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EMECO INDUSTRIES INC
Date: 01/31/14
P.O.:

Report No.: 101452001GRR-001
Quote No: 500495248
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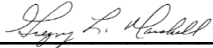
Furniture VOC Emissions

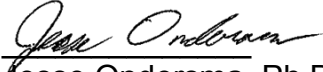
Test Summary	
Test Method	ANSI/BIFMA M7.1
Modeling Scenario	Seating

Test Results	
Acceptance Criteria	Pass/Fail
ANSI/BIFMA e ³ -2012 Section 7.6.1	Pass
ANSI/BIFMA e ³ -2012 Section 7.6.2	Pass
ANSI/BIFMA e ³ -2012 Section 7.6.3	Pass

Customer Information	
Organization	EMECO Industries Inc
Address	2650 El Presido St Long Beach, CA 90810
Contact Name	Magnus Breitling
Phone Number	717-637-5951
Email	magnus@emeco.com

Product Sample Information	
Manufacturer / Location	
Product Name	Navy 111 Chair
Product CSI Category	Seating
Customer Sample ID	
Date of Manufacture	November 2013
Date of Collection	
Date of Shipment	
Date Received by Lab	12/23/13
Date of Test Start and Duration	12/30/14 7 day duration
As Received Sample Condition	No observed problems


Greg Marshall, M.S.
Reviewer


Jesse Ondersma, Ph.D
Senior Chemist

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DATE RECEIVED: 12/23/13
DATES TESTED: 12/30/13-01/17/14

DESCRIPTION OF SAMPLES:

Part Description: Navy 111 Chair
Material Submitted: One Chair

WORK REQUESTED:

Test Method: Reference ANSI/BIFMA M7.1-2011
Acceptance Criteria: ANSI/BIFMA X7.1, ANSI/BIFA e3-2012e sections 7.6.1, 7.6.2, and 7.6.3.

Test Summary:

The emissions testing were performed according to ANSI/BIFMA M7.1-2011 "*Standard Test Method for Determining VOC Emissions from Office Furniture Systems, Components and Seating*". The sample was placed as received in the testing chamber for 7 days with all surfaces exposed. A photograph of the tested sample in the chamber is included herein. Air samples were collected prior to the sample being placed in the chamber (0 hours), at 72 hours, and at 168 hours after initiating the test. The 72 h and the 168 h air samples were collected in duplicate. Samples analyzed for individual VOCs and TVOC were collected on multi-sorbent tubes containing Tenax TA 35/60 backed by Carbograph 1 TD 40/60. These VOC samples were analyzed by thermal desorption-gas chromatography/mass-spectroscopy, TD-GC/MS. TVOC was calculated using toluene as a surrogate. Individual VOCs were calculated using calibration curves based on pure standards. Samples analyzed for low molecular weight aldehydes were collected on tubes treated with 2,4-di-nitrophenylhydrazine (DNPH). Low molecular weight aldehydes were analyzed using high pressure liquid chromatography, HPLC.

Table 1: Sample and chamber conditions during test period.

Sample Dimensions:	0.218 m x 0.179 m x 0.0053 m
Sample Surface Area:	0.081 m ²
Chamber Size:	0.1159 m ³
Loading Factor:	0.702 m ² /m ³
Air Flow Rate:	0.120 m ³ /h
Air Change Rate:	1.035 h ⁻¹
Chamber Pressure:	17 ± 5 Pa
Duration:	168 h
Environmental Conditions:	23 ± 1 °C
Humidity:	50 ± 5 % RH

Table 2: Summary and Pass/Fail Criteria based on the VOC emission factor for seating in ANSI/BIFMA e³-2012, section 7.6.1.

Chemical Name	Acceptance Criteria	Calculated	Pass/Fail
TVOC (mg/m ³) *	≤ 0.25	≤ 0.001**	Pass
Formaldehyde (ppb)	≤ 25	≤ 0.1**	Pass
Total Aldehyde (ppb)	≤ 50	≤ 1**	Pass
4-phenylcyclohexene (mg/m ³)	≤ 0.00325	≤ 0.00001**	Pass

*As defined in ANSI/BIFMA M7.1-2011.

**Below Detection Limit.

Table 3: Summary and Pass/Fail Criteria based on the VOC emission factor (EF) at 336 hours for seating in ANSI/BIFMA e³-2012, section 7.6.2. Only detected VOCs with acceptance criteria are listed.

Chemical Name	Acceptance Criteria	Calculated	Pass/Fail
N/A*	---	---	Pass

*No individual VOCs specified in ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e³-2012e were found to be above the detection limits

Table 4: Summary and Pass/Fail Criteria based on the VOC emission factor at 336 hours for seating components in ANSI/BIFMA e³-2012, section 7.6.3.

Chemical Name	Acceptance Criteria	Calculated	Pass/Fail
Formaldehyde (µg/m ³)	≤ 4.5	≤ 0.1**	Pass

*As defined in ANSI/BIFMA M7.1-2011.

**Below Detection Limit

Table 5: Measured concentrations of VOCs specified in ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e³-2012e between n-C6 and n-C16 measured by GC/MS (µg/m³)

VOC	72 hour Air Samples				168 hour Air Samples			
	#1	#2	Mean	% diff	#1	#2	Mean	% diff
N/A*	---	---	---	---	---	---	---	---

*No individual VOCs specified in ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e³-2012e were found to be above the detection limits

Table 6: Calculated chamber emission factors (EF) of VOCs specified in ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e³-2012e.

VOC	EF (µg/m ² h)		Power Law Coefficients	
	72 hour	168 hour	a	b
N/A*	---	---	---	---

*No individual VOCs specified in ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e³-2012e were found to be above the detection limits

Table 7: Calculated chamber emission factors (EF) at 336 hours of VOCs specified in ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e³-2012e.

VOC	336 hour EF (µg/m ² h)
N/A	---

*No individual VOCs specified in ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e³-2012e were found to be above the detection limits

Calculations for Product Emission Factors Using the Direct Scaling Approach

Product emission factors were calculated to compare with acceptance criteria for maximum seating office emissions concentration limits as defined in ANSI/BIFMA e³-2012e. Calculations of emission factors followed ANSI/BIFMA M7.1 Section 11.4. A worst case scenario was identified having a total emitting surface area of 1.0 m².

Table 8: Calculated seating emission factors at 168 hours for individual furniture components in ANSI/BIFMA e³-2012, section 7.6.1.

Chemical Name	Emission Factor
TVOC (µg/unit•h)	< 15*
Formaldehyde(µg/unit•h)	< 2.3*
Total Aldehyde (µmol/unit•h)	< 0.2*
4-phenylcyclohexene (µg/unit•h)	< 0.2*

*Below Detection Limits

Table 9: Calculated product emission factors (EF) at 336 hours of VOCs specified in ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e³-2012e.

VOC	EF (µg/unit•h)
N/A*	---

*No individual VOCs specified in ANSI/BIFMA X7.1-2011 and ANSI/BIFMA e³-2012e were found to be above the detection limits

Table 10: Facilities and Equipment:

Instrumentation Used:	Markes TD-100 Thermal Desorption Agilent 7890A GC Agilent 5975C MS Agilent 1260 HPLC
Column Used:	Agilent HP-5MS (GC) Acentis C18 (HPLC)

All data, including but not limited to raw instrument files, calibration fits, and quality control checks used to generate the test results are available to the client upon request.

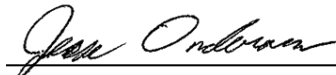

Jesse Ondersma, Ph.D.
Senior Chemist

Photo Documentation

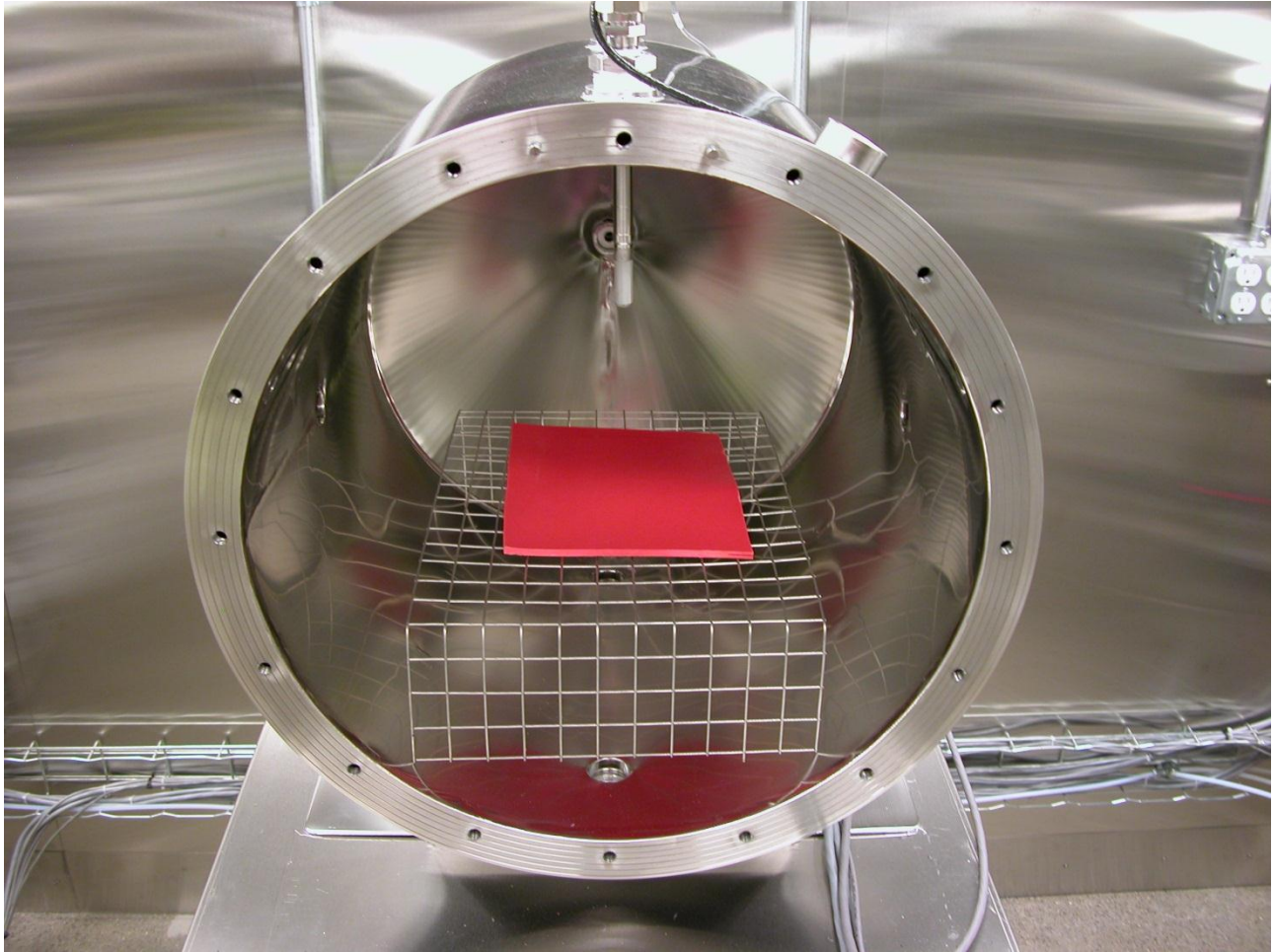


Figure 1: Photograph of sample as loaded into the environmental testing chamber.