62.2-2004: ASHRAE'S RESIDENTIAL VENTILATION STANDARD

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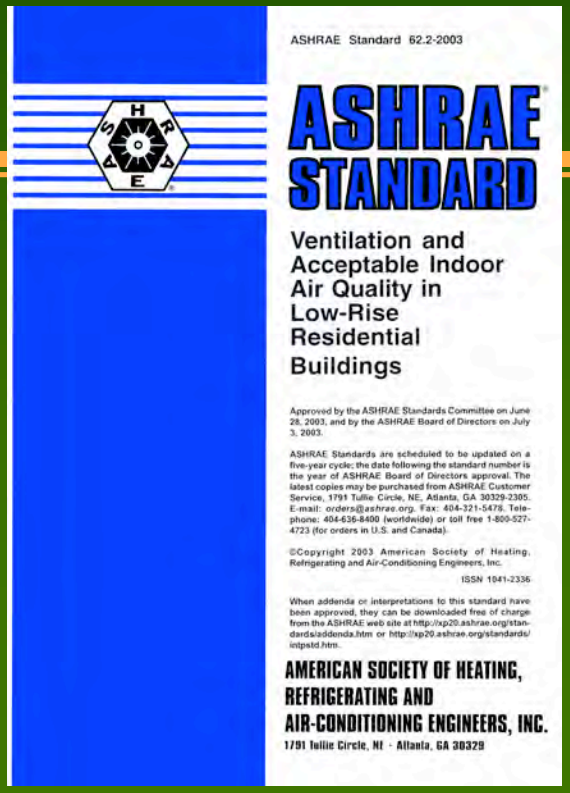

ASHRAE Standard 62.2-2003

ASHRAE STANDARD

Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings

Approved by the ASHRAE Standards Committee on June 28, 2003, and by the ASHRAE Board of Directors on July 3, 2003.

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AMERICAN SOCIETY OF HEATING, REFRIGERATING AND AIR-CONDITIONING ENGINEERS, INC.

1791 Tullie Circle, NE · Atlanta, GA 30329

VENTILATION AND ACCEPTABLE INDOOR AIR QUALITY IN LOW-RISE RESIDENTIAL BUILDINGS

1: PURPOSE

2: SCOPE

3: DEFINITIONS

4: WHOLE BLDG VENT

5: LOCAL VENT.

6: OTHER REQ.

7: EQUIPMENT

8: REF. & CLIMATE

A: BACKDRAFTING

B: OPERATIONS

C: SYSTEMS

GUIDELINE

PURPOSE OF 62.2

OVERVIEW
COMPLIANCE
WHOLE-HOUSE
LOCAL EXHAUST
OTHER REQ.
EQUIPMENT
REFERENCE
SOURCE IMPACTS
STATUS
END

Back

"*This standard defines the roles of and minimum requirements for mechanical and natural ventilation systems and the building envelope intended to provide acceptable indoor air quality in low-rise residential buildings*."

- Ventilation Systems
- Sources
- Envelope

62.2-2003 HISTORY

OVERVIEW
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Back

- 1997: Split off From SSPC 62
- Summer 2000: 1st Full Public Review
  - 500 commentors; 3000 comments
- Summer 2001: 2nd Full *(130,400)*
- Spring 2002: 3rd ISC *(19,66)*
- Fall 2002: 4th ISC *(7,28)*
- Summer 2003: ASHRAE BOD Approval
- Fall 2003: Publication; SSPC formation

62.2 in 2004

OVERVIEW
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Back

- ANSI Approves 62.2
  - Appeals filed by Gas Industry
- Spring 2004: Addenda processed
  - Remove backdrafting test option
  - Tweak climate definitions
- Summer 2004: ASHRAE BOD Approval
- Fall 2004: Publication of 62.2-2004
- SSPC Considering New Addenda

NEED FOR STANDARD

OVERVIEW
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Back

- American Houses Have No "Ventilation" systems
- Indoor Air Quality Concerns Rising
  - 4th largest problem
  - Asthma is #1 childhood problem
- Energy & comfort concerns have led to tightening of envelope
- New Materials in Dwellings

SCOPE OF STANDARD 62.2

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Back

- Single-family houses and multi-family structures of three stories or fewer
- Chemical, physical and biological contaminants
- Not thermal comfort ; Not Unvented appl.
- Caveats:
  - Diversity of sources & susceptibilities
  - Non IAQ perceptions
  - Poor outdoor air
  - Improper O&M
  - High Polluting Events

PRINCIPLES BEHIND 62.2

OVERVIEW
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Back

- "*A Man's Home is his Castle*"
  - Occupants control sources
  - Occupants operate building
- Envelope Plays Important Role
  - Infiltration and Natural Ventilation
  - Potential Pollutant Source
- Sources Matter
- Simple Solutions

KEY DEFINITIONS

OVERVIEW
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- **Acceptable indoor air quality:** air in an occupied space toward which a substantial majority of occupants express no dissatisfaction and in which there are not likely to be contaminants at concentrations that are known to pose a health risk Acceptable indoor air quality must also satisfy the requirements of acceptable *perceived indoor air quality*.
- **Pressure boundary:** primary air enclosure boundary, which separates indoor and outdoor air.
- **High-Polluting Event:** Isolated and occupant controlled emission

COMPLIANCE

OVERVIEW
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Back

- Whole-House Mechanical Ventilation
  - Or equivalent
- Fans in Kitchens and Baths
- Windows in Most Rooms
- Some Source Control
- “Good” Equipment

OUTDOOR AIR TARGET

OVERVIEW
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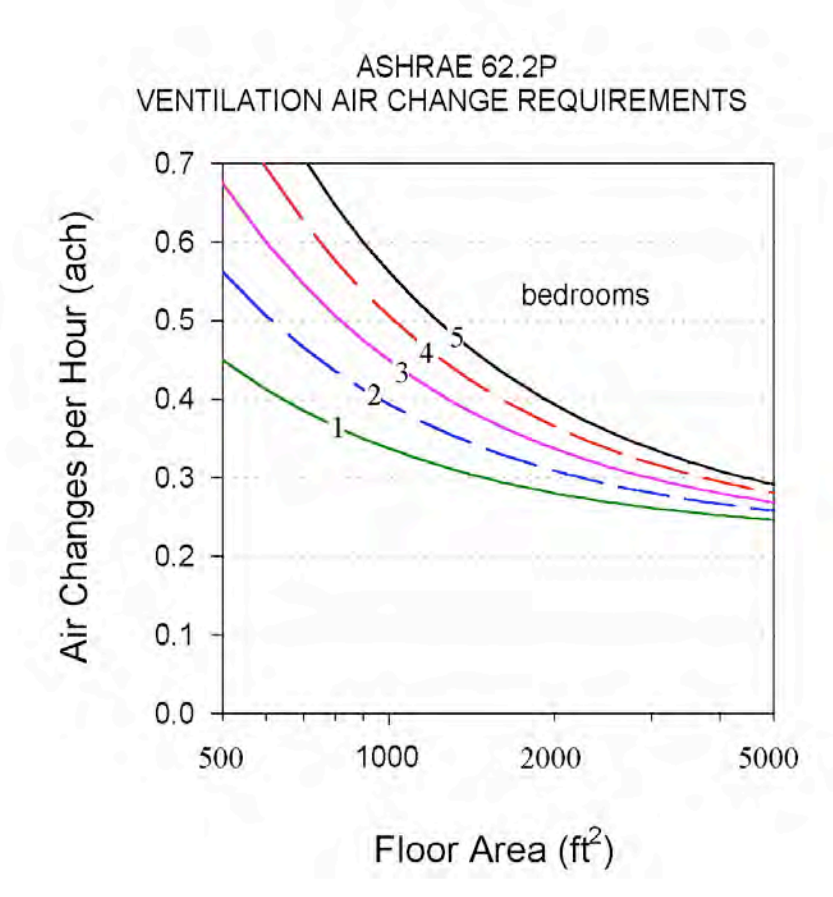
Back

- Building+People
  - 3 cfm/100 ft^2. (15 l/s/100 m^2.)
  - + 7.5 cfm/person (3.5 l/s/person)
  - Count Bedrooms
- Compare w/0.35 ACH from 62-01



10 ft^2=1 m^2

NATURAL VENTILATION

OVERVIEW
COMPLIANCE
WHOLE-HOUSE
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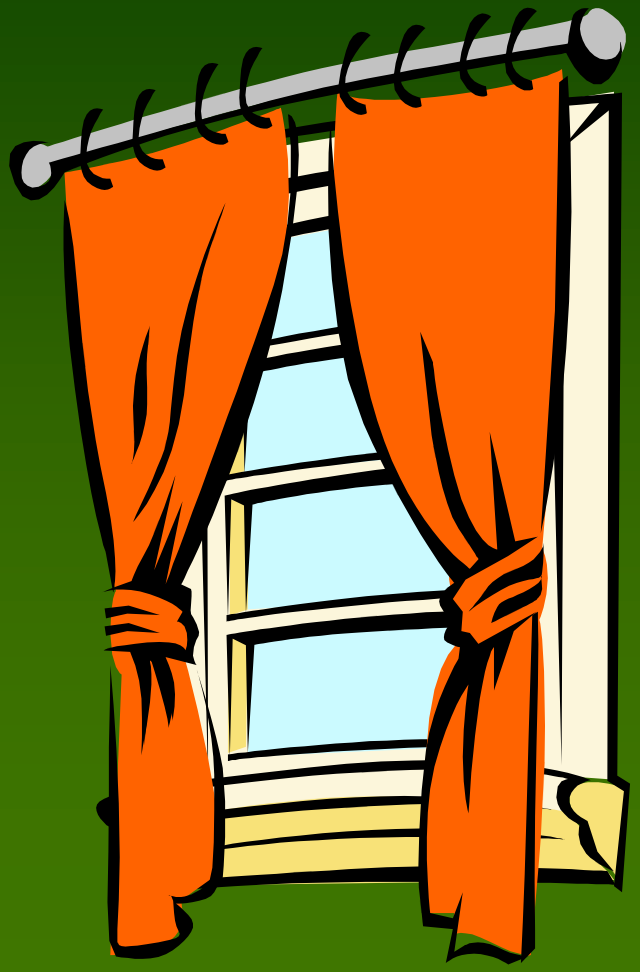

- Required in Most Rooms
- Openings
  - 4% of Floor Area
- Extra Capacity
- **Whole-House**
  - **rarely**
- ***NOT* Local Exhaust**

MECHANICAL VENTILATION

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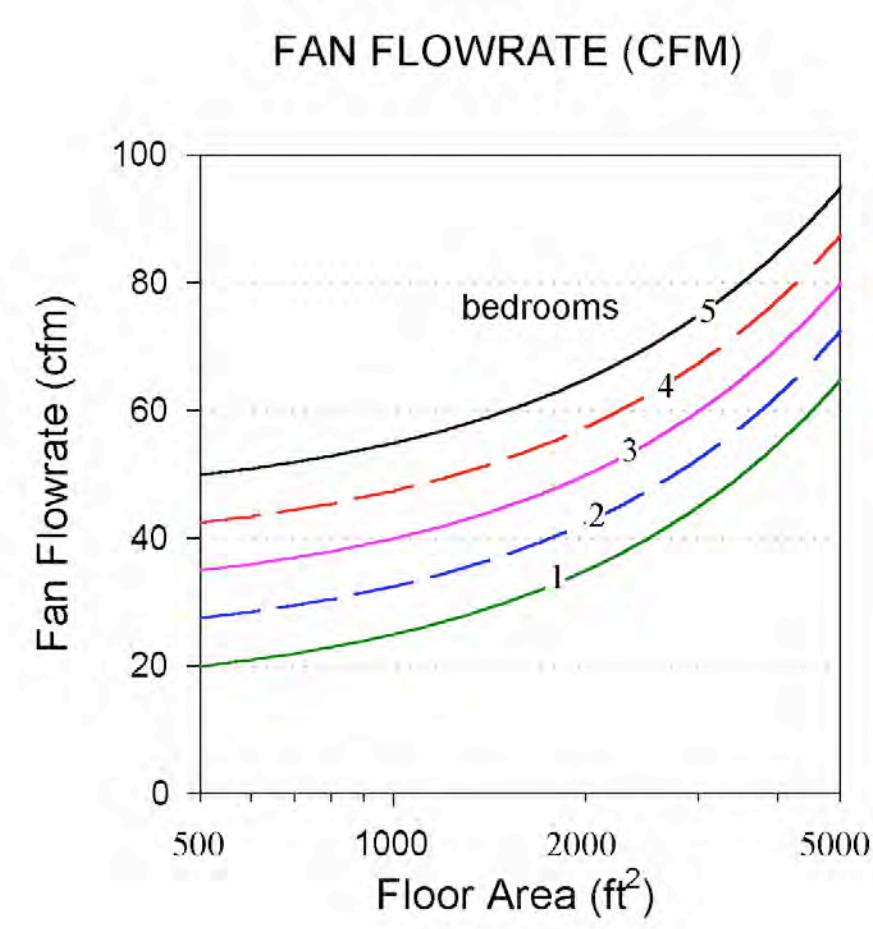
Back

- Building+People
  - 1 cfm/100 ft^2. (5 l/s/100 m^2.)
  - +7.5 cfm/person (3.5 l/s/person)
  - Count Bedrooms
- Control System



INTERMITTENT VENTILATION

OVERVIEW
COMPLIANCE
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SOURCE IMPACTS
STATUS
END

Back

- Must Cycle: At least 1 hr out of 12
- Timer to Assure Minimum On-time
  - e.g. “Fan Recycler”
- De-rate Flow if Cycle > 3 hours:

Not flexible enough

INFILTRATION

OVERVIEW
COMPLIANCE
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OTHER REQ.
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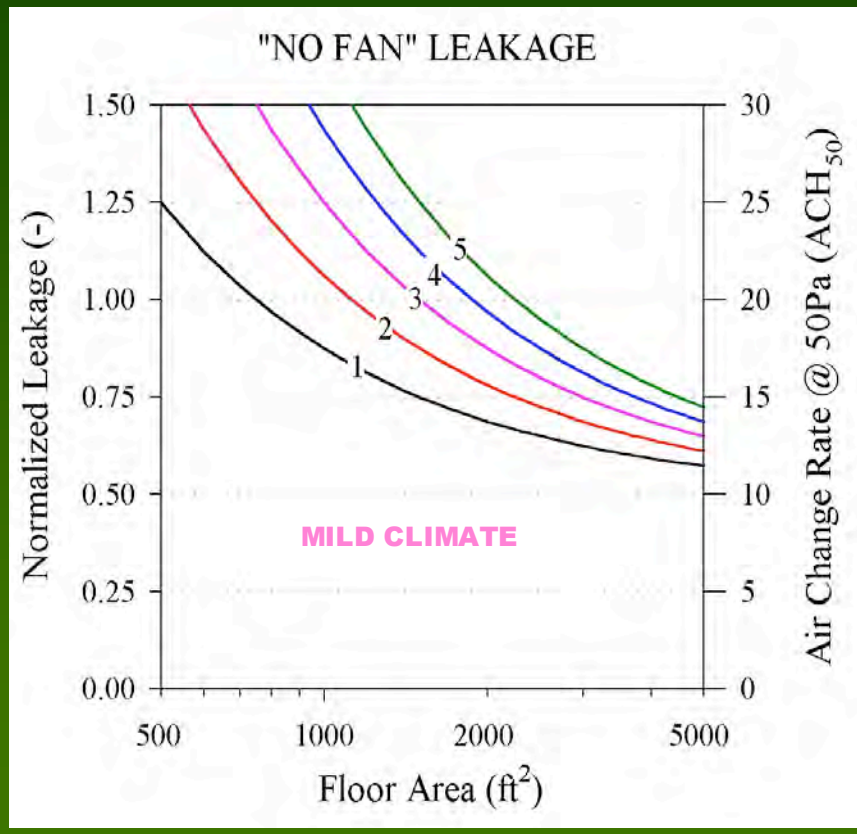
END

Back

- Default in 62.2
  - 2 cfm/100 ft^2 (10 l/s/100 m^2)
- Extra Credit
  - Half of Std 136
  - Starts @ NL=.25
  - Existing only
- Implied Benchmark



Not flexible enough

10 ft^2=1 m^2

MYTHS & GHOST STORIES

OVERVIEW
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Back

- The South Needs Less Air
- Infiltration is Bad Air
  - Can be a robust and cost-effective contributor to whole-house rate
- Unbalanced Ventilation Will Rot Walls
  - Not at minimum rates
    - **Unless envelope is too tight!**

SYSTEM TYPES

OVERVIEW
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Back

- Balanced System
  - E.g. Can have HRV
- Exhaust System
  - E.g. Bath Fan Upgrade
- Supply System
  - E.g. Integrated with Air Handler

LOCAL VENTILATION

OVERVIEW
COMPLIANCE
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EQUIPMENT
REFERENCE
SOURCE IMPACTS
STATUS
END

Back

- Intended to Exhaust Contaminants
- For Rooms with Known Sources
  - Kitchen, Bathroom
- Normally Requires Exhaust Fan
  - Intermittent Preferred
  - Windows Restricted
- Also Rooms Have Natural Ventilation

KITCHENS AND BATHS

OVERVIEW
COMPLIANCE
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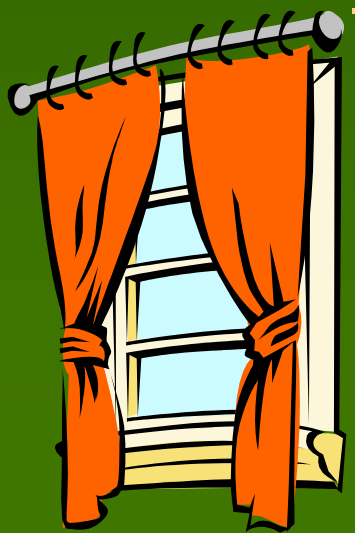
SOURCE IMPACTS
STATUS
END

Back

- Kitchens
  - 100 cfm (50 l/s) range hood or
  - 5 (kitchen) ACH
  - Exhaust only
- Bathrooms
  - 50 cfm (25 l/s) capacity or
  - 20 cfm (10 l/s) continuous
  - Exhaust only



OTHER REQUIREMENTS

OVERVIEW
COMPLIANCE
WHOLE-HOUSE
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END

Back

- Transfer Air
- Labeling
- Source Control
- Natural Ventilation
  - Beyond Minimum
- Ventilation Openings

SOURCE REQUIREMENTS

OVERVIEW
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END

Back

- Clothes Dryers: Exhausted to Outside
- Combustion Appliances Not Allowed in Conditioned Space
  - When sufficient exhaust fans
  - Unless Exhaust Fans Compensated
- Air Handlers in Garages Must Meet Tightness Spec.
- Particle Filtration

SOURCES & PRESSURES

OVERVIEW
COMPLIANCE
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END

Back

- Clothes Dryers
- Combustion Appliances
- Outdoor Air
  - Regional
  - Transient
- Garages
  - Cars
  - Chemical Storage

VENTILATION CAPACITY

OVERVIEW
COMPLIANCE
WHOLE-HOUSE
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Back

- Normally Satisfied By Windows
  - Fans like Bathroom if No Window
- Not Required in Toilets and Laundries

VENTILATION OPENINGS

OVERVIEW
COMPLIANCE
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Back

- Should Not Allow (Re) entrainment
- Separation from Flues, Cars, etc.
  - 2 to 10 ft
- Natural Ventilation Openings Must Be Accessible

PARTICLE FILTRATION

OVERVIEW
COMPLIANCE
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Back

- On Ducts > 10 ft.
- 60% for 3 micron
  - MERV 6
- Primarily to Keep Supply Air Clean
  - System as Source
- Pressure Concerns

AIR MOVING EQUIPMENT

OVERVIEW
COMPLIANCE
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Back

- Must be Rated for Continuous Use
- Must Deliver Air Flow
- Dampers in Multi-family
- Control System
- Must be Quiet
  - 1 Sone (continuous)
  - 3 Sone (intermittent)
  - Downdraft kitchen exhaust is “special”

CALIF. MODIFICATIONS

OVERVIEW
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Back

- No “or equivalent” on minimum airflow
  - i.e. Mech. vent. not windows
  - ARB study shows windows not used much for IAQ control
- More Flexible “Intermittent Ventilation”
  - Use improved algorithm
  - Enables better response to peak and outdoor AQ problems

MY SUGGESTIONS

OVERVIEW
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Back

- Mandatory 5% Duct Leakage Limit
  - For ducts outside conditioned space
  - Limits contaminant entrainment
- Add 25 cfm to Mech. Vent
  - New CA houses are tight
  - Allows 4 hours of no vent. per day
    - Better peak performance
    - Protection against bad OAQ

VENTILATION AND ACCEPTABLE INDOOR AIR QUALITY IN LOW-RISE RESIDENTIAL BUILDINGS

1: PURPOSE

2: SCOPE

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GUIDELINE

REFERENCES

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- Standard 119, 136
- Standard 52.2
  - Filtration (MERV)
- Cold/Humid Climates
- HVI 920
  - Fan Performance
- AMCA & NFGC

(OLD) CLIMATE

OVERVIEW
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Supply Ventilation Limited

Exhaust Ventilation Limited

COMBUSTION SAFETY

OVERVIEW
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APPENDIX A: TEST METHOD

- 2004 version removed backdrafting test as compliance pathway
- Naturally aspirated combustion appliances not allowed inside conditioned space if exhaust flows are too high (or vice versa).

OPERATIONS & MAINTENANCE

OVERVIEW
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REQUIRED

- Design for Operation
- Labeling of System
- Instructions to Owner/Occupant

RECOMMENDED

Appendix B

- Design Parameters
- Ventilation Equip
- Passive Operation
- Controls
- Building Envelope
- O&M Form

HVAC SYSTEM GUIDANCE

OVERVIEW
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APPENDIX C

- Design Issues
  - Climate
  - Combustion
  - Envelope
  - Pressures
  - Energy
  - O&M
- System Selection
  - Sizing
  - Central vs. local
  - Bal. vs. Supply vs. Exhaust

SOURCES AND 62.2

OVERVIEW
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Back

- Radon
- Particulates
- Lead & Asbestos
- Allergens
- Moisture
- Combustion
- Garages
- VOCs
- Outdoor Air
- Occupant Activities

skip

RADON AND SOIL GAS

OVERVIEW
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Back

- Base Rates Cover Most Houses
- Ventilation Can Make Bad Problem Worse
- Problem Locations Need Remediation
- Radon Resistant Designs Available

RESPIRABLE PARTICULATES

OVERVIEW
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Back

- Std Requires Some "Good" Filtration
  - For equipment
- Consider the Source
  - System Type
  - Supplemental Filtration
  - Removal
- Usually OK

INORGANIC COMPOUNDS

OVERVIEW
COMPLIANCE
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Back

- Normally not a Problem
- Lead & Asbestos
- Poor Response to
  - Ventilation
  - Filtration
- Source Removal or Encapsulation

ALLERGENS

OVERVIEW
COMPLIANCE
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END

Back

- Identify Source
- Supplement Filtration
  - Pollen, Yes
  - Pets, No
  - Biologicals, No
- Not Ventilation
- Moisture Control = Biological Control
- 62.2 Helps

MOISTURE AS POLLUTANT

OVERVIEW
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Back

- Envelope Effects
  - Molds
  - Dust Mites
  - Building Damage
- 62.2 Considers Moisture Control
- Excess Sources Can be a Problem
  - Inc Intrusion

VOCs IN HOUSEHOLD

OVERVIEW
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Back

- Volatile Organic Compounds
  - Materials
  - Furnishings
  - Products
- Base Rates Cannot Control High Emission Rates
- Ventilation Capacity

EXTERNAL SOURCES

OVERVIEW
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Back

- Outdoor Pollutants
  - Ozone/Exhaust
  - Pesticides
  - Toxic Releases
- No Air Cleaning
- Short-term Rate Reduction

(UN)USUAL ACTIVITIES

OVERVIEW
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Back

- Pollutants From
  - Combustion
  - Hobby
  - Home-Office
- May not be Handled by Std
- Occupant Responsibility
- Guidance from 62.2

STATUS OF 62.2

OVERVIEW
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WHOLE-HOUSE
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- Published by ASHRAE 2003, 2004
  - ANSI approved
  - Users Manual almost done
- Developing Guideline Document
- On Continuous Maintenance (CM)
  - Always considering addenda
  - Next publication 2007

GUIDELINE 24

OVERVIEW
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WHOLE-HOUSE
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- Supplement to “Minimum” Standard
  - How to do better; resolve comments
- Topics Not Covered in Standards
  - Sources, control, mitigation
  - Unusual situations, populations
- Effort Initiated June, 2002
  - Working outline
  - First chapter drafts in progress

Ventilation and Indoor Air Quality in Low-Rise Residential Buildings

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1 PURPOSE

1.1 This guideline provides information on achieving good indoor air quality, which may go beyond minimum requirements.

1.2 This guideline provides information relevant to ventilation and indoor air quality on envelope and system design, material selection, commissioning and installation, and operation and maintenance.

2 SCOPE

This guideline primarily applies to ventilation and indoor air quality for human occupancy in residential buildings 3 stories or fewer in height above grade, including manufactured and modular houses.

62.2 USER'S MANUAL

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- Companion to "Minimum" Standard
  - How to meet the standard
- Implementation of Std Topics
  - Nothing new just options
- Done by Outside Contractor
  - SSPC reviews work
- Intended For Sale With Standard

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