



Air Quality Report

Prepared For

PLN Group

Report No. J 1611252

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PROJECT Furniture Emissions – IQ Commercial Keystone

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BACKGROUND

PLN Group is a family of furniture brands comprising Fletcher Systems, IQ Commercial, Essenze and Finewood. IQ Commercial specializes in commercial furniture including office workstations at its facility in Auckland, New Zealand.

PLN Group engaged BELL Laboratories to determine emissions of volatile organic compounds and aldehydes from a Keystone office workstation for product certification purposes. The sample details are listed in the Sample Details table below.

The work station was tested using the ANSI/BIFMA M7.1 standard test method.

SAMPLE DETAILS

Test Item ID	Keystone workstation
Product type	Office workstation
Manufacturer	IQ Commercial
Date Manufactured	17/11/2016
Date Shipped	21/11/2016
Date Received	24/11/2016
Date Test Started	25/11/2016

TEST PARAMETERS & CONFORMANCE CRITERIA

The following tests were performed by BELL Laboratories in accordance with requirements of ANSI/BIFMA M7.1. Volatile organic compounds were sampled onto Tenax TA tubes, desorbed and analysed by GCMS. Aldehydes were sampled onto DNPH treated silica gel tubes, extracted and analysed by HPLC.

ANSI/BIFMA M7.1 Table 1.2

Parameter	Systems Furniture - concentration	Seating - concentration
Total volatile organic compounds	0.5 mg/m ³	0.25 mg/m ³
Formaldehyde	50 ppb	25 ppb
Total aldehydes	100 ppb	50 ppb
4-Phenylcyclohexene	0.0065 mg/m ³	0.00325 mg/m ³

ANSI - American National Standards Institute

BIFMA - Business & Institutional Furniture Manufacturers Association

TEST OUTCOME

The pass/fail conformity with regards to ANSI BIFMA M7.1-2011, Table A1.1 is outlined in the table below.

Detailed concentration, emission rate and emission factor data are presented in the tabulated results section later in this report.

Chemical/Chemical Group	Systems Furniture – Concentration
TVOC's	Pass
Formaldehyde	Pass
Total aldehydes	Pass
4-Phenylcyclohexane (4-PCH)	Pass

PHOTOGRAPH – TEST ITEM

TABULATED RESULTS

Report	J 1611252	Client	PLN Group	Location	Auckland
Chamber ID	ECH 4	Project type	Building Material Emissions	State	NZ
Date made	17/11/16	Test method	ANSI BIFMA M7		
Test started	25/11/16	Sample ID	Keylock	Sample type	Office workstation
Analyst	HM	Sample description	Enclosure dimensions: 1.65m long, 1.3m wide, 1.25m high. Vertical surface area: 10.6m ² . Work surface area: 2.4m ² . Total area 13.0m ²		

Test Details	Chamber
Length, cm	240
Width, cm	160
Height, cm	160
Area, m ²	3.8
Volume, L	6140

Test Parameters	Test 1	Test 2
Temperature, °C	23.3	22.9
Relative humidity, %	50.4	51.1
Barometric pressure, kPa	101.8	101.8
Static pressure, Pa	10.5	10.9
Chamber pressure, kPa	101.8	101.8
Flowrate, L/min	65.3	64.8
Air exchange rate, per hour	0.638	0.633

Gas Parameters	Test 1	Test 2
Moisture content, %	1.0	1.0
Gas molecular weight, q/q mole	28.8 (wet)	29.0 (dry)
Gas density at 23°C, kg/m ³	1.19 (wet)	1.19 (dry)

VOC's	Test 1 - 168h				Test 2 - 168h			
	Test Conc mg/m ³	Emission Factor mg/unit/h	Emission Rate mg/h	Room Conc mg/m ³	Test Conc mg/m ³	Emission Factor mg/unit/h	Emission Rate mg/h	Room Conc mg/m ³
Toluene	0.031	0.12	0.12	0.0082	0.028	0.11	0.11	0.0072
Ethylbenzene	0.022	0.087	0.087	0.0058	0.019	0.075	0.075	0.005
m+p-Xylene	0.036	0.14	0.14	0.0095	0.035	0.14	0.14	0.009
o-Xylene	0.024	0.093	0.093	0.0062	0.023	0.091	0.091	0.0061
α-Pinene	0.33	1.3	1.3	0.087	0.29	1.1	1.1	0.076
β-Pinene	0.7	2.8	2.8	0.18	0.62	2.4	2.4	0.16
D-Limonene	0.025	0.1	0.1	0.0066	0.025	0.097	0.097	0.0065
4-Phenylcyclohexene	<0.011	<0.046	<0.046	<0.003	<0.011	<0.046	<0.046	<0.003
TVOC	1.2	4.8	4.8	0.32	1	4.3	4.3	0.28

Aldehydes	Test 1 - 168h				Test 2 - 168h			
	Test Conc mg/m ³	Emission Factor mg/unit/h	Emission Rate mg/h	Room Conc ppb	Test Conc mg/m ³	Emission Factor mg/unit/h	Emission Rate mg/h	Room Conc ppb
Formaldehyde	0.022	0.09	0.09	4.9	0.019	0.078	0.078	4.3
Acetaldehyde	<0.0055	<0.022	<0.022	<0.83	<0.0055	<0.022	<0.022	<0.83
Total Aldehydes	0.022	0.09	0.09	4.9	0.019	0.078	0.078	4.3

QUALITY ASSURANCE

BELL Laboratories operates to ISO 17025 – General Requirements for the Competence of Testing and Calibration Laboratories. ISO 17025 requires that laboratories have an ISO 9002 compliant quality system. More importantly, it requires that testing laboratories have adequate equipment, as well as laboratory personnel with the technical competence to perform the analytical procedures. The quality assurance system is administered and maintained by the Quality Assurance Manager.

A formal Quality Control program is in place at BELL Laboratories to monitor field sampling activities as well as laboratory analyses. The program is designed to check sampling reproducibility as well as analytical precision & accuracy. The Laboratory Manager is responsible for administration and maintenance of this program.

STATEMENT OF LIMITATIONS

This report has been prepared in accordance with the agreement between BELL Laboratories Pty Ltd and Haworth Asia Pacific. Within the limitations of the agreed scope of services, this work has been performed in a professional manner, in accordance with generally accepted practices, using a degree of skill and care ordinarily exercised by members of its profession and consulting practice. No other warranty, expressed or implied, is made.

Any reliance on this report by third parties shall be at such parties sole risk and may not contain sufficient information for purposes of other parties or for other uses. This report shall only be presented in full and may not be used to support any other objective than those set out in the report, except where written approval with comments are provided by BELL Laboratories Pty Ltd.

DEFINITIONS

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

<	Less than
NA	Not applicable
NS	Not specified
TSP	Total suspended particulate matter
PM ₁₀	Particulate matter less than 10 micron
RH	Relative humidity
CO	Carbon monoxide
CO ₂	Carbon dioxide
BP	Barometric pressure
µg/m ³	Micrograms per cubic metre
mg/m ³	Milligrams per cubic metre
ppb	Parts per billion
ppm	Parts per million
µm	Micrometre
hPa	Hectopascals