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FORMALDEHYDE EMISSIONS FROM ENGINEERED FLOORING AS PER ASTM E1333

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1. INTRODUCTION

Limitations on formaldehyde concentrations in air have been established for some building products permanently installed in manufactured and conventional homes. Formaldehyde emission testing has been requested by Elite International Forest Ltd. (the Client).

2. OBJECTIVE

The objective of this experiment is to evaluate the formaldehyde emissions and compare the results to existing regulations.

3. METHOD IDENTIFICATION

The testing was done according to ASTM E1333-14 entitled "Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber"

4. ENVIRONMENTAL LARGE CHAMBER

The chamber has a volume of 893 ft^3. Inside walls are made of stainless steel and temperature and relative humidity are maintained to 25°C and 50% respectively. Purified air is supplied to the chamber through the inlet port at an air exchange rate of 0.50 chamber volume per hour.

5. TECHNICAL TEAM

- Sylvain Lefebvre (ing., Ph.D., LGBC), Manager
- Diane Schorr, Scientist
- Mathieu Gosselin, Principal Technologist

6. DESCRIPTION OF SAMPLES AND SAMPLING METHOD

Samples were selected by the Client. Samples were received on July 19th, 2019 at FPInnovations facility in boxes and labeled as: 5" White Oak Eng. Hand Scraped Natural Color. Upon arrival, samples were stored in a controlled room at 24°C and 50% R.H. in original boxes until conditioning. On the conditioning day (July 23rd, 2019), samples were assembled on a back to back configuration.

7. RECEPTION DATES OF SAMPLES

Samples were received on July 19th, 2019.

8. DATES OF TESTING

All experiment dates are found in the specimen test report, appendix 1.

9. EXPERIMENTAL METHOD

a. Conditioning

The conditioning is done in a controlled area where temperatures and relative humidity are kept at 24 °C ± 3 °C and 50% ± 5%. Specimens are conditioned for seven days before introduction into chambers.

b. Specimen Installation

For the purpose of this experiment, the test specimens were installed on an inert support in the chamber. Calculations were made in order to respect the product loading ratio of 0.13 ft^2/ft^3. A total of 116 ft^2 of sample surface has been exposed in the chamber. Flooring planks were installed and taped together on a back to back configuration. (figure 1)

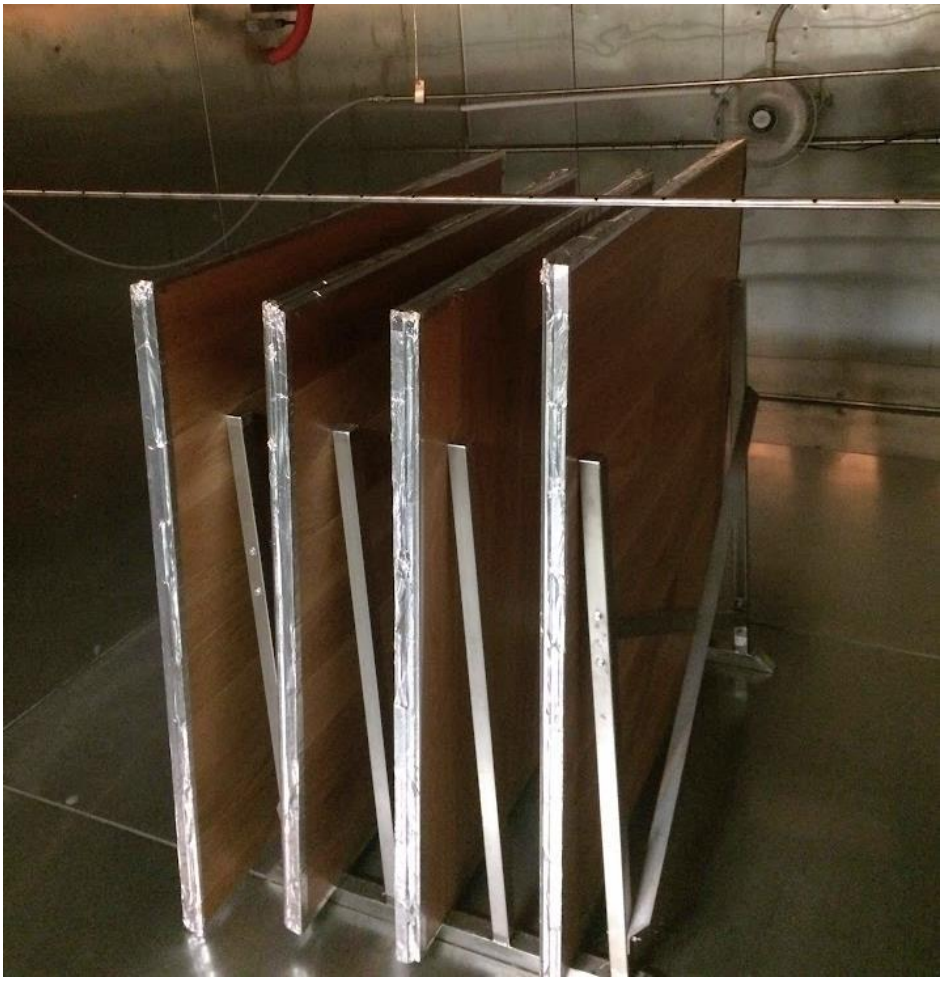

Figure 1. Specimens mounted on a back to back configuration in large chamber

c. Technical details

All experiment technical details are found in the specimen test report, appendix 1.

d. Air sampling

After 16 to 20 hours of exposure, air inside the chamber is drawn through sampling ports via a sampling train consisting of an air sampling pump and a collecting media. Sampling is done using calibrated pumps at a flow rate of 1.0 liter per minute. Formaldehyde is trapped in a midget impingers containing 1%w/w sodium bisulfite aqueous solution. A total of 60 litres of contaminated air is sampled from two different sampling ports (Port A & Port B).

e. Analysis

The formaldehyde trapped in the impingers is analyzed according to NIOSH 3500 and based on the chromotropic acid test procedure using spectrophotometer (colorimetric method). Aliquots of unknown concentration are compared to a calibration curve and results are thus calculated. An aliquot of a known concentration is also compared and calculated following the same procedure for quality assurance.

10. RESULTS AND DISCUSSION

a. Formaldehyde emission results.

Formaldehyde results are presented in table 1. The results are expressed in concentration which correspond to a quantity of formaldehyde over the sampled volume. Emission rates are also presented in table 1, this corresponds to a mass of formaldehyde emitted from a square meter of product in an hour.

Table 1. Formaldehyde concentrations and emission rates from samples submitted to analysis.
Test report ID : G19-02LC

Volatile organic compound	Concentration ppm			Emission Rates mg/(m^2.h)
	Sampling port	At test	Corrected (To 25°C and 50% RH)	Corrected (To 25°C and 50% RH)
Formaldehyde	A	0.01	0.01	**0.011**
	B	0.01	0.01	
Reported value	**Average**	**0.01**	**0.01**	

11. CONCLUSION

Samples submitted to analysis showed relatively low emission values. In fact, the engineered flooring specimen revealed emissions values similar to those found in the background. One could conclude that the product submitted to analysis easily meets the GREENGUARD requirements which has been established to 0.05 ppm.

12. REFERENCES

ASTM E1333-14 *Standard Test Method for Determining Formaldehyde Concentrations in Air and Emission Rates from Wood Products Using a Large Chamber*

APPENDIX I -
SPECIMEN TEST REPORT G19-02LC

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