Report No/ Rapor No :	2025061772
Applicant/Deney Sahibi **:**	**ASPEN YAPI VE ZEMİN SİSTEMLERİ SAN. VE TİC. AŞ.**
Applicant Address/ Adres:	Hamidiye Mah. Cendere Cad. Porta Vadi T2 Blok No:103/1 Kat:2/14 34408 Kağıthane / İSTANBUL
Contact Person / Yetkili :	Ferhat ÖZBAŞOĞLU
Contact Telephone / Telefon:	(0212) 318 88 88
Contact e-mail / E-Posta:	fozbasoglu@aspen.com.tr
Sample Accepted on / Numune Tarihi :	29.05.2025
Report Date / Rapor Tarihi :	17.06.2025
Total number of pages/Rapor Sayfa :	10 Pg
Sample ID :	**"Dendro" Branded "Oak Engineered Parquet"**

	TEST/ INSPECTION	DIRECTIVE	METHOD	RESULT
*	**TVOC TEST**	**The General Product Safety Directive (GPSD) (2001/95/EC)**	**CDPH Standard Method v1.2 (2017) / Standard Method For The Testing And Evaluation Of Volatile Organic Chemical Emissions From Indoor Sources Using Environmental Chambers Version 1.2**	**See Tables**

NOTE: This test/inspection result replaces the conformity assessment, can be presented to official institutions, and used in products and brochures.

Seal

Customer Representative

Merve Nur KIRVELİ

Laboratory Manager

Merve ÖZLÜ

Scope

This method applies to any product category generally used within the envelope of an enclosed indoor environment. The method is applicable to products that can be tested whole or by representative sample in environmental chambers. This includes, as examples, paints, other architectural coatings and finishes, sealants, adhesives, wallcoverings, floor coverings, acoustical ceilings, wood paneling, wall and ceiling insulation used in public and commercial office buildings, schools, residences and other building types.

This method applies to freestanding furniture used in schools and offices by incorporation of an American National Standard Method for furniture VOC emissions. For open-plan office furniture, this method adopts the open-plan office defined in an American National Standard Method for furniture VOC emissions. Private office workstations are not addressed within the current scope of this Standard Method.
This method applies to newly manufactured products before they are used in construction, finishing and furnishing of buildings.

The standard does not apply to structural building products, janitorial products, air fresheners, electronic air cleaners, and other electronic equipment.

This method establishes the procedures for product sample collection, emission testing, indoor concentration modeling, and documentation requirements associated with quantifying the emissions of volatile organic chemicals from various sources using environmental chambers.
This method defines scenarios for a standardized school classroom (including pupil desks and chairs) and a typical private office environment (for building products other than office furniture). These scenarios include the dimensions, occupancy and ventilation characteristics of the space and the amounts of major products contained within the space.

This method establishes performance criteria for specific chemicals of interest. These criteria are specifically for evaluating potential chronic health risks from inhalation exposures of vapor phase organic chemicals emitted by the products covered within the scope.

This method includes requirements on laboratory quality management system and measure uncertainty estimation.

The indoor concentration modeling scenarios and the performance criteria may be applied to emission test results obtained from other recognized test methods.

This method may be utilized as the basis for product claims and for certification/verification programs. General guidelines are provided for incorporation of the method into such programs.

This method specifies target chemicals and their maximum allowable concentrations. However, this method does not purport to address all of the safety, health, comfort (e.g odor) and performance concerns, if any associated with its use. Users of this method may establish additional safety, health, comfort and other performance conditions and determine the applicability of regulatory requirements prior to use.

Adress: Mahmutbey Mah. Dilmenler Cad, No:2 Bağcılar İstanbul Türkiye
Contact: www.laboratuvar.com e-mail: info@laboratuvar.com

Conditioning of Test Specimens

Principle

The principle of conditioning is to maintain test specimens in clean air at controlled conditions of temperature and RH for a defined period of 10 days before initiating a 96-hour test in a small-scale test chamber at more precisely controlled conditions. In this manner, the final VOC measurements determining the suitability of a product are made after the specimen has been exposed for a total of 14 days. Fourteen days represents an early, but realistic, time for first occupancy after new building construction or major renovation.

At the 14-day time point, the emissions of VOCs from most products primarily will be dependent upon the characteristic diffusion rate of the VOCs within the material and the concentration of the VOCs in the bulk material and should change slowly from day to day and from week to week. Thus, minor differences in product sample age at the time of collection should be partially or wholly compensated for by use of a 10-day conditioning period and any minor surface contamination not directly related to the content of VOCs in the bulk material should be eliminated. Also, the potential effect of external mass transfer resistance on the emission rates of most VOCs should be diminished substantially after 10 days of conditioning. Incorporation of conditioning into a product testing method is described in ISO 16000-9:2006, Section 12.3.

Test Conditions

The test shall be conducted at the conditions and within the limits specified in Table 3-1. Standard conditions for the purpose of calibrating flow measurement devices and calculating all flow rates shall be 25 °Cand one atmosphere pressure (101.3 kPa). The chamber volume shall be between 50 L and 1 m^3 . The chamber shall be ventilated at 1 ± 0.05 air changes per hour.

The loading factor shall be optimized to produce an area specific flow rate approximately equal to the area specific flow rate for the product in the modeled scenarios. For example, a value of 0.5 m^2 of exposed specimen surface area per m^{-3} chamber volume results in an area specific flow rate of 2 m^3 h^{-1} m^{-2} (m h^{-1}), which is close to the value for many materials in both the classroom and private office scenarios. A loading factor of 0.3 to 1.0 m^2 m^{-3} is allowed for all materials. Specimen sizes are to be adjusted according to the chamber volume to achieve the specified loading factors.

Table 3-1 Chamber conditions for 96-h test period

Parameter	Symbol	Units	Value
Chamber Volume	V	m^3	0.05 - 1.0
Loading Factor	L	m^2 m^{-3}	0.3 - 1.0
Air Change Rate	A	h^{-1}	1.0 ± 0.05
Area Specific Flow Rate	q_A	m h^{-1}	1.0 - 3.3
Temperature	T	°C	23 ± 1[2]
Relative Humidity	RH	%	50 ± 5[2]

Duration

The chamber test shall last 96 hours. Sealing of the chamber lid/door following insertion of the product specimen into the chamber establishes the starting time for the chamber test, following 10 days of conditioning.

Adress: Mahmutbey Mah. Dilmenler Cad, No:2 Bağcılar İstanbul Türkiye
Contact: www.laboratuvar.com e-mail: info@laboratuvar.com

Background concentrations in the empty chamber ventilated at 1.0 air changes per hour shall not exceed 2 µg m^{-3} for any individual VOC, and 2 µg m^{-3} for TVOC.

Air Sampling

Sampling Schedule
Chamber air samples shall be collected at average elapsed times of 24, 48 and 96 hours after initiating the chamber test.

At 24 and 48 hours, only samples for formaldehyde and TVOC analyses are required to be collected. These first measurements, when compared to the corresponding 96-h measurements, are used to determine whether the chamber concentrations remained relatively constant or declined slowly throughout the test. Temporal variations or fluctuations outside of the normally expected range (e.g., ± 25%) likely indicate that a test parameter was uncontrolled or an analysis was incorrect. In this case, the cause of the variations shall be determined and the test repeated if necessary.

At an average time of 96 ± 2 hours after initiating the test, samples for the full characterization of VOC emissions shall be collected.

TVOC Method
Because the TVOC results are dependent upon the details of the analytical method and because there are substantial variations in the TIC response of VOCs with different chemical functionality, the analysis of TVOC is a semi-quantitative measure that is inherently less accurate than the calibrated measurement of individual VOCs.

Formaldehyde and *acetaldehyde* are not included in *TVOC* calculations.

The TVOC method shall span a retention time interval consistent with the analysis of individual VOCs. Per definition of TVOC used in this Method, the mass range is n pentane through n-heptadecane (i.e., C5 – C17). Use toluene as the reference compound for calculating TVOC mass.

Target Chemicals, Maximum Allowable Concentrations, And Iaq Concentration Modeling

IAQ Concentration Modeling

Principle
The purpose of IAQ concentration modeling is to convert the measured VOC emission rates into estimated airborne concentrations that are relevant to potential indoor inhalation exposures of building occupants. The calculation is accomplished using a steaJKdy-state mass-balance model with several simplifying assumptions described in Section 3.10. The calculation requires inputs for the emission factor of a VOC emitted by a product and the flow rate of outdoor air per unit amount of product.

Adress: Mahmutbey Mah. Dilmenler Cad, No:2 Bağcılar İstanbul Türkiye
Contact: www.laboratuvar.com e-mail: info@laboratuvar.com

Table 4-1 Target CREL VOCs and their maximum allowable concentrations

No.	Compound Name	CAS No.	Allowable Conc.[a] (µg/m³)
1	Acetaldehyde	75-07-0	70.0
2	Benzene	71-43-2	1.5[b]
3	Carbon disulfide	75-15-0	400
4	Carbon tetrachloride	56-23-5	20
5	Chlorobenzene	108-90-7	500
6	Chloroform	67-66-3	150
7	Dichlorobenzene (1,4-)	106-46-7	400
8	Dichloroethylene (1,1)	75-35-4	35
9	Dimethylformamide (N,N-)	68-12-2	40
10	Dioxane (1,4-)	123-91-1	1500
11	Epichlorohydrin	106-89-8	1.5
12	Ethylbenzene	100-41-4	1000
13	Ethylene glycol	107-21-1	200
14	Ethylene glycol monoethyl ether	110-80-5	35
15	Ethylene glycol monoethyl ether acetate	111-15-9	150
16	Ethylene glycol monomethyl ether	109-86-4	30
17	Ethylene glycol monomethyl ether acetate	110-49-6	45
18	Formaldehyde	50-00-0	9[c]
19	Hexane (n-)	110-54-3	3500
20	Isophorone	78-59-1	1000
21	Isopropanol	67-63-0	3500
22	Methyl chloroform	71-55-6	500
23	Methylene chloride	75-09-2	200
24	Methyl t-butyl ether	1634-04-4	4000
25	Naphthalene	91-20-3	4.5
26	Phenol	108-95-2	100
27	Propylene glycol monomethyl ether	107-98-2	3500
28	Styrene	100-42-5	450
29	Tetrachloroethylene	127-18-4	17.5
30	Toluene	108-88-3	350
31	Trichloroethylene	79-01-6	300
32	Vinyl acetate	108-05-4	100
33-35	Xylenes, technical mixture	108-38-3	350

a) Refer to http://www.oehha.ca.gov/air/chronic_rels/AllChrels.html. All maximum allowable concentrations are one-half the corresponding CREL adopted by Cal/EPA OEHHA with the exception of formaldehyde. For any future changes in the CREL list by OEHHA, values in Table 4.1 shall continue to apply until these changes are published in the Standard Method.
b) Benzene has a CREL of 3 µg/m³ (June 2014); guidance value established by this Standard Method at 30 µg/m³ before March 31th, 2017 and at 1.5 µg/m³ starting from April 15, 2017. See Addendum 2017-01 for details.
c) Formaldehyde has a CREL of 9 µg/m³ (December 2008); guidance value established by this Standard Method at 16.5 µg/m³ before Dec 31th, 2011 and at 9 µg/m³ starting from Jan 1, 2012.

Adress: Mahmutbey Mah. Dilmenler Cad, No:2 Bağcılar İstanbul Türkiye
Contact: www.laboratuvar.com e-mail: info@laboratuvar.com

Table 4-2 Definition of standard *school classroom*

Parameter	Unit of Measure	Parameter Value
Length (40 ft)	m	12.2
Width (24 ft)	m	7.32
Floor (ceiling) area	m^2	89.2
Ceiling height (8.5 ft)	m	2.59
Volume	m^3	231
Windows (4 ft x 4 ft and 4ft x 8 ft)	m^2	4.46
Door (3 ft x 7 ft)	m^2	1.89
Net wall area	m^2	94.6
Occupancy	Unit	27
Outdoor air flow rate[1]	m^3/h	654
Adjusted outdoor air flow rate[2]	m^3/h	191
Effective outdoor air change rate[2]	1/h	0.82

[1.] Based on ASHRAE 62.1-2007, Table 6-1, for classrooms occupied by pupils, ages five and up. The minimum ventilation requirement is 5 L/s-person (10 cfm/person) and 0.6 L/s-m^2 floor area (0.12 cfm/ft^2). The code minimum total flow rate of outdoor air is then 654 m^3 h^1 (182 L/s or 385 cfm). This produces a ventilation rate of 2.8 h^1 for occupied hours.

[2.] As documented in various reports, classroom HVAC systems sometimes do not deliver the required amount of outdoor air for a variety of reasons including poorly designed or overridden controls and lack of maintenance. In addition, HVAC systems may not be started sufficiently early in the school day to achieve a fully ventilated condition prior to the start of class. Therefore for use in this method, average the ventilation over a 168-h week assuming 40 hours of operation at 654 m^3 h^1 (2.8 h^1) and 128 hours of operation with ventilation of only 0.2 h^1 due to infiltration. This yields an average ventilation rate of 0.82 h^1 and an average flow rate of 191 m^3 h^1 (53.1 L/s or 112 cfm).

Table 4-3 Product quantities and specific air flow rates to be used for estimation of VOC concentrations in standard *school classroom*

Product Type	Area or Quantity	Quantity Value	Air Flow Rate Unit	Air Flow Rate
Flooring (all types)	m^2	89.2	m^3/h	2.14
Ceiling (all types)	m^2	89.2	m^3/h	2.14
Wall paint & wallcoverings[1]	m^2	94.6	m^3/h	2.02
Thermal insulation - Ceiling	m^2	89.2	m^3/h	2.14
Thermal insulation - Wall	m^2	94.6	m^3/h	2.02
Thermal insulation - Ceiling & Wall	m^2	183.8	m^3/h	1.04
Wall base (10-inch)	m^2	9.68	m^3/h	19.7
Visual aid boards[2]	m^2	11.9	m^3/h	16.1
Desk (pupil)	Unit	27 ea	m^3/h	7.07
Seating (pupil)	Unit	27 ea	m^3/h	7.07

[1.] The net wall area is 94.6 m^2 based on the total wall area minus the area of one door and two windows.

[2.]. Area of visual aid boards is assumed to be 1.22 m by 9.75 m (4 ft by 32 ft) based on typical classroom layouts and traditional markerboard/chalkboard materials. Unique, specialty visual aid board products (e.g. with multimedia projection capabilities, etc.) that are restricted in size by the manufacturer may justify different area values. Any deviations from the area specified in Table 4.3 shall be stated in reports and public claims of compliance.

Adress: Mahmutbey Mah. Dilmenler Cad, No:2 Bağcılar İstanbul Türkiye
Contact: www.laboratuvar.com e-mail: info@laboratuvar.com

Table 4-4 Definition of standard *private office*

Parameter	Unit of Measure	Parameter Value
Length (12 ft)	m	3.66
Width (10 ft)	m	3.05
Floor (ceiling) area	m^2	11.15
Ceiling height (9 ft)	m	2.74
Volume	m^3	30.6
Window (4 ft x 4 ft)	m^2	1.49
Door (3 ft x 7 ft)	m^2	1.89
Net wall area	m^2	33.4
Occupancy	Unit	1
ASHRAE Outdoor air flow rate[1]	m^3/h	20.7
Effective outdoor air change rate[1]	1/h	0.68

[1.] Based on ASHRAE 62.1-2007, Table 6-1, for offices. The minimum ventilation requirement is 2.5 L/s-person (5 cfm/person) and 0.3 L/s-m^2 floor area (0.06 cfm/ft^2). The minimum total flow rate of outdoor air is then 20.7 m^3 h^1 (5.76 L/s or 12.2 cfm). This produces a ventilation rate of 0.68 h^1 for occupied hours.

Table 4-5 Product quantities and specific air flow rates to be used for estimation of VOC concentrations in a standard *private office*

Product Type	Area Unit	Area	Air Flow Rate Unit	Air Flow Rate
Flooring (all types)	m^2	11.1	m^3/h	1.86
Ceiling (all types)	m^2	11.1	m^3/h	1.86
Wall paint & wallcoverings[1]	m^2	33.4	m^3/h	0.62
Thermal insulation - Ceiling	m^2	11.1	m^3/h	1.86
Thermal insulation - Wall[2]	m^2	ND	m^3/h	ND
Thermal insulation - Ceiling & Wall[2]	m^2	ND	m^3/h	ND
Wall base (4-inch)	m^2	1.27	m^3/h	16.3
Door & other millwork	m^2	1.89	m^3/h	11.0
Window treatments	m^2	1.49	m^3/h	13.9

[1.] The net wall area is 33.4 m^2 based on the total wall area minus the area of one door and one window.
[2.] The material area for thermal insulation in walls has not been fully defined (ND).

Measurement Uncertainty

Measurement uncertainty (accuracy) and precision limits for test chamber conditions and test results are listed in Table 5-1.

Table 5-1 Guidelines for measurement uncertainty and precision of chamber conditions and VOC measurements

Parameter	Measurement Uncertainty	Precision
Temperature, °C	±0.5	±1.0
Relative humidity, %	±5	±5
Air flow rate, %	±3	±5
Exposed area of test specimen, %	±1	±2

Adress: Mahmutbey Mah. Dilmenler Cad, No:2 Bağcılar İstanbul Türkiye
Contact: www.laboratuvar.com e-mail: info@laboratuvar.com

Time, %	±1	±2
VOC Concentration, %RSD[1]	--	±15
VOC Emission factor, %RSD[1]	--	±20
1. %RSD= Relative standard deviation = estimate of the standard deviation / mean x 100%		

Test Result

Conditioning	
Time	240 h
Temperature	23 ± 2 °C
Humidity	50 ± 10 % RH

Test Parameter	
Time	96 h
Temperature	23 °C
Atmosphere Pressure	101.3 kPa

Compound	**Classroom**			**Private Office**		
	24 Hours	48 Hours	96 Hours	24 Hours	48 Hours	96 Hours
VOC[a]	N.D			N.D		
TVOC	≤0.5 mg/m^3			≤0.5 mg/m^3		

N.D: *Not Detected*
Values below the limit value are reported as Not Detected.

TVOC Method Result

Compound	CAS #	Result
Formaldehyde	75-07-0	N.D
Acetaldehyde	50-00-0	N.D

N.D: *Not Detected*
Values below the limit value are reported as Not Detected.

Adress: Mahmutbey Mah. Dilmenler Cad, No:2 Bağcılar İstanbul Türkiye
Contact: www.laboratuvar.com e-mail: info@laboratuvar.com

Lower quantitation limits of VOCs measured in 96-hour air samples

Table A1 - Compound List/Result

Compound	CAS #	Result
		96 Hours
1,1-Dichloroethene	75-35-4	**N.D.**
Benzene	71-43-2	**N.D.**
1,2-Dibromo-3-chloropropane	96-12-8	**N.D.**
1,4-Dichlorobenzene	106-46-7	**N.D.**
2,2-Dichloropropane	594-20-7	**N.D.**
Toluene	108-88-3	**N.D.**
m-Xylene	108-38-3	**N.D.**
o-Xylene	95-47-6	**N.D.**
sec-Butylbenzene	135-98-8	**N.D.**
tert-Butylbenzene	98-06-6	**N.D.**
Hexachlorobutadiene	87-68-3	**N.D.**
p-Isopropyltoluene	99-87-6	**N.D.**
Naphthalene	91-20-3	**N.D.**
n-Propylbenzene	103-65-1	**N.D.**
1,2,3-Trichlorobenzene	87-61-6	**N.D.**
1,2,4-Trichlorobenzene	120-82-1	**N.D.**
1,2,4-Trimethylbenzene	95-63-6	**N.D.**
1,3,5-Trimethylbenzene	108-67-8	**N.D.**
Bromochloromethane	74-87-3	**N.D.**
cis-1,3-Dichloropropene	10061-01-5	**N.D.**
trans-1,3-Dichloropropene	10061-02-6	**N.D.**
Bromoform	75-25-2	**N.D.**
Carbon tetrachloride	56-23-5	**N.D.**
Dibromochloromethane	124-48-1	**N.D.**
1,1-Dichloroethane	75-34-3	**N.D.**
1,2-Dichloroethane	107-06-2	**N.D.**
trans-1,2-Dichloroethene	156-60-5	**N.D.**
1,2-Dichloropropane	78-87-5	**N.D.**
Methylene chloride	75-09-2	**N.D.**
1,1,2,2-Tetrachloroethane	79-34-5	**N.D.**
Tetrachloroethene	127-18-4	**N.D.**
1,1,2-Trichloroethane	79-00-5	**N.D.**
Trichloroethene	79-01-6	**N.D.**
Chlorobenzene	108-90-7	**N.D.**
Chloroform	67-66-3	**N.D.**
Bromobenzene	108-86-1	**N.D.**
Bromodichloromethane	75-27-4	**N.D.**
n-Butylbenzene	104-51-8	**N.D.**
2-Chlorotoluene	95-49-8	**N.D.**
4-Chlorotoluene	106-43-4	**N.D.**

Adress: Mahmutbey Mah. Dilmenler Cad, No:2 Bağcılar İstanbul Türkiye
Contact: www.laboratuvar.com e-mail: info@laboratuvar.com

1,2-Dibromoethane	106-93-4	**N.D.**
Dibromomethane	74-95-3	**N.D.**
1,2-Dichlorobenzene	95-50-1	**N.D.**
1,3-Dichlorobenzene	541-73-1	**N.D.**
cis-1,2-Dichloroethene	156-59-2	**N.D.**
1,3-Dichloropropane	142-28-9	**N.D.**
Ethylbenzene	100-41-4	**N.D.**
Isopropylbenzene	98-82-8	**N.D.**
Styrene	100-42-5	**N.D.**
1,1,1,2-Tetrachloroethane	630-20-6	**N.D.**
1,1,1-Trichloroethane	71-55-6	**N.D.**
1,2,3-Trichloropropane	96-18-4	**N.D.**
p-Xylene	106-42-3	**N.D.**
1,1-Dichloropropene	563-58-6	**N.D.**

N.D: *Not Detected*
Values below the limit value are reported as Not Detected.

The results of this test report are valid for all colour options of the tested parquet type, provided that the surface coating and/or other parquet properties remain the same.

Sample Images

*****End Of Report*****

Adress: Mahmutbey Mah. Dilmenler Cad, No:2 Bağcılar İstanbul Türkiye
Contact: www.laboratuvar.com e-mail: info@laboratuvar.com