TEST REPORT: 7191209724-CHM19-02-MA-AD1

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SUBJECT

Evaluation of "AS-1730" product sample in accordance with CDPH/EHLB/Standard Method Version 1.2

CLIENT

Alseal Marketing Sdn Bhd
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47000 Selangor DE
Malaysia

Attn To: Mr Cheong Chee Leong

DESCRIPTION OF SAMPLE

The testing results of two tubes of sealant received on 12 Mar 2019 were extended for below product

Product Name : AS-1730

DATE OF ANALYSIS

12 Apr 2019 – 08 May 2019

METHOD OF TEST

1. Emission Test

The following emission tests were conducted according to CDPH/EHLB/Standard Method Version 1.2 – *Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers*

1) Total Volatile Organic Compounds (TVOC) Emission Rate
2) Formaldehyde Emission Rate

Emission Test Condition

1)	Chamber Volume:	about 1m^3
2)	Temperature:	23°C
3)	Relative Humidity:	50%
4)	Air Exchange Rate:	n=1 (air change rate per hour in the chamber)
5)	Chamber Loading Ratio:	0.3-1.0 m^2/m^3 (total exposed surface area of the test specimen divided by the net air volume of the emission test chamber)
6)	Air Velocity:	0.1 m/s to 0.3 m/s (over the surface of the test specimen)

Note: Chamber Loading ratio for the tested sample: 0.007 m^2/m^3

2. Sampling, Desoprtion, Analysis

1) For analysis, the air was sampled using constant flow rate pumps, equipped with absorbent containing Tenax TA to trap VOCs. (sampling and assay carried out according to ISO 16000-6 / ASTM D5116).
2) In addition, the air was sampled using constant flow rate pumps, provided with absorbent containing di-nitrophenylhydrazine (DNPH) grafted silica cartridge to trap aldehydes. (sampling and assay performed according to ISO 16000-3)
3) The Tenax samples were then desorbed by Automated Thermal Desorber System and then analyzed by Gas Chromatography coupled with Mass Spectrometry (ATD-GCMS).
4) The samples on DNPH cartridge were then desorbed to form the stable compound hydrazone, which was then assayed by Liquid Chromatography (HPLC) with UV / Diode Array Detector.

METHOD OF TEST *(cont')*

3. Calculation of Results

Air Concentration Determinations

Emission Factor Calculations

EF = C X (N/L)

EF = emission factor (µg/m^2·hr) or (µg/unit·hr)
C = chamber concentration (µg/m^3)
N = chamber air exchange rate (hr $^{-1}$)
L = product loading (m^2/m^3)

The model measurements were made with the following assumptions: air within open office areas of the building is well-mixed at the breathing level zone of the occupied space; environmental conditions are maintained at 50 % relative humidity and 23°C (73°F); there are no additional sources of these pollutants; and there are no sinks or potential re-emitting sources within the space for these pollutants.

The predicted exposure concentrations ($C_{P,t}$) (µg/m^3) are calculated from the modelled emission factors as:

$$C_{P,t} = EF_{m,t}\left(\frac{A}{V}\right)\left(\frac{1}{N}\right)$$

where,

$C_{P,t}$ = predicted exposure concentration at time t (µg/m^3)
$EF_{m,t}$ = modelled emission factor at time t (µg/m^2·hr) or (µg/unit·hr)
A = product area exposed in room (m^2 or unit)
V = room volume (m^3)
N = room air change per hour (hr $^{-1}$)

The model was set as Private Office and/or Standard Classroom scenario as defined in Table 4-4 and Table 4-5 with reference to California Department of Public Health (CDPH) *Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers* V 1.2 (2017). The following parameters are used for estimating VOC air concentrations at 336 hours for the modelling scenarios.

Parameter	Units	Value	
		Standard Classroom	Private Office
Volume	m^3	231	30.6
Air Change Rate	1/h	0.82	0.68
HVAC Surface Area *	m^2	39.1	5.5

* Based on Table 2 of UL 2821 for HVAC Duct Material

RESULTS

Table 1. Summary of TVOC Chamber Concentrations, Emission Factors and Predicted Air Concentrations for "AS-1730"

Elapsed Exposure Hour after 10 Days Conditioning *	Chamber Concentrations ($\mu g/m^3$)	Emission Factor ($\mu g/m^2 \cdot hr$)	Predicted Air Concentration ($\mu g/m^3$)	
			Standard Classroom	Private Office
0 (Background)	BQL	BQL	-	
24	151.3	21615.0	4461.8	5713.3
48	142.8	20399.1	4210.8	5391.9
96	128.8	18402.3	3798.6	4864.1

* Exposure hours are nominal (± 1 hour)
BQL = Below quantifiable level of 0.02 µg based on a standard 12 L air collection volume

Table 2. Summary of Formaldehyde Chamber Concentrations, Emission Factors and Predicted Air Concentrations for "AS-1730"

Elapsed Exposure Hour after 10 Days Conditioning *	Chamber Concentrations ($\mu g/m^3$)	Emission Factor ($\mu g/m^2 \cdot hr$)	Predicted Air Concentration ($\mu g/m^3$)	
			Standard Classroom	Private Office
0 (Background)	BQL	BQL	--	--
24	BQL	BQL	--	--
48	BQL	BQL	--	--

* Exposure hours are nominal (± 1 hour)
BQL = Below quantifiable level of 0.05 µg based on a standard 30 L air collection volume

RESULTS *(cont'd)*

Table 3. Chamber Concentrations, Emission Factors and Predicted Air Concentrations of Target CRELs Compounds for "AS-1730" at 96 Hours Following 10 Day of Conditioning.

Cas Number	Target CRELs Compound Name	Chamber Concentrations (µg/m³)	Emission Factor (µg/m²·hr)	Predicted Air Concentration (µg/m³)		Half CREL (µg/m³)
				Standard Classroom	Private Office	
75-07-0	Acetaldehyde	BQL	BQL	--	--	70
71-43-2	Benzene	BQL	BQL	--	--	1.5
75-15-0	Carbon Disulfide	BQL	BQL	--	--	400
56-23-5	Carbon Tetrachloride	BQL	BQL	--	--	20
108-90-7	Chlorobenzene	BQL	BQL	--	--	500
67-66-3	Chloroform	BQL	BQL	--	--	150
106-46-7	Dichlorobenzene (1,4-)	BQL	BQL	--	--	400
75-35-4	Dichloroethylene (1,1)	BQL	BQL	--	--	35
68-12-2	Dimethylformamide (N,N)	BQL	BQL	--	--	40
123-91-1	Dioxane (1,4-)	BQL	BQL	--	--	1500
106-89-8	Epichlorohydrin	BQL	BQL	--	--	1.5
100-41-4	Ethylbenzene	BQL	BQL	--	--	1000
107-21-1	Ethylene Glycol	BQL	BQL	--	--	200
110-80-5	Ethylene Glycol Monoethyl Ether	BQL	BQL	--	--	35
111-15-9	Ethylene Glycol Monoethyl Ether Acetate	BQL	BQL	--	--	150
109-86-4	Ethylene Glycol Monomethyl Ether	BQL	BQL	--	--	30
110-49-6	Ethylene Glycol Monomethyl Ether Acetate	BQL	BQL	--	--	45
50-00-0	Formaldehyde	BQL	BQL	--	--	9
110-54-3	Hexane (n-)	BQL	BQL	--	--	3500
78-59-1	Isophorone	BQL	BQL	--	--	1000
67-63-0	Isopropanol	BQL	BQL	--	--	3500
71-55-6	Methyl Chloroform	BQL	BQL	--	--	500
75-09-2	Methylene Chloride	BQL	BQL	--	--	200
1634-04-4	Methyl t-Butyl Ether	BQL	BQL	--	--	4000
91-20-3	Naphthalene	BQL	BQL	--	--	4.5
108-95-2	Phenol	BQL	BQL	--	--	100
107-98-2	Propylene Glycol Monomethyl Ether	BQL	BQL	--	--	3500
100-42-5	Styrene	BQL	BQL	--	--	450
127-18-4	Tetrachloroethylene	BQL	BQL	--	--	17.5
108-88-3	Toluene †	BQL	BQL	--	--	150
79-01-6	Trichloroethylene	BQL	BQL	--	--	300
108-05-4	Vinl Acetate	BQL	BQL	--	--	100
108-38-3 /95-47-6 /106-42-3	Xylenes	BQL	BQL	--	--	350

* Indicates Wiley ver. 8.0 best library match only based on retention time and mass spectral characteristics
† Denotes quantified using authentic standard curve. Other VOCs quantified relative to toluene
BQL = Below quantifiable level of 2.0 µg/m³

RESULTS *(cont'd)*

Table 4. Chamber Concentrations, Emission Factors and Predicted Air Concentrations of Identified Individual Organic Compounds (VOCs) for "AS-1730" at 96 Hours Following 10 Day of Conditioning for Standard Classroom and Private Office scenario.

Cas Number	Compound Identified	Chamber Concentrations ($\mu g/m^3$)	Emission Factor ($\mu g/m^2 \cdot hr$)	Predicted Air Concentration ($\mu g/m^3$)		Half CREL ($\mu g/m^3$)
				Standard Classroom	Private Office	
57-55-6	Propylene Glycol *	121.1	17293.2	3569.6	4570.9	not listed

* Indicates Wiley ver. 8.0 best library match only based on retention time and mass spectral characteristics
† Denotes quantified using authentic standard curve. Other VOCs quantified relative to toluene
BQL = Below quantifiable level of 2.0 $\mu g/m^3$

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