



SP/01350 Update: Current Progress and Future Needs

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Outline

- ◆ **Need & Strategy for Updating SP/01350**
- ◆ **Initial Update**
- ◆ **Next Generation**

Need for Update

◆ Update testing protocols

- *Revise in accordance with current best practices*
- *Allow shorter material “conditioning” times for selected product categories, as appropriate*
- *Expand categories of materials for testing*
- *Consolidate flooring categories*
- *Update exposure model parameters (e.g., default material areas, ventilation rates, etc.)*
- *Advise on alternate exposure scenarios*

◆ Improve health protection

- *Incorporate updated health guidance, notably the new CREL for formaldehyde*
- *Reevaluate truncated target list for carpet*
- *Consider addition of exposure limits for new chemical classes (e.g., asthmagens, semi-VOCs)*

Strategy for Update

◆ Step 1 – Initial Update (SM2009)

- *Create a sound base for next generation version without losing the continuity with SP/01350*
 - ✓ *Document clean-up and restructure*
 - ✓ *QA/QC section*
 - ✓ *Guidelines on use of SM 2009 as basis for a building product claim*
- *Address immediate needs of SP/01350 users*
 - ✓ *Low-emitting materials criteria (CHPS, LEED, etc.)*
 - ✓ *Residential scenario*
- *Reflect up-to-date scientific information/knowledge*
 - ✓ *Adoption of new CRELs*
 - ✓ *Reference to most recent ASHRAE ventilation standards*
- *Revise in accordance with current best practices*

Strategy for Update

◆ Step 2 - Next Generation Revision (2010)

- *Complete version addressing update needs identified per April 2009 announcement*
 - ✓ *Expand categories of materials for testing and modeling*
 - ✓ *Consider addition of exposure limits for new chemical classes (e.g., asthmagens, semi-VOCs)*
 - ✓ *Advise on alternate exposure scenarios*
 - ✓ *Reevaluate truncated target list for carpet*
 - ✓ *Allow shorter material “conditioning” times for selected product categories, as appropriate*
 - ✓ *Consolidate flooring categories*

Outline

- ◆ Needs and Strategy for Updating SP/01350

- ◆ **Initial Update (SM2009)**
 - *Document change log*
 - *Specific topics of interests*
 - *Formaldehyde – maximum allowable concentrations*
 - *New single-family residence scenario*
 - *Adhesives, caulks & sealants evaluation*
 - *Freestanding furniture testing and evaluation*
 - *Use of **SM2009** as basis for a building product claim*

- ◆ Next Generation

Title and Overall Structure Change

	SM2009 (Draft)	SP2004
Title	Standard method of the testing and evaluation of volatile organic chemical emissions from various sources using environmental chambers	Standard practice for the testing of volatile organic emissions from various sources using small-scale environmental chambers.
Overall Structure	<p>Section 5 Quality assurance and quality control</p> <p>Section 6 Required elements of the laboratory test report</p> <p>Section 7 Testing of freestanding furniture</p> <p>Section 8 Guidelines for use of standard method as basis for a building product claim</p>	<p>Section 5 Required elements of the laboratory test report</p> <p>Section 6 Acceptable alternatives to the practice</p> <p>Section 7 Tables</p> <p>Section 8 Useful Information</p> <p>Section 9 Acceptable Emission Testing for Carpet</p> <p>Addendum 2004-01 for Formaldehyde & Acetaldehyde</p>

Collection, Packaging, Shipment & Documentation of Product Samples

◆ Allowable sample age

➤ *Dry Products*

- ✓ *Collected within 7 days of manufacture*
- ✓ *Testing within 5 weeks of production*

➤ *Containerized Products*

- ✓ *Received by laboratory within 3 months of production*
- ✓ *Testing within 4 months*

◆ Sample collection procedure refined

◆ Relative humidity specifications for sample storage added –maximum 65% RH

Sample Preparation, Testing, Chemical Analysis and Calculations

◆ Sample preparation steps generalized

◆ Environmental Chamber Testing

- *Chamber size range is now 50 L to 1 m³*
- *Glass chamber option has been eliminated*
- *Alternate chamber cleaning methods are allowed*
- *Temperature and RH requirement during 96-hr test*
 - ✓ *Temperature – 23 ± 1 °C at least 90% of the time, not to exceed 23 ± 2 °C*
 - ✓ *RH – 50 ± 5 % at least 90 % of the test period, not to exceed 50 ± 10 %*

Sample Preparation, Testing, Chemical Analysis and Calculations (cont.)

◆ Chemical Analysis

➤ *TVOC Calculations*

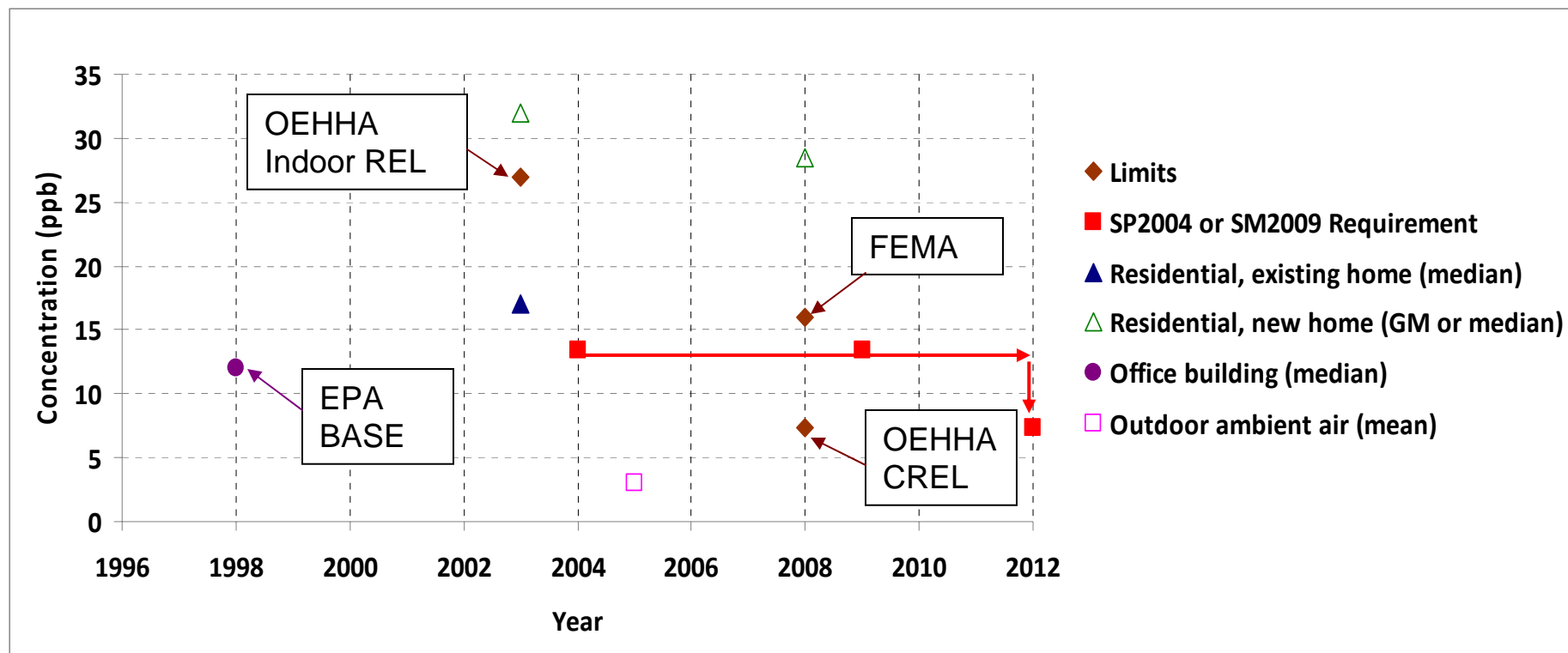
- ✓ *Specifies that TVOC concentrations be calculated using Toluene response factors.*
- ✓ *Alternate TVOC method may be used if fully documented.*

➤ *Calibration Verification*

- ✓ *A calibration standard is to be analyzed with each batch of air samples.*

Maximum Allowable Concentrations

- ◆ Adoption of most recent CREL values (published in Dec. 2008) except formaldehyde.
- ◆ Formaldehyde



References: (1) Offermann et al. 2008; (2) Hodgson and Levin 2003; (3) Weisel et al. 2005;
(4) U.S. EPA <http://www.epa.gov/iaq/base/>; (5) U.S. FEMA <http://www.fema.gov/index.shtm>

New Single-family Residence Scenario

◆ Definition (Table 4.6)

Parameter	Unit of Measure	Parameter Value
Floor area (2,272-ft ²) ¹	m ²	211
Ceiling height (8.5 ft) ²	m	2.59
Volume	m ³	547
ASHRAE Outdoor air flow rate ³	m ³ /h	127
Effective outdoor air change rate ³	1/h	0.23
No. Bedrooms ⁴	Unit	4
No. Full Baths ⁴	Unit	2
No. Other Rooms ⁴	Unit	3

Material and Product Quantities

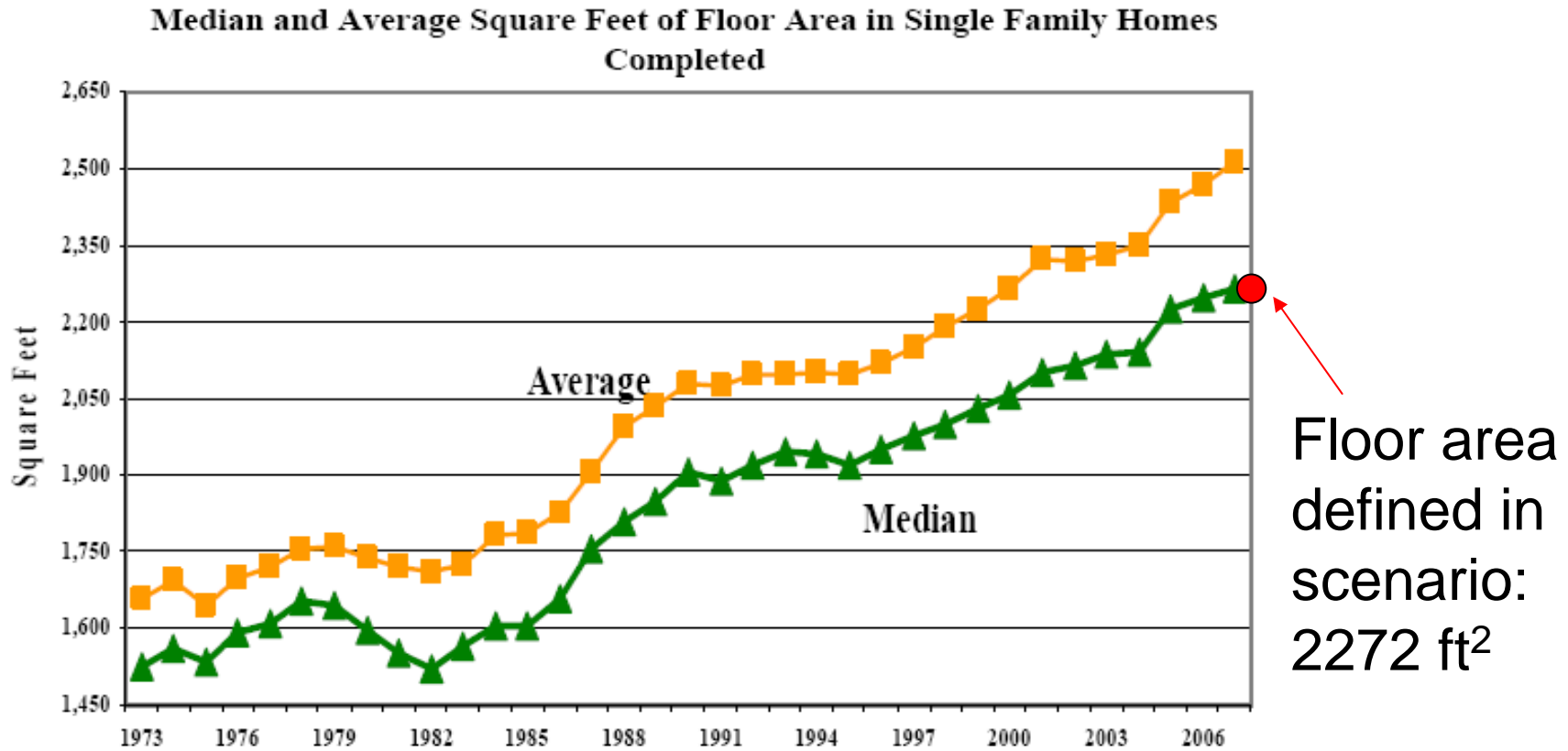
Materials Used in the Construction of a 2,272 Square-Foot Single-Family Home, 2000

13,837 board-feet of lumber	<u>12 interior doors</u>
13,118 square feet of sheathing	<u>6 closet doors</u>
19 tons of concrete	2 garage doors
3,206 square feet of exterior siding material	1 fireplace
3,103 square feet of roofing material	3 toilets, 2 bathtubs, 1 shower stall
<u>3,061 square feet of insulation</u>	3 bathroom sinks
<u>6,050 square feet of interior wall material</u>	<u>15 kitchen cabinets, 5 other cabinets</u>
<u>2,335 square feet of interior ceiling material</u>	1 kitchen sink
226 linear feet of ducting	1 range, 1 refrigerator, 1 dishwasher, 1 garbage disposal,
<u>19 windows</u>	1 washer, 1 dryer
<u>4 exterior doors (3 hinged, 1 sliding)</u>	1 heating and cooling system
<u>2,269 square feet of flooring material</u>	

Data taken from DOE Buildings Energy Data Book:

<http://buildingsdatabook.eren.doe.gov/ChapterView.aspx?chap=2#2>

Floor Area



Source: US Census Bureau. Compiled by NAHB Economics
Note: 2007 estimates are based on data from the first three quarters of the year

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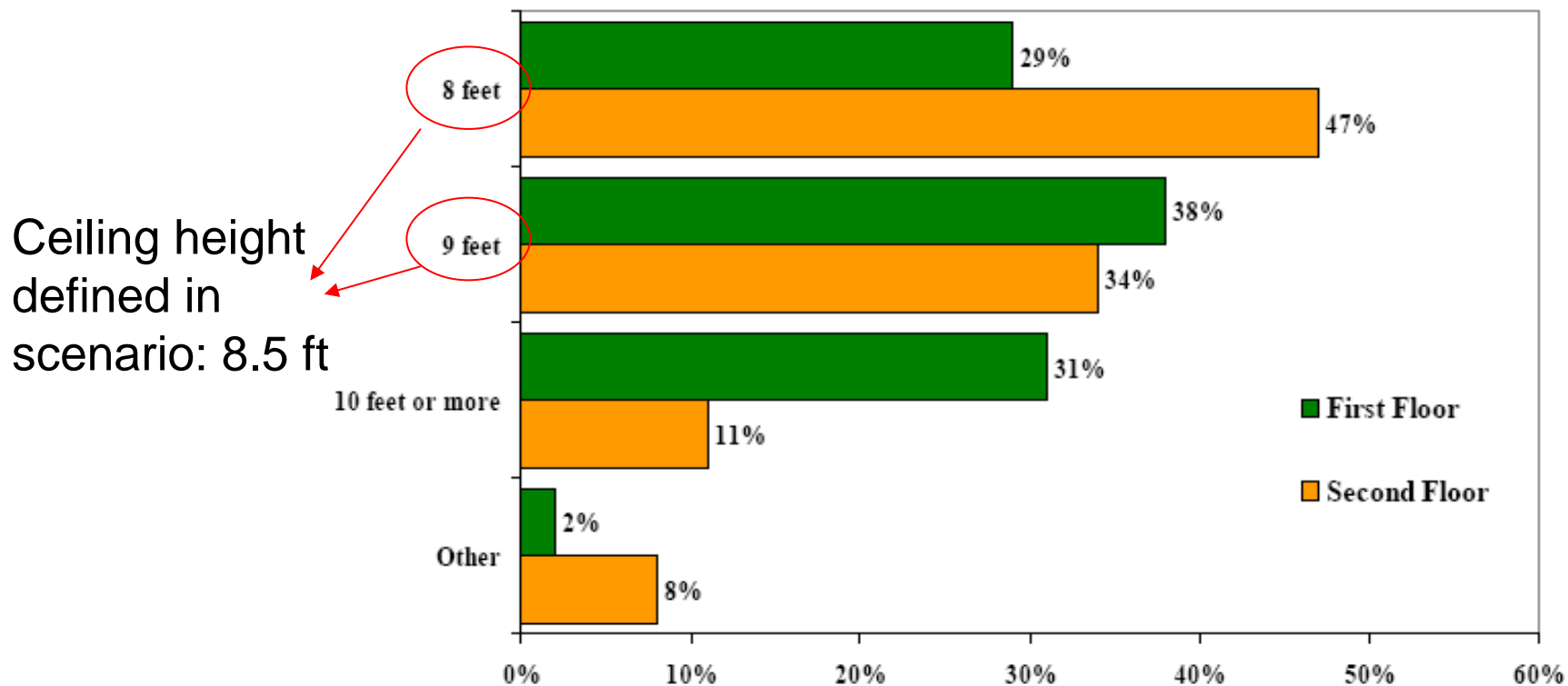
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Graph taken from NAHB website:

http://www.nahb.org/fileUpload_details.aspx?contentTypeID=3&contentID=51299&subContentID=137332

Ceiling Height

**Ceiling Height Preferred on First and Second Floors
(Percent of Respondents)**



Source: NAHB Consumer Preference Survey 2007

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Graph taken from NAHB website:

http://www.nahb.org/fileUpload_details.aspx?contentTypeID=3&contentID=51299&subContentID=137332

Outdoor Air Change Rate

ASHRAE 62.2-2007

CARB Study on New California Homes (Offermann et al., 2008)

Whole Building Ventilation Requirements (cont) Table 4.1a (cfm)					
Number of Bedrooms	0-1	2-3	4-5	6-7	>7
<1500 ft ²	30	45	60	75	90
1501-3000	45	60	75	90	105
3001-4500	60	75	90	105	120
4501-6000	75	90	105	120	135
6001-7500	90	105	120	135	150
>7500 ft ²	105	120	135	150	165

Table 2. Average 24-hour outdoor air exchange rates as calculated from passive PFT trace gas measurements in homes with and without mechanical outdoor air ventilation.

	No Mechanical Outdoor Air Homes (n=73)	DOA Mechanical Outdoor Air Homes (n=13)	HRV Mechanical Outdoor Air Homes (n=5)
Quartile	Outdoor Air Exchange Rate (h ⁻¹)	Outdoor Air Exchange Rate (h ⁻¹)	Outdoor Air Exchange Rate (h ⁻¹)
Minimum	0.09	0.10	0.33
25%	0.18	0.13	0.64
50%	0.25	0.23	0.66
75%	0.35	0.38	1.43
Maximum	5.34	6.24	4.28

Equivalent to 0.23 h⁻¹

School Classroom Scenario

◆ Definition (Table 4.2)

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

Average of 40 h at ASHRAE 62.1-2007 rate and 128 h at 0.2 h⁻¹ for infiltration

was 0.81h⁻¹ in SP2004

School Classroom Scenario (cont.)

◆ Material and Product Quantities (Table 4.3)

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

newly added categories

Office Scenario

◆ Definition (Table 4.4)

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

based on ASHRAE 62.1-2007

same as SP2004

Office Scenario (cont.)

◆ Material and Product Quantities (Table 4.5)

Product Type	Area		Area-Specific Air Flow Rate	
	m ²		m/h	
Flooring (all types)	m ²	11.1	m/h	1.86
Ceiling (all types)	m ²	11.1	m/h	1.86
Wall paint & wallcoverings ¹	m ²	33.4	m/h	0.62
Thermal insulation				
Ceiling	m ²	11.1	m/h	1.86
Wall	m ²	33.4	m/h	0.62
Ceiling & Wall	m ²	44.6	m/h	0.47
Wall cove base (4-inch)	m ²	1.27	m/h	16.3
Door & other millwork	m ²	1.89	m/h	11.0
Window treatments	m ²	1.49	m/h	13.9

newly added categories

Products Not Specifically Addressed in Data Tables

- ◆ Referred in low-emitting material credits
(i.e., CHPS 2009 Criteria EQ 2.2.1 Adhesives & Sealants)
- ◆ Standard application data not readily available
- ◆ Material loading in IAQ concentration modeling shall be determined based on:
 - *Surface area of the system in the selected standard environment, where the product is applied*
 - *Published product's standard application specifications*
- ◆ Parameters used to establish the loading shall be made part of the test report record

Quality Assurance and Quality Control

◆ Mandatory Practices on Quality Management

- *Laboratories shall be maintained under a Quality Management System (QMS).*
- *Minimum element requirements are specified.*
- *QMS performance shall be audited on an annual basis.*
- *Relevant documentation shall be available for review by clients and certification bodies*

◆ Measurement Uncertainty

- *Consistent with ANSI/BIFMA M7.1 specifications*

◆ Recommended Laboratory Practices

- *Compliance with ISO/IEC 17025:2005 - General requirements for the competence of testing and calibration laboratories*
- *Verification of the overall accuracy or bias of chamber testing performance*
- *Participation in proficiency test (PT) programs*

Required Elements of Lab Test Report

- ◆ The following requirements are added:
 - *The sampling and analytical methods (including the TVOC method) used for chamber tests and chemical analysis.*
 - *A photographic image of each test specimen.*
 - *For products for which data on standard applications are not readily available, the manufacturer's published application specifications used to estimate VOC concentrations in IAQ concentration modeling.*

Testing of Freestanding Furniture

◆ Scope

- *Classroom pupil furniture (desk units and seating units)*
- *Open plan office workstations*
- *Office seating*

◆ Test Method

- *ANSI/BIFMA M7.1-2007 chamber test method is recognized*
- *Determination of VOC emission factors at 14 days*
 - ✓ *Projection by application of the power-law model to the measured data at 72h and 168h*
 - ✓ *Average of 72h and 168h emission factors if decay coefficient, b , is >-0.2 and <0.2 (BIFMA e3-2008)*
 - ✓ *Direct measurement at 336h*

Testing of Freestanding Furniture (cont.)

◆ IAQ Concentration Modeling

- *Classroom pupil furniture (desk units and seating units)*
 - ✓ Apply standard classroom scenario defined in SM2009
 - ✓ Assume 27 occupants
- *Open plan office workstations*
 - ✓ Apply standard open-plan office defined in ANSI/BIFMA M7.1
- *Office seating*
 - ✓ Assume 2 identical seating units
 - Low-emitting furniture credit in BIFMA e3-2008:
 - CHPS 2009 Criteria

Modeling Parameters	Admin Area & Teacher		Classroom Pupil	
	Workstn	Seating	Workstn	Seating
Number of units	1	1	27 ^a	27 ^a
Air Flow rate, m ³ /h	15.01 ^b	24.84 ^b	187 ^c	187 ^c
Total workstation area, m ²	21.75 ^d	n/a ^e	n/a ^e	n/a ^e
VOC Emission Guidelines				
Must meet ANSI/BIFMA X7.1	Yes	Yes	Yes	Yes
Must meet CDPH Std Practice guidelines	Yes	Yes, ¼ CREL ^f	Yes	Yes

Guidelines for Use of Standard Method as Basis for a Building Product Claim

◆ Why adding this Section

- *Wide adoption of SP/01350 by verification and certification programs has lead to substantial impact on market*
- *No authority and resources in CDPH to review/monitor these programs*

◆ Contents

- *Laboratory Selection*
- *Breadth of Claim*
- *Modifications of Method*
- *Acceptable Alternative to Method*
- *Manufacturer Quality Control*
- *Product Sample Selection*
- *Retesting*

Thank you for your attention

Your Comments?

Next Generation (2010)

- *Alternate exposure scenarios*
 - ✓ *Healthcare facilities*
- *Expansion of categories of materials for testing and modeling*
 - ✓ *Cleaning and finishing products*
 - ✓ *Cabinets*
- *Health protection improvement*
 - ✓ *Addition of exposure limits for new chemical classes (e.g., semi-VOCs)*
 - ✓ *Reevaluation of truncated target list for carpet*
- *Others*
 - ✓ *Allow shorter material “conditioning” times for selected product categories*
 - ✓ *Consolidate flooring categories*
 - ✓ *etc.*