BAA TESTING LAB

PRODUCT VOC EMISSION TEST RESULTS

Report Number & Date:	339-001-01A-Mar2708 - 3/7/2008
Protocol or test method/criteria:	CA DHS Section 01350 protocol

Client Information

Contact:	Dackor, Inc., Tel: 407-654-5013 350 E. Crown Pt Rd. #1030, Winter Garden, FL 34787
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Manufacturer Information

Product name:	B2L
Product category:	Wall Covering (09720)
Product subcategory:	PET (polyethylene terephthalate)
Manufacturer ID:	Ivory Sand
Date manufactured:	2/13/2008
Date collected:	2/13/2008
Date shipped:	2/13/2008

Sample/Specimen Information

Date received:	2/27/2008
Specimen ID (Lab tracking No.):	**339-001-01A**
Specimen preparation:	covered one side and the edges of the cut specimen before testing
Conditioning period start & duration:	3/7/2008, 10 days
Test period start & duration:	3/17/2008, 96 hours

-- Emission tests are performed following California Dept. of Health Services “Standard Practice for the Testing of Volatile Organic Emissions from Various Sources Using Small-Scale Environmental Chambers,” CA/DHS/EHLRB/R-174, 07/15/04 (http://www.cal-iaq.org/VOC/Section01350_7_15_2004_FINAL_PLUS_ADDENDUM-2004-01.pdf). This practice is based on ASTM D 5116, “Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Materials/Products” and incorporates the chamber testing portion of California Specification 01350 (http://www.ciwmb.ca.gov/GreenBuilding/Specs/Section01350/). Project-specific results are calculated as described in Specification 01350.

Table 1. Chamber Conditions for Test Period **

Parameter	Symbol	Units	Value
Product exposed area	Ac	m_2	0.0316
Chamber volume	Vc	m_3	0.067
Loading ratio	Lc	$m_2\ m_{-3}$	0.047
Inlet air flow rate	Q	m_3h_{-1}	0.067
Ventilation rate	Ac	h_{-1}	1.00
Temperature		°C	22.5
Relative humidity		%	51.2

** Specified ranges 22C to 24C, RH 45% to 55%, and Q0.064 to 0.070 (small chamber) or 5.81 to 6.42 (mid-size chamber)

Table 2. Parameters used to calculate building VOC concentrations

Parameter	Symbol	Units	Building Type* Standard Classroom
Product exposed area	A_B	m_2	94.7
Building volume	V_B	m_3	231.1
Ceiling height		m	2.59
Loading ratio	L_B	m_2m_{-3}	0.410
Ventilation rate	aB	h_{-1}	0.90
Ventilation vol. fraction	VfB		0.90
Vent.flow rate per area		(m3h-1)/m2	1.98

Parameter	Symbol	Units	Building Type* Standard Office
Product exposed area	A_B	m_2	34.8
Building volume	V_B	m_3	30.6
Ceiling height		m	2.74
Loading ratio	L_B	m_2m_{-3}	1.139
Ventilation rate	aB	h_{-1}	0.75
Ventilation vol. fraction	VfB		0.90
Vent.flow rate per area		(m3h-1)/m2	0.59

* Standard building types are: (1) School classroom defined in Table 7.4, CA/DHS/EHLB/R-174, 07/15/04; (2) Office space (individual) defined in Table 7.5, CA/DHS/EHLB/R-174, 07/15/04; and (3) Large office building with volume ceiling height from East End Project, Products Passed Section 01350, Calif. Integrated Waste Management Board. For floor products ceiling panels, 100% coverage is assumed. For wall paint and wallcoverings, exposed area is wall paint area for the building (http://www.ciwmb.ca.gov/GreenBuilding/Specs/EastEnd/).

Table 3. Pass/fail results of emission test for identified VOCs with chronic RELs

Substance	CAS No.	½ REL ug m-3	Building Type
No VOCs detected	None	None	PASS

Table 4. Lit of emitted VOCs

Substance	CAS No.	Surrogate	Chronic REL	CARB TAC Category	Prop 65 List?
No VOCs detected	None	None	None	None	None

Table 4. Emission Test Results for Individual VOC
(Only VOCs detected above limit reported)

No VOCs Detected, No Formaldehyde Chamber & Building Concentrations

Definition of Parameters and Notes to Tables
Parameter/Value Definition
CAS No. Chemical Abstract Service identification number
Surrogate? "Yes" indicates compound was quantified by GC/MS total-ion-current (TIC) method using toluene as calibration reference
Chronic REL Chronic Reference Exposure Level (REL) established by Calif. Office of Environmental Health Hazard Assessment, Feb. 2005 and adopted by Section 01350 as target IAQ limit for building; for formaldehyde, IAQ limit is interim Indoor REL of 33 µg m^{-3}. No product may contribute more than ½ IAQ limit for an REL compound, with the exception of acetaldehyde for which the full REL is allowed.
CARB TAC Cat. Toxic Air Contaminant (TAC) on Calif. Air Resources Board list, Dec. 1999, with toxic category indicated
Prop 65 List? "Yes" indicates compound is chemical known to cause cancer or reproductive toxicity listed by Calif. Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65), Mar. 2005 96-h Chamber Conc. Measured chamber VOC concentration at 96-h time point minus any analytical blank or blank concentration for empty chamber operated following same procedure. Lower limit of quantitation (LOQ) for individual VOCs on lists of toxicants is 2 µg m^{-3}, based on a 2 ng limit for a 1-liter sample. LOQ for TVOC is 20 µg m^{-3}. LOQ for formaldehyde and acetaldehyde is given below Emission Factor Mass of compound emitted per square meter of exposed surface per hour (calculations shown below). Reporting limits for emission factors are established by LOQ or reporting limit for hamber concentration and specimen's exposed surface area Classroom/Office/Office Bldg. Conc. Concentrations for school classroom, small office (individual), large office building, or specific project building calculated using parameters given in Table 2 (calculations shown below) TVOC Total Volatile Organic Compounds quantified by GC/MS TIC method using toluene as calibration reference Formaldehyde & acetaldehyde Volatile aldehydes quantified by HPLC following ASTM Method D 5197-97. LOQ for formaldehyde and acetaldehyde is ~1 µg m^{-3} Individual VOCs Quantified by thermal desorption GC/MS following EPA Methods TO-1 and TO-17. Compounds are quantified using multipoint calibrations prepared with pure substances unless otherwise indicated see Surrogate?). VOCs with chronic RELs are listed first, followed by other TAC and Prop. 65 compounds. Additional abundant VOCs at or above reporting limit of 5 µg m^{-3} are listed last. VOCs are listed in order of decreasing volatility within each group
"<" "Less than" concentrations established by LOQ
"HC" Hydrocarbon compound
"LQ" Indicates calculated value is below quantitation based on concentration LOQ
"na" Not applicable

Comments
Cut a 7.5" by 7.5" specimen from the received product sample and taped it to a stainless steel plate to cover all the edges and bottom surface, leaving a 7" by 7" exposed top surface for testing.
END OF REPORT

Equations Used in Calculations
An emission factor (EF) in µg m^{-2} h^{-1} for a chemical substance in a chamber test is calculated using Equation 1:
$EF = (Q (C - C_0)) / A_C$ (1)
where C is the chamber concentration of the substance (µg m^{-3}) and C_0 is the corresponding substrate or chamber blank concentration (µg m^{-3}). The other parameters are defined in Table 1. For an emitting unit, such as a chair, the number of units, N, is substituted for surface area, A_C, and EF is expressed as µg/unit-h.

A building concentration (C_B) in µg m^{-3} can be estimated from the EF using Equation 2:

$C_B = (EF * A_B) / Q_B$ (2)

where A_B is the area of the product in the building space and Q_B is the outdoor air flow rate to the space.

An EF in µmol m^{-2} h^{-1} for an individual VOC in a chamber test is calculated from the above EF using Equation 3:

EF (µmol m^{-2} h^{-1}) = EF (µg m^{-2} h^{-1}) / MW (3)

where MW is the molecular weight (molar mass) of the respective compound.

A chamber concentration in ppb (molar basis) for an individual VOC is calculated from the chamber concentration ($C - C_o$) in µg m^{-3} using Equation 4:

Chamber concentration (ppb) = ($C - C_o$) x 24.45 / MW (4)

where 24.45, in L/mol, is the molar volume of air at standard conditions (1 atm pressure, 25^o C).

For a furniture component, the workstation concentration of formaldehyde and total aldehydes in ppb can be estimated from the corresponding aldehyde EF (µmol m^{-2} h^{-1}) using Equation 5:

WS Aldehyde concentration (ppb) = ($EF_{aldehyde}$)(A_{ws})(24.45) / Q_{ws} (5)

where A_{ws} is the surface area of the component in the workstation (m^2) and Q_{ws} is the outdoor air flow rate to the workstation (m^3/h).

TEST END