

# TEST REPORT: 7191097124-02-CHM14-MA-CR1

Date: 07 OCT 2014

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## SUBJECT

Emission Rate Evaluation for Ceiling Product comply with Singapore Green Labelling Scheme (SGLS), Category 41: Panel Board

## CLIENT

USG Boral Building Products Sdn Bhd  
Suite 17-03, Level 17, The Pinnacle  
Persiaran Lagoon, Bandar Sunway  
46150 Petaling Jaya  
Selangor

Attn : Ms. Nisanat Suksong

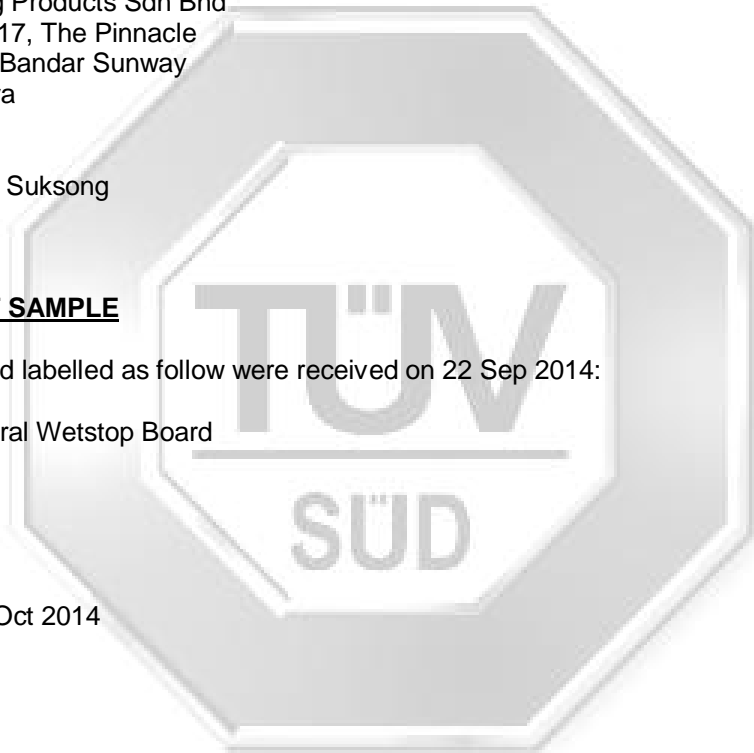
## DESCRIPTION OF SAMPLE

Two pieces of board labelled as follow were received on 22 Sep 2014:

Product Name: Boral Wetstop Board

## DATE OF TEST

22 Sep 2014 – 02 Oct 2014



TÜV SÜD PSB

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## METHOD OF TEST

### 1. Emission Test

The following emission tests were conducted according to ASTM D5116-10 – *Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions From Indoor Materials / Products*, as reference.

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

### Emission Test Condition

- 1) Chamber Volume: about 1m<sup>3</sup>
- 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: 0.4-1.0 m<sup>2</sup>/m<sup>3</sup> (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)

## REMARKS

Product Loading Ratio for the “Elephant Fire Resistant Moisture Resistant Board” sample was 0.41.

### 2. Analysis of Hazardous Substances

#### **1) Analysis of Halogenated Solvent and Aromatic Solvent**

The sample was analysed by Headspace-Gas Chromatography with Mass Selective Detector (HS-GC-MSD).

#### **2) Elemental Analysis of Antimony (Sb), Copper (Cu), Selenium (Se), Tin (Sn), Mercury (Hg), Lead (Pb), Cadmium (Cd), Chromium (Cr), and Arsenic (As)**

The sample was digested by inorganic acid, followed by analysis using Inductively Coupled Plasma Atomic Emission Spectroscopy (ICP-AES).

#### **3) Analysis of Chlorine (measured as Cl<sup>-</sup>); Fluoropolymer additives (PTFE) (measured as F<sup>-</sup>) and Phosphogypsum (measured as PO<sub>4</sub><sup>3-</sup> together with elemental analysis)**

The sample was analyzed according to BS EN 14582:2007 method as reference (by combustion, followed by Ion Chromatography (IC) analysis).

#### **4) Analysis of Phenols, Tar oils (benzo (a) pyrene), Aniline based amines, Aziridine or Polyaziridines, Chlorofluorocarbons (CFCs) and other halons, Polybrominated Biphenyls, Polybrominated Diphenyl Ethers and Short-Chain Chlorinated Organic Flame Retardants**

The sample was analyzed by Gas Chromatograph with Mass Selective Detector (GC-MSD) and/or High Performance Liquid Chromatography (HPLC), after the appropriate pretreatment of the sample.

#### **5) Analysis of Phthalates**

The sample was analysed by or Gas Chromatograph with Mass Selective Detector (GC-MSD), after the appropriate pretreatment of the sample.

#### **6) Potential Explosive Chemicals**

Flammable test by Seta Flash

**RESULTS****Table 1. Total Volatile Organic Compounds (TVOC) Emission Rate Test Result**

Sample	Test Result (After 24 hours)	Criteria for Singapore Green Label Category 41	Inferred Result
Boral Wetstop Board	< 0.2 mg per m <sup>2</sup> per hour	< 0.5 mg per m <sup>2</sup> per hour	Pass

\* TVOC is the sum of volatile organic compounds sampled on the sorbent tube between n-hexane (C6) and n-hexadecane (C16), and quantified by converting the total area of the chromatogram in that region to Toluene concentration equivalent.

**Table 2. Formaldehyde Emission Rate Test Result**

Sample	Test Result (After 48 hours)	Criteria for Singapore Green Label Category 41	Inferred Result
Boral Wetstop Board	< 0.05 mg per m <sup>2</sup> per hour	< 0.1 mg per m <sup>2</sup> per hour	Pass

**Table 3. The analytical results of Halogenated Solvent and Aromatic Solvent for the sample**

Test	Results
Halogenated Solvent (including CFC, HCFC, HFC, Methylene Chloride)	Not Detected <sup>a</sup>
Aromatic Solvent	Not Detected <sup>a</sup>

<sup>a</sup>The method detection limit was 250 ppm.

**Table 4. The elemental analytical results for the sample.**

Test	Result
Antimony, Sb	Not Detected <sup>b</sup>
Copper, Cu	Not Detected <sup>b</sup>
Selenium, Se	Not Detected <sup>b</sup>
Tin, Sn	Not Detected <sup>b</sup>
Mercury, Hg	Not Detected <sup>b</sup>
Lead, Pb	Not Detected <sup>b</sup>
Cadmium, Cd	Not Detected <sup>b</sup>
Chromium, Cr	Not Detected <sup>b</sup>
Arsenic, As	Not Detected <sup>b</sup>

<sup>b</sup>The method detection limit was 50 ppm.

**RESULTS** (cont'd)**Table 5. The analytical results for the sample.**

Test	Result
Fluoropolymer additives (PTFE) (measured as F <sup>-</sup> )	Not detected <sup>c</sup>
Chlorine (measured as Cl <sup>-</sup> )	Not detected <sup>c</sup>
Phosphogypsum (measured as PO <sub>4</sub> <sup>3-</sup> )	Not detected <sup>c</sup>

<sup>c</sup>The method detection limit was 25 ppm.**Table 6. The analytical results for the sample**

Test	Result
Pentachlorophenol (PCP)	Not detected <sup>d</sup>
Ortho-phenylphenol (OPP)	Not detected <sup>d</sup>
Tetrachlorophenol (TeCP)	Not detected <sup>d</sup>
Tar oils (benzo (a) pyrene)	Not detected <sup>e</sup>
Aniline based amines	Not detected <sup>f</sup>
Aziridine or polyaziridines	Not detected <sup>f</sup>

<sup>d</sup>the method detection limit was 2 mg/kg.<sup>e</sup>the method detection limit was 50 ppm.<sup>f</sup>the method detection limit was 250 ppm.**Table 7. The Phthalate analytical results for the sample**

Test	Result
Extractable Dibutyl phthalate (DBP)	Not detected <sup>9</sup>
Extractable Bis(2-ethylhexyl) phthalate (DEHP)	Not detected <sup>9</sup>
Extractable Diethyl phthalate (DEP)	Not detected <sup>9</sup>
Extractable Butyl benzyl phthalate (BBP)	Not detected <sup>9</sup>
Extractable Di-n-octyl phthalate (DnOP)	Not detected <sup>9</sup>
Extractable Dimethyl phthalate (DMP)	Not detected <sup>9</sup>

<sup>9</sup>the method detection limit was 50 ppm.**Table 8. The Analysis results for the sample.**

Test	Result
Potential Explosive Chemicals	No Flash

**RESULTS** (cont'd)

**Table 9. The analytical results of Polybrominated Biphenyls Flame Retardants for the sample.**

Test	Result
Extractable Monobromo Biphenyl	Not Detected <sup>h</sup>
Extractable Dibromo Biphenyl	Not Detected <sup>h</sup>
Extractable Tribromo Biphenyl	Not Detected <sup>h</sup>
Extractable Tetrabromo Biphenyl	Not Detected <sup>h</sup>
Extractable Pentabromo Biphenyl	Not Detected <sup>h</sup>
Extractable Hexabromo Biphenyl	Not Detected <sup>h</sup>
Extractable Heptabromo Biphenyl	Not Detected <sup>h</sup>
Extractable Octabromo Biphenyl	Not Detected <sup>h</sup>
Extractable Nonabromo Biphenyl	Not Detected <sup>h</sup>
Extractable Decabromo Biphenyl	Not Detected <sup>h</sup>

<sup>h</sup>The method detection limit was 250 ppm.

**Table 10. The analytical results of Polybrominated Diphenyl Ethers Flame Retardants for the sample.**

Test	Result
Extractable Monobromo Diphenyl Ether	Not Detected <sup>i</sup>
Extractable Dibromo Diphenyl Ethers	Not Detected <sup>i</sup>
Extractable Tribromo Diphenyl Ethers	Not Detected <sup>i</sup>
Extractable Tetrabromo Diphenyl Ethers	Not Detected <sup>i</sup>
Extractable Pentabromo Diphenyl Ethers	Not Detected <sup>i</sup>
Extractable Hexabromo Diphenyl Ethers	Not Detected <sup>i</sup>
Extractable Heptabromo Diphenyl Ethers	Not Detected <sup>i</sup>
Extractable Octabromo Diphenyl Ethers	Not Detected <sup>i</sup>
Extractable Nonabromo Diphenyl Ethers	Not Detected <sup>i</sup>
Extractable Decabromo Diphenyl Ether	Not Detected <sup>i</sup>
Short-chain chlorinated organic flame retardants	Not Detected <sup>i</sup>

<sup>i</sup>The method detection limit was 250 ppm.



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07 OCT 2014



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July 2011

