Ektimo

REPORT NUMBER R011367

Annual Emission Testing
Dunlop Flooring, Wetherill Park

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Document Information

Template Version; 230621

Client Name:	Dunlop Flooring
Report Number:	R011367
Date of Issue:	13 October 2021
Attention:	Joe Fernandes
Address:	183-187 Newton Road Wetherill Park NSW 2162
Testing Laboratory:	Ektimo Pty Ltd, ABN 86 600 381 413

Report Authorisation

Steven Cooper
Senior Air Monitoring Consultant

NATA Accredited Laboratory
No. 14601

Accredited for compliance with ISO/IEC 17025 - Testing. NATA is a signatory to the ILAC mutual recognition arrangement for the mutual recognition of the equivalence of testing, calibration and inspection reports.

Please note that only numerical results pertaining to measurements conducted directly by Ektimo are covered by Ektimo's terms of NATA accreditation. This does not include comments, conclusions or recommendations based upon the results. Refer to 'Test Methods' for full details of testing covered by NATA accreditation.

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1 EXECUTIVE SUMMARY

1.1 Background

Ektimo was engaged by Dunlop Flooring to perform emission testing at their Wetherill Park plant. Testing was carried out in accordance with Environment Protection Licence 12721.

1.2 Project Objectives

The objectives of the project were to conduct a monitoring programme to quantify emissions from three (3) discharge points to determine compliance with Dunlop Flooring's Environmental Licence.

Monitoring was performed as follows:

Location	Test Date	Test Parameters*
EPA 1 – DP3	10 August 2021	Speciated & total volatile organic compounds (VOCs) as n-propane Particulate matter <10µm (PM_{10}) Toluene diisocyanate (TDI)
Boiler Stack		Speciated & total volatile organic compounds (VOCs) as n-propane Particulate matter <10µm (PM_{10}) Nitrogen oxides, carbon dioxide, oxygen
Hot Oil Heater Stack		Nitrogen oxides, carbon dioxide, oxygen

* Flow rate, velocity, temperature, and moisture were also determined.

All results are reported on a dry basis at STP.

1.3 Results Summary

The following licence comparison table shows that all analytes highlighted in green are within the licence limit set by the NSW EPA as per licence 12721 (last amended on 1 March 2017).

EPA No.	Pollutant	Units	Licence Limit	Detected Values 10 August 2021
DP3 (EPA Point 1)	Toluene 2,4 & 2,6 diisocyanate (TDI) (combined)	mg/m^3	0.007	<0.0005

Please note that the measurement uncertainty associated with the test results was not considered when determining whether the results were compliant or non-compliant.

Refer to the Test Methods table for the measurement uncertainties.

2 RESULTS

2.1 EPA 1 – DP3

Date	10/08/2021	**Client**	Dunlop Flooring
Report	R011367	**Stack ID**	EPA 1 - DP3
Licence No.	12721	**Location**	Wetherill Park
Ektimo Staff	Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		210730

Sampling Plane Details	
Sampling plane dimensions	750 mm
Sampling plane area	0.442 m²
Sampling port size, number	4" Holes x 2
Access & height of ports	Fixed ladder 8 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 1 D
Upstream disturbance	Louvre 2.5 D
No. traverses & points sampled	2 16
Sample plane compliance to AS4323.1	Compliant but non-ideal

The sampling plane is deemed to be non-ideal due to the following reasons:
The sampling plane is too near to the downstream disturbance but is greater than or equal to 1D
The sampling plane is too near to the upstream disturbance but is greater than or equal to 2D

Stack Parameters		
Moisture content, %v/v	<0.4	
Gas molecular weight, g/g mole	29.0 (wet)	29.0 (dry)
Gas density at STP, kg/m³	1.29 (wet)	1.29 (dry)
Gas density at discharge conditions, kg/m³	1.20	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	0942 & 1324	
Temperature, °C	25	
Temperature, K	298	
Velocity at sampling plane, m/s	9.8	
Volumetric flow rate, actual, m³/s	4.3	
Volumetric flow rate (wet STP), m³/s	4	
Volumetric flow rate (dry STP), m³/s	4	
Mass flow rate (wet basis), kg/hour	19000	
Velocity difference, %	<1	

Toluene Diisocyanate	Results	
Sampling time	0951-1319	
	Concentration mg/m³	Mass Rate g/min
2,6 - TDI	<0.0003	<0.00006
2,4 - TDI	<0.0003	<0.00006
2,6 - TDI & 2,4 TDI (combined)	<0.0005	<0.0001

Date	10/08/2021	**Client**	Dunlop Flooring
Report	R011367	**Stack ID**	EPA 1 - DP3
Licence No.	12721	**Location**	Wetherill Park
Ektimo Staff	Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		210730

Isokinetic Results	Results	
Sampling time	1010-1132 (PM10)	
	Concentration mg/m³	Mass Rate g/min
Fine particulates (PM10)	<2	<0.5
D50 cut size, 10µm	9.5	
Isokinetic Sampling Parameters		
Sampling time, min	80	
Isokinetic rate, %	106	
Velocity difference, %	<1	
Gravimetric analysis date (PM_{10}/$PM_{2.5}$)	12-08-2021	

Total VOCs (as n-Propane)	Results	
Sampling time	1003-1103	
	Concentration mg/m³	Mass Rate g/min
Total	<0.06	<0.01

VOC (speciated)	Results	
Sampling time	1003-1103	
	Concentration mg/m³	Mass Rate g/min
Detection limit(1)	<0.06	<0.01

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Dichloromethane, Ethanol, Isopropanol, 1,1-Dichloroethene, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, Toluene, 1,1,2-Trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m + p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-Trimethylbenzene, tert-Butylbenzene, 1,2,4-Trimethylbenzene, 1,2,3-Trimethylbenzene, Acetone, Pentane, Acrylonitrile, Methyl ethyl ketone, n-Hexane, Ethyl acetate, Cyclohexane, 2-Methylhexane, Isopropyl acetate, 2,3-Dimethylpentane, 3-Methylhexane, Heptane, Ethyl acrylate, Methyl methacrylate, Propyl acetate, Methylcyclohexane, Methyl Isobutyl Ketone, 2-Hexanone, Octane, Butyl acetate, 1-Methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, alpha-Pinene, beta-Pinene, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

2.2 Boiler Stack

Date	10/08/2021	**Client**	Dunlop Flooring
Report	R011367	**Stack ID**	Boiler Stack
Licence No.	12721	**Location**	Wetherill Park
Ektimo Staff	Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		210730

Sampling Plane Details	
Sampling plane dimensions	320 mm
Sampling plane area	0.0804 m²
Sampling port size, number	4" BSP (x2)
Access & height of ports	Fixed ladder 8 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit cone 4 D
Upstream disturbance	Bend 8 D
No. traverses & points sampled	2 4
Sample plane compliance to AS4323.1	Compliant but non-ideal

The sampling plane is deemed to be non-ideal due to the following reasons:
The gas velocity at some or all sampling points is less than 3 m/s

Stack Parameters		
Moisture content, %v/v	15	
Gas molecular weight, g/g mole	27.9 (wet)	29.6 (dry)
Gas density at STP, kg/m³	1.24 (wet)	1.32 (dry)
Gas density at discharge conditions, kg/m³	0.80	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1155 & 1321	
Temperature, °C	154	
Temperature, K	427	
Velocity at sampling plane, m/s	3	
Volumetric flow rate, actual, m³/s	0.24	
Volumetric flow rate (wet STP), m³/s	0.16	
Volumetric flow rate (dry STP), m³/s	0.13	
Mass flow rate (wet basis), kg/hour	710	
Velocity difference, %	6	

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	1207 - 1317		1207 - 1317		1207 - 1317	
	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases						
Nitrogen oxides (as NO_2)	45	0.36	<4	<0.04	80	0.65
	Concentration %v/v		Concentration %v/v		Concentration %v/v	
Carbon dioxide	6.6		<0.4		10.2	
Oxygen	10.2		4.4		20.5	

Date	10/08/2021	**Client**	Dunlop Flooring
Report	R011367	**Stack ID**	Boiler Stack
Licence No.	12721	**Location**	Wetherill Park
Ektimo Staff	Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		210730

Isokinetic Results	Results	
Sampling time	1202-1306 (PM10)	
	Concentration mg/m³	Mass Rate g/min
Fine particulates (PM10)	5.2	0.041
D50 cut size, 10µm	11.1	
Isokinetic Sampling Parameters		
Sampling time, min	60	
Isokinetic rate, %	113	
Velocity difference, %	6	
Gravimetric analysis date (PM_{10}/$PM_{2.5}$)	12-08-2021	

Total VOCs (as n-Propane)	Results	
Sampling time	1209-1309	
	Concentration mg/m³	Mass Rate g/min
Total	<0.1	<0.0008

VOC (speciated)	Results	
Sampling time	1209-1309	
	Concentration mg/m³	Mass Rate g/min
Detection limit(1)	<0.1	<0.0009

(1) Unless otherwise reported, the following target compounds were found to be below detection:
Dichloromethane, Ethanol, Isopropanol, 1,1-Dichloroethene, trans-1,2-Dichloroethene, cis-1,2-Dichloroethene, Chloroform, 1,1,1-Trichloroethane, 1,2-Dichloroethane, Benzene, Carbon tetrachloride, Butanol, 1-Methoxy-2-propanol, Trichloroethylene, Toluene, 1,1,2-Trichloroethane, Tetrachloroethene, Chlorobenzene, Ethylbenzene, m + p-Xylene, Styrene, o-Xylene, 2-Butoxyethanol, 1,1,2,2-Tetrachloroethane, Isopropylbenzene, Propylbenzene, 1,3,5-Trimethylbenzene, tert-Butylbenzene, 1,2,4-Trimethylbenzene, 1,2,3-Trimethylbenzene, Acetone, Pentane, Acrylonitrile, Methyl ethyl ketone, n-Hexane, Ethyl acetate, Cyclohexane, 2-Methylhexane, Isopropyl acetate, 2,3-Dimethylpentane, 3-Methylhexane, Heptane, Ethyl acrylate, Methyl methacrylate, Propyl acetate, Methylcyclohexane, Methyl Isobutyl Ketone, 2-Hexanone, Octane, Butyl acetate, 1-Methoxy-2-propyl acetate, Butyl acrylate, Nonane, Cellosolve acetate, alpha-Pinene, beta-Pinene, Decane, 3-Carene, D-Limonene, Undecane, Dodecane, Tridecane, Tetradecane

2.3 Hot Oil Heater Stack

Date	10/08/2021	**Client**	Dunlop Flooring
Report	R011367	**Stack ID**	Oil Heater Stack
Licence No.	12721	**Location**	Wetherill Park
Ektimo Staff	Steven Cooper	**State**	NSW
Process Conditions	Please refer to client records.		210730

Sampling Plane Details	
Sampling plane dimensions	200 mm
Sampling plane area	0.0314 m²
Sampling port size, number	Sampled at exit
Access & height of ports	Fixed ladder 8 m
Duct orientation & shape	Vertical Circular
Downstream disturbance	Exit 0 D
Upstream disturbance	Change in diameter 6 D
No. traverses & points sampled	2 4
Sample plane compliance to AS4323.1	Non-compliant

The sampling plane is deemed to be non-compliant due to the following reasons:
The gas velocity at some or all sampling points is less than 3 m/s
The downstream disturbance is <1D from the sampling plane
The stack or duct does not have the required number of access holes (ports)

Stack Parameters		
Moisture content, %v/v	5.7	
Gas molecular weight, g/g mole	28.9 (wet)	29.6 (dry)
Gas density at STP, kg/m³	1.29 (wet)	1.32 (dry)
Gas density at discharge conditions, kg/m³	0.94	
Gas Flow Parameters		
Flow measurement time(s) (hhmm)	1050 & 1215	
Temperature, °C	107	
Temperature, K	380	
Velocity at sampling plane, m/s	1.9	
Volumetric flow rate, actual, m³/s	0.061	
Volumetric flow rate (wet STP), m³/s	0.044	
Volumetric flow rate (dry STP), m³/s	0.042	
Mass flow rate (wet basis), kg/hour	210	
Velocity difference, %	<1	

Gas Analyser Results	Average		Minimum		Maximum	
Sampling time	1106 - 1205		1106 - 1205		1106 - 1205	
	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min	Concentration mg/m³	Mass Rate g/min
Combustion Gases						
Nitrogen oxides (as NO_2)	60	0.15	<4	<0.01	84	0.21
	Concentration %v/v		Concentration %v/v		Concentration %v/v	
Carbon dioxide	6.7		<0.4		9.2	
Oxygen	10.1		6.1		20.7	

3 PLANT OPERATING CONDITIONS

See Dunlop Flooring records for complete process conditions.

4 TEST METHODS

All sampling and analysis performed by Ektimo unless otherwise specified. Specific details of the methods are available upon request.

Parameter	Sampling Method	Analysis Method	Uncertainty*	NATA Accredited	
				Sampling	Analysis
Sampling points - Selection	NSW EPA TM-1	NA	NA	✓	NA
Flow rate, temperature and velocity	NSW EPA TM-2	NSW EPA TM-2	8%, 2%, 7%	NA	✓
Moisture content	NSW EPA TM-22	NSW EPA TM-22	19%	✓	✓
Molecular weight	NA	NSW EPA TM-23	not specified	NA	✓
Dry gas density	NA	NSW EPA TM-23	not specified	NA	✓
Carbon dioxide	NSW EPA TM-24	NSW EPA TM-24	13%	✓	✓
Nitrogen oxides	NSW EPA TM-11	NSW EPA TM-11	12%	✓	✓
Oxygen	NSW EPA TM-25	NSW EPA TM-25	13%	✓	✓
Toluene diisocyanate (TDI) and methylene bis phenyl isocyanate (MDI)	Ektimo 350	Ektimo 350	19%	✓	✓†
Speciated volatile organic compounds (VOCs)	NSW EPA TM-34[d]	Ektimo 344	19%	✓	✓†
Particulate matter (PM_{10})	NSW EPA OM-5	NSW EPA OM-5	6%	✓	✓††

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* Uncertainties cited in this table are estimated using typical values and are calculated at the 95% confidence level (coverage factor = 2).

† Analysis conducted at the Ektimo Mitcham, VIC laboratory, NATA accreditation number 14601. Results were reported on:
26 August 2021 in report number LV-001823.
30 August 2021 in report number V-001844.

†† Gravimetric analysis conducted at the Ektimo Unanderra, NSW laboratory, NATA accreditation number 14601.

d Excludes recovery study as specified in section 8.4.3 of USEPA Test Method 18.

5 QUALITY ASSURANCE/QUALITY CONTROL INFORMATION

Ektimo is accredited by the National Association of Testing Authorities (NATA) for the sampling and analysis of air pollutants from industrial sources. Unless otherwise stated test methods used are accredited with the National Association of Testing Authorities. For full details, search for Ektimo at NATA's website www.nata.com.au.

Ektimo is accredited by NATA (National Association of Testing Authorities) to ISO/IEC 17025 - Testing. ISO/IEC 17025 - Testing requires that a laboratory have adequate equipment to perform the testing, as well as laboratory personnel with the competence to perform the testing. This quality assurance system is administered and maintained by the Quality Director.

NATA is a member of APAC (Asia Pacific Accreditation Co-operation) and of ILAC (International Laboratory Accreditation Co-operation). Through mutual recognition arrangements with these organisations, NATA accreditation is recognised worldwide.

6 DEFINITIONS

The following symbols and abbreviations may be used in this test report:

% v/v	Volume to volume ratio, dry or wet basis
~	Approximately
<	Less than
>	Greater than
≥	Greater than or equal to
APHA	American Public Health Association, Standard Methods for the Examination of Water and Waste Water
AS	Australian Standard
BSP	British standard pipe
CARB	Californian Air Resources Board
CEM/CEMS	Continuous Emission Monitoring/Continuous Emission Monitoring System
CTM	Conditional test method
D	Duct diameter or equivalent duct diameter for rectangular ducts
D_{50}	'Cut size' of a cyclone is defined as the particle diameter at which the cyclone achieves a 50% collection efficiency i.e. half of the particles are retained by the cyclone and half pass through it. The D_{50} method simplifies the capture efficiency distribution by assuming that a given cyclone stage captures all of the particles with a diameter equal to or greater than the D_{50} of that cyclone and less than the D_{50} of the preceding cyclone.
DECC	Department of Environment & Climate Change (NSW)
Disturbance	A flow obstruction or instability in the direction of the flow which may impede accurate flow determination. This includes centrifugal fans, axial fans, partially closed or closed dampers, louvres, bends, connections, junctions, direction changes or changes in pipe diameter.
DWER	Department of Water and Environmental Regulation (WA)
DEHP	Department of Environment and Heritage Protection (QLD)
EPA	Environment Protection Authority
FTIR	Fourier Transform Infra-red
ISC	Intersociety Committee, Methods of Air Sampling and Analysis
ISO	International Organisation for Standardisation
ITE	Individual threshold estimate
Lower bound	When an analyte is not present above the detection limit, the result is assumed to be equal to zero.
Medium bound	When an analyte is not present above the detection limit, the result is assumed to be equal to half of the detection limit.
NA	Not applicable
NATA	National Association of Testing Authorities
NIOSH	National Institute of Occupational Safety and Health
NT	Not tested or results not required
OM	Other approved method
OU	Odour unit. One OU is that concentration of odorant(s) at standard conditions that elicits a physiological response from a panel equivalent to that elicited by one Reference Odour Mass (ROM), evaporated in one cubic metre of neutral gas at standard conditions.
PM_{10}	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 10 microns (µm).
$PM_{2.5}$	Atmospheric suspended particulate matter having an equivalent aerodynamic diameter of less than approximately 2.5 microns (µm).
PSA	Particle size analysis
RATA	Relative accuracy test audit
Semi-quantified VOCs	Unknown VOCs (those not matching a standard compound), are identified by matching the mass spectrum of the chromatographic peak to the NIST Standard Reference Database (version 14.0), with a match quality exceeding 70%. An estimated concentration is determined by matching the area of the peak with the nearest suitable compound in the analytical calibration standard mixture.
STP	Standard temperature and pressure. Gas volumes and concentrations are expressed on a dry basis at 0°C, at discharge oxygen concentration and an absolute pressure of 101.325 kPa, unless otherwise specified.
TM	Test method
TOC	The sum of all compounds of carbon which contain at least one carbon-to-carbon bond, plus methane and its derivatives.
USEPA	United States Environmental Protection Agency
VDI	Verein Deutscher Ingenieure (Association of German Engineers)
Velocity difference	The percentage difference between the average of initial flows and after flows.
Vic EPA	Victorian Environment Protection Authority
VOC	Volatile organic compound. A carbon-based chemical compound with a vapour pressure of at least 0.010 kPa at 25°C or having a corresponding volatility under the given conditions of use. VOCs may contain oxygen, nitrogen and other elements. VOCs do not include carbon monoxide, carbon dioxide, carbonic acid, metallic carbides and carbonate salts.
XRD	X-ray diffractometry
Upper bound	When an analyte is not present above the detection limit, the result is assumed to be equal to the detection limit.
95% confidence interval	Range of values that contains the true result with 95% certainty. This means there is a 5% risk that the true result is outside this range.

7 APPENDIX 1: SITE PHOTOS

Figure 1 – EPA 1 – DP3

Figure 2 – Boiler Stack

Figure 3 – Hot Oil Heater Stack

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