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October 16th 2018

Our reference: 809785/hbk

Evaluation of emission test results of materials for storage configuration 3

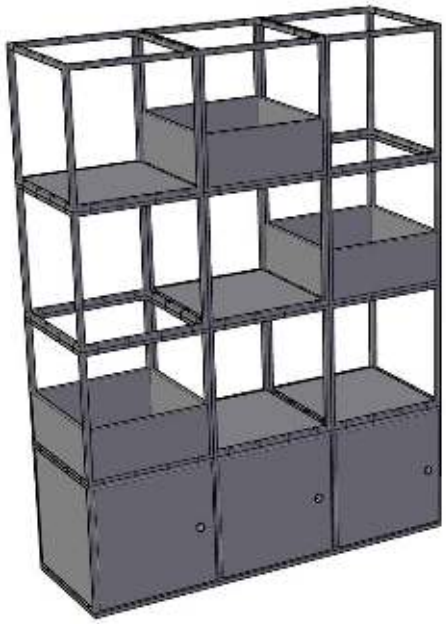
For emission testing of materials for manufacture of storage cabinets, the following test method was applied: ANSI/BIFMA M7.1-2011 (R2016) – Standard test method for determining VOC emissions from office furniture systems, components and seating. Results of material emissions are shown in Table 1.

Table 1. Emission test results from storage materials after 168 hours (7 days), emission factor approach.

Emission Factor (E)	Basic Module PA6 (Report 809785T1-AB)	Lacquered MDF (Report 809785T3-AB)
$TVOC_{toluene}$ (mg/m²h)	0.001	1.6
Formaldehyde (µg/m²h)	0.8	23
Formaldehyde (ppm)*	0.68	18.7
Total aldehydes (µmol/m²h)	0.14	4.0
Total aldehydes (ppm)*	3.49	97.6
4-Phenylcyclohexene (µg/m²h)	< 1	< 1

* E (ppm) = (E (µg/m²h) x 24,45) / MW (g/mol)

The storage system "Configuration 3" is composed of the tested materials Basic module and lacquered MDF shown in the Figure below.



The direct scaling approach from component assemblies was applied for calculation of the building concentration in the standard office, according to ANSI/BIFMA M7.1-2011(2016) described in chapter 11.6.

The storage total external area of the materials were calculated and the respective ratios must be used for calculation of the building concentration of the storage unit.
Unexposed surfaces to the indoor air, including surfaces covered by adjacent material, were not included in area calculations.

Storage configuration 3 total exposed surface area is 5.55 m^2:
Total exposed area (Basic module) is 1.40 m^2, ratio 0.2527 (25.27 % of total surface)
Total exposed area (Lacquered MDF) is 4.15 m^2, ratio 0.7473 (74.73 % of total surface)

Table 2: Parameters for calculation based on standard office workstations and materials from the storage unit "Configuration 3".

	Open plan office workstation	Private office workstation
Storage area - Standard office* (m^2)	4.57	10.55
Area of Basic module PA6 (m^2)	1.155	2.666
Area of Lacquered MDF (m^2)	3.415	7.884
Modelled air flow Q_o* (m^3/h)	15.02	34.68

* ANSI/BIFMA M7.1-2011(2016) Table 11.1 Standard office environmental parameters

The material surfaces applied for calculation of the emission rate for each component in the fully assembled storage, was calculated by the emission rates (E) (Table 1) and the areas (A) (Table 2) using the following formulas:

Emission rate for each analyte (R):

$$R_{ca}(t) = E(t) \times A_{material}$$

The estimated building concentration (C_{bldg}):

$$C_{bldg}(t) = \frac{R_{tot}(t)}{Q_o}$$

The resulting building concentrations are shown in table 3.

Table 3: Building concentrations from the storage unit "Configuration 3".

	Open plan office workstation	Private office workstation	Emission limits Systems furniture*
$TVOC_{toluene}$ (mg/m^3)	0.4	0.4	≤ 0.5 mg/m^3
Formaldehyde (ppm)	4.3	4.3	≤ 50 ppb
Total aldehydes (ppm)	22.5	22.5	≤ 100 ppb
4-Phenylcyclohexene (mg/m^3)	< 0.001	< 0.001	≤ 0.0065 mg/m^3

* ANSI/BIFMA M7.1-2011(2016) Table A1.1 Limits of indoor air concentrations due to emissions from systems furniture at 168 hours (7 days).

In conclusion, the emissions from the storage unit "Configuration 3" are below the maximum allowable emission limits and is hence low emitting furniture.
The emissions from storage module "Configuration 3" to the open plan and private offices are compliant with LEED v4 for interior design and construction.

Best regards,

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