Date of Implementation of the 2006 ICC Codes with Wisconsin Amendments
March 1st, 2008

Reference for Which Edition of the WI Commercial Building Code Applies

If you have a NEW building, and plans INITIATING the building submittal, (ie. footing and foundation, or building plans) are IN THE SAFETY & BUILDINGS (OR ITS REPRESENTATIVE'S) OFFICE **PRIOR** TO THE DATE OF CODE IMPLEMENTATION, then ALL future plans required to be submitted as based on the building would be based on the current code and NOT the future code. These plans would include, but not be limited to HVAC, kitchen hood, precast, truss, lighting, fire suppression, fire alarm, etc. which would likely be submitted at later time AFTER the implementation date.

If the building plans were submitted PRIOR to the implementation date for say a shell or spec building, and was completed, then at a later time, building alteration plans are submitted to address a tenant building out, then the code applicable is based on when the building alteration plans for the specific tenant space in question is submitted, (ie. plan initiating submittal) The HVAC would be based on the date of the building alteration plan. See also Comm IEBC/Comm 66.0101(2).

If there are no building plans, and the changes involve ONLY HVAC (say replacement of a kitchen hood system), then the date on which the plans were received relative to the implementation would define the code which code was to be used.

+++++

http://commerce.wi.gov/SB/

The 2006 ICC codes and commentary can currently be purchased from www.iccsafe.org. S&B recommends getting the 3-hole punched format. The Safety and Building Division intends to create special 3-hole punched pages intended to be inserted into the ICC codes. These pages would have the relevant Wisconsin sections and will be numbered for insertion in the appropriate places in the ICC codes. More information about those pages should be available in late January. Watch the S&B WebSite Home Page for the news or subscribe to the commercial buildings email group.

The 2006 NFPA 1 is available from http://www.nfpa.org.

In recent years, ICC and the Safety and Buildings Division have created and printed an "Enrolled Code" containing both the adopted ICC code sections and the Wisconsin Commercial Buildings Code sections. There will NOT be another Enrolled Code created to reflect the 2008 changes.

The Wisconsin amendments to the 2006 ICC codes may be found on the internet PRIOR to the implementation date at the following web site:
http://commerce.wi.gov/SBdocs/SB-CodeDevComm616514AdoptedDraft1107.pdf

Starting March 1, 2008, the WI amendments the 2006 ICC codes can be found at:
http://www.legis.state.wi.us/rsb/code/comm/comm060.html

2006 International Existing Building Code With Wisconsin Amendments

- **Training As Developed by**
  Randy Dahmen, PE
  John Spalding, AIA
- **WI Dept. of Commerce, Safety & Buildings Division, Madison, WI & LaCrosse, WI**
- **Web Site:**
- **COMMERCE.STATE.WI.US/SB**

Additions, Alterations & Renovations

Comm 66.0300 (Ch. 3 Not adopted), 66.0607, IEBC 711, & 808

- **Additions, alterations renovations or repairs**--Such actions in an existing building, building system or portion shall conform to the provisions of the IECC as they relate to new construction without requiring the unaltered portions of the existing building or building system to comply with this code. Such actions are not allowed to create an unsafe or hazardous condition or overload existing building systems. **Exceptions---**

Additions, Alterations & Renovations

Comm 66.0300 (Ch. 3 Not adopted), 66.0607, IEBC 711, & 808

- **Examples:**
  - **Appliance replacement required to have current IECC economizer rules applied**
  - **Appliance efficiency requirements are to be applied to equipment replacements**
  - **Lighting alterations to follow IECC which allows use of IECC or ASHRAE 90. 1-2004 per IECC 501.2**

2006 International Energy Conservation Code With Wisconsin Amendments

- **Training As Developed by**
  Randy Dahmen, PE
  John Spalding, AIA
- **WI Dept. of Commerce, Safety & Buildings Division, Madison, WI & LaCrosse, WI**
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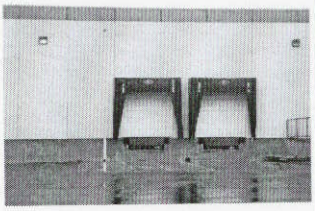
- **COMMERCE.STATE.WI.US/SB**

Loading Dock Weather Seals

IECC 502.4.5

- Cargo doors & loading dock doors shall be equipped with weather seals to restrict infiltration when vehicles are parked in the doorway.



Vestibules

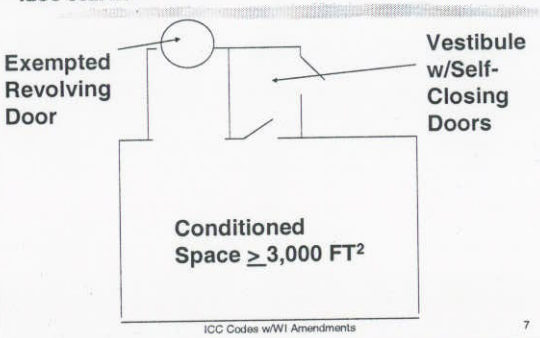
IECC 502.4.6

Vestibules on "**Primary**" Entrance Doors

- Req'd to reduce infiltration into spaces
- Req'd on entrance doors leading into spaces ≥ 3,000 ft²
- Doors **MUST** have self-closing devices
- Exceptions
  - Doors from a guest room or dwelling unit
  - Doors used primarily for vehicular movement, materials handling & adjacent personnel doors

Vestibules

IECC 502.4.6



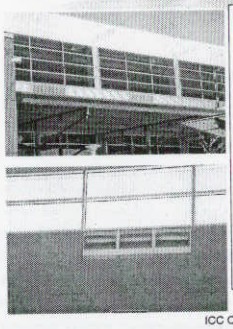
Outdoor Intake, Exhaust Dampers & Vents Integral to the Bldg Envelope

Comm 63.0403(3), IECC 503.2.4.4/Comm 63.0503(5)

- Motorized dampers required on all outdoor air **supply & exhaust** (not relief) ducts that will automatically shut when the system or a space is not used, & to permit gravity dampers only under certain conditions.
  - Gravity (barometric) dampers may be utilized in outside air or exhaust airflows of 300 cfm or less, OR bldgs 2 stories in height or less

Outdoor Intake, Exhaust Dampers & Vents Integral to the Bldg Envelope

IECC 502.4.4



If a motorized damper is required to be installed, the damper shall meet:

- **AMCA test 500D for a Class 1 motorized leakage-rated damper**
  - **Maximum leakage rate ≤ 4 cfm /ft² @ 1.0 inch w.g.**

Pool Requirements

IECC 504.7

- Pool heaters to have on/off switch. Heaters using natural gas shall NOT have continuously burning pilot lights.
- Time switches req'd that can be used on heaters and pumps to turn equipment on/off based on a preset schedule—Exceptions

Energy Recovery Ventilation

IECC 503.2.6

- Required to be installed for individual fan systems w/supply air ≥ 5,000 cfm **AND** minimum outside air supply ≥ 70% are required to have an energy recovery system.
- Exceptions
- **NOTE**—Use of a energy recovery system will NOT be recognized as having met the Economizer requirements of the code.

Energy Recovery Ventilation

IMC 514

- Prohibited Applications:
  - Hazardous exhaust system per IMC 510
  - Dust, stock and refuse that convey explosive/flammable vapors, fumes or dust
  - Smoke control systems covered in IMC 513
  - Commercial kitchen exhaust systems serving Type I and Type II hoods
  - Clothes dryer exhaust systems covered in Section 504

Duct Insulation Requirements

Comm 63.0403(2), Comm 63.0503(5), IECC 503.2.7

- Ducts outside the building envelope or within a building envelope assembly require a minimum of R-8 insulation (inclusive of underground ducts)
- Ducts in unconditioned spaces, shall be insulated to minimum of R-4

Duct Sealing

IECC 503.2.7 (Commercial bldgs & residential > 3 stories)

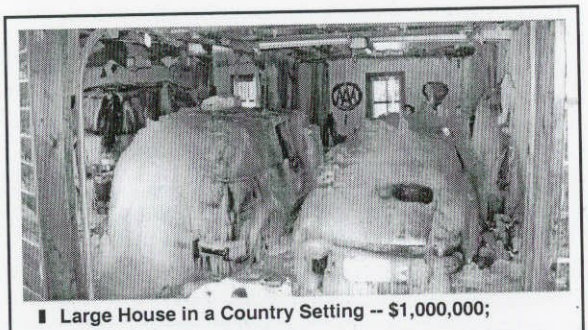
- Labeling for approved mastics and tapes

Sealant/ Duct Connection Type	UL Listing
Pressure Sensitive Tape	181A-P
Mastic	181A-M
Heat Sensitive Tape	181A-H
Flexible Air Ducts - Pressure Sensitive Tape	181B-FX
Flexible Air Ducts - Mastic	181B-M

Duct Sealing

IECC 503.2.7.1

- Low (≤ 2" w.g.), Medium (> 2" but < 3" w.g.), and High pressure (≥ 3" w.g.) duct systems require:
  - ALL longitudinal & transverse joints, seams and connections of **supply, return & exhaust ducts** to be securely fastened & sealed
  - **Designation to be on the HVAC Plans as to the pressure classification of the duct system**



- **Large House in a Country Setting -- $1,000,000;**
- **3 Sports Cars -- $150,000;**
- **Forgetting to shut your water off prior to leaving Wisconsin for the winter --*Priceless***

Piping Insulation

IECC 503.2.8

Table redone with R-values = (1/k value) x minimum pipe insulation thickness (inches)

Commercial: All piping serving heating or cooling system must be insulated in accordance with Table 503.2.8 shown

MINIMUM PIPE INSULATION[a]
(thickness in inches)

FLUID	NOMINAL PIPE DIAMETER	
	≤1.5"	> 1.5"
Steam	R- 5.5	R-11
Hot water	R- 3.7	R- 7.4
Chilled water, brine or refrigerant	R- 3.7	R- 5.5

Economizers

IECC/COMM Table 63.0503

- Unless a listed exception is met, Economizers are required for
  - Split systems & water source heat pumps **≥ 54,000 Btu/h**

    Split Systems (furnace & condensor similar to those found in homes, small businesses)
  - All other systems **≥ 33,000 Btu/h**
    - Rooftop units, built-up VAV reheat/single fan dual duct, etc.

Economizers

IEBC/COMM 66.0300, 66.0607, 66.0711, 66.0808
IECC/COMM Table 63.0503

- Rooftop fan systems that replace existing fan systems shall be provided with economizers that comply with Ch. 63 requirements for new construction (per International Existing Building Code)
- **NOTE**—Use of an energy recovery system will NOT be recognized as having met the Economizer requirements of the code.

Economizers

IEBC/COMM 66.0300, 66.0607, 66.0711, 66.0808
IECC/COMM Table 63.0503

- "Where a single room or space is supplied by multiple air systems, the aggregate capacity of those systems shall be used in applying the requirement" (ie. for economizers)
  - If the room is served by 2 split furnace/condensor systems, the total cooling capacity for the aggregate systems are referenced when determining when an economizer is required to be installed

2006 International Mechanical Code With Wisconsin Amendments

- **Training As Developed by**
  Randy Dahmen, PE
  John Spalding, AIA
- **WI Dept. of Commerce, Safety & Buildings Division, Madison, WI & LaCrosse, WI**
- **Web Site:**
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IMC Breakdown (Cont.)

- Ch. 8 Chimneys and Vents
- Ch. 9 Specific Appliances/Fireplaces & Solid Fuel Burning Equipment
- Ch. 10 Boilers, Water Heaters & Pressure Vessels (NA-Not Applicable-See Comm 41)
- Ch. 11 Refrigeration (NA-See Comm 45)
- Ch. 12 Hydronic Piping
- Ch. 13 Fuel Oil Piping & Storage
- Ch. 14 Solar Systems (See also COMM 71)

Elevation of Ignition Source

IMC 304.2/IFGC 305.3

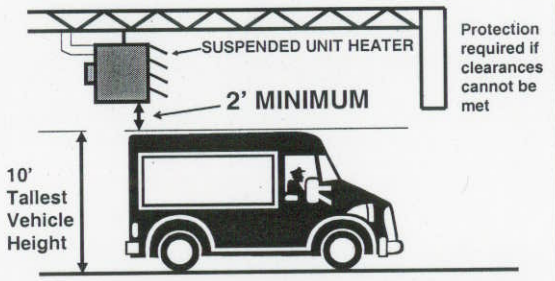
- Equipment & appliances located in a hazardous location shall be elevated such that the source of ignition is not less than 18" above the floor surface on which the equipment or appliance rests.
- Exception: Elevation NOT required for appliances listed as ***"Flammable Vapor Ignition Resistant"***
- Direct Vent Sealed Combustion Units does not meet FVIR listing

Equipment Clearances

IMC 304.5 & 6 / IBC 1607.7.3

- Public motor vehicle areas-Min. 8 ft above the floor **OR** if vehicles exceed 6 ft in height & are capable of passing under appliance, appliance to be 2 ft higher than tallest vehicle (whichever is greater); **OR** guarded (See IBC for criteria)
- Private motor vehicle areas-Min. 6 ft above the floor or guarded

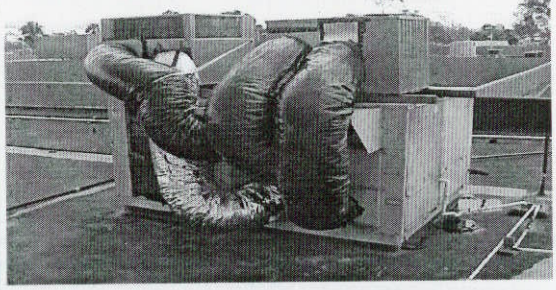
HVAC Equipment Clearances
Public Motor Vehicle Area IMC 304.3 & 5



Equipment Clearances to Combustible Construction & Listing Requirements
IMC 304.7

- HVAC equipment to be installed per listing & manufacturer's instructions
- Clearances may be reduced per IMC 308

Per Equipment Listing? Main roof top on bottom no longer is working. Two smaller units used as replacements. Main roof top was never designed to handle roof loads from small roof tops, or to act as "plenum"

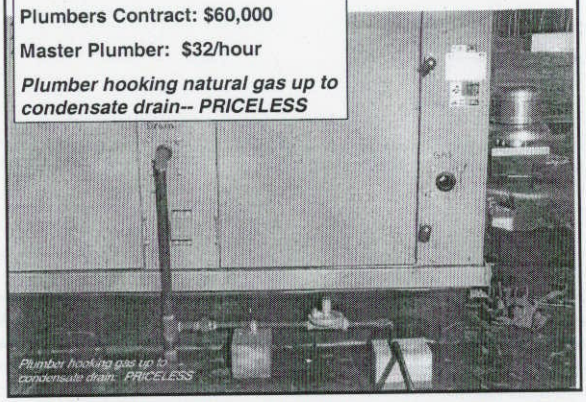


Employee Break Room: $2 Million

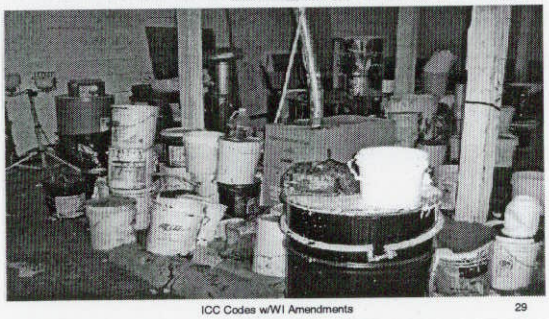
Plumbers Contract: $60,000

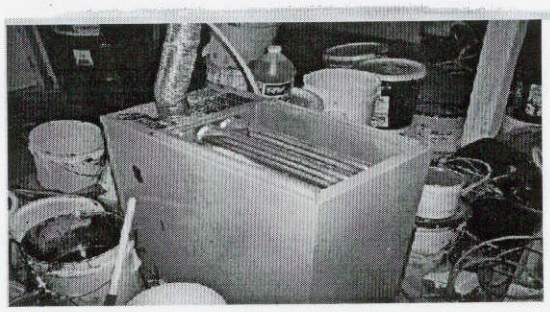
Master Plumber: $32/hour

Plumber hooking natural gas up to condensate drain-- PRICELESS

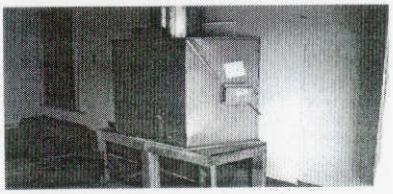


Do you see any problem(s)?



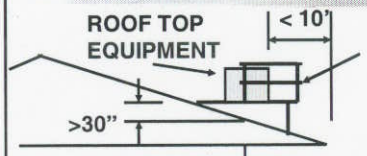


Wood burner must meet clearance to combustibles requirements & be labeled for use in a garage....



Guards for HVAC Equipment & Roof Hatch Openings

IMC 304.10, IBC 1009.11.2, 1013, 1607.7.1, IFGC 306.6



SUBSTANTIAL RAILING AT ≥42" HIGH W/<21" SPACING

GUARD MUST BE >30" BEYOND EACH END OF THE APPLIANCE

GUARD REQUIRED IF <10' FROM EDGE AND THERE IS AN OPEN SIDE >30" ABOVE THE FLOOR, ROOF, OR GRADE BELOW

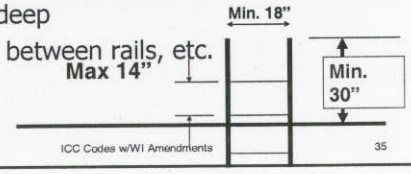
HVAC on Roofs & Elevated Structures IMC 306.5

- **Permanent approved means of access required** for equipment & appliances on roofs or elevated structures at heights >16 ft
- Ladder "Design" defined by code
- Access may NOT involve:
  - Climbing over obstructions > 30" high
  - Walking on roofs w/> 4/12 pitch

Permanent Ladder Requirements

IMC 306.5

- The side railing shall extend above the parapet or roof edge ≥ 30"
- Ladders shall have rung spacing not to exceed 14" on center, w/min. ¾" diam.
- Ladders shall have a toe spacing not less than 6" deep
- Min. 18" between rails, etc.

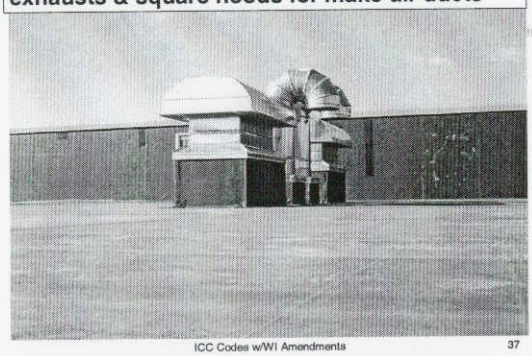


Intake Opening Locations

COMM 64.0401(4)

- Outside air intakes minimum 10' HORIZONTALLY from hazardous or noxious contaminant source, except where the opening is ≥ 2 ft below the contaminant source;
  - Exception: Exhaust from bathrooms or kitchens in residential dwellings shall not be considered to be hazardous or noxious contaminant

"New" Commercial Laundry with round laundry exhausts & square hoods for make-air ducts



Intake Opening Locations

IMC 202, 401.4

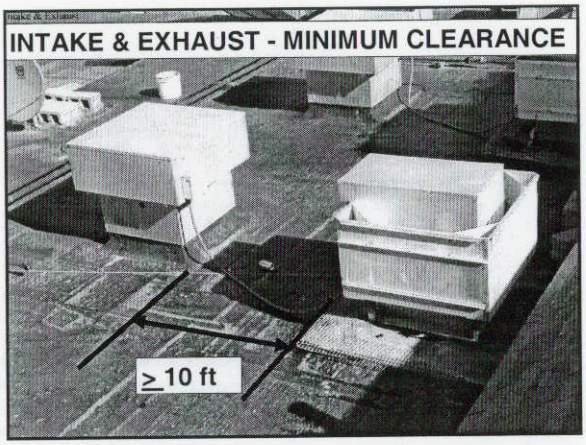
- Exhaust outlets for "environmental air" exhaust openings shall be located ≥ 3 ft from property lines and > 3 ft from openings into the building
  - "Environmental air" –Air that is conveyed to from occupied areas through ducts which are not part of the heating or air-conditioning system, such as ventilation for human usage, domestic kitchen range exhaust, bathroom exhaust and domestic clothes dryer exhaust

Intake Opening Locations

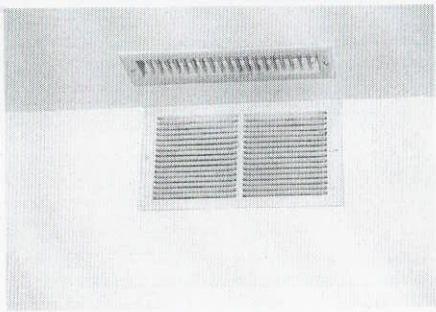
COMM 64.0401(4)(a) & (b)(2)

- *Exception involving a minimum 12" if the exhaust is ≤ 100 cfm is* ***REMOVED***
- Air intake to be a minimum 12" above adjoining grade, roof surface or areaway

INTAKE & EXHAUST - MINIMUM CLEARANCE



Here's a brilliant idea: Keep the supply & return registers close together so the hot air can flow freely back to the furnace.



Supply/Exhaust Requirements

IMC 401.3, 501.3, Comm Table 64.0403

- Table 64.0403
- Ventilation (inclusive of exhausts) shall be provided during the periods that the room or space is occupied.

Metal Duct Construction

IMC 603.3, 603.15, 603.17

- Constructed as specified in the SMACNA HVAC Duct Construction Standards-Metal & Flexible
- Requires the installation of volume dampers in all ducts to permit accurate balancing of the system. **NEW!!!! <u>Volume dampers shall have access.</u>**

Hydronic Piping

IMC Ch. 12

- Acceptable pipe, fittings, joints & connections, pipe insulation, valves, general piping installation, transfer fluid, tests, & embedded piping requirements are now addressed.

Fuel Oil Piping & Storage

IMC Ch. 13

- Materials, piping, joints & connections, piping support, installation requirements, oil-gauging, fuel oil valves, & testing is addressed.
- All tanks over 5,000 gallons are required to be reviewed by the Environment Regulatory Service (ERS), or by the local designated inspection group for tanks between 110 and 5,000 gallons. Call Andy Hahn @ 608 266-8981 with questions, & application of Comm 10.

2006 International Fuel Gas Code With Wisconsin Amendments

- **Training As Developed by**
  Randy Dahmen, PE
  John Spalding, AIA
- **WI Dept. of Commerce, Safety & Buildings Division, Madison, WI & LaCrosse, WI**
- **Web Site:**
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International Fuel Gas Code (IFGC) Breakdown

- Ch. 1 Administration
- Ch. 2 Definitions
- Ch. 3 General Regulations
- Ch. 4 Gas Piping Installations
- Ch. 5 Chimneys and Vents
- Ch. 6 Specific Appliances
- Ch. 7 Gaseous Hydrogen Systems
- Ch. 8 Referenced Standards

Combustion Air From Inside the Building

IFGC 304.5

- Two (2) Methods for Combustion Air from within the Building are acceptable:
  - **Standard Method**
  - **Known Air-Infiltration Rate Method** (Req'd to be used with bldgs with a known infiltration rate≤ 0.40 air changes per hour)
- Both methods address the sum of required air volume calculated for all appliances located within the space.

Combustion Air From Inside the Building

IFGC 304.5

- Rooms communicating directly with the space in which the appliances are installed, through openings not furnished with doors, & through combustion air openings sized & located in accordance with 304.5.3, are considered to be part of the required volume.

Combustion Air From Inside the Building

IFGC 304.5.1

- **Standard Method**
  - The minimum required volume shall be 50 cubic ft/1,000 Btu/h of the appliance input rating.

Combustion Air From Inside the Building

IFGC 304.5.2

- **Known Air-Infiltration Rate Method** (for use with **non-fan assisted** equipment)

  Req'd $\text{Volume}_{\text{other}} \geq$

  (21 ft^3/ACH) (I_{other} /1,000 Btu/hr)

  Where:

  Iother- All appliances other than fan assisted (input in Btu/h); ACH Air-Change per Hour

Combustion Air From Inside the Building

IFGC 304.5.2

- **Known Air-Infiltration Rate Method** (for use **with fan assisted** equipment)

  Req'd $\text{Volume}_{\text{fan}} \geq$

  (15 ft^3/ACH) (I_{fan} /1,000 Btu/hr)

  Where:

  Ifan- All appliances which are fan assisted (input in Btu/h); ACH Air-Change per Hour

Combustion Air From Inside the Building

IFGC 304.5.2

- **Known Air-Infiltration Rate Method**
  - For purposes of this calculation an infiltration rate ≥ 0.60 ACH shall **NOT** be used

Combustion Air From Inside the Building

IFGC 304.5.3

- Using Adjacent Spaces for Volume on the **Same Story**
  - Requires 2 openings open w/adjacent space(s) in building
  - Locate openings within 12" of top & bottom of enclosure
  - Req'r 1 in^2/1,000 Btu/hr input (min. 100 in^2)
  - Minimum dimension of air opening $\geq$ 3"

Combustion Air From Inside the Building

IFGC 304.5.3

- Using Adjacent Spaces for Volume on **Different Stories**
  - Considered as a communicating space where spaces are connected by 1 or more openings in doors or floors having a total minimum free area of 2 in^2 per 1,000 Btu/h of total input rating of all appliances. (See IBC 707.2)

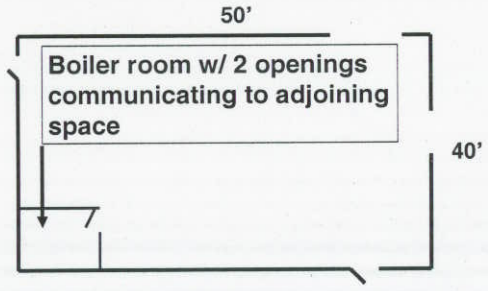
Example- Combustion Air From Inside the Building

IBC 304.5.1

- A 50,000 Btu/hr Input fan assisted Water Heater is located in a 10 ft x 10 ft x 10 ft enclosed mechanical room in a building which is assumed to have an air change rate 0.45.
- What is the minimum volume that the room must have accessible to the Water Heater in order for inside combustion air to be used? Use two (2) methods.

Example- Combustion Air From Inside the Building

IBC 304.5.1



Example- Combustion Air From Inside the Building

COMM 65.0304(3)

- **Standard Method**
- 50,000 Btu/hr X 50 ft^3/1,000 Btu/hr = 2,500 ft^3 is the minimum volume required
- Roughly a 16' x 16' x 10' room is required
- Note: If there is insufficient volume in mechanical room, design combustion air for use of the adjacent space for additional volume on the same story.

Example- Combustion Air From Inside the Building

IBC 304.5.2

- **Known Air-Infiltration Rate Method**

  Req'd $Volume_{fan} \geq$

  (15 ft^3/ACH) (I_{fan} /1,000 Btu/hr)

  Req'd $Volume_{fan} \geq$

  (15 ft^3/0.45) (50,000/1,000 Btu/hr)=**1,667 ft^3**

Note: If there is insufficient volume in mechanical room, design combustion air for use of the adjacent space for additional volume on the same story.

IFGC Chapter 4 vs NFPA 54

- IFGC Chapter 4 "Gas Piping" is Replaced with the National Fuel Gas Code NFPA 54-2002
- Settlement in recent lawsuit will soon require most, but not all, gas tubing installations to be bonded with #6 copper wire. Such action is being incorporated as part of various product listings, & will eventually be incorporated into NFPA 54 & NEC
- For additional information:
  - http://www.pddocs.com/csst/
- Buildings with gas piping/tubing installed prior to Sept. 2006, may be eligible to have corrections made, with a reimbursement

Chimney Vents

IFGC 501.15, 503.5.6

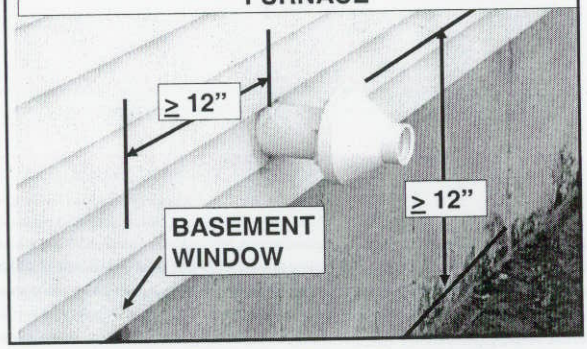
- Cleanouts required
- Must be in good working order. Inspection required by contractor/designer.
  - If an appliance is **added** to, or **removed** from, an existing chimney or vent, the process of the "new" installation for the chimney or vent shall comply with IFGC 501.14.1 through 501.15.4 **(ie. the chimney liner shall be replaced as applicable to the change of use)**

Venting System Termination

IFGC 503.8

- Direct Vent appliance vent clearances to building openings:
  - ≤ 10,000 Btu/h requires minimum 6"
  - >10,000 Btu/h ≤ 50,000 Btu/h requires minimum 9"
  - > 50,000 Btu/h, requires min. 12" clearance

DIRECT VENT/SEALED COMBUSTION TERMINATION-INTAKE for 60,000 BTU/H FURNACE



Commercial Cooking Appliances Vented by Exhaust Hoods

IFGC 505.1.1

- Where (gas) appliances are vented by Type I or II kitchen exhaust hoods, exhaust systems shall be fan powered & the appliances shall be interlocked with the exhaust hood system to prevent appliance operation when the exhaust hood system is not operating-**See Exception**
- Dampers shall **NOT** be installed in the exhaust system.

Recirculating Direct-Fired Industrial Air Heaters – Also known as "Air Turnover Units"

Recirculating Direct-Fired Industrial Air Heaters IFGC 612

- To be allowed if:
  - Listed to ANSI Z83.18, installed per listing
  - Combustion air is defined from bldg, ducted from outdoors, or combination.
  - Direct fired units have combustion air of 4 cfm/1,000 Btu/h input
  - Placed in non-hazardous industrial or commercial occupancies, and do NOT serve sleeping quarters.
- Also known as "Air Turnover Units"

Gaseous Hydrogen System

IFGC Ch. 7

- This is a new Chapter to the IFGC
- The Chapter was created in order to address the installation of hydrogen gas systems used to fuel various transportation vehicles.
- Users of Chapter 7 should also review Comm 40—Gas Systems Code

Gaseous Hydrogen System

IFGC Ch. 7, Comm 2.44, 40.10, 41.17, & 41.24

- Comm 40.10 requires
  - Plan submittal for both Gaseous & Liquefied Systems located outside the building
  - 4 sets of plans
  - 2 sets of specifications
  - Comm 2.44 requires involving $200 plan review & $250 field inspection
  - Completed Form SBD 6038
- Comm 41.17 requires periodic inspections
- Owner is responsible for tank review by licensed boiler/pressure vessel inspector every 3 yrs for Permission To Operate (PTO)

Questions -----

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