Shaping Tomorrow's
Built Environment Today
A Global Society for Building Technology

Activities of ASHRAE related to ventilation and airtightness

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2017-2018 ASHRAE President

Extending Our Global Community

56,500+
members

15
Regions

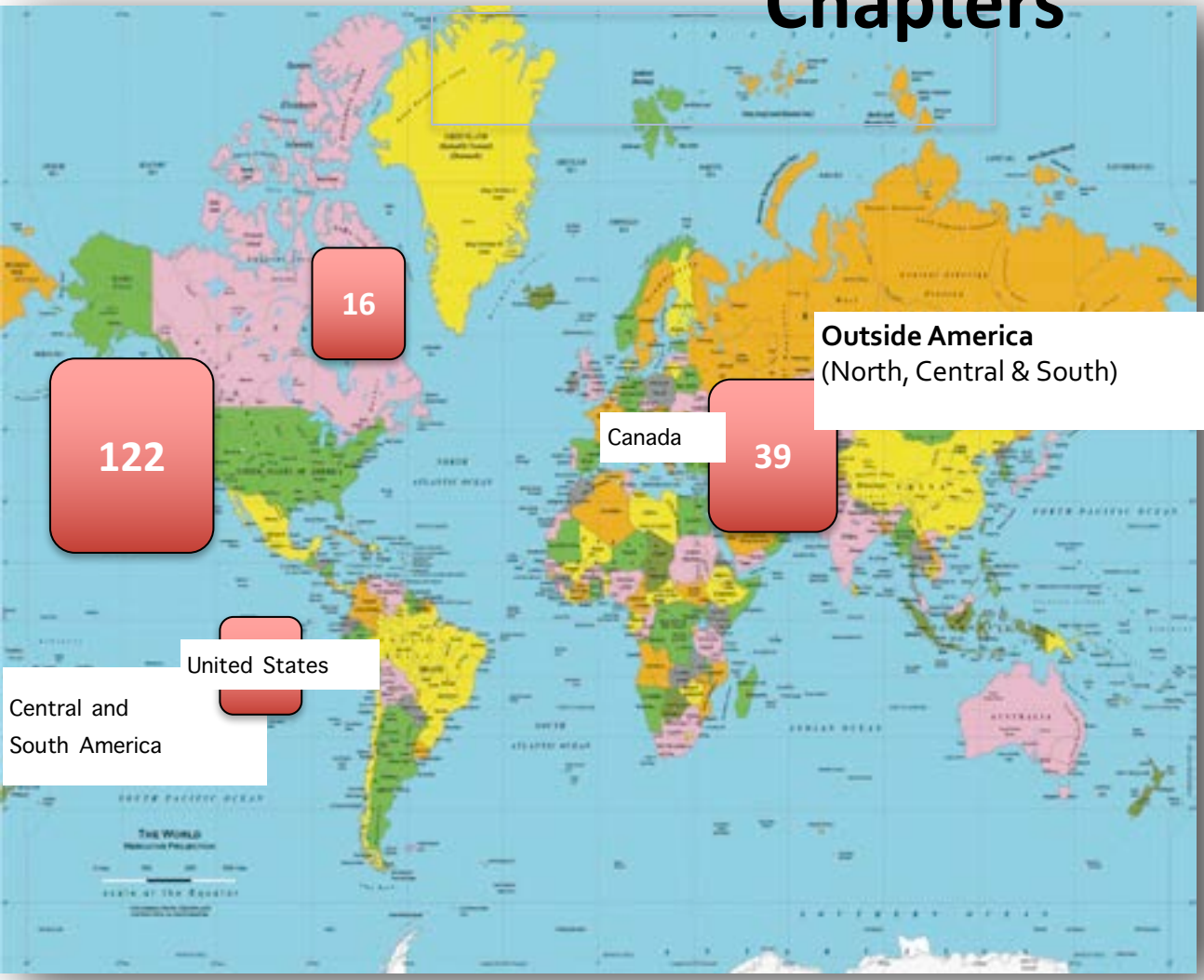
130+
countries

180+
Chapters

11,000+
outside N.A.

280+
Student Chapters

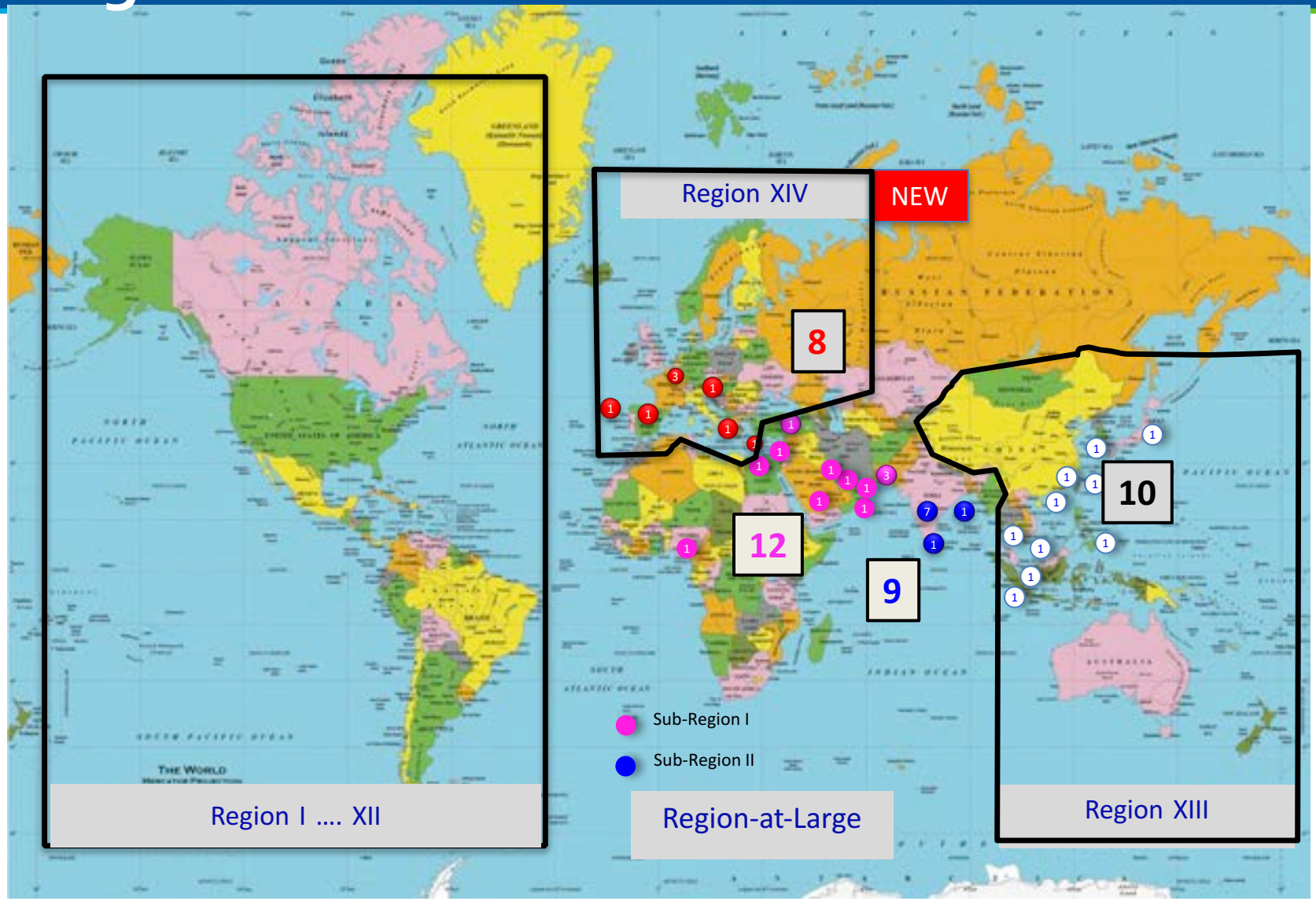
Chapters



Outside America
(North, Central & South)

186 Chapters

Regions


Region XIV
NEW
8
12
9
10
Sub-Region I
Sub-Region II
Region I XII
Region-at-Large
Region XIII

ASHRAE Overview

- Founded in 1894
- 56,000+ volunteer members in more than 130 countries

- Industry Classification
  - Consulting engineers
  - Contractors
  - Manufacturers
  - Manufacturing representatives
  - Government, health and education
  - Design build
  - Architects
- U.S./Canada (45,000+)
- Global (12,000+)

ASHRAE Overview

What We Do

- Serve as pipeline for technical information to members, chapters and companies
- Create standards and technical guidelines to serve built environment
- Offer continuing education for industry professionals
- Serve as networking tool for industry professionals

How We Do It

- 27 standing committees
- 130 standards and guidelines committees
- 100+ technical committees
- 300+ publications
- Six certification programs
- 100+ educational courses
- Research

ASHRAE : Air Tightness-Ventilation

ASHRAE Web-site search:

- Air Tightness 290
- Air leakage 829
- Air Infiltration 904
- Ventilation 5140

How We Do It

- Handbooks
- Standards and guidelines committees
- Technical committees
- Publications
- Educational courses
- Conferences
- Research Activities

SECTION 4.0-LOAD CALCULATIONS AND ENERGY REQUIREMENTS

- 4.1 Load Calculation Data and Procedures
- 4.2 Climatic Information
- 4.3 Ventilation Requirements and Infiltration
- 4.4 Building Materials and Building Envelope Performance
- 4.5 Fenestration
- 4.7 Energy Calculations
- 4.10 Indoor Environmental Modeling
- TRG4 Indoor Air Quality Procedure Development

SECTION 5.0-VENTILATION AND AIR DISTRIBUTION

- 5.1 Fans
- 5.2 Duct Design
- 5.3 Room Air Distribution
- 5.4 Industrial Process Air Cleaning (Air Pollution Control)
- 5.5 Air-to-Air Energy Recovery
- 5.6 Control of Fire and Smoke
- 5.7 Evaporative Cooling
- 5.9 Enclosed Vehicular Facilities
- 5.10 Kitchen Ventilation
- 5.11 Humidifying Equipment

International Standards
Indoor Air Quality - Ventilation

- Standard 119-1988 (RA94)
  - Air Leakage Performance for Detached Single-Family Residential Buildings
- ASHRAE 62.1 and 62.2 -2013
  - Ventilation and indoor air quality
- prEN16798-1 and ISO 17772-1:
  - Indoor environmental input parameters for the design and assessment of energy performance of buildings.
- TR16798-2 and ISO TR 17772:
  - Guideline for using indoor environmental input parameters for the design and assessment of energy performance of buildings.
-

ASHRAE 62.1

TABLE 6-1 MINIMUM VENTILATION RATES IN BREATHING ZONE
(This table is not valid in isolation; it must be used in conjunction with the accompanying notes.)

Occupancy Category	People Outdoor Air Rate R_p	Area Outdoor Air Rate R_a	Notes	Default Values		Air Class
				Occupant Density (see Note 4)	Combined Outdoor Air Rate (see Note 5)	
	cfm/person	cfm/ft^2		#/1000 ft^2	cfm/person	
Office Buildings						
Office space	5	0.06		5	17	1
Reception areas	5	0.06		30	7	1

Total ventilation rate

$$q_{tot} = n \cdot q_p + A_R \cdot q_B$$

$$q_{supply} = q_{tot} / \varepsilon_v$$

- Where
- ε_v = the ventilation effectiveness (EN13779)
- q_{supply} = ventilation rate supplied by the ventilation system
- Q_{tot} = total ventilation rate for the breathing zone, l/s
- n = design value for the number of the persons in the room,
- q_p = ventilation rate for occupancy per person, l/s, pers
- A_R = room floor area, m^2
- q_B = ventilation rate for emissions from building, l/s,m^2

Type of building/ space	Occu-pancy person/m^2	Cate-gory CEN	Occupants only l/s person		Additional ventilation for building (add only one) l/s·m^2			Total l/s·m^2	
			ASH-RAE Rp	CEN	CEN low-polluting building	CEN *Non*-low-polluting building	ASH-RAE Ra	CEN Low Pol.	ASH-RAE
Single office (cellular office)	0,1	A	2,5	10	1,0	2,0	0,3	2	0,55
		B		7	0,7	1,4		1,4	
		C		4	0,4	0,8		0,8	
Land-scaped office	0,07	A	2,5	10	1,0	2,0	0,3	1,7	0,48
		B		7	0,7	1,4		1,2	
		C		4	0,4	0,8		0,7	
Confe-rence room	0,5	A	2,5	10	1,0	2,0	0,3	6	1,55
		B		7	0,7	1,4		4,2	
		C		4	0,4	0,8		2,4	

1 l/s m^2 = 0.2 cfm/ft^2

HEALTH CRITERIA FOR VENTILATION

Minimum 4 l/s/person

ASHRAE 62.2 Residential

$$Q_{tot} = 0.15A_{floor} + 3.5(N_{br} + 1) \qquad \text{(SI)} \quad (4.1b)$$

where

Q_{tot} = total required ventilation rate, L/s

A_{floor} = dwelling-unit floor area, m^2

N_{br} = number of bedrooms (not to be less than 1)

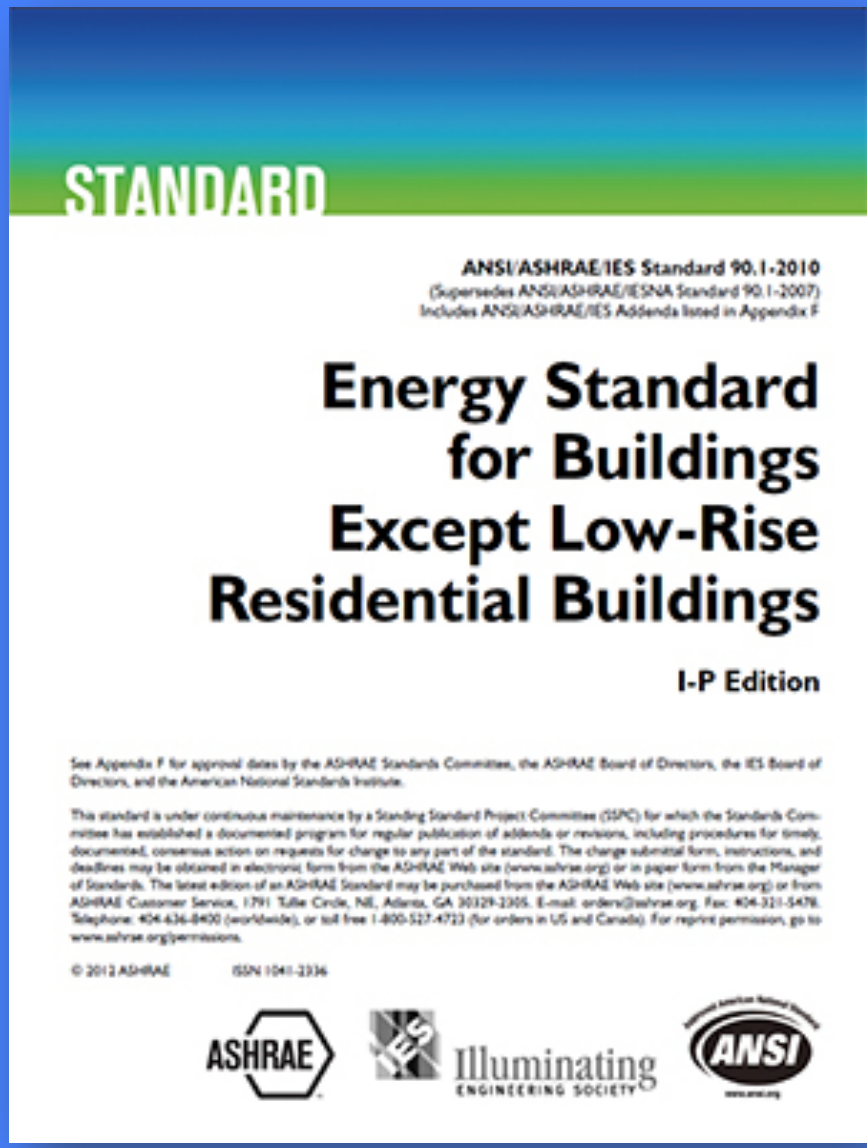
Occupant density:
Two persons (studio, one-bedroom
Plus one person i.e. plus 3.5 L/s for
each additional bedroom

TABLE 4.1b (SI) Ventilation Air Requirements, L/s

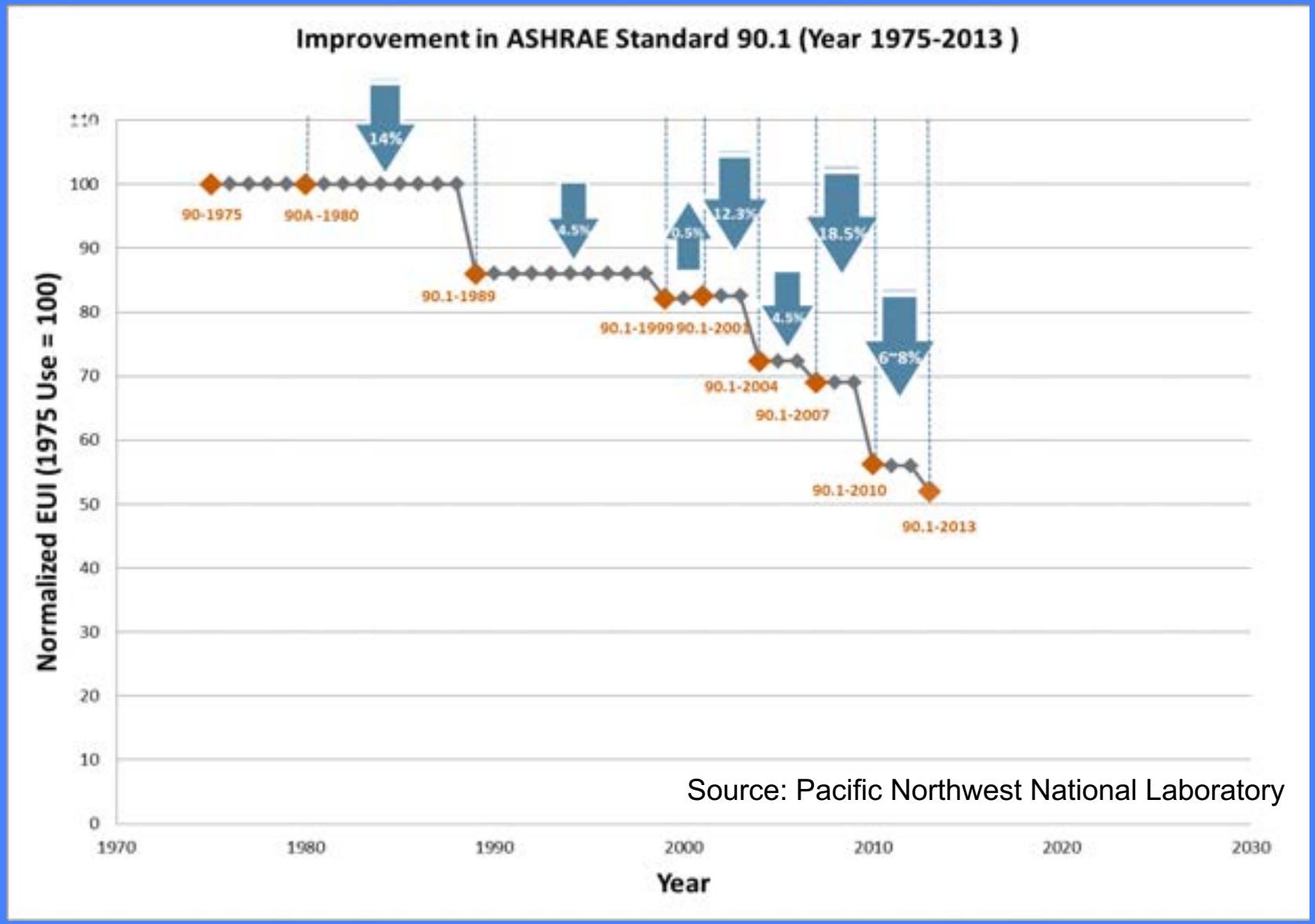
	Bedrooms				
Floor Area, m^2	1	2	3	4	5
<47	14	18	21	25	28
47–93	21	24	28	31	35
94–139	28	31	35	38	42
140–186	35	38	42	45	49
187–232	42	45	49	52	56
233–279	49	52	56	59	63
280–325	56	59	63	66	70
326–372	63	66	70	73	77
373–418	70	73	77	80	84
419–465	77	80	84	87	91

ASHRAE Standard 90.1-2016, *Energy Standard for Buildings Except Low-Rise Residential Buildings*

- Standard 90.1 is a benchmark for commercial building energy codes
- ASHRAE has set forth efforts to address plug load reduction and help design teams account for them when evaluating building loads with Standard 90.1
- "Regulated loads" are no longer included in a summary of energy savings in the Standard 90.1 revision in 2016
- Plug loads will continue to be a critical component in achieving Advanced Energy Design Guides



ANSI/ASHRAE/IES Standard 90.1-2013 -- Energy Standard for Buildings Except Residential Buildings



ANSI/ASHRAE/IES Standard 90.1-2013 -- Energy Standard for Buildings Except Residential Buildings

5.4.3 Air Leakage

5.4.3.1.3 Testing, Acceptable Materials, and Assemblies

The *building* shall comply with whole-*building* pressurization testing in accordance with Section 5.4.3.1.3(a) or with the *continuous air barrier* requirements in Section 5.4.3.1.3(b) or 5.4.3.1.3(c).

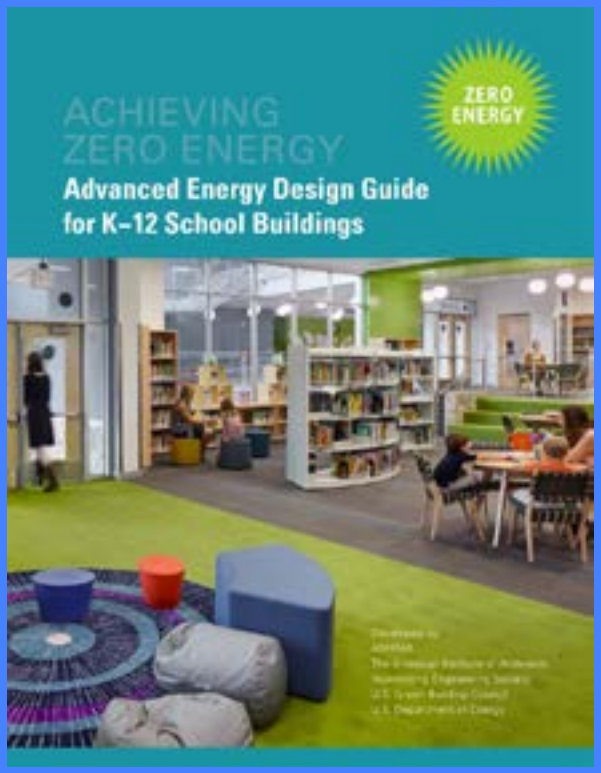
a. Whole-*building* pressurization testing shall be conducted in accordance with ASTM E779 or ASTM E1827 by an independent third party. The measured air leakage rate of the *building envelope* shall not exceed 0.40 cfm/ft2 under a pressure differential of 0.3 in. of water, with this air leakage rate normalized by the sum of the above and below-*grade building envelope* areas of the *conditioned* and *semiheated space.*

ASHRAE Standard 189.1-2014, *Standard for the Design of High-Performance Green Buildings*

- Standard 189.1 provides total building sustainability guidance for designing, building and operating high-performance green buildings
- Has broader scope than Standard 90.1
- Partners with the International Code Council (ICC) for the International Green Construction Code (IgCC)
- Single resource on green buildings "IgCC powered by 189.1" to be published in summer 2018

Extending Our Technology:

Advanced Energy Design Guide for K-12 School Buildings



- **Achieving zero energy is a driving force for ASHRAE**
- **New AEDG for Zero Energy K-12 Schools**
- **Prepared under ASHRAE special project 139**
- **First in a series for achieving zero energy and tailored to the design and creation of zero energy schools**

Thank You

To Join or Renew - www.ashrae.org/join

To Get More Involved - www.ashrae.org/volunteer