50% RH ± 5% RH 22.6ºC - 23.6ºC

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 - Cabiate	UL International Italia S.r.l ATTN: IAQ Laboratory Via Europa, 9, I – 22060 – Cabiate (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.

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TABLE 2

Product Description	FD25		
TVOC CHAMBER CONCENTRATIONS, EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS			
Elapsed Exposure Hour*	**Chamber Concentration µg/m³**	**Emission Factor µg/m²•hr**	**Predicted Air Concentration** µg/m³**
0 (Background)	BQL	BQL	---
6	71.8	223	20
24	52.3	162	14
48	24.7	76.5	13
72	36.5	113	12
96	38.4	119	12
168	45.1	140	11
Power Law Decay Constant = k_T = 0.122			

FORMALDEHYDE CHAMBER CONCENTRATIONS, EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS				
Elapsed Exposure Hour*	**Chamber Concentration µg/m³**	**Emission Factor µg/m²•hr**	**Predicted Air Concentration****	
			µg/m³	**ppm**
0 (Background)	BQL	BQL	---	---
6	BQL	BQL	< 1	< 0.001
24	BQL	BQL	< 1	< 0.001
48				
72	BQL	BQL	< 1	< 0.001
96	BQL	BQL	< 1	< 0.001
168	BQL	BQL	< 1	< 0.001

TARGET LIST ALDEHYDES CHAMBER CONCENTRATIONS, EMISSION FACTORS AND PREDICTED AIR CONCENTRATIONS				
Elapsed Exposure Hour*	**Chamber Concentration µg/m³**	**Emission Factor µg/m²•hr**	**Predicted Air Concentration****	
			µg/m³	**ppm**
0 (Background)	BQL	BQL	---	---
6	BQL	BQL	< 1	< 0.001
24	BQL	BQL	< 1	< 0.001
48				
72	BQL	BQL	< 1	< 0.001
96	BQL	BQL	< 1	< 0.001
168	BQL	BQL	< 1	< 0.001

*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.

48 elapsed exposure hour aldehyde sample was lost due to instrument malfunction.

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TABLE 3

Product Description	FD25

CHAMBER CONCENTRATIONS OF IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS

CAS Number	**Compound**	**Elapsed Exposure Hour (µg/m³)**						
		0 (BG)	**6**	**24**	**48**	**72**	**96**	**168**
---	Unresolved hydrocarbons	BQL	64.8	50.0	23.4	34.7	36.6	43.1
75-09-2	Methylene chloride (Dichloromethane)†	BQL	4.0					
98-86-2	Acetophenone (Ethanone, 1-phenyl)*†	BQL	2.8	2.4	1.3	1.8	1.8	2.2
541-02-6	Cyclopentasiloxane, decamethyl	BQL	2.2					
98-56-6	Benzene, 1-chloro-4-(trifluoromethyl)-*	BQL	2.0					

TABLE 4

Product Description	FD25

EMISSION FACTORS OF IDENTIFIED INDIVIDUAL VOLATILE ORGANIC COMPOUNDS

CAS Number	**Compound**	**Elapsed Exposure Hour (µg/m²•hr)**					
		6	**24**	**48**	**72**	**96**	**168**
---	Unresolved hydrocarbons	201	155	72.5	108	113	134
75-09-2	Methylene chloride (Dichloromethane)†	12.2					
98-86-2	Acetophenone (Ethanone, 1-phenyl)*†	8.7	7.4	4.0	5.6	5.6	6.9
541-02-6	Cyclopentasiloxane, decamethyl	7.0					
98-56-6	Benzene, 1-chloro-4-(trifluoromethyl)-*	6.3					

*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.

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TABLE 5

Product Description	FD25

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	BQL	BQL		BQL	BQL	BQL
75-07-0	Acetaldehyde	BQL	BQL	BQL		BQL	BQL	BQL
100-52-7	Benzaldehyde	BQL	BQL	BQL		BQL	BQL	BQL
5779-94-2	Benzaldehyde, 2,5-dimethyl	BQL	BQL	BQL		BQL	BQL	BQL
529-20-4	Benzaldehyde, 2-methyl	BQL	BQL	BQL		BQL	BQL	BQL
620-23-5 / 104-87-0	Benzaldehyde, 3- and/or 4-methyl	BQL	BQL	BQL		BQL	BQL	BQL
123-72-8	Butanal	BQL	BQL	BQL		BQL	BQL	BQL
590-86-3	Butanal, 3-methyl	BQL	BQL	BQL		BQL	BQL	BQL
50-00-0	Formaldehyde	BQL	BQL	BQL		BQL	BQL	BQL
66-25-1	Hexanal	BQL	BQL	BQL		BQL	BQL	BQL
110-62-3	Pentanal	BQL	BQL	BQL		BQL	BQL	BQL
123-38-6	Propanal	BQL	BQL	BQL		BQL	BQL	BQL

TABLE 6

Product Description	FD25

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	BQL	BQL		BQL	BQL	BQL
75-07-0	Acetaldehyde	BQL	BQL		BQL	BQL	BQL
100-52-7	Benzaldehyde	BQL	BQL		BQL	BQL	BQL
5779-94-2	Benzaldehyde, 2,5-dimethyl	BQL	BQL		BQL	BQL	BQL
529-20-4	Benzaldehyde, 2-methyl	BQL	BQL		BQL	BQL	BQL
620-23-5 / 104-87-0	Benzaldehyde, 3- and/or 4-methyl	BQL	BQL		BQL	BQL	BQL
123-72-8	Butanal	BQL	BQL		BQL	BQL	BQL
590-86-3	Butanal, 3-methyl	BQL	BQL		BQL	BQL	BQL
50-00-0	Formaldehyde	BQL	BQL		BQL	BQL	BQL
66-25-1	Hexanal	BQL	BQL		BQL	BQL	BQL
110-62-3	Pentanal	BQL	BQL		BQL	BQL	BQL
123-38-6	Propanal	BQL	BQL		BQL	BQL	BQL

BQL = Below quantifiable level of 0.1 µg based on a standard 45 L air collection volume.

48 elapsed exposure hour aldehyde sample was lost due to instrument malfunction.

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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	FD25						
CAS Number	**Compound**	**✓() = FOUND IN LISTING (CLASS)**					
		CAL PROP. 65	**NTP**	**IARC**	**CAL AIR TOXICS**	**CREL**	**TLV**
98-86-2	Acetophenone (Ethanone, 1-phenyl)†				✓(IVA)		✓
75-09-2	Methylene chloride (Dichloromethane)†	✓(1)	✓(2B)	✓(2B)	✓(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
2A = probably carcinogenic to humans
2B = possibly carcinogenic to humans
3 = unclassifiable as to carcinogenicity to humans
4 = probably not 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.

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CHAIN OF CUSTODY

INTERNAL Use Only			
Project #	1000621365		
Product #	2070792		
Order #	12724591		
Task Line	2.1	UL BU	
____ of ____			

2070792 2070792
Description
FD25

Customer: FRP Architectural Door
Received Date: 2019-APR-01 01:53:33 PM
Aurora Project No.: 1000621365
Order No.: 12724591
Oracle Project No.:

1 of 4

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

GREENGUARD Test Information

Test Type	◉ Certification Test • Annual/Initial Year _____	○ Out-of-Scope Test	
	○ Quarterly Test • Year _____ Quarter _____	○ Profile Study Test	
Service Line	☐ GREENGUARD ☑ GREENGUARD GOLD	☐ Other _____	
Test Group	Doors-01		
Product Category	Building Materials and Systems	Subcategory	Doors
Application	☐ Floor/Ceiling ☐ Panel	☐ Wall ☐ Work Surface	☐ Other: _____
Wet Products Only	Coverage Rate	Density	Specific Gravity

Product and Company Information

Product Description	FD25		
Manufacture ID#	FD25		
Company Name	FRP Architectural Doors	Date Manufactured	3.27.19
		Contact Name	PAT CIAMBRELLO
Address	2424 STATE RD.	Job Title	SUPERVISOR
	Building 8	Contact Phone	215 244 1818
	Bensalem PA 19020	Contact Email	JPIASCIK@FRPARCH.COM

Collection Information

Collector Name	JOE PIASCIK	Date Collected	3.28.19
Collector Phone	215 947 4756	Time Collected	9:00 AM
Collector Signature	Joe P	Collection Location	SHOP

Shipping Information

Carrier	FedEx Freight Economy		
Shipper Name	FRP Architectural Doors	Date Shipped	3/28/19
Shipper Phone	215-244-1818	Time Shipped	RG176331019
Shipper Signature	Michael	Air Bill #	496 528 2436

Sample Submitted to

◉ UL Environment (Marietta) 2211 Newmarket Pkwy Suite 106 Marietta, GA 30067, USA	○ UL Verification Services (Guangzhou) Building A1, 3F, Nansha Science and Technology Innovation Ctr. No. 25, South Huanshi Avenue, Nansha District, Guangzhou 511458, China	○ UL International Italia S.r.l ATTN: IAQ Laboratory Via Europa, 9 I – 22060 – Cabiate (Como), Italia	○ 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	⊗ Acceptable ○ Not Acceptable	Receive Date	4-1-19
Condition Notes		Receive Time	12:00 PM
Completed By	Based On		Date

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APPENDIX 1

GREENGUARD GOLD RESULTS SUMMARY

Product Description	FD25			
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**	0.013 mg/m³	0.001 mg/m³	Yes
Formaldehyde	**≤ 0.0073 ppm**	< 0.001 ppm	< 0.001 ppm	Yes
Total Aldehydes	**≤ 0.043 ppm**	< 0.001 ppm	< 0.001 ppm	Yes
1-Methyl-2-Pyrrolidinone	**≤ 0.16 mg/m³**	< 0.001 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/m³)**	**168 Hour Emission Factor (µg/m²•hr)**	**Predicted Air Concentration** (µg/m³)**	
				Office	**Classroom**
---	Unresolved hydrocarbons	43.1	133	12	1
98-86-2	Acetophenone (Ethanone, 1-phenyl)*	2.2	6.9	1	0.1

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**
98-86-2	Acetophenone (Ethanone, 1-phenyl)†	2.2	6.9	1	0.1		✓(IVA)		✓

COMPARISON OF COMPOUNDS FOUND WITH EXISTING TLV AND/OR CHRONIC REL						
CAS Number	**Compound**	**1/100 TLV[a] (µg/m³)**	**½ CA Chronic REL[b] (µg/m³)**	**168 Hour Predicted Concentration** (µg/m³)**		**Product Compliance**
				Office	**Classroom**	
98-86-2	Acetophenone (Ethanone, 1-phenyl)	490	---	1	0.1	Yes

[a]American Conference of Governmental Industrial Hygienists. Threshold Limit Values for Chemical Substances and Physical Agents. Cincinnati, OH: ACGIH.
[b]Chronic 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.

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