

Built environment facing climate change

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ASHRAE 62.1 Indoor Air Quality Procedure vs. ASHRAE 62.2 Approach

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Outline

- Introduction ASHRAE Ventilation Standards
- ASHRAE Standard 62.1
 - Current Indoor Air Quality Procedure (62.1-2016)
 - Exhaust requirements
 - Addendum 62.1-2016 aa regarding Indoor Air Quality Procedure
- ASHRAE Standard 62.2-2016 ventilation requirement
- Conclusion

Introduction

ASHRAE standards

- Consensus standards developed by balanced committees
- Development process governed by ANSI procedures public review, responses to comments, change proposals
- ASHRAE approves title, purpose and scope, not contents

History

- 1973 First Standard 62 published
- 2003 62 becomes 62.1 for non-residential buildings with first publication of 62.2 for residential buildings
- Additional standards deal with specialized environments, e.g., healthcare facilities (Standard 170)

Introduction

- Both 62.1 and 62.2 are perceived air quality standards with similar definitions of acceptable indoor air quality
- ASHRAE 62.1-2016:

(A)ir in which there are no known contaminants at harmful concentrations as determined by cognizant authorities and with which a substantial majority (80% or more) of the people exposed do not express dissatisfaction

■ ASHRAE 62.2-2016

(A)ir toward which a substantial majority of occupants express no dissatisfaction with respect to odor and sensory irritation and in which there are not likely to be contaminants at concentrations that are known to pose a health risk

ASHRAE Standard 62.1

- Compliance paths
 - Ventilation Rate Procedure (VRP, prescriptive)
 - Indoor Air Quality Procedure (IAQP, performance)
 - Natural Ventilation Procedure (prescriptive)
- Major changes have been proposed to IAQP in Addendum aa to standard 62.1-2016



ANSI/ASHRAE Standard 62.1-2016 (Supersedes ANSI/ASHRAE Standard 62.1-2013) Includes ANSI/ASHRAE addenda listed in Appendix K

Ventilation for Acceptable Indoor Air Quality

See Appendix K for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, and the American National Standards Institute.

This Standard is under continuous maintenance by a Standing Standard Project Committee (SSPC) for which the Standards Committee has established a documented program for regular publication of addmad or revision; including procedures for timely, documented, consensus action on requests for change to any part of the Standard. The change submittal form, instructions, and dealines may be obtained in electronic form from the ASHRAE vebate(www.aihrae org) or in paper form from the Senior Manager of Standards. The latest edition of an ASHRAE standard may be purchased from the ASHRAE vebate(www.aihrae org) for from ASHRAE Clastomer Senior, B717 Tullic Circle, Ng. Autat, GA 30129-2105. E-mail: orders@latinae.org. Exc 678-539-2129 Telephone: 404-636-6400 (worldwide), or toll free I-800-527-4723 (for orders in US and Canda), For replinit permission, so to www.aihrae.org) promissions.

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ASHRAE 62.1-2016 IAQP (Section 6.3)

- Identify contaminants of concern, safe limits, indoor/outdoor sources and emission rates – use sum of concentration/safe limit < 1 for mixtures
- Determine design level of acceptability (%) may be adapted and/or unadapted
- Do mass balance calculations to determine required ventilation rate <u>including</u> <u>effect of air cleaners</u>
- Required ventilation rate is greater of mass balance calculation and either
 - Post-occupancy subjective evaluation, or
 - Rate required for a similar zone for which subjective evaluation has been done
- May use VRP to determine minimum outside air and IAQP to determine additional outside air required to meet criteria for specific contaminants

ASHRAE 62.1-2016 Exhaust Requirements (Section 6.5)

- Exhaust is treated somewhat analogously to outside air
- Requirements maybe be met by
 - Complying with flows in table 6.5 (prescriptive)
 - As with IAQP, identify contaminants of concern, safe concentrations, sources, source strengths and automatically control to achieve them

Addendum aa to ASHRAE Standard 62.1-2016

- Addendum aa is a major proposed revision to the IAQP
- Three public review drafts issued, latest in Feb 2019
- Addresses perceived weakness in existing IAQP
 - Identifying contaminants of concern
 - Identifying safe limits and periods of exposure
 - Specifying percentage satisfied
- Approach
 - Design compounds and PM_{2.5} limits specified
 - Specific mixture for which mixture compliance is needed are identified
 - Eight hour time period for exposure assessment
 - 80% acceptable criterion specified

Design Compounds/PM2.5

Mixtures

Compound or PM2.5	Upper Respiratory Tract Irrita
Acetaldehyde	acetaldehyde
Acetone	acetone
Benzene	<u>xylene, total</u>
Denzene	ozone
Dichloromethane	
Formaldehyde	
<u>Naphthalene</u>	
Phenol	
Tetrachloroethylene	
Toluene	
1,1,1-trichloroethane	
Xylene, total	
Carbon dioxide	
Carbon monoxide	
<u>PM2.5</u>	Note – Informa
Ozone	addendum may
Ammonia	

Upper Respiratory Tract Irritation	Eye Irritation	Central Nervous System		
acetaldehyde	acetaldehyde	acetone		
acetone	acetone	dichloromethane		
xylene, total	<u>xylene, total</u>	xylene, total		
ozone	<u>ozone</u>	1,1,1-trichloroethane		
	formaldehyde	toluene		



Note – Information on this slide taken from First Public Review Draft – addendum may not be approved and if approved final content may differ

ASHRAE Standard 62.2

- Ventilation requirements are prescriptive
 - Number of bedrooms
 - Floor area

$$Q_{tot}[l/s] = 0.15[l/s/m^2]A_{floor}[m^2] + 3.5[l/s/br](N_{br} + 1)$$

- Can take credit for infiltration if leakage has been measured
- Can adjust for differences in assumed occupancy, time average occupancy
- Currently no performance path



ANSI/ASHRAE Standard 62.2-2016 (Supersedes ANSI/ASHRAE Standard 62.2-2013) Includes ANSI/ASHRAE addenda listed in Appendix D

Ventilation and Acceptable Indoor Air Quality in Residential Buildings

See Appendix D for approval dates by the ASHRAE Standards Committee, the ASHRAE Board of Directors, and the American National Standards Institute.

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	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		

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

Conculsion

- ASHRAE Standard 62.1 for non-residential buildings has had a performance path for many years, but perception of most designers has been that it is difficult and *risky* to use.
- 62.1 IAQP is undergoing a major update, but it has been contentious, mainly because of views of committee members and other interested parties about air cleaners
- ASHRAE Standard 62.2 takes a prescriptive approach like 62.1 although somewhat simplified.
- There is substantial interest in expanding the performance approach but concern about the knowledge base available to support it





Thank you!

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