

2006 International Mechanical Code With Wisconsin Amendments



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- **Web Site:**
- **COMMERCE.STATE.WI.US/SB**

International Mechanical Code (IMC) Breakdown



- Ch. 1 Administration
- Ch. 2 Definitions
- Ch. 3 General Regulations
- Ch. 4 Ventilation
- Ch. 5 Exhaust Systems
- Ch. 6 Duct Systems
- Ch. 7 Combustion Air

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

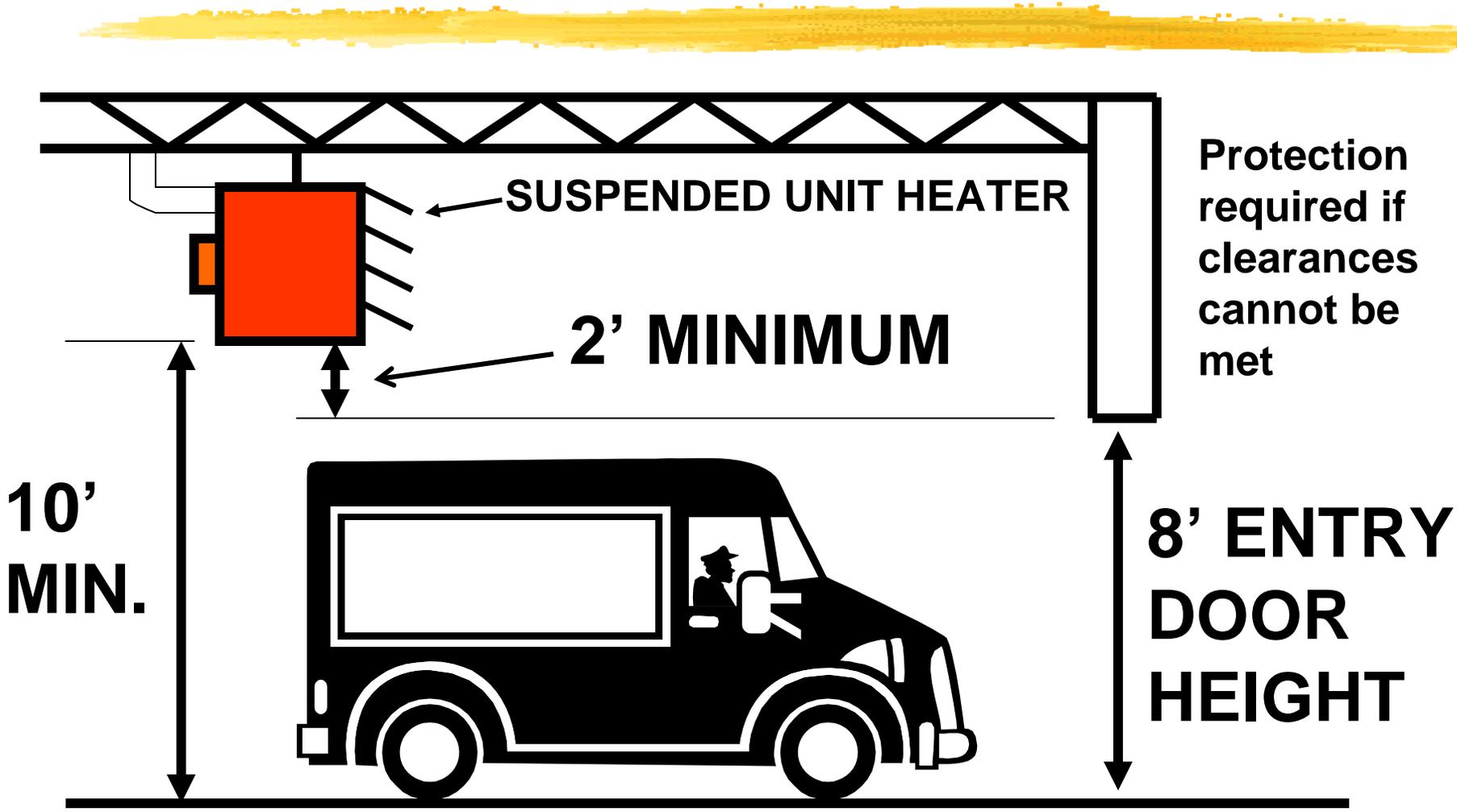
Equipment Clearances

IMC 304.3 & 5 / IBC 1607.7.3

- Public motor vehicle areas-Min. 8 ft above the floor **OR** 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
- Public- Public building or place of employment

HVAC Equipment Clearances

Public Motor Vehicle Area IMC 304.3 & 5



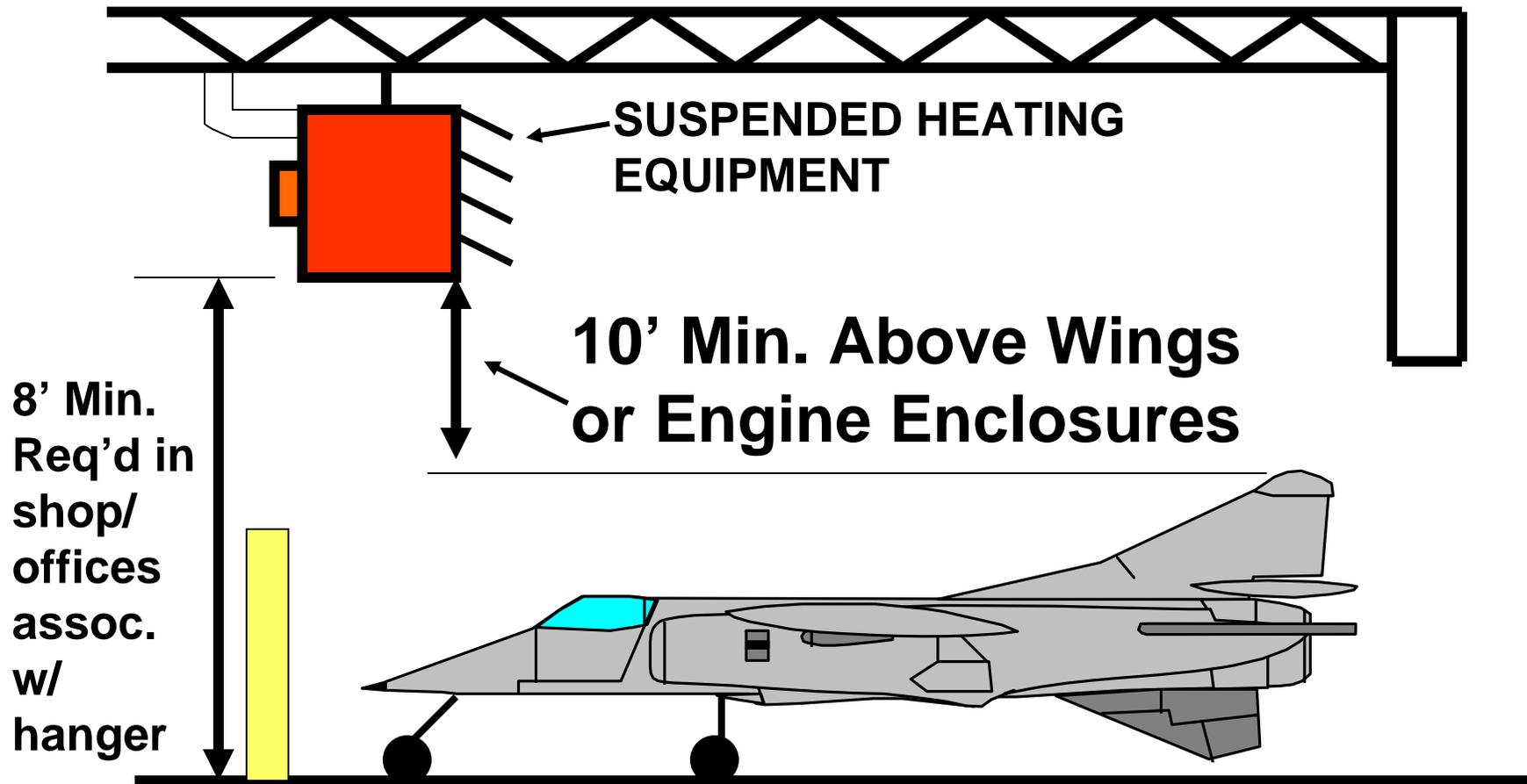
HVAC Equipment Clearances

Aircraft Hanger IBC 412, 1607.7.3



- Heating equipment to be suspended at least 10 ft above the upper surface of wings or engine enclosures of the highest aircraft which may be housed in the hangar; or at least 8 ft above the floor in shops, offices and other sections of the hangar communicating with storage or service areas.

HVAC Equipment Clearances Aircraft Hanger IBC 412, 1607.7.3



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”

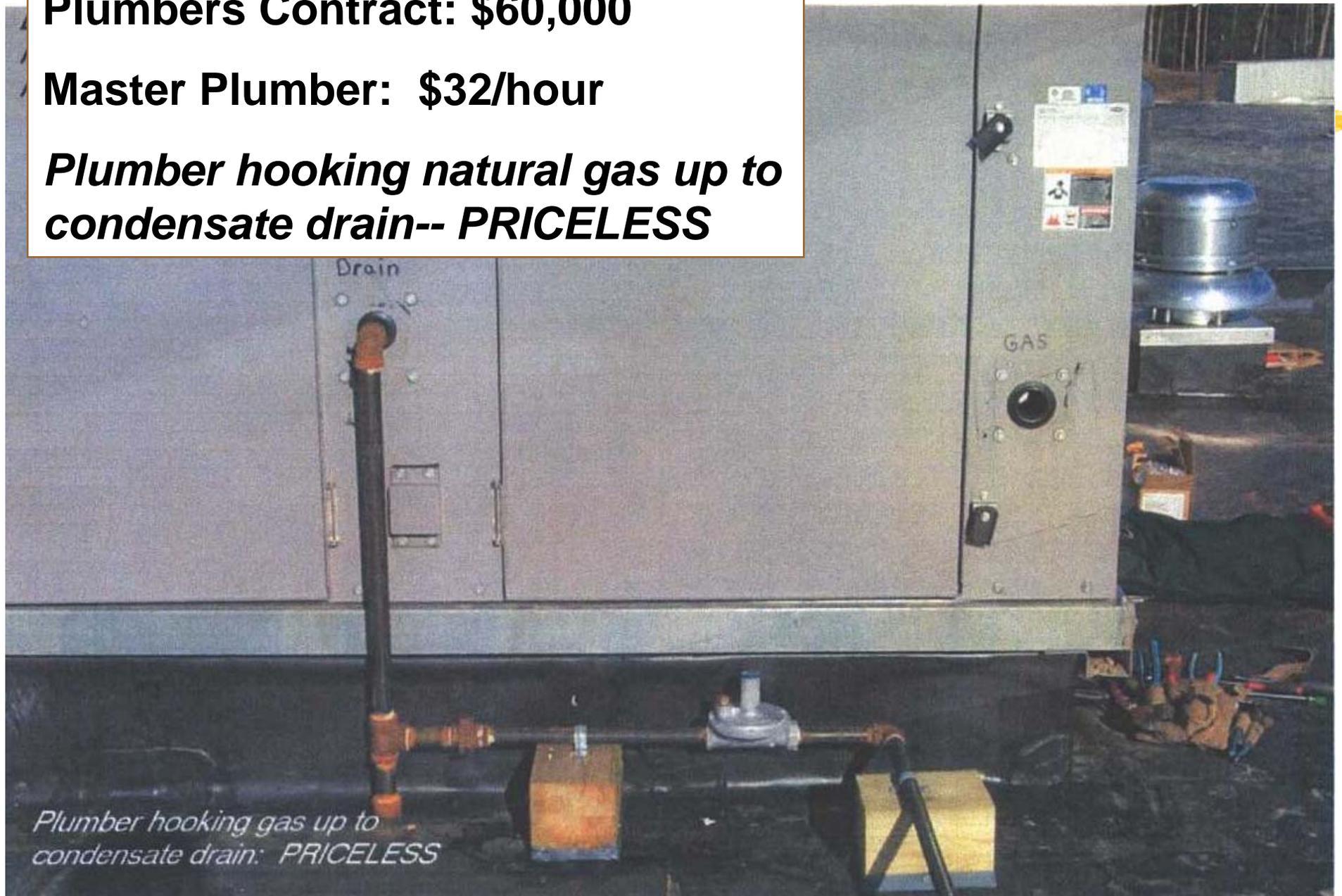


Employee Break Room: \$2 Million

Plumbers Contract: \$60,000

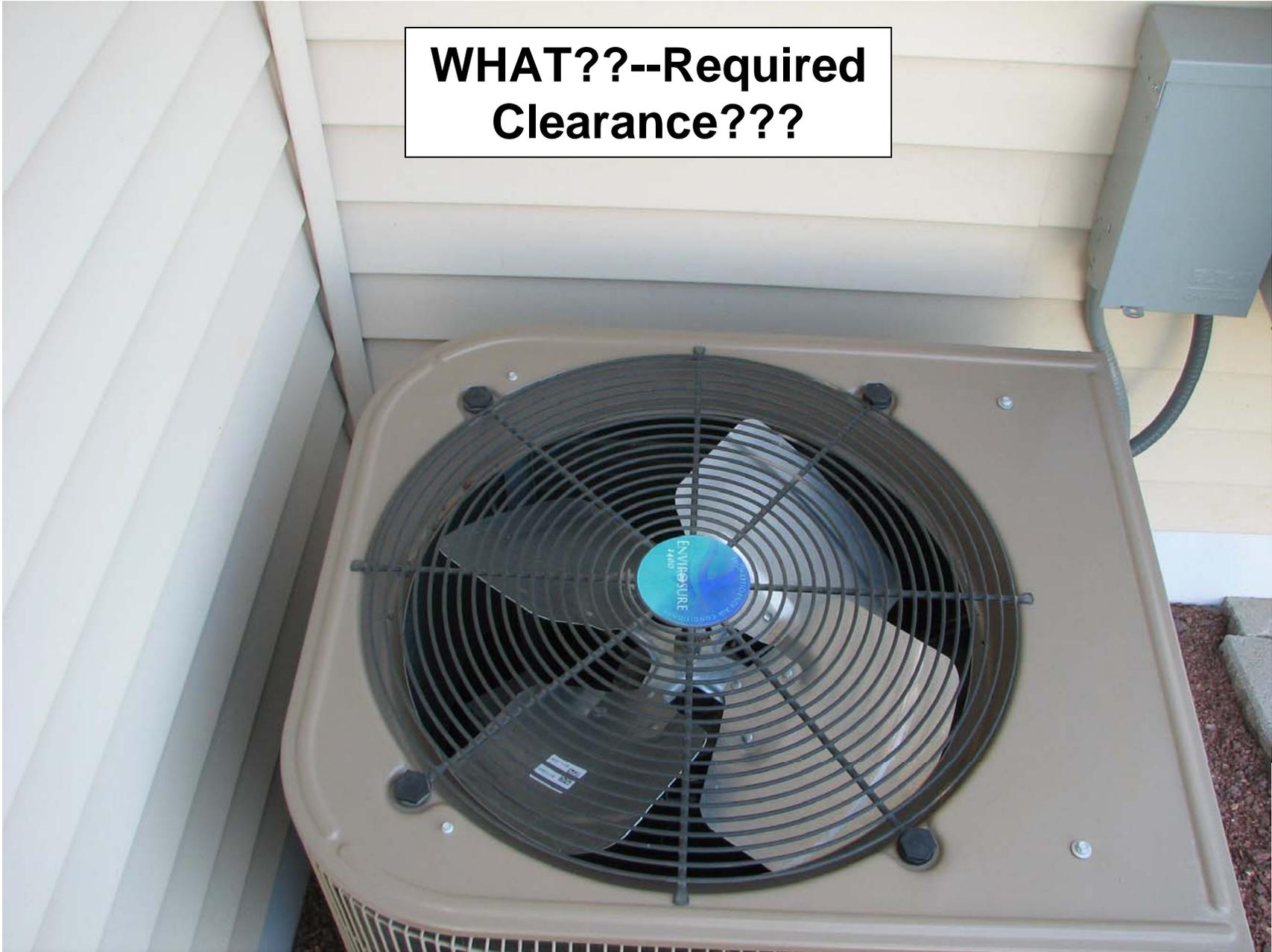
Master Plumber: \$32/hour

***Plumber hooking natural gas up to
condensate drain-- PRICELESS***



*Plumber hooking gas up to
condensate drain: PRICELESS*

WHAT??--Required Clearance???



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



Vent clearance ???



HVAC Equipment Clearance to Grade IMC 304.9



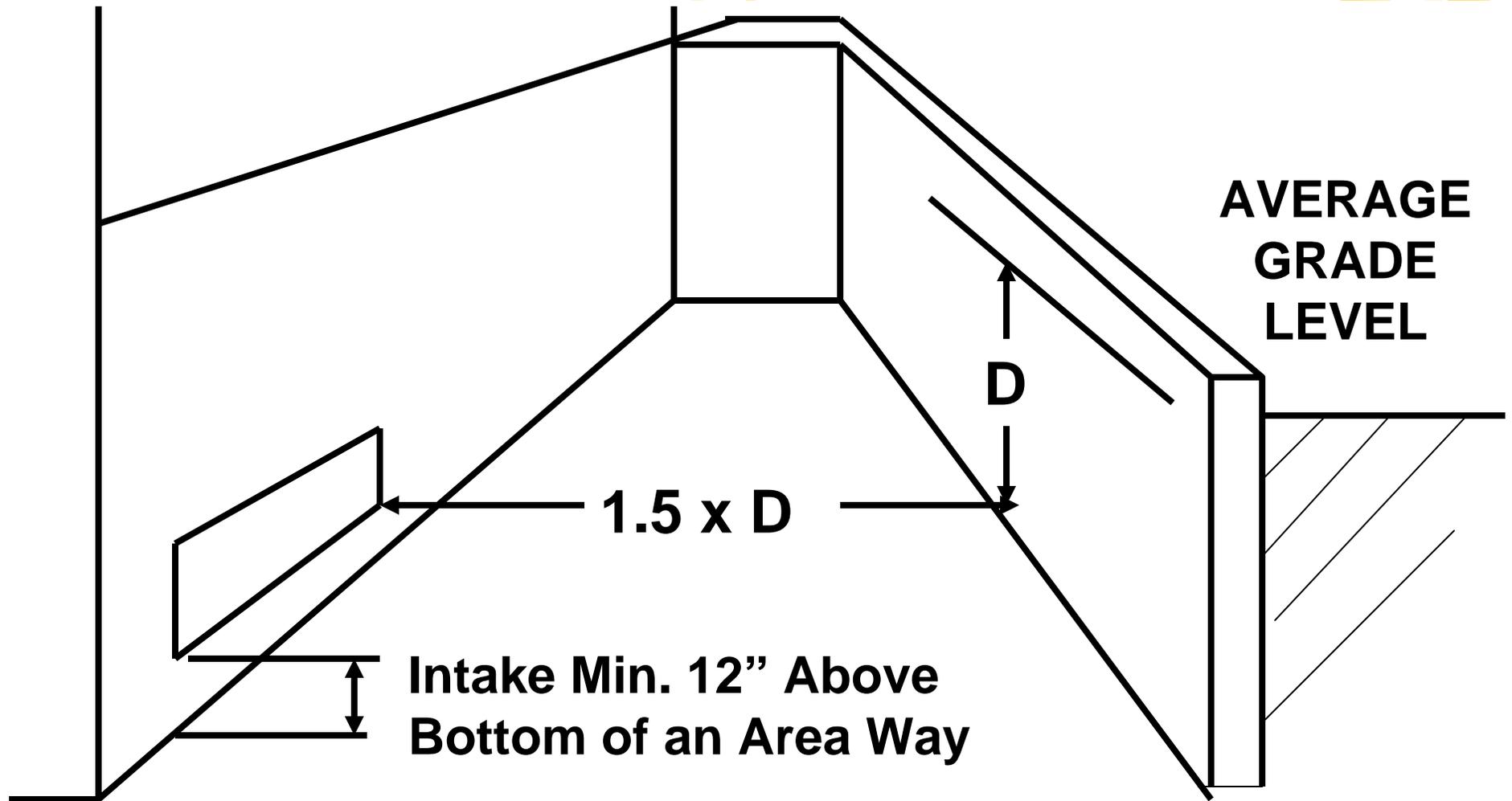
- Equipment at grade level to be supported on a level concrete slab, **OR** other approved material, extending **above** adjoining grade; **OR**
- Shall be suspended $\geq 6''$ above adjoining grade

**NOT
ACCEPTABLE**



Outside Air / Natural Ventilation Area Well Clearances

IBC 1203.4.1.2 / COMM 64.0401(4)(a)2.



Outside Air / % Openables

IMC 401.5



- Outside air intakes & exhausts opening to be located 10' from lot lines or buildings on same lot
- For openings on a street or public way, the distance is measured to the centerline of the street or public way

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



Intake Opening Locations

COMM 64.0401(4)

- Outside air intakes minimum 10' from exhaust outlets, except where the opening is ≥ 2 ft below the contaminant source; **12" if the exhaust is ≤ 100 cfm**
- Minimum 12" above adjoining grade, roof surface or areaway
- **Health Care Facilities** require minimum 25' set back for hospitals and nursing homes, other restrictive provisions listed



Chippewa Falls, WI

The distance from the upper outside air intake and lower grating located above a generator exhaust stack is < 10 ft

The distance from the openable door to the exhaust stack is also < 10 ft

< 12" from a Window?

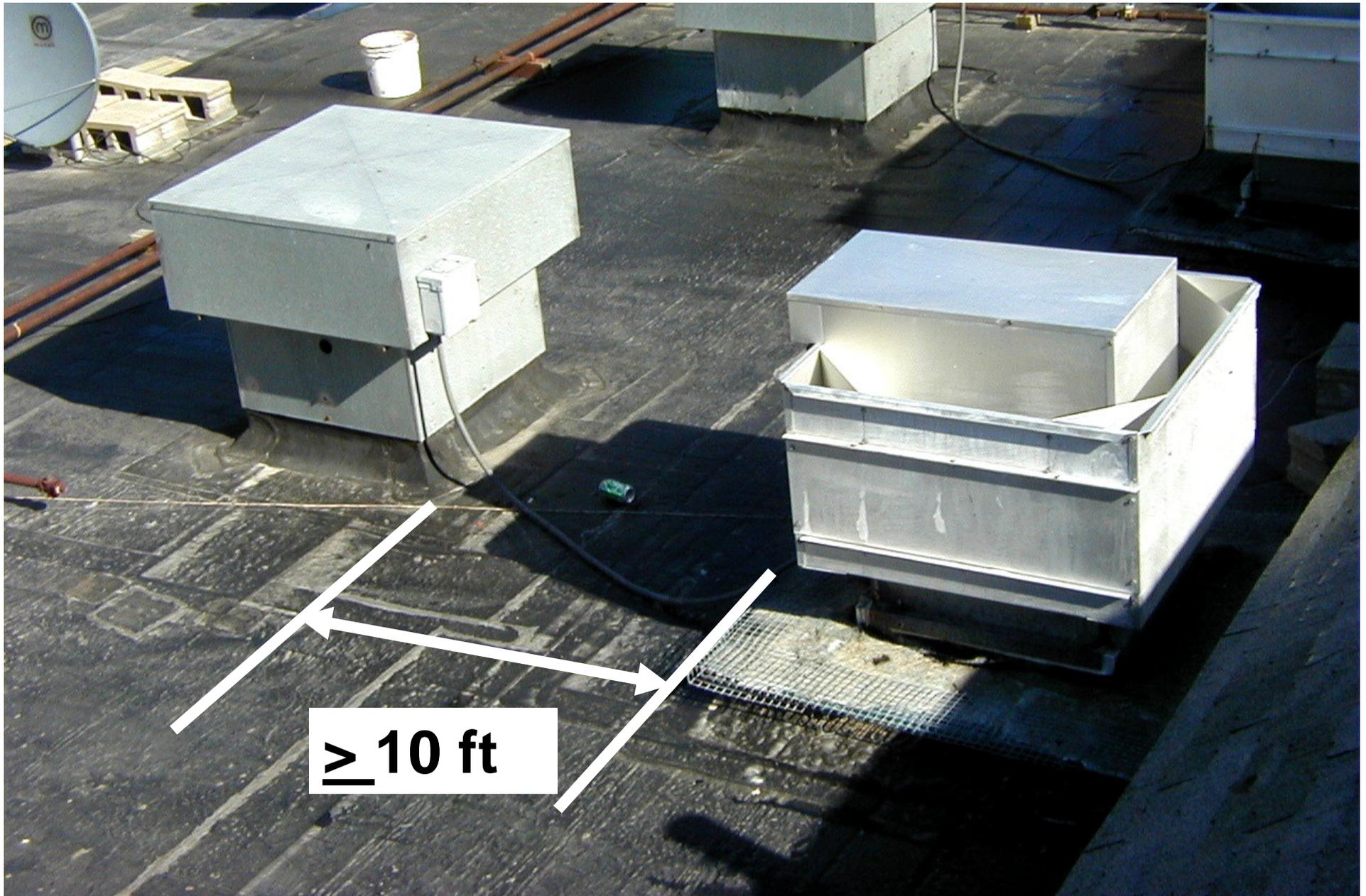


Mechanical Draft Termination

Clearances IMC 804.3.4, 401.5 & 5/IFGC 503.3.3

- Horizontal & vertical mechanical draft system terminations must be ≥ 7 ft above the level of a walkway

INTAKE & EXHAUST - MINIMUM CLEARANCE



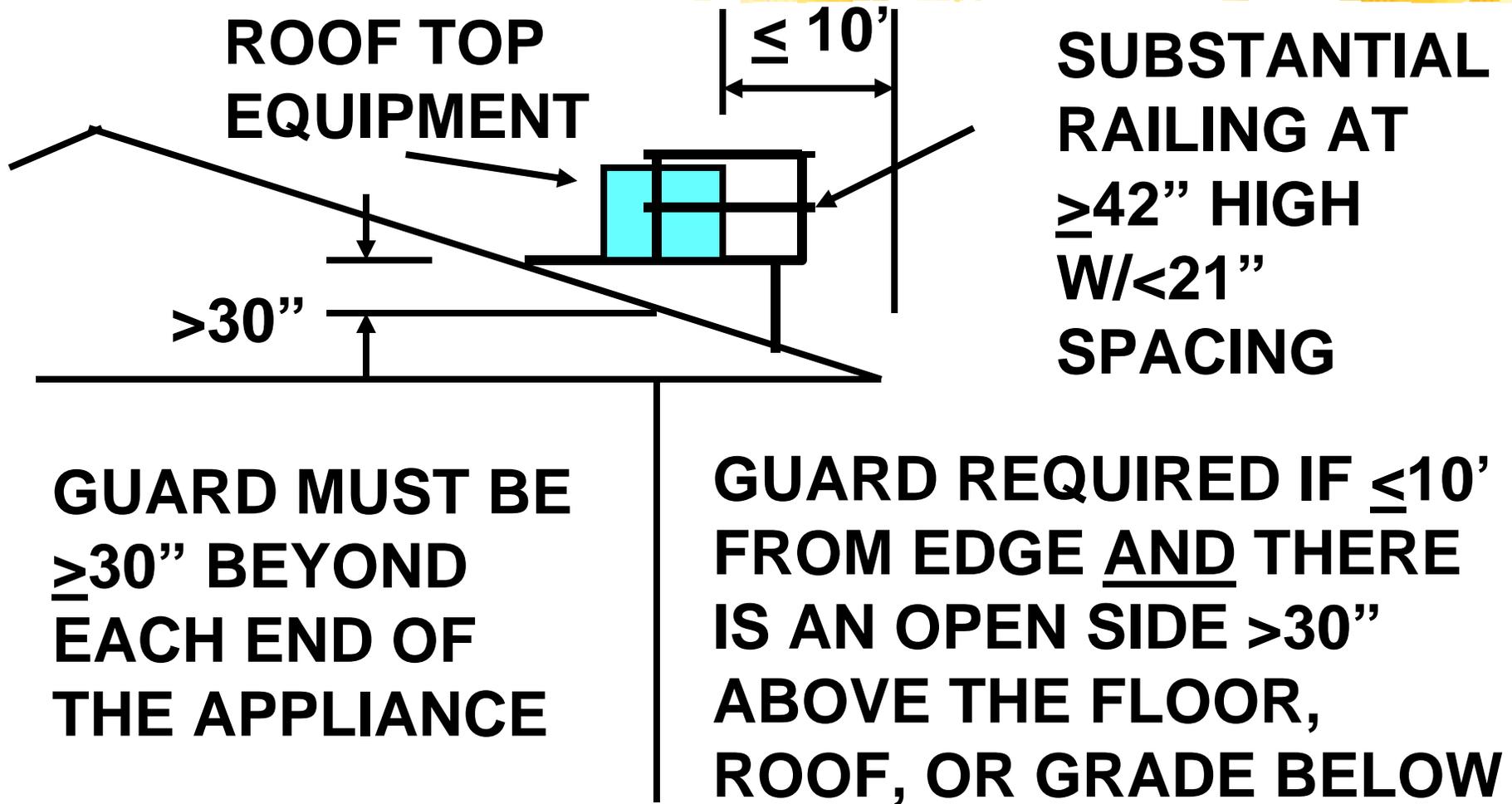




COMPLIANCE FAILURE: < 10' FROM INTAKE TO EXHAUST; EXHAUST < 2' ABOVE INTAKE

Guards for HVAC Equipment & Roof Hatch Openings

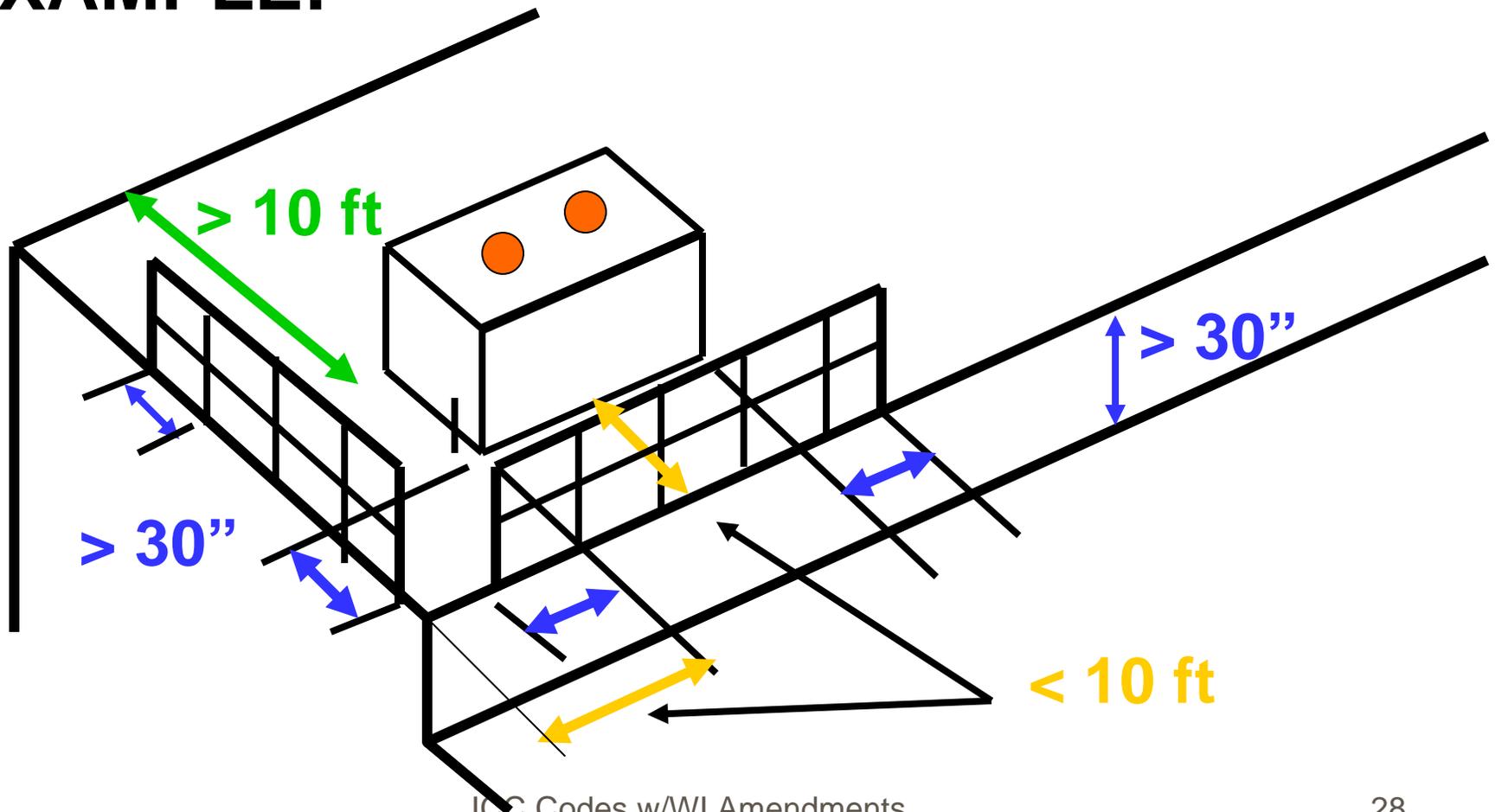
IMC 304.10, IBC 1009.11.2, 1013, 1607.7.1,



HVAC Equipment Guards

IMC 304.10, IBC 1009.11.2, 1013, 1607.7.1

EXAMPLE:





Hmmm.....

ICC Codes w/WI Amendments

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

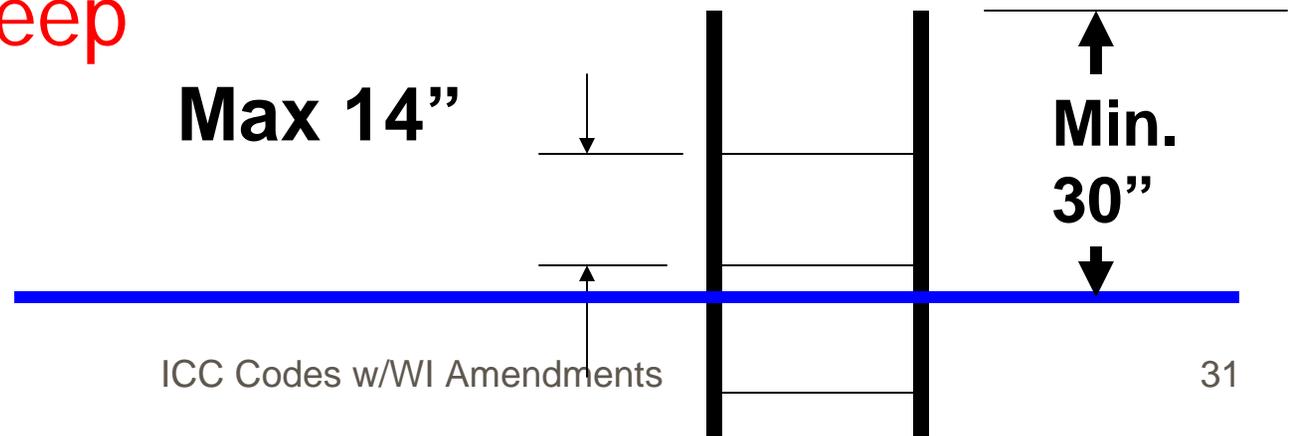


Permanent Ladder Requirements

IMC 306.5

- The side railing shall extend above the parapet or roof edge $\geq 30''$
- Ladders shall have rung spacing not to exceed 14" on center
- Ladders shall have a toe spacing not less than 6" deep

Roof Deck



Access?



HVAC on Roofs & Elevated Structures

IBC 1608.1 / ASCE 7-7.8

- Snow loading for HVAC systems with a length or width of 15 ft or more, will require snow load/drift calculations to be submitted



LET'S PLAY A GAME--WHERE'S THE ROOF TOP UNIT?

ICC Codes w/WI Amendments

HVAC on Roofs & Elevated Structures

IMC 306.5.1/Comm 64.0306(1)

- **Permanent platform req'd** where equipment and appliances requiring access are installed on roofs or elevated structures
- Platform not required if roof pitch is $< 3/12$
- NOT required when installation consists of exhaust fans ONLY

Condensate Disposal

IMC 307.1



- Liquid combustion by-products of condensing appliances are required to be collected and discharged in a defined manner
- Condensate drain is not considered plumbing

Make-up Air

COMM 64.0309(1) , IMC 403.1, 508.1.1



- Not explicitly stated to be tempered, but “Minimum Temperatures” MUST be maintained 3 ft above the floor within the occupied space
- Exception
 - Kitchen make-up air may not be $>10^{\circ}\text{F}$ of the conditioned space being served unless part of AC or air that does not decrease comfort

Seasonal Occupancies

COMM 64.0309(3)



- When approved by Dept., heating requirements waived, but not ventilation, for the period of **May 1 through October 15**
- Typical applications include drive-in eating places, club houses, outdoor toilets, camp lodge buildings, canning factories and labor camps or similar

Smoke and Heat Vents

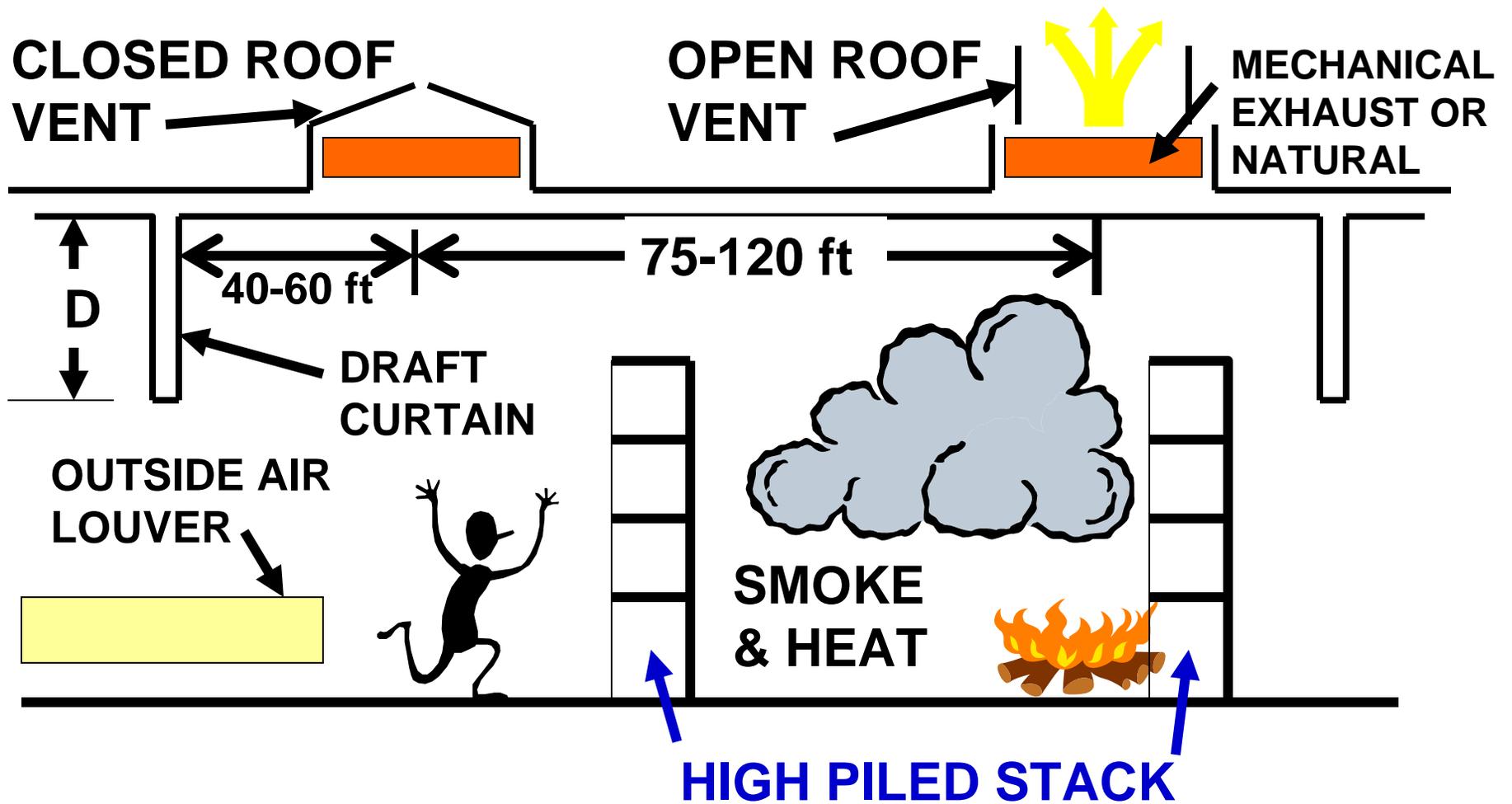
IMC 311, IBC 910 & IFC 2306.2

- Req'd in one-story bldgs or portions with the following uses unless exception is met:
- F-1 & S-1 > 50,000 sf, **High-Piled Combustible Storage (>12')**
- 100 ft maximum between exhaust fans
- Size exhaust fan per IBC Table 910.4.2
- Supply air to be uniformly distributed
- To be activated with sprinkler system or by heat detectors, and wired as defined



Smoke and Heat Vents

IMC 311, IBC 910 & IFC 2306.2



Balancing, Operation & Maintenance

COMM 64.0313

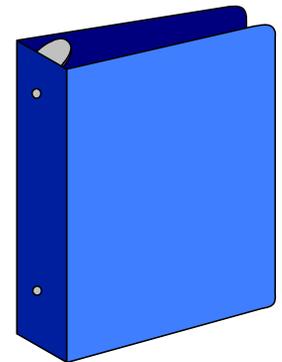


- Balancing **MUST** be performed on every HVAC installation
- Balancing report **MUST** be provided to owner & made available to Dept. Representative
- Air systems & hydronic systems **SHALL** be balanced as outlined in the code
- Operation & maintenance information **SHALL** also be provided

Balancing & Operations

COMM 64.0313

- Outside air quantities, exhaust rates, etc. to be identified in balancing report
- Control sequences, & calibrating Info also to be included



Basic Design Heat Loss

ASHRAE/ IMC 312.1, COMM 63.0302 & Table 64.0309

- Heat Loss comes from 2 main areas:
 - **Building** via $U \times A \times T_d$
 - **Ventilation** via $1.085 \times \text{CFM} \times T_d$
 - Where $U = 1/R$; $A = \text{Area (sf)}$ of Assembly; $T_d = \text{Temperature Difference between Minimum Indoor Temperature vs Minimum Outdoor Design Temperature.}$; $\text{CFM} = \text{CFM of Outside Air}$

Design Requirements

IMC 309.1 & 312.1 / COMM 63.0302 & 64.0309

- Minimum Exterior Design Temperatures found in Comm Table **63.0302**
- Minimum Inside Temperature for Winter Design to be 60, **68**, or 70°F (Based on Occupancy)
- Maximum Inside Temperature for Summer Design to be no lower than **75°F** (**Only** if Lowering Air Changes)
- No Maximum on Equipment Size

Design Notes



- Code is a set of minimum requirements
- Code is NOT a design manual
- Use of outside design temperature chart does NOT relieve **Owner** of responsibility to maintain “Minimum Inside Temperatures”

Stamped HVAC Heat Loss Calculations Req'd with HVAC Plans

COMM 61.31(2)(e), IECC 63.0302, IMC Table 64.0309

- Determined using ***ASHRAE Handbook of Fundamentals*** for:
 - Ventilation
 - Envelope
- Lighting loads may **NOT** be included for the purpose of calculating design heating loads
- Heat Gain Calc's required only if a lower air change rate is incorporated into design

HVAC Equipment Replacement

COMM 61.30(3)



- If the **new** heating/cooling equipment Btu output is \geq the **old** htg/clg equipment Btu output of the same fuel & heating/cooling design, no submittal is required
- If submittal is required, include info on both new/old manufacturer, model, btu input/output, efficiency, and heat loss calculations (to verify size decrease), site, owner & contractor information

Outside Air Requirements

IBC 1203.4.1 / COMM 64.0401(2)(a) & 64.0403



- Minimum of 7.5 CFM of O.A./person
 - Per COMM Table 64.0403 (# of People/1,000 sf)
 - Per "Acceptable Justification"
 - Continuous when people are present (w/Exceptions)
- Natural ventilation (4%)
- Diversity allowed
- Exceptions

Outside Air Requirements

COMM 64.0403(6)(a)2.d.



- When using IMC Table 64.0403 places of worship (< 100 people) requires:
 - Mechanical ventilation or natural ventilation
- Places of worship (\geq 100 people) requires:
 - ????? See COMM 64.0403(6)(a)2.d.

Outside Air Waived (Exception)

COMM 64.0401(1)



- If, in large volume spaces, there is $> 5,000 \text{ ft}^3$ per occupant. Required exhaust ventilation and makeup air is still required

Outside Air Requirements

COMM Table 64.0403



- Determination of Outside Air for Private Dwellings; Single & Multiple:
 - 4% Openables are acceptable **OR**
 - 2 people for 1st bedroom + 1 person for each additional bedroom
 - | Bedrooms are determined per Dwelling Unit

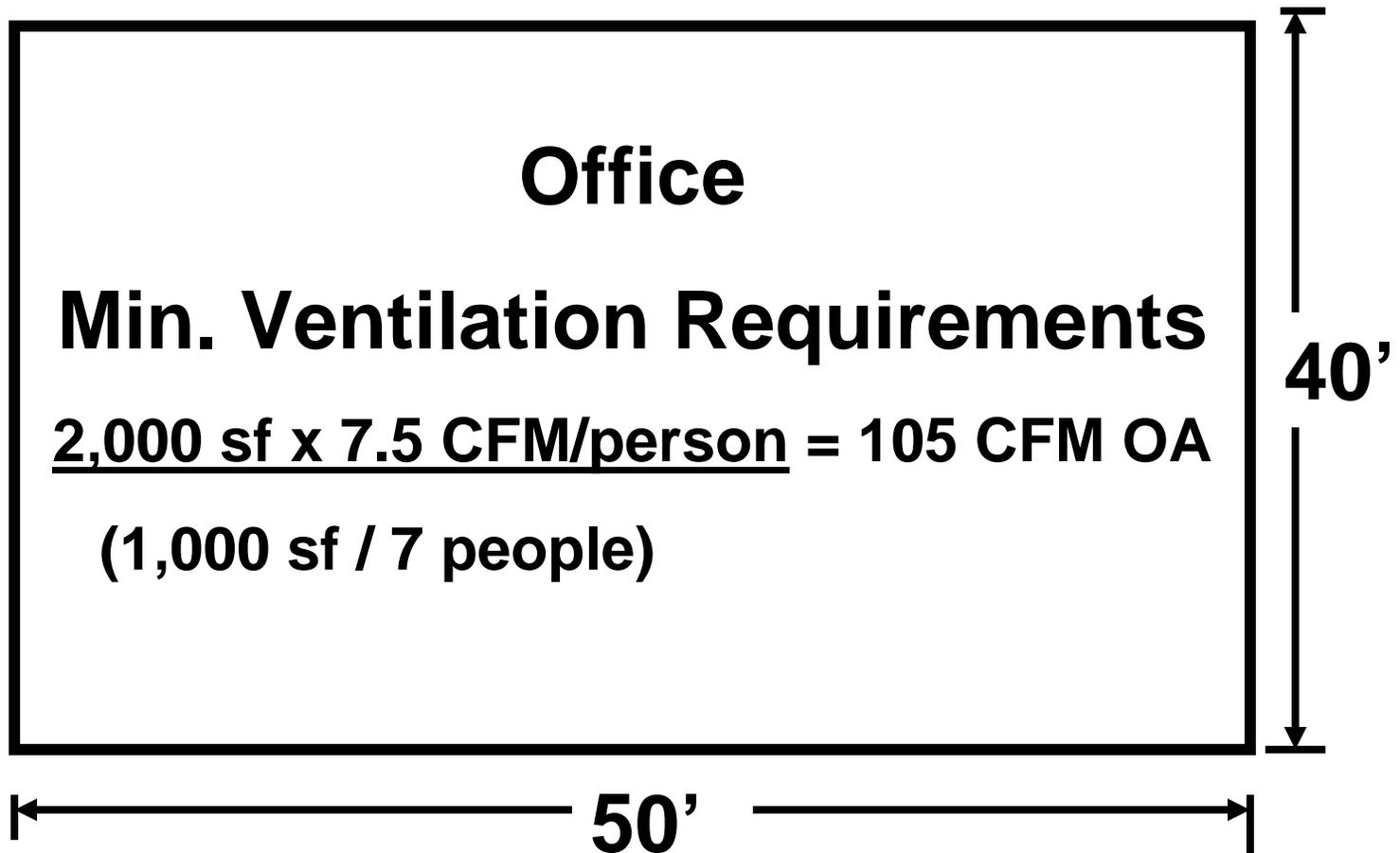
Outside Air Requirements

COMM Table 64.0403, IBC 1203.4



- Determination of Outside Air for Hotels, Motels, Resorts & Dorms:
 - 4% Openables are Acceptable **OR**
 - Note "n" ---- Requires 15 cfm of outside air per room

Outside Air Example



Outside Air / % Openables

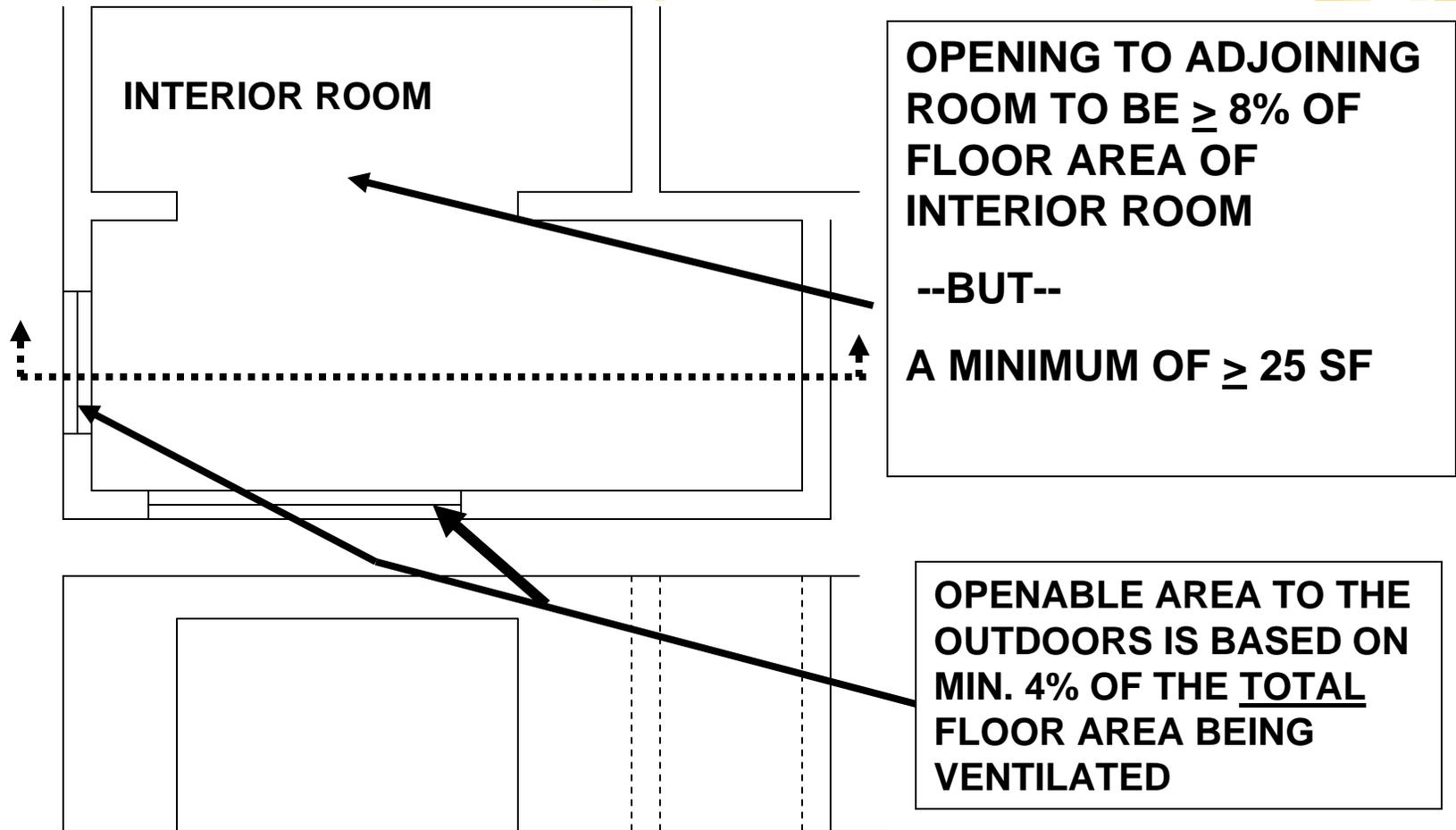
IBC 1203.4.1.1



- Where rooms and spaces without openings to the outdoors are ventilated through an adjoining room, the opening to the adjoining room(s) **shall be unobstructed** and shall have > 8% of the floor area of the interior room, but not < 25 sf. The minimum openable area to the outdoors shall be based on the total floor area being ventilated

Outside Air / % Openables

IBC 1203.4.1.1



Air Change Requirements

COMM 64.0403(8)/64.0202



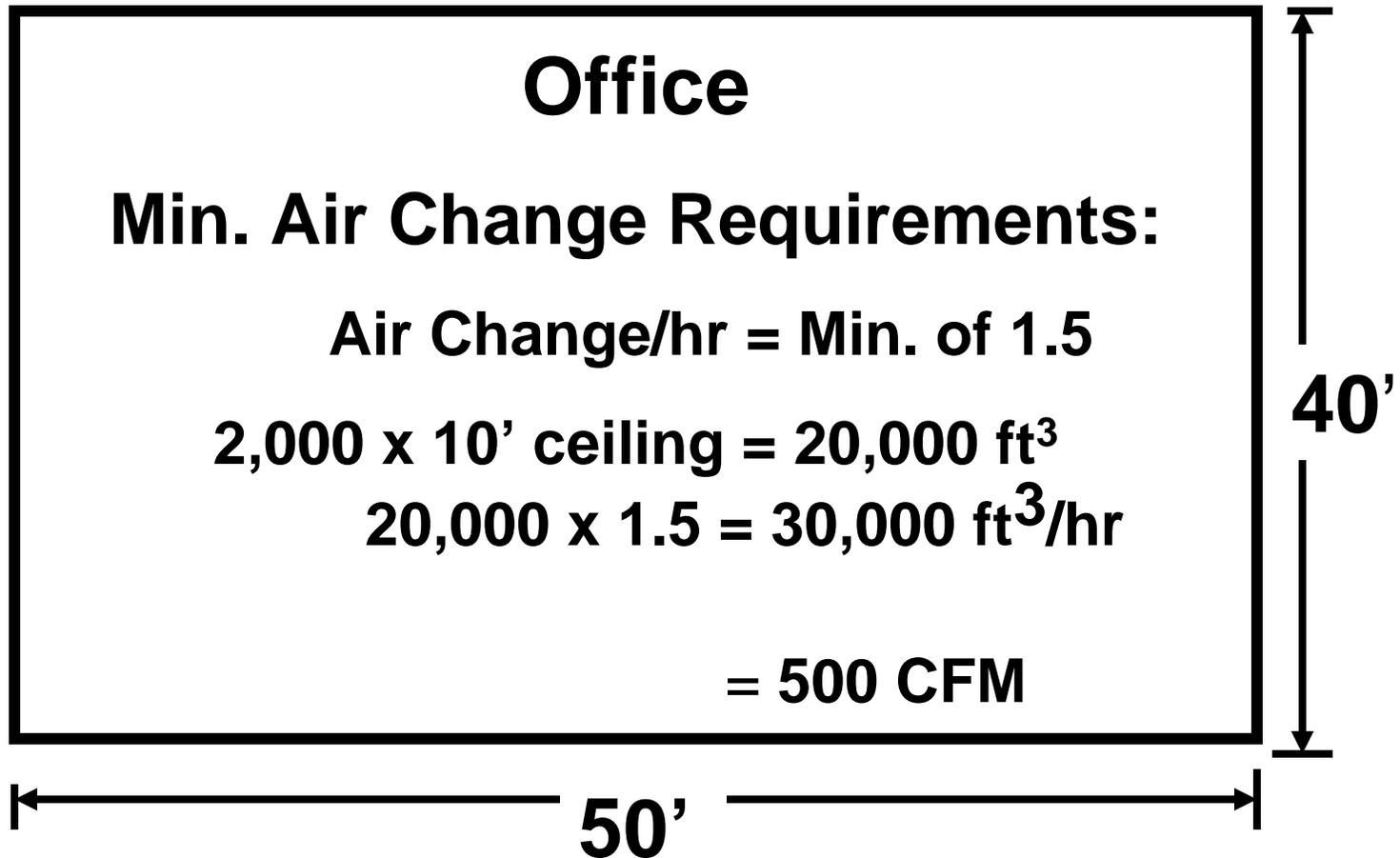
- Must occur when people are present
- Min. 6 Air Changes w/no ac
- < 6 Air Changes w/ ac per Table 64.0403
- Lower 10 ft to be addressed (or 10 ft higher than human occupancy)
- Ceiling fans recognized via definition of "Air Change"
- Exceptions - See COMM 64.0401

Air Change Example

COMM 64.0403

NOTE:

*Without A/C
the requirement
is 6 air
changes per
hour (see
exceptions)*



Contamination Exhaust Requirements

IMC 401.6, 502.1 & 510.4, Comm 64.0401(6)

- Sources: particulates, heat, odors, fumes, spray, vapors, smoke or gases (in quantities which are irritating or injurious to health)
- Contaminated air shall not be recirculated to occupied areas unless the contaminants have been ***removed***
- Exhausts shall discharge **outside building** to approved location or filtered

Do you see an “Air Quality” problem?



Recirculation of Air

IMC 202, 403.2.1, 510.4, & 918.8



- Ventilation air not to be re-circulated from one dwelling to another or to dissimilar occupancies
- Re-circulation of required mechanical exhaust ventilation is prohibited
- Return air from one dwelling unit shall not be discharged into another dwelling unit

Exhaust Requirements

IMC 501.3 / COMM 64.0401(2)(b) & 64.0403

- Table 64.0403
- Requires exhausts to operate continuously w/ building occupancy
 - Exceptions involve ≤ 2 toilet fixtures, ≤ 2 showers, or ≤ 4 wash/dryers (any combination)
 - Exceptions **NOT** allowed if part of the required air balancing with supply air

Exhaust Requirements

IMC 403 / COMM Table 64.0403, IBC 1203.4.1



- PRIVATE DWELLINGS-MULTIPLE RESIDENTIAL
- Toilet/Bathrooms minimum 50 cfm intermittent or 20 cfm continuous
- Kitchen requires 1 of the following:
 - Natural ventilation (4%)
 - 100 cfm intermittent
 - 20 cfm continuous



ICC Codes w/WI Amendments

Exhaust Requirements

IMC 403, COMM 64.0403(6)(c)1./COMM Table 64.0403

- Shower areas minimum 2 cfm/sf
- Min. 75 cfm/toilet fixture (Public Space)
Min. 35 cfm/bathroom (Hotel/Motel/Dorms)
- 2 sf natural ventilation to outside w/1 toilet fixture (not allowed for multiple fixtures)
(No ductless treatment device allowed)
- Janitor Closets Min. 2 cfm/sf or 75 cfm/sink
(No ductless treatment device allowed)



What do you mean plumbing vents & toilet exhausts can't be hooked together.....??

Car Wash Exhausts

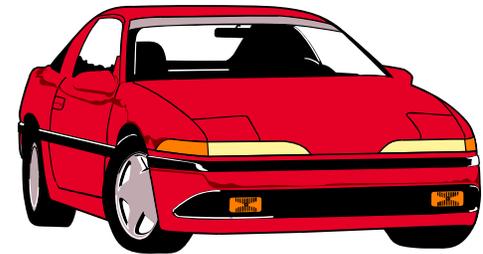
Comm Table 64.0403, 502.1.1, IBC 1203.4

■ Self Serve Fully Automated

- Natural ventilation acceptable (4%)
- No Minimum Requirement (NMR) for "Minimum Inside Temperature"

■ All other types

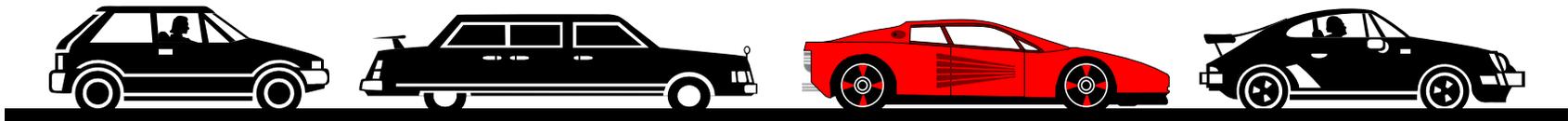
- **NO** Natural Ventilation Allowed
- Minimum 0.5 cfm/sf exhaust required
- Exhaust to be removed within 18" above floor
- 60°F "Minimum Inside Temperature"



Car Wash Exhausts

Comm Table 64.0403

- For a facility having a portion that is automated with a conveyor system, the net floor area may be calculated as including only the floor area between the termination of the conveyor system and the vehicle-exit



Private Dwelling Garage Exhaust

Req'ts IMC 404 / COMM Table 64.0403 & 64.0404



- Garages w/solid walls for each dwelling 4% openable or 100 cfm continuous
- Garages, common for multiple dwelling units 0.50 cfm/sf continuous within 18" of floor
- Intermittent allowed as defined by code

Enclosed Parking Garage

IMC 404 / COMM Table 64.0403 Footnote d, 64.0404

- Must be < 30% open area in total wall area
- Min. 0.5 cfm/sf continuous w/in 18" of floor
- Intermittent--
 - Operate min. of 5 hrs/day
 - Maintain < **35** ppm CO & < 1 ppm NO₂
 - Maintain Negative/Neutral Pressure

Enclosed Parking Garage

Enclosed Parking Garage IMC 404, 502.13, COMM
Table 64.0403 Footnote d, 64.0404

- NOTE: CO and NO₂ sensors have area limitations per their listing, thus multiple units may be required to be installed and wired appropriately with the exhaust system
- Any failure by one (1) of the sensors must result in the system operating in the “continuous exhaust ventilation mode” per the listing requirements

Enclosed Parking Garage

IMC 404, Comm 64.0404



- New Option:
 - Continuously exhaust 0.05 cfm/sf during non-occupied times of the enclosed parking garage
 - Increase exhaust rate to 0.5 cfm/sf during vehicle operation or the presence of occupants.
 - Plans shall be explicate on method by which the system will automatically operate.

Airplane Hanger Ventilation

- An Airplane Hanger, used strictly for storage, does not require any exhaust or make-up air if natural ventilation requirements of the code are met.



Airplane Hanger Ventilation

- However, if any Service or Maintenance work is done, the bldg requires exhaust & make-up air, same as a repair or service garage – ½ cfm per sq. ft.



Different Ventilation Requirements

COMM 64.0403(6)(b)

- Spaces requiring different ventilation requirements shall be provided with a complete solid separation or the most stringent ventilation requirements shall apply to all un-separated areas
- Common areas of concern: Offices/Retail adjacent to Auto Repair/Parking Garage areas



Pool Exhaust Requirements

IMC 403.2.1 Item 2., COMM 64.0401(2)(b)2.d., Table 64.0403 & 64.0403(6)(c)5.

■ Pool Minimums

- 2.0 cfm/sf of Pool Surface **OR**

- 1.0 cfm/sf of Pool Surface w/Humidity Controls

- Pool Exhausts **MUST** operate Continuously at or above minimum exhaust rates (**Recirculation NOT allowed unless IMC 403.2.1 met**)

Pressure Equalization

IMC 501.3 / IBC 310



- Where mechanical exhaust is req'd in a room or space in all occupancies except Group R-3, such space shall be maintained with a neutral or negative pressure

Pressure Equalization

IMC 501.3 / IBC 310 / COMM 64.0501



- A mechanically exhausted room or space in a dwelling unit is not required to have negative or neutral pressure
- NOTE: This allowance can be used **ONLY** if the units have independent HVAC systems



Repair/Service/Garage Exhaust Req'ts

IMC 304.3, 502.1.1/ COMM Table 64.0403

- Minimum 0.5 cfm/sf for
 - Repair, S-1; Service, M;
Enclosed Garage Areas, S-2
- Exhaust intake w/18" of floor
- Equipment & appliances w/ ignition sources shall be elevated $\geq 18"$ above the floor (DVSC **NOT** exempted)

Repair Operation

IMC 502.13 & 14



- Source Capture System required
- Source/Capture System: Dept. will recognize a non-combustible flexible tube/hose \leq 10 ft terminating outside the bldg.
- S/C System **NOT** applicable to oil/lube establishments

Repair Operation

IMC 502.13 & 14



Battery Charging Areas

IMC 502.1.1 & 502.4 / IBC 907.2.23



- System to limit hydrogen to 1.0 % of the total volume of the room
- Continuous ventilation req'd at a minimum of 1.0 cfm/sf of floor area of room
- Inlet to exhaust system to be located at ceiling height
- Smoke detection req'd with audible alarm at attended location if criteria met

Flammable/Combustible Liquids

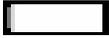
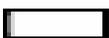
IMC 502.9.5.4 & 503, Comm 10.25/NFPA 30 4-4.9-11, NFPA 91

- Use, Dispensing & Mixing Areas:
 - Greater of 1 CFM/sf or 150 CFM mechanical exhaust system required for Class 1 liquids (See Comm 10/NFPA 30)
 - Class I liquids require spark proof fan, & explosion proof motors
 - Dispensing areas require an airflow switch, or similar, interlocked to sound audible alarm upon ventilation system failure

Clothes Dryer Exhaust Requirements IMC 504

- Exhaust duct limited < 25 ft unless the product listing allows for longer length (Power Booster Fans **NOT ALLOWED** unless part of dryer listing)
- Penalty for each bend of duct
- Cleanouts required for each vertical riser

Some Dryers are Listed & Approved for Longer Exhaust Vent Length

| | DUCT PIECES | EQUIVALENT RIGID LENGTH | X | NUMBER USED | = | EQUIVALENT LENGTH |
|--|---|-------------------------|---|-------------|---|-------------------|
| TRANSITION DUCTING (DRYER TO WALL) |  Rigid Metal Ducting (Preferred) | 1 Ft. | X | (4) | = | 4 Ft. |
| INSIDE WALLS/CEILING (WALL TO WALL CAP) |  Elbows (90°/45°) | 10 Ft. | X | (3) | = | 30 Ft. |
| |  Turns Less Than 4 Ft. | 2 Ft. | X | (1) | = | 2 Ft. |
| |  Rigid Ducting | 1 Ft. | X | (5) | = | 5 Ft. |
| WALL CAPS |  4 Wall Cap | 5 Ft. | X | (1) | = | 5 Ft. |
| Total Ductwork Length | | | | | = | 46 Ft. |
| TOTAL MUST BE LESS THAN OR EQUAL TO 150 FT. | | | | | | |

Total Equiv Length \leq 150 ft

Dryer Installation

Instructions are part of Code by Reference



*Owner's Manual
and Installation
Instructions*

DPGT750

FOR YOUR SAFETY:

WARNING

- Use only rigid metal or flexible metal 4-inch diameter ductwork for exhausting to the outdoors. Never use plastic or other combustible easy-to-puncture ductwork.
- This dryer **must** be exhausted to the outdoors.

Minimum clearance to combustible surfaces and for air openings are:

- 0 inch clearance both sides
- 1 inch front
- 3 inches rear

Consideration **must** be given to provide adequate clearance for proper operation and service.

Clothes Dryer Exhaust Requirements

IMC 504

- Make-up air is required for exhausts > 200 cfm
- Closet locations require 100 sq. inches of opening
- Duct must be galvanized steel or aluminum, \geq 4 inches (See listing limitations)
- Ducts in the wall cavity must be sheet metal--**NO METAL FLEXIBLE DUCT**



Clothes Dryer Exhaust Requirements IMC 504



- No screws allowed (Use rivets or other fastening means)
- Exposed listed metal transition (flexible) ducts limited to ≤ 8 ft
- Transition ducts NOT allowed to be concealed within construction

Transition Duct

As allowed by clothes dryer equipment manufacturer





Clothes Dryer Exhaust Requirements IMC 504



- May tie multiple ducts into one main duct, ONLY if allowed by product listing (typically NOT allowed)
- Can not be used in combination of with exhausts for other systems (toilet, combustion, kitchen, etc.)
- Additional req'ts for commercial dryers (Type 2 clothes dryers)

Type I Kitchen Hood/ Exhaust Duct Requirements



Follow NFPA Codes for location of Fire Suppression Activation system

ICC CODES WWW.AMERICANFIRE

Type I Kitchen Hood/ Exhaust Duct Requirements

IMC 308, 501.2, 506.3.2, 506.3.10 507 & 509.1/COMM 64.0506

- Type I-Collects/Removes Grease Vapors & Smoke
 - Independent System required over a grease source
 - Suppression System required for commercial food heat-processing appliances
 - Fire Rated Duct Enclosure required/18" from combustible (gypsum is "combustible"....)
 - Ducts liquid tight, minimum 16 ga Steel, requires cleanouts

Type I Kitchen Hood/ Exhaust Duct Requirements IMC 506.3.10 / IBC 707.4

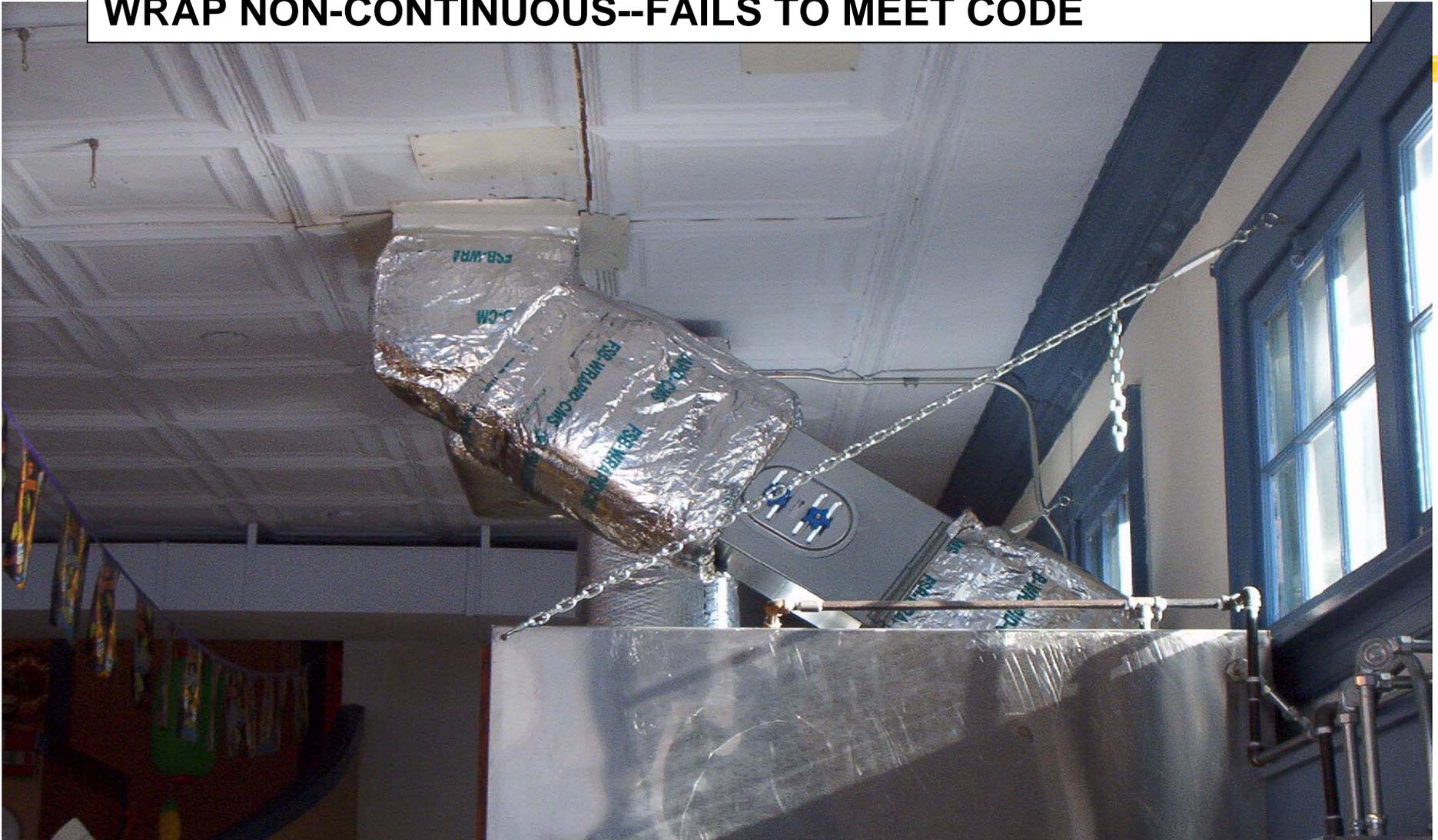


- Duct must be enclosed from point of roof/wall penetration to outlet terminal as allowed for by code for that location
- Must meet IBC requirements for shaft construction, with required clearances
 - Exception: The “Grease Duct Enclosure” can meet ASTM E814 and have the proper “F” & “T” ratings (See UL YYET “Grease Duct Enclosures”)

Type I Kitchen Hood/ Exhaust Duct Requirements IMC 506.3.10 / IBC 707.4

- BEWARE: **1 or 2 layers** of wrap material may be required to attain a 1 or 2 hour fire enclosure rating --Refer to material listing
- Many wraps are listed as allowing “zero’ clearance to combustibles”. The listing **MUST** be followed before this clearance reduction is recognized as acceptable.
DESIGNER/Contractor responsible for information distribution!!

**TYPE I COMMERCIAL KITCHEN HOOD EXHAUST DUCTS
ABOVE A SUSPENDED CEILING--GREASE DUCT ENCLOSURE
WRAP NON-CONTINUOUS--FAILS TO MEET CODE**



Type I Kitchen Hood/ Exhaust Duct Requirements IMC 506.3.5

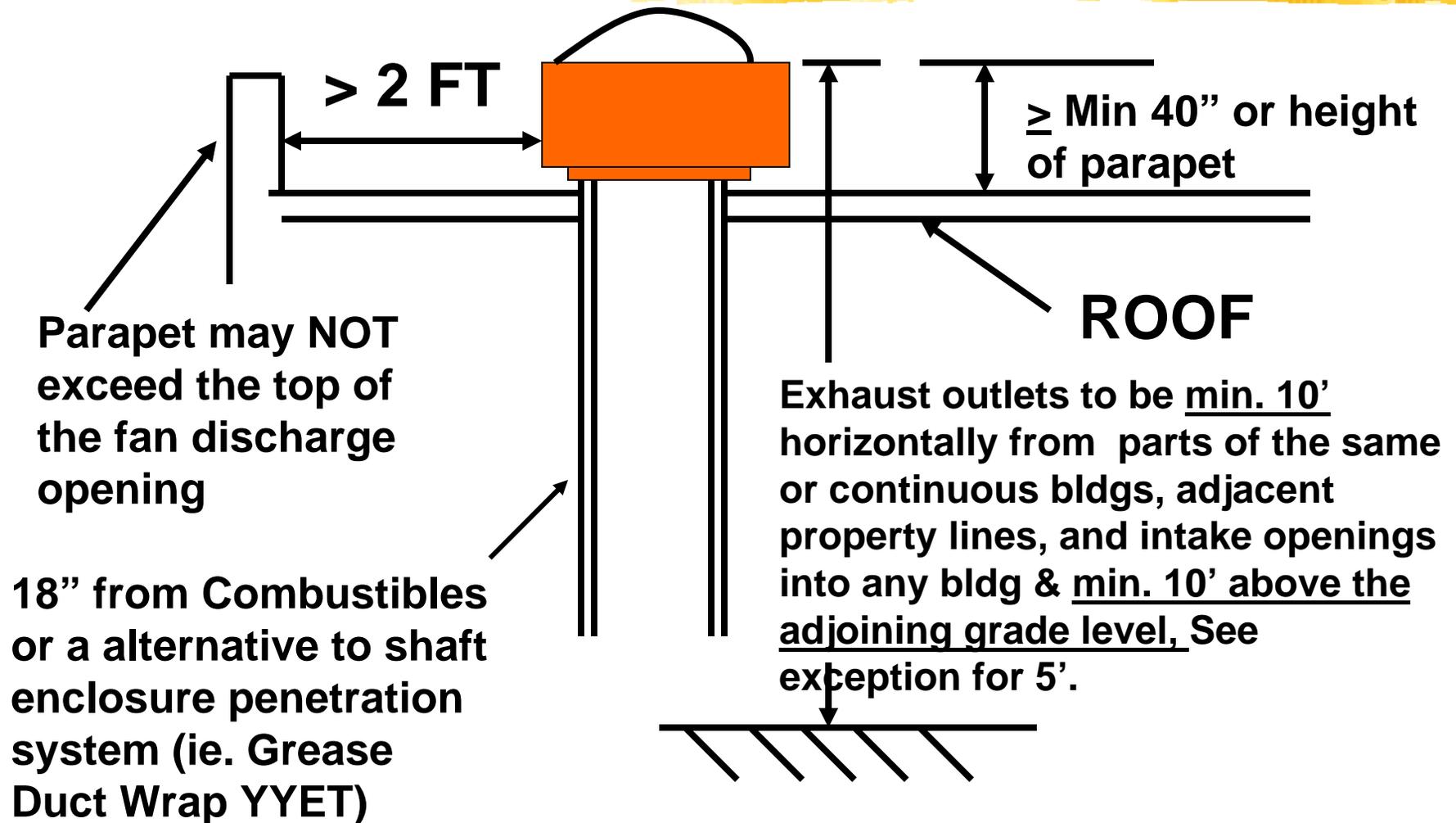
- Separate duct system for each Type I hood unless ALL conditions are met:
 - **Interconnected hoods are on the same story**
 - **Interconnected hoods are located within same or adjoining room**
 - Interconnecting ducts do not penetrate assemblies required to be fire rated
 - Grease duct system does not serve solid fuel fire appliances

Type I Kitchen Hood/ Exhaust Duct Requirements IMC 506.3.12.1 & 3

- Exhaust outlets terminating above the roof must have the discharge opening located no less than 40" above the roof surface
- The minimum horizontal distance between vertical discharge fans and parapet type buildings structures is 2 ft assuming structures are not higher than the top of the fan discharge opening

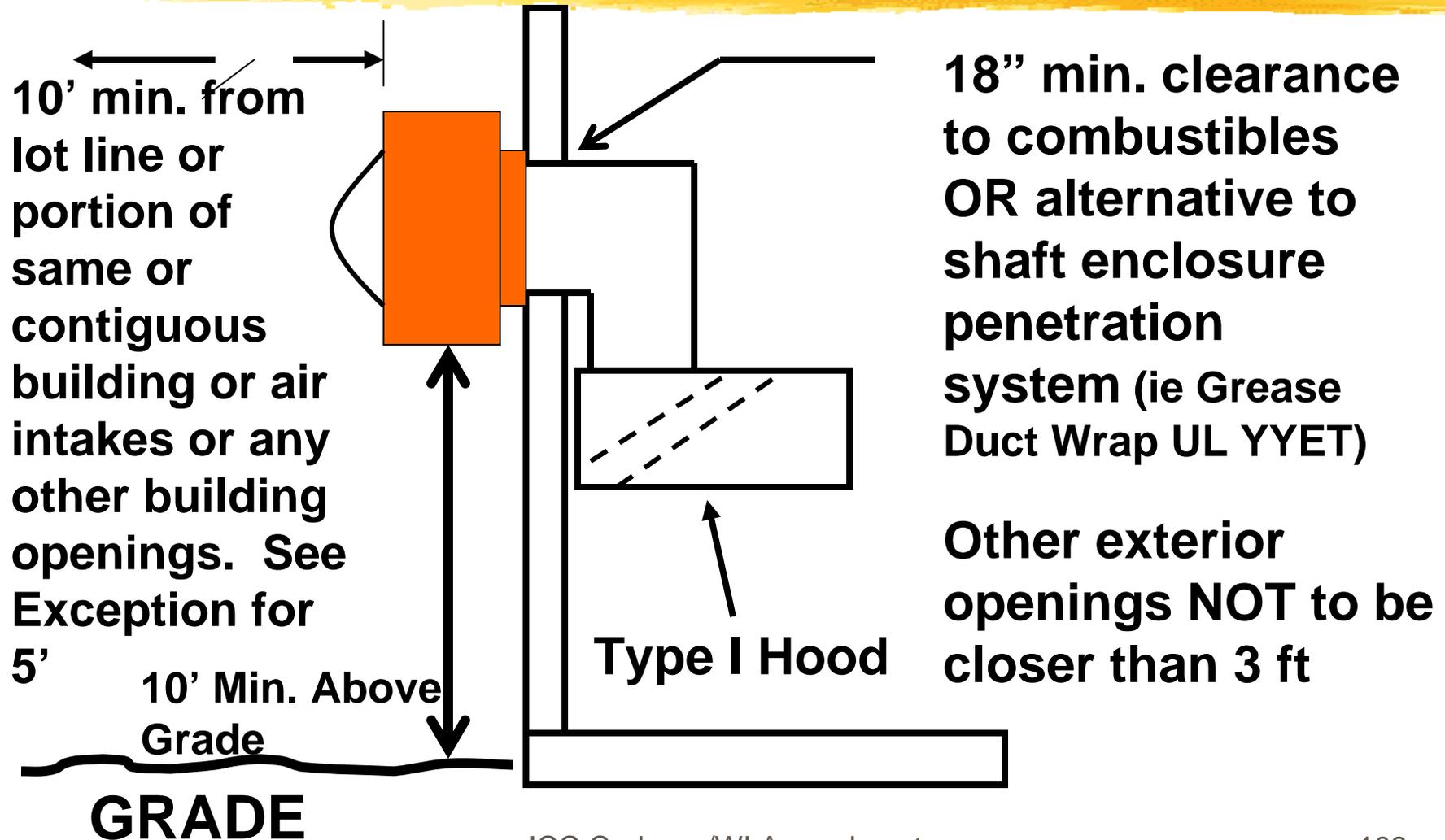
Type I Kitchen Hood/ Exhaust Duct Requirements

IMC 506.3.10, 506.3.12.1 & 3, 506.5.5



Type I Kitchen Hood/ Exhaust Duct Requirements

IMC 506.3.10, 506.3.12.2





**IMC 506.3.12.3 10 ft above adjoining grade? Comm 64.0403(4)(1)
Min. 10 ft from openable window? IMC 506.3.12.2 Nuisance/fire
hazard to wood stairway?**



Main bldg & walk-in cooler "building". Are the exhausts 40" above roof, 10 ft from bldg(s), etc.





Type I Kitchen Hood/ Exhaust Duct Requirements IMC 506.3.8, 506.3.9

- Horizontal cleanouts must be < 20 Ft apart
- Access opening to be $\geq 1.5''$ above the bottom of the duct, other options listed
- Access door dimensions must be a minimum of 12"/side, --Exception
- Personnel entry required if duct dimensions allows entry of personnel (min. access 20" x 20" with properly sized supports)

Type I Kitchen Exhaust Duct Requirements

IMC 506.3.2, 506.3.10, Comm 64.0506(2)

- Joints/Seams/Penetrations of grease ducts require continuous liquid tight weld or braze
- Or use other liquid tight seal good to 1500 F
- NOTE: If listed caulk is used, **listed "Grease Duct Enclosure" wrap may NOT be used** around the grease duct due to **conflict with the wrap listing**

Type I Kitchen Hood/ Exhaust Duct Requirements IMC 506.3.13.1 & 3



Type I Kitchen Exhaust Duct Requirements

IMC 507.13, Comm 64.0507(1)

- Air velocity & capacity of hoods is dependent on temperature of grease below hood--**MUST** meet code OR be designed through engineering analysis
- No ducts are required on those units which meet UL 710 or UL 197 and listed code requirements (Factory built commercial cooking re-circulative systems)

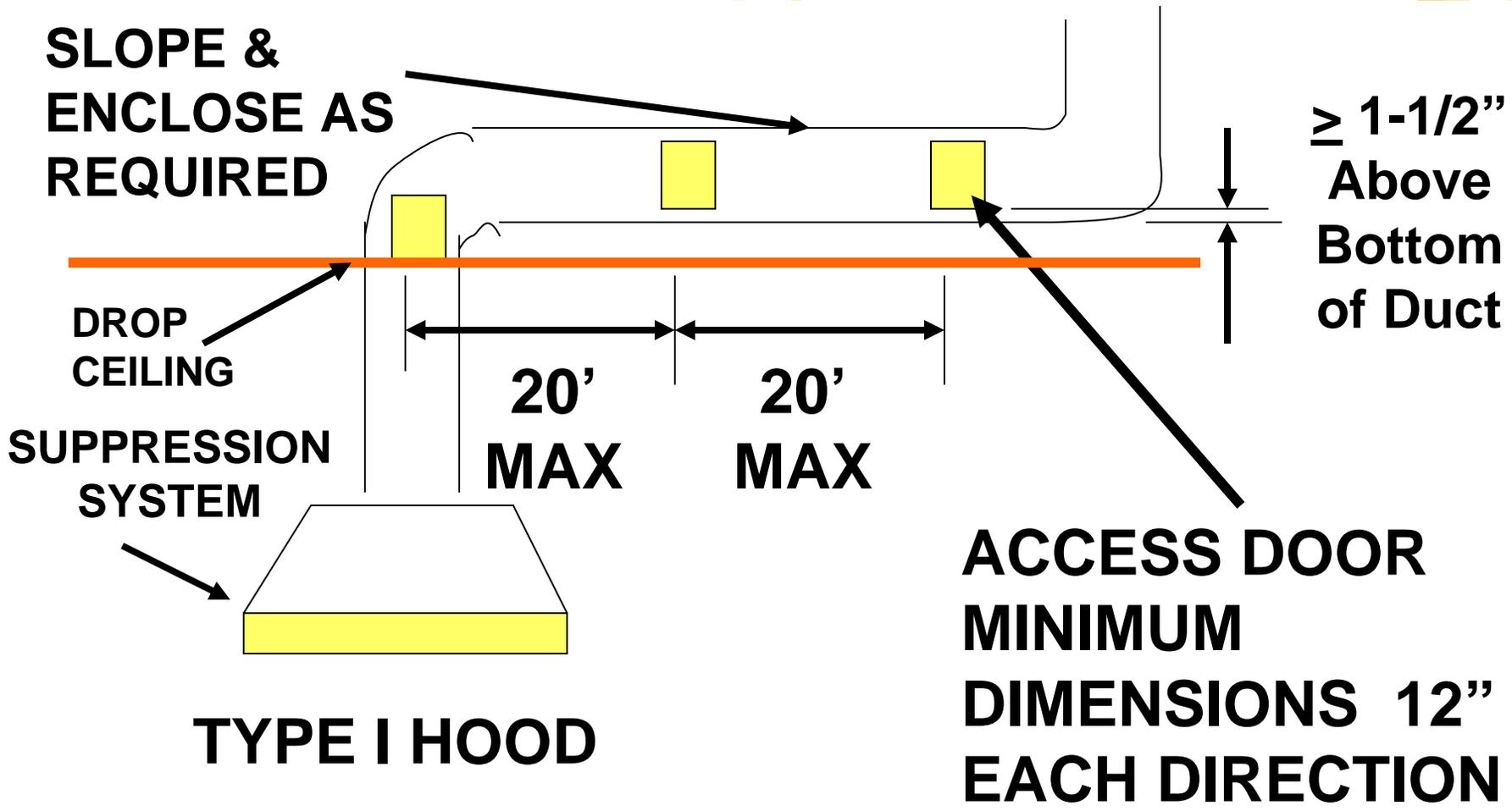
Type I Kitchen Hood/ Exhaust Duct Requirements IMC 506.3.7



- Horizontal System < 75' in length must be sloped $\geq 1/4:12$ (2% slope) toward hood or approved grease reservoir
- Horizontal System > 75' in length must be sloped $\geq 1:12$ (8.3% slope) toward hood or approved grease reservoir

Type I Kitchen Hood/ Exhaust Duct Requirements

IMC 506.3.7, 8 & 9



Type I Kitchen Hood/ Exhaust Duct Requirements IMC 507.9



- A Type I hood to be 18" from combustibles
- Exception: Clearance of 18" not req'd from gypsum wallboard if attached to non-combustible structures (steel studs, masonry), provided that a smooth, cleanable, nonabsorbent and non-combustible material (such as aluminum, stainless steel, etc) is installed between the hood & the gypsum wall board over an area extending not less than 18" in ALL directions from the hood.

Type I Kitchen Hood Requirements

IMC 507.1



- Factory-built commercial cooking recirculating systems which are tested in accordance with UL 710B, listed, labeled and installed as defined by this code section are acceptable.



There is a hole in a commercial kitchen hood wall protection assembly, which causes containment discontinuity. Plover, WI

Type II Kitchen Hood/ Exhaust Duct Requirements

IMC 501.2, 506.4, 507.2.2, & 507.5, Comm 64.0507(2)

- Type II- Collects/Removes Steam, Vapor, Heat & Odors
- Required above Commercial Dishwashing Machines which are **NOT** under the counter; Also steamers, kettles, & pasta cookers, domestic appliances used for commercial purposes
- Hood Req's 22 ga Steel, Cleanouts Required
- Independent of all other exhaust systems

Type II Kitchen Hood For Commercial Dishwashing Appliances

IMC 507.13.5



- The minimum net air flow for Type II hoods used for dishwashing appliances shall be 100 cfm per linear foot of hood length.

Kitchen Hood Canopy Size and Location

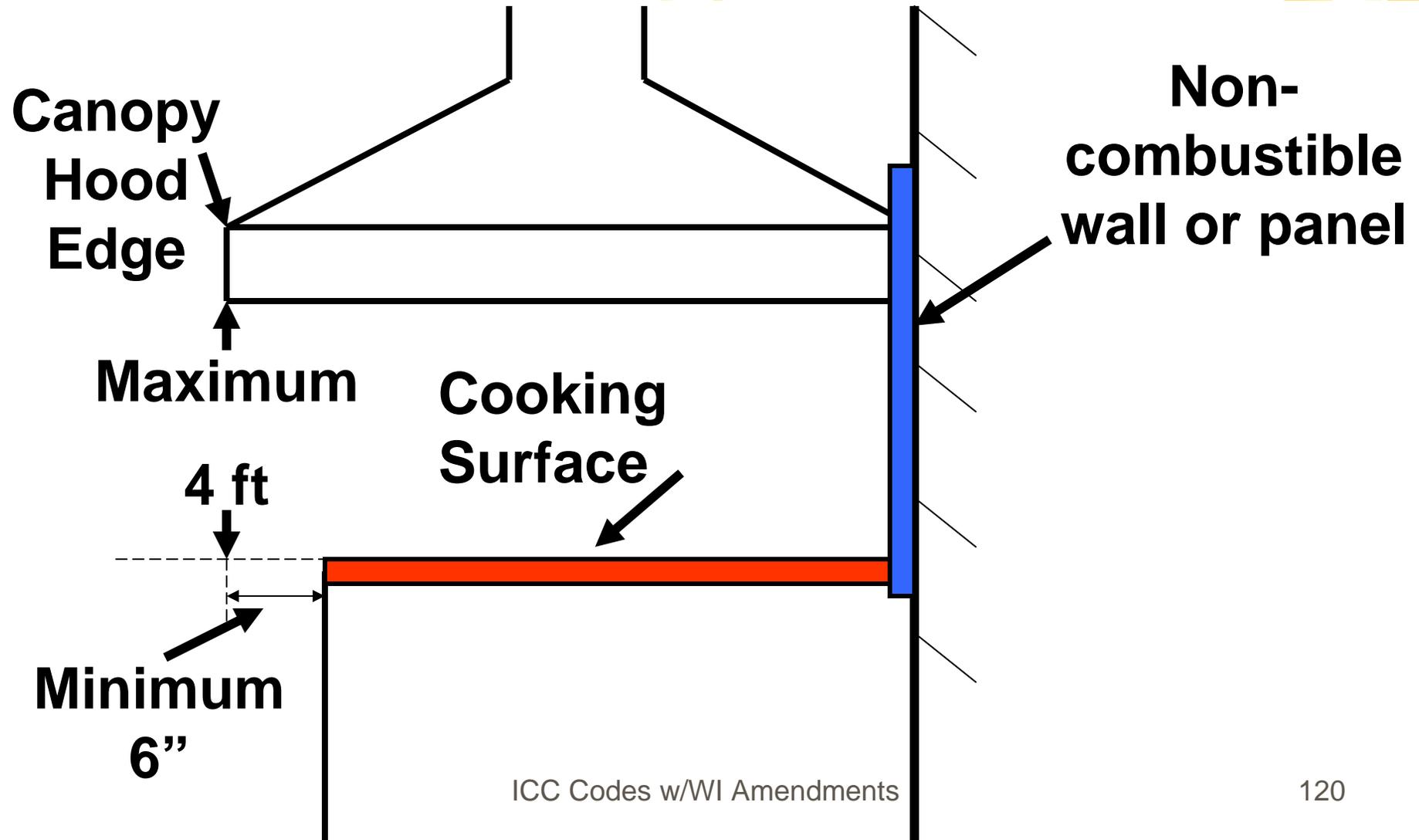
IMC 507.12



- Inside lower edge of canopy type commercial cooking hoods shall overhang or extend a horizontal distance of not less than 6" beyond the edge of the cooking surface, on all open sides.
- Vertical distance between the front lower lip of the hood & the cooking surface to be \leq 4 ft.

Kitchen Hood Canopy Size and Location

IMC 507.12



Smoke Control Systems

IMC 513, IBC 909

- Installation is req'd for, but is not limited to:
 - Atriums IBC 404.4
 - Underground Bldgs IBC 405.5
 - Group I-2 & I-3 Occupancies IBC 407.3-4, 408.6
 - Stages & Platforms IBC 410.3.7.2

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!!!! Volume dampers shall have access.



Metal Duct Construction

IMC 603.17, IBC 1210.1



- Diffusers, registers and grilles shall be **PROHIBITED** in the floor or its upward extension (ie 6" above the floor) within toilet and bathing room floors required by the International Building Code to have smooth hard, nonabsorbent surfaces.
- Exception: Dwelling units.

Transfer of Air to Corridors

IMC 601.2

- **CORRIDORS NOT ALLOWED** to Serve as supply, return, exhaust, relief or ventilation air duct or plenums
- Exceptions:
 - Use of a corridor as a source of makeup air for exhaust system in rooms that open directly onto such corridors, including toilet rooms, dressing rooms, smoking lounges, janitor closets, is permitted provided that the corridor is directly supplied w/outdoor air at a rate greater than the rate of makeup air taken from the corridor

Transfer of Air to Corridors

IMC 601.2



- Exceptions (Continued)
 - Allowed within a dwelling unit
 - Allowed when located within tenant spaces of $\leq 1,000$ sf

Transfer of Air to Corridors

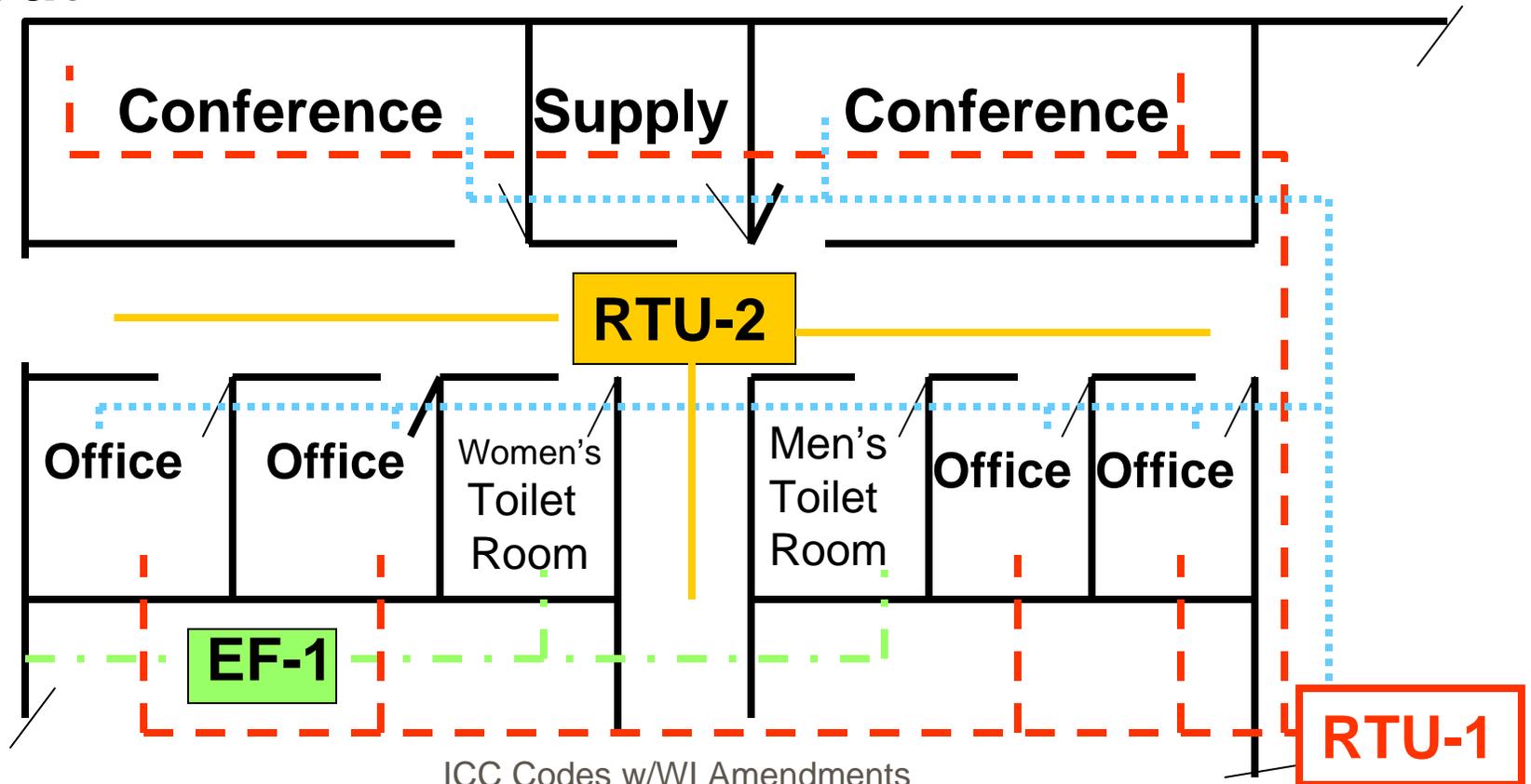
IMC 601.2 (1 of many possibilities shown)

General Corridor

- EF- 1 Interlocked with RTU-2

Layout

- RTU- 2 Areas + Pressurized vs RTU-1 Areas



Transfer of Air to Areas Above Corridors IMC 601.2

- Space between corridor ceiling and floor/roof above may be used as a return air plenum if 1 or more of the following conditions is met:
 - Corridor is not required to be fire rated construction
 - Corridor is separated from the plenum by fire rated construction
 - The air handling system serving the corridor is shut down upon activation of the air-handling unit smoke detectors required by the IMC

Transfer of Air to Areas Above Corridors

IMC 601.2

- Exceptions for use of Areas Above Corridors (Cont.):
 - The air handling system serving the corridor is shut down upon detection of a sprinkler water flow where the building is equipped throughout w/ an automatic sprinkler system
 - The space between the corridor ceiling and the floor or roof structure above the corridor is used as a component of an approved engineered smoke control system

Transfer of Air to Exit Passageways (Stairwells, etc)

IBC 1021.5

- Exit Enclosure is a “Stair Enclosure”, “Stair Extension” or “Hallway” that is protected the same as a stair enclosure (**NOT** a corridor)



Transfer of Air to Exit Passageways (Stairwells, etc)

IBC 1021.5

■ **NOT ALLOWED**

- Penetrations into, and openings through, an Exit Enclosure are prohibited except forductwork necessary for independent pressurization...



Nonmetallic Ducts

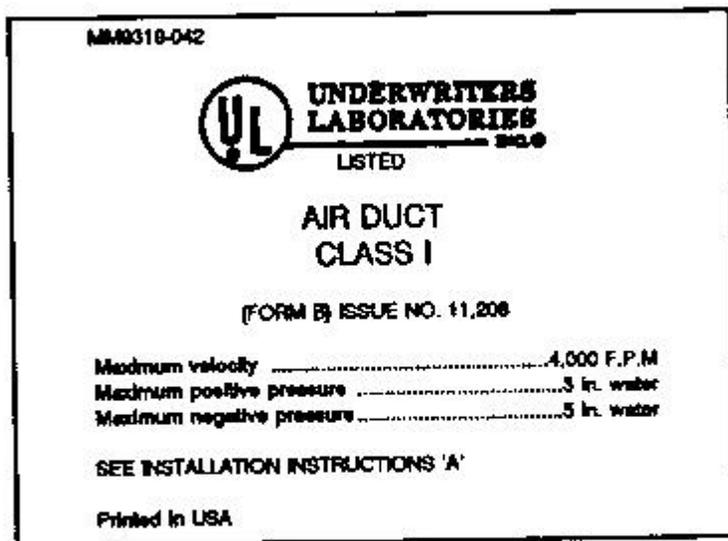
IMC 603.5



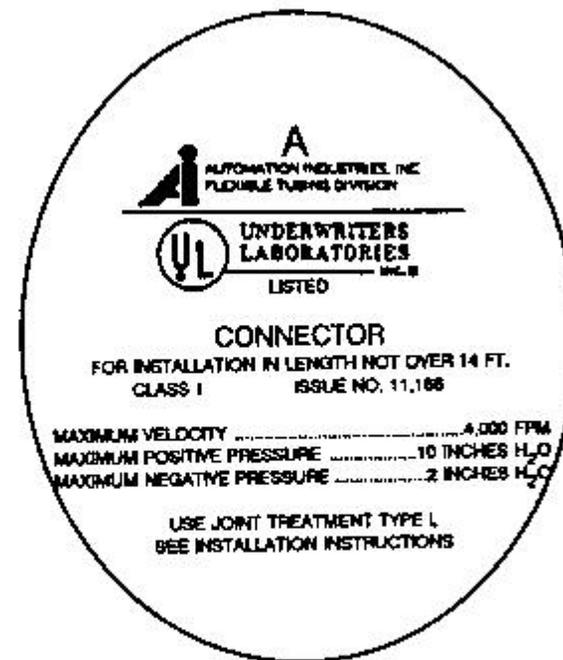
- Air temperature within the duct must be $< 250^{\circ}\text{F}$
- Gypsum ducts OK for return ONLY where air temp $\leq 125^{\circ}\text{F}$ & gyp board surface is above dew point-
Do **NOT** use with evaporative coolers

Flexible Air Connectors- Metallic & Non-Metallic IMC 603.6

- Air temperature within the duct must be $< 250^{\circ}\text{F}$
- Connectors length must be < 14 ft
- When used with an appliance, the Connectors must meet the minimum clearance defined by manufacturer



**Flexible Air Duct Label
 Rectangular/Square Label**



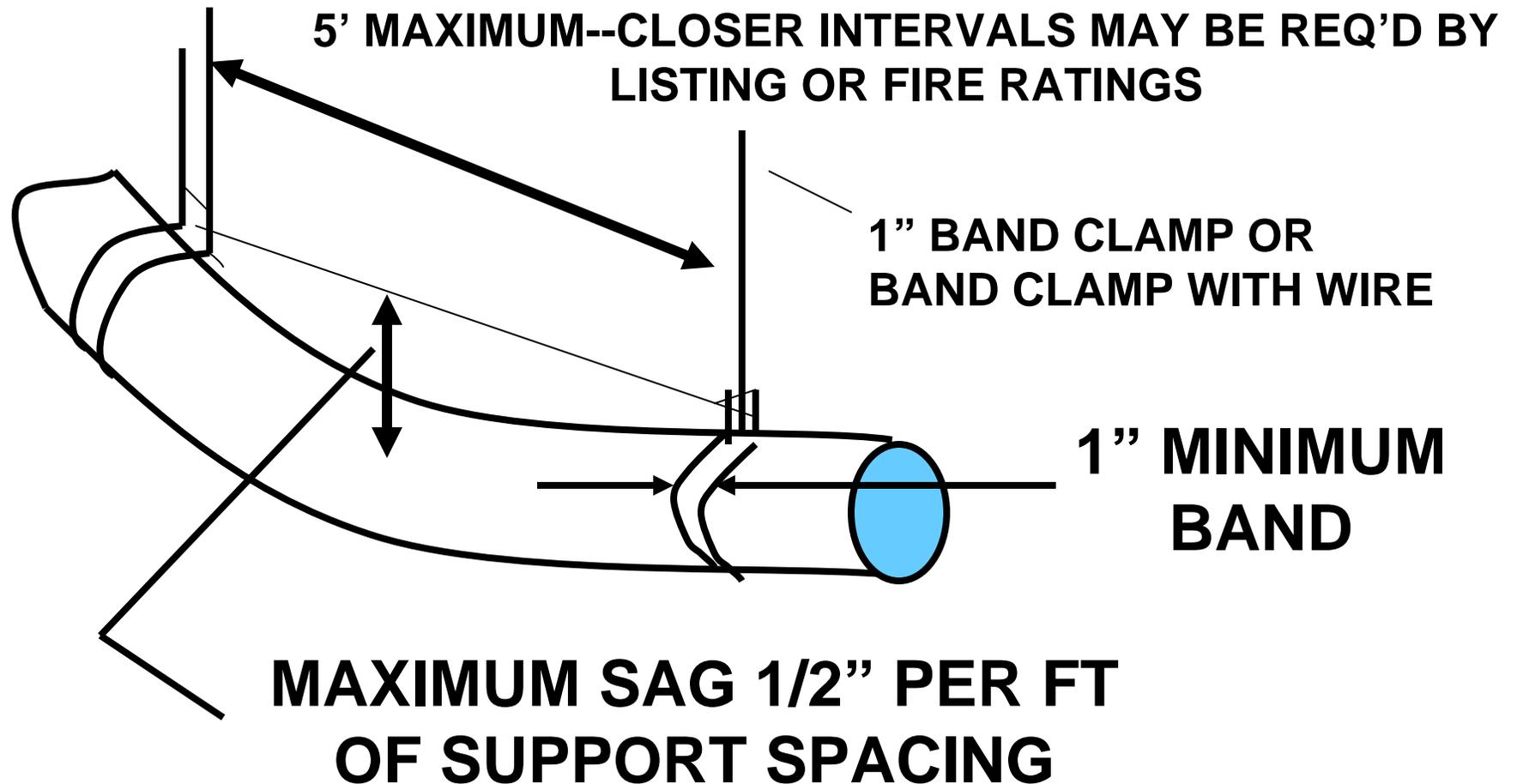
**Flexible Air Connector Label
 Figure 10
 Oval/Round Label**

Meeting SMACNA Standards?



It just keeps going and going and going.....

Flexible Air Connectors- Metallic & Non-Metallic IMC 603.4 & 6



Plenums

IMC 602.2

- Plenum enclosures shall be constructed of materials permitted for the type of construction classification of the building
- Limitations for Rigid/Flexible Ducts; Duct Coverings/Linings/Connectors; Wiring; Fire Sprinkler Piping; Pneumatic Tubing; Electrical Equipment

Plenums

IMC 602.3

- Stud wall cavities and the space between solid floor joists to be used as air plenums shall comply with the following conditions:
 - Cavities/Spaces are not used for supply air
 - Cavities/Spaces are not part of req'd fire rated assembly
 - Stud wall cavities convey air from ONLY 1 floor
 - Stud wall cavities and joist space plenums must meet protection req'ts of IBC
 - Stud wall cavities/joist spaces shall be isolated from adjacent concealed spaces by fire blocking

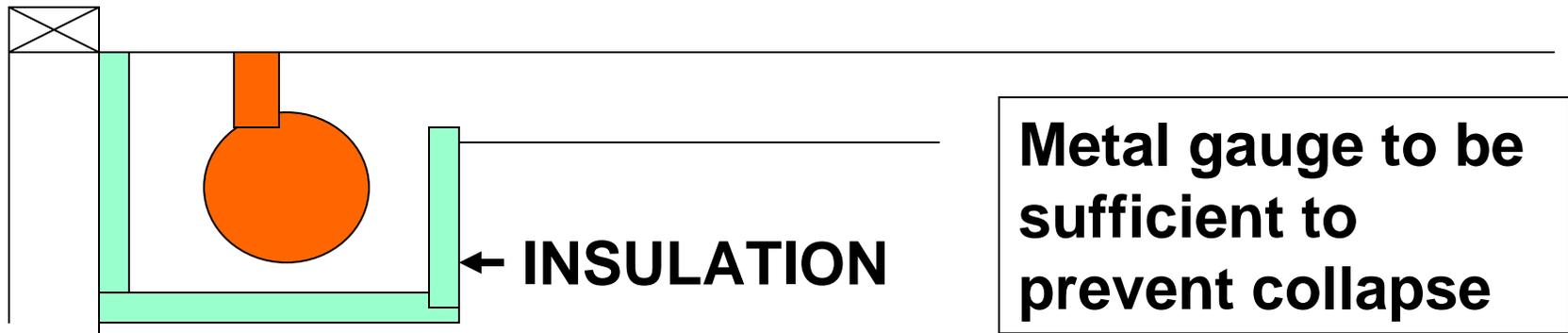
Underground Ducts

IMC 603.8

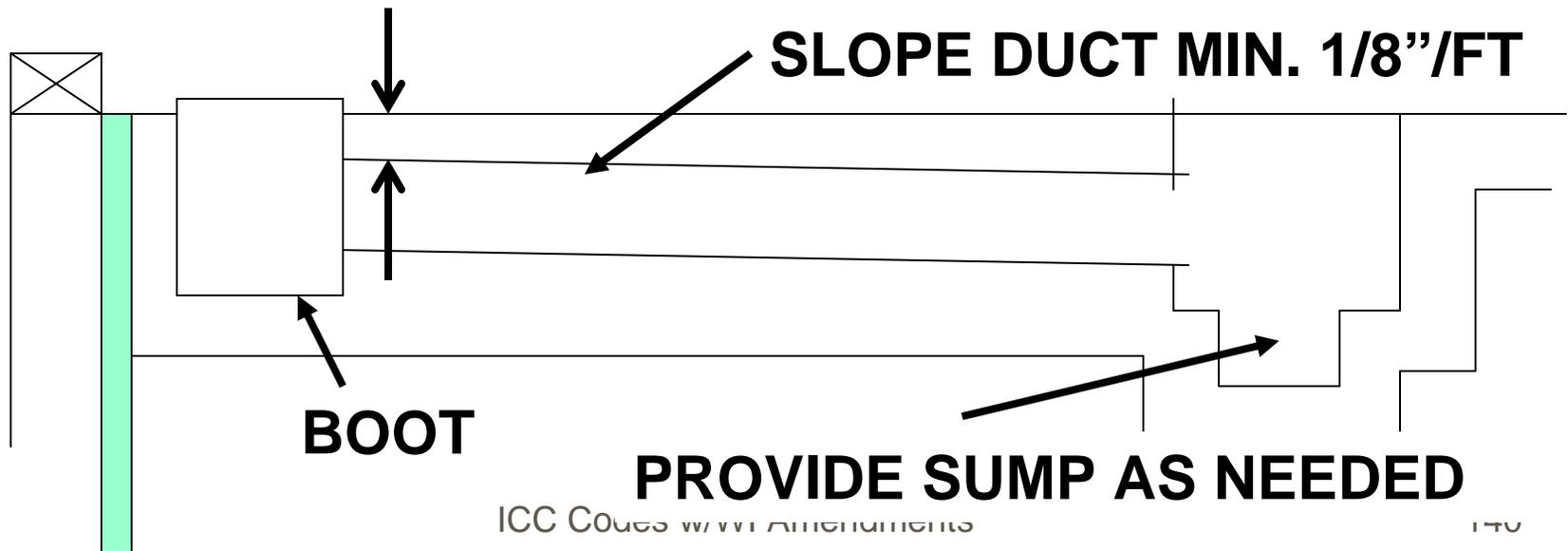
- Shall be encased in $\geq 2''$ of concrete if no protective coating
- Req'r drainage slope with access provision
- Must be properly sealed
- Locations involving high hazard flood zones shall be located above the base flood elevation
- PVC may be used for underground ONLY when limitations are met

Underground Ducts

IMC 603.4 & 603.8 / SMACNA



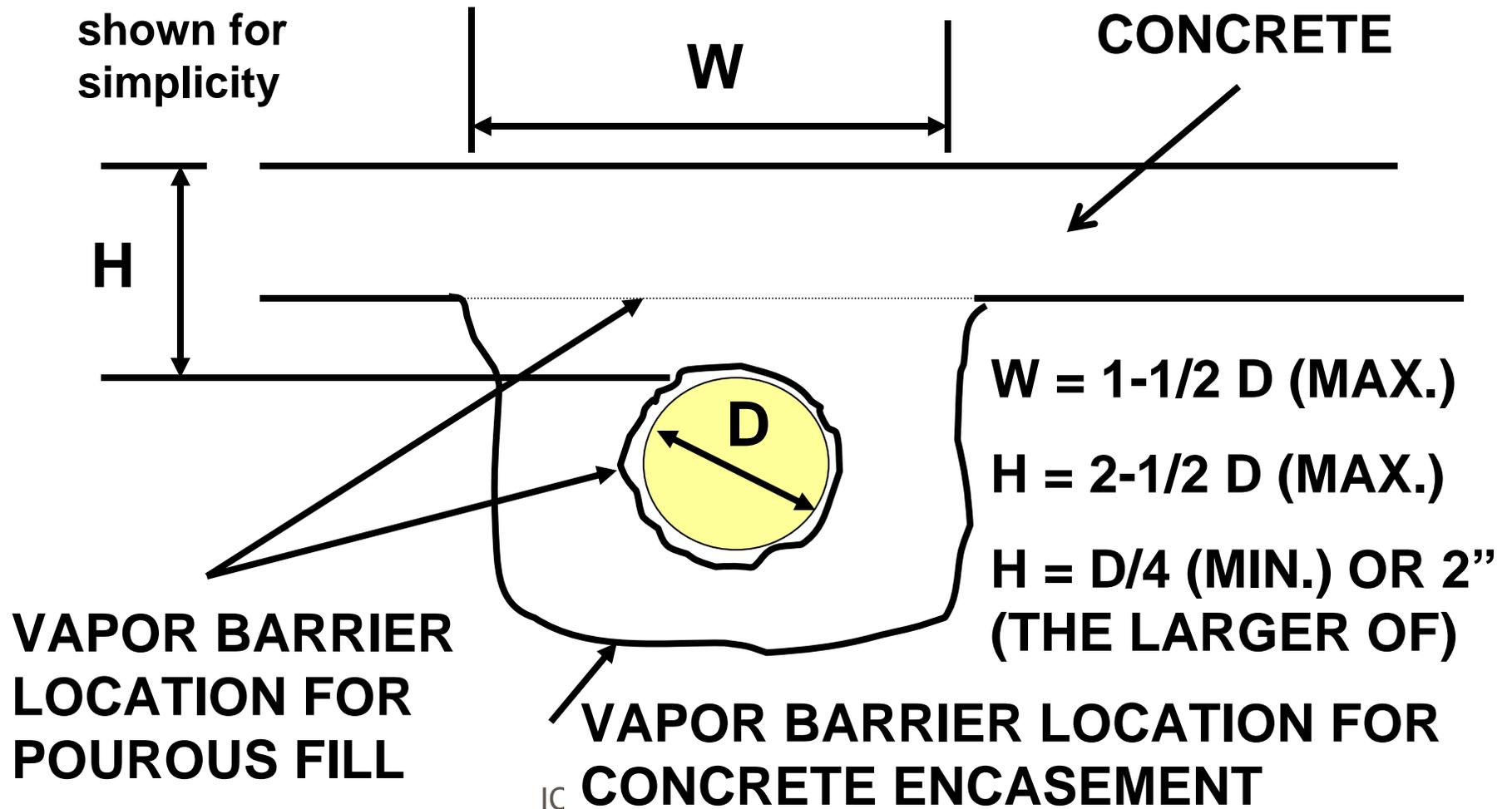
> 2" CONCRETE ENCASEMENT REQ'D FOR METAL DUCT & BOOT



Underground Ducts

IMC 603.4 / SMACNA

*No Insulation
shown for
simplicity

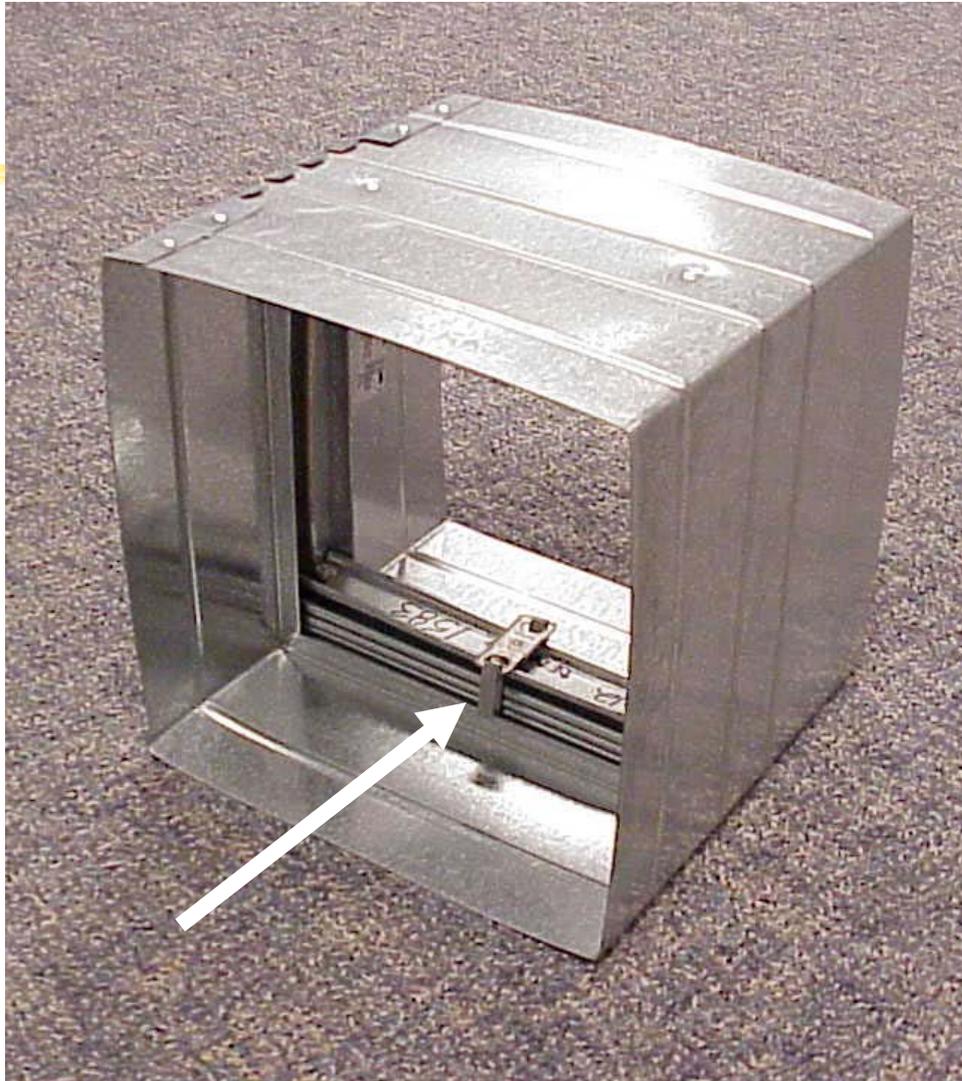


Fire, Smoke & Ceiling Radiation Dampers

IMC 607.3.1/IBC 716.3.1

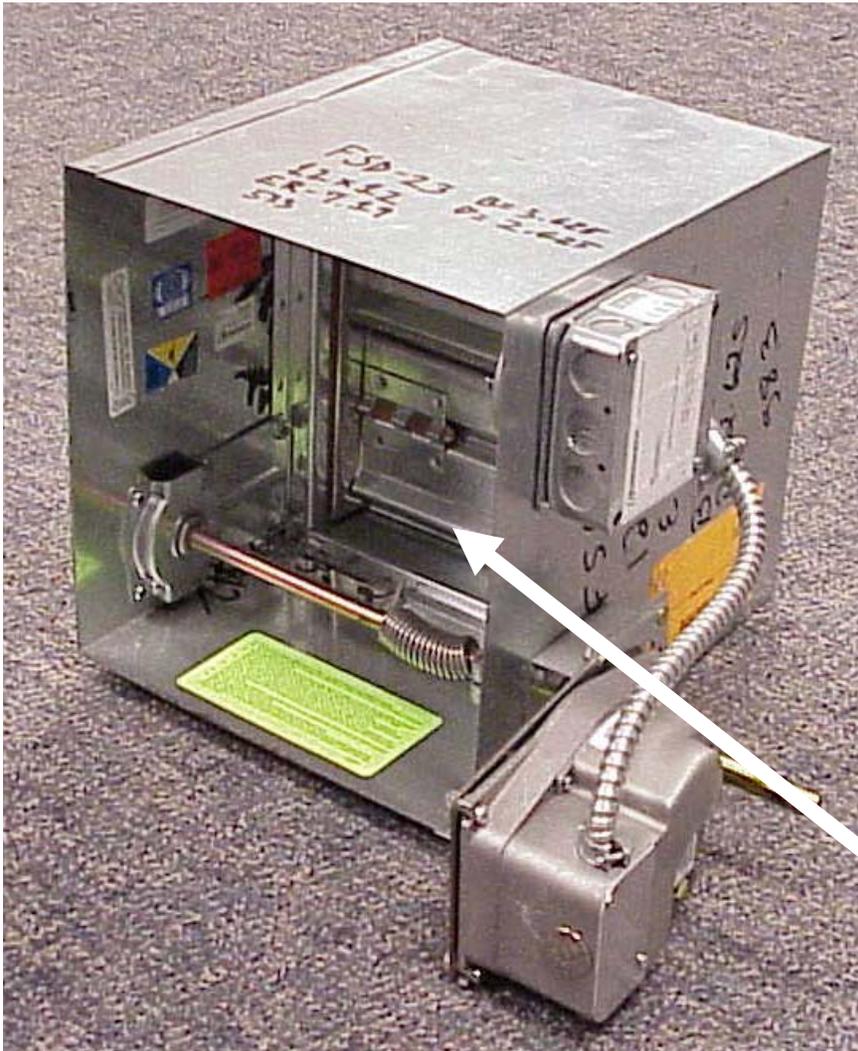
- Must meet rating requirements UL 555 for Fire, UL 555S for Smoke, & 555C for Ceiling Dampers
- Access & Identification Req'd for each

| Type of Penetration | Min. Damper Rating (hr) |
|---|--------------------------------|
| < 3 hr fire resistance-rated assemblies | 1.5 |
| ≥ 3 hr fire resistance-rated assemblies | 3 |



**Fire Damper
with metal
melting lock
used for
activation**





■ Required for Shaft Enclosures

- Enclosed space extending through one or more stories of a bldg connecting openings in successive floors or floors & roof
- Required for fire rated corridor enclosures per IBC 1017 & 716.5.4.1

**Fire/Smoke Damper with actuator on side for activation
See IBC 716.3.2.1 for acceptable activation methods**

Fire Dampers

IMC 607.5.1, IBC 705.1 & 705.11



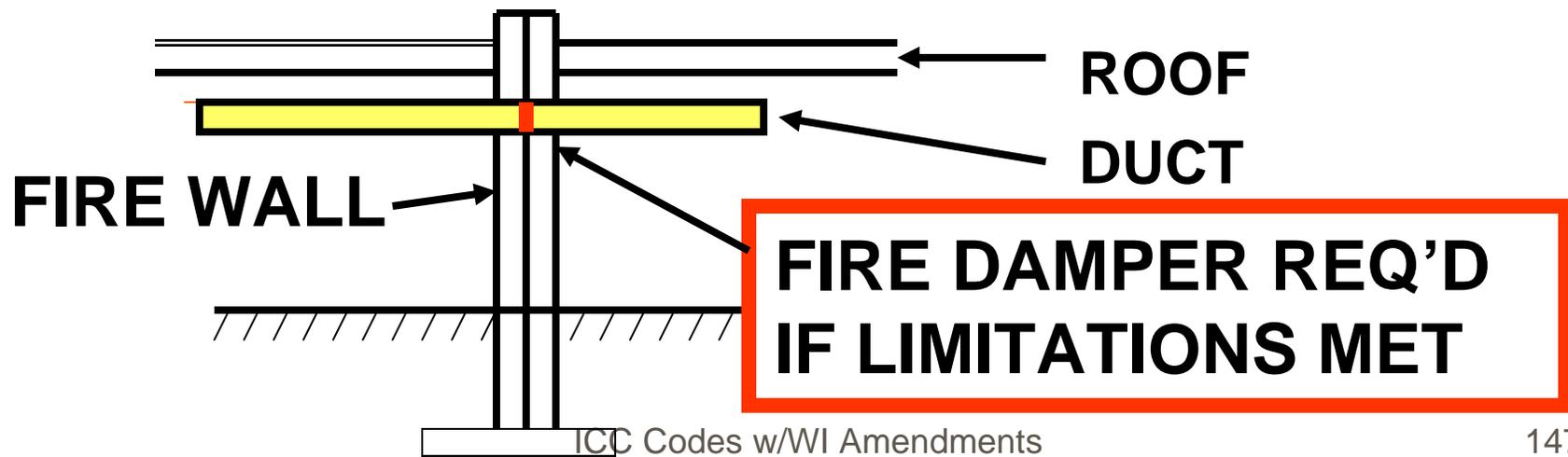
- **No Fire Dampers Allowed in a:**
 - **Party Wall** - A Fire Wall located on property line
 - | **NO** OPENINGS ALLOWED
 - | **NO** PENETRATIONS
 - | **NO** FIRE DAMPERS
 - | ***NOTHING!!!!!!!!!!***

Fire Dampers

IMC 607.5.1, IBC 702, 705.8, 705.11 & 716.5.1

■ May be Required for:

- **Fire Walls**--Extend continuously from foundation to/through roof with stability to allow collapse of construction on either side without collapse of the wall



Fire Dampers

IMC 607.5.1, IBC 705.8, 705.11, 712.3 & 716.5.1



■ Required For Fire Walls If:

- No one opening to exceed 120 sf
- Aggregate width of all openings is $\geq 25\%$ of the Fire Wall length
- Exceptions

■ Not Required For Fire Walls If:

- Penetrations comply with all requirements of IBC 712 (per IBC 716.1)

Fire Dampers

IMC 607.5.2, IBC 706.7

- **Allowed to be used in Fire Barriers**--(Fire resistance rated vertical) **If:**
 - No one opening to exceed **156 sf**
 - Aggregate width of all openings is $\leq 25\%$ of the Fire Barrier length
 - Exceptions

Fire Dampers

IMC 607.5.2, IBC 706.7

■ Not Required for Fire Barriers:

- When penetrations have been tested to ASTM E119 as part of fire rated assembly
- Ducts are part of smoke control system
- Walls have \leq 1 hr rating, part of an HVAC system (ie. return/supply), in areas other than Group H, are in sprinklered building sprinklered NFPA 13 & 13R, & uses sheet steel \geq 26 ga back to appliance.

Fire & Smoke Dampers

IMC 607.5.5, IBC 702 & 716.5.3



■ Required for Shaft Enclosures

- Enclosed space extending through one or more stories of a bldg connecting openings in successive floors or floors & roof

Fire & Smoke Dampers

IMC 607.5.5, IBC 716.5.3 Exception 1



■ Fire Dampers Not Req'd in a Shaft Enclosure

- Steel subducts extend min. 22" vertical in exhaust shaft provided there is continuous airflow upward to the outside (min. gauge not defined for fire damper exception)

Fire & Smoke Dampers

IMC 607.5.5, IBC 716.5.3 Exception 2.

■ Smoke Dampers Not Req'd in a Shaft Enclosure

- In "B" & "R" occupancies, sprinklered per NFPA 13, w/min. 0.019" (25 ga) metal subducts that extend min. 22" vertical in exhaust shaft with exhausts fan powered continuously per IBC 909.11, airflow upward to the outside, involving kitchen, clothes dryer, bathroom and & toilet room exhaust openings.

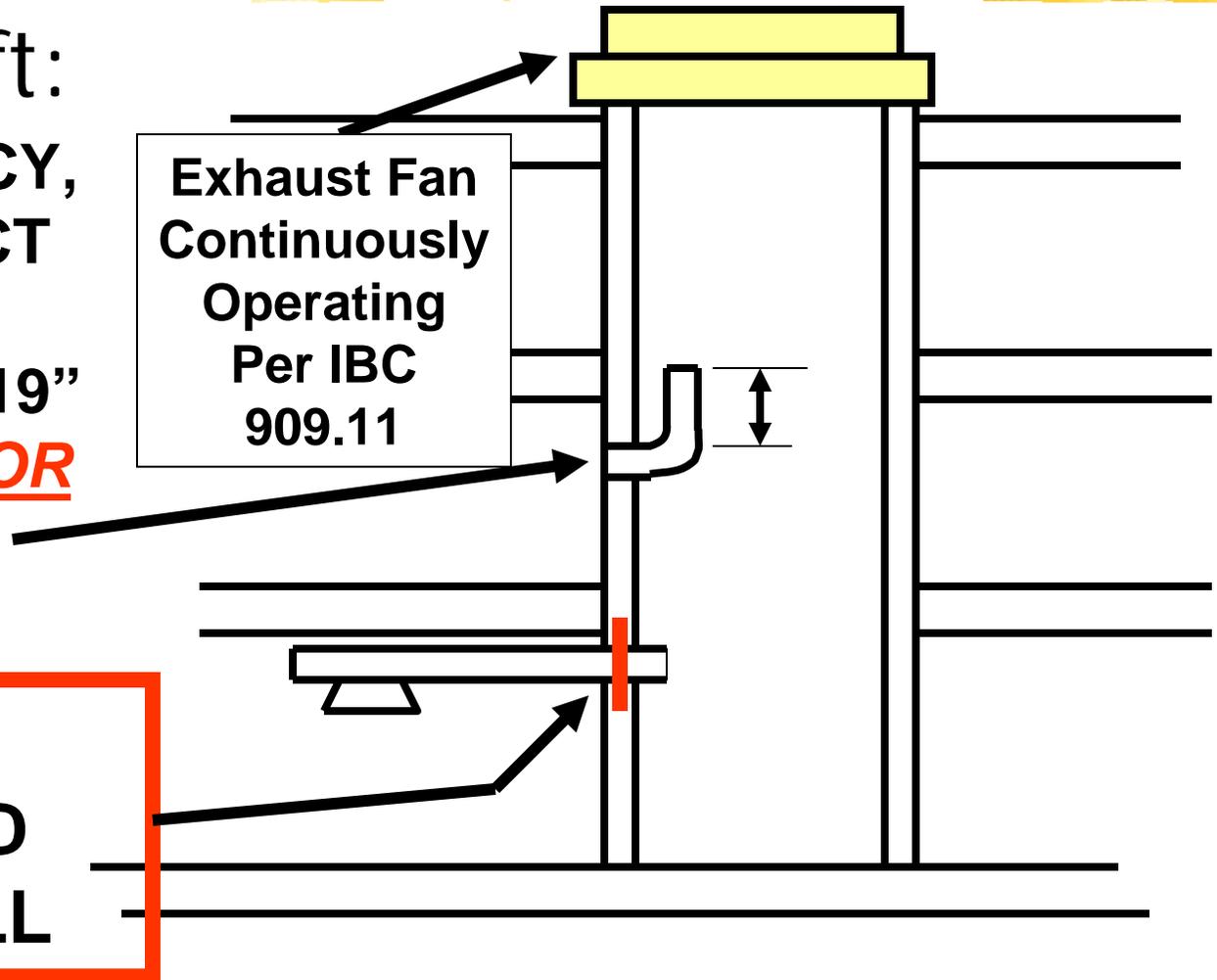
Fire & Smoke Dampers

IMC 607.5.5, IBC 702, 716.5.3 Exceptions 1.1 & 2

■ Rated Shaft:

**B or R OCCUPANCY,
NFPA 13, SUBDUCT
WITH MIN. 22"
EXTENSION & 0.019"
METAL- NO FIRE OR
SMOKE DAMPER
REQ'D**

**FIRE & SMOKE
DAMPER REQ'D
AT SHAFT WALL**



Fire & Smoke Dampers

IMC 607.5.5, IBC 716.5.3 Exception 1.2



■ Fire Dampers Not Req'd in a Shaft Enclosure

- Penetrations are tested per ASTM E119 as part of fire rated assembly

Fire & Smoke Dampers

Comm 62.0716(1)



■ Smoke Dampers Not Req'd in a Shaft Enclosure

- In exhaust portion of systems which are designed and installed in accordance with NFPA 45 (Standard on Fire Protection for Laboratories Using Chemicals-- ie. Fume/Chemical Hoods)

Fire & Smoke Dampers

IMC 607.5.5, IBC 702, 716.5.3 Exceptions 3 & 4



■ **Shaft Enclosure** Fire & Smoke Damper--Exceptions

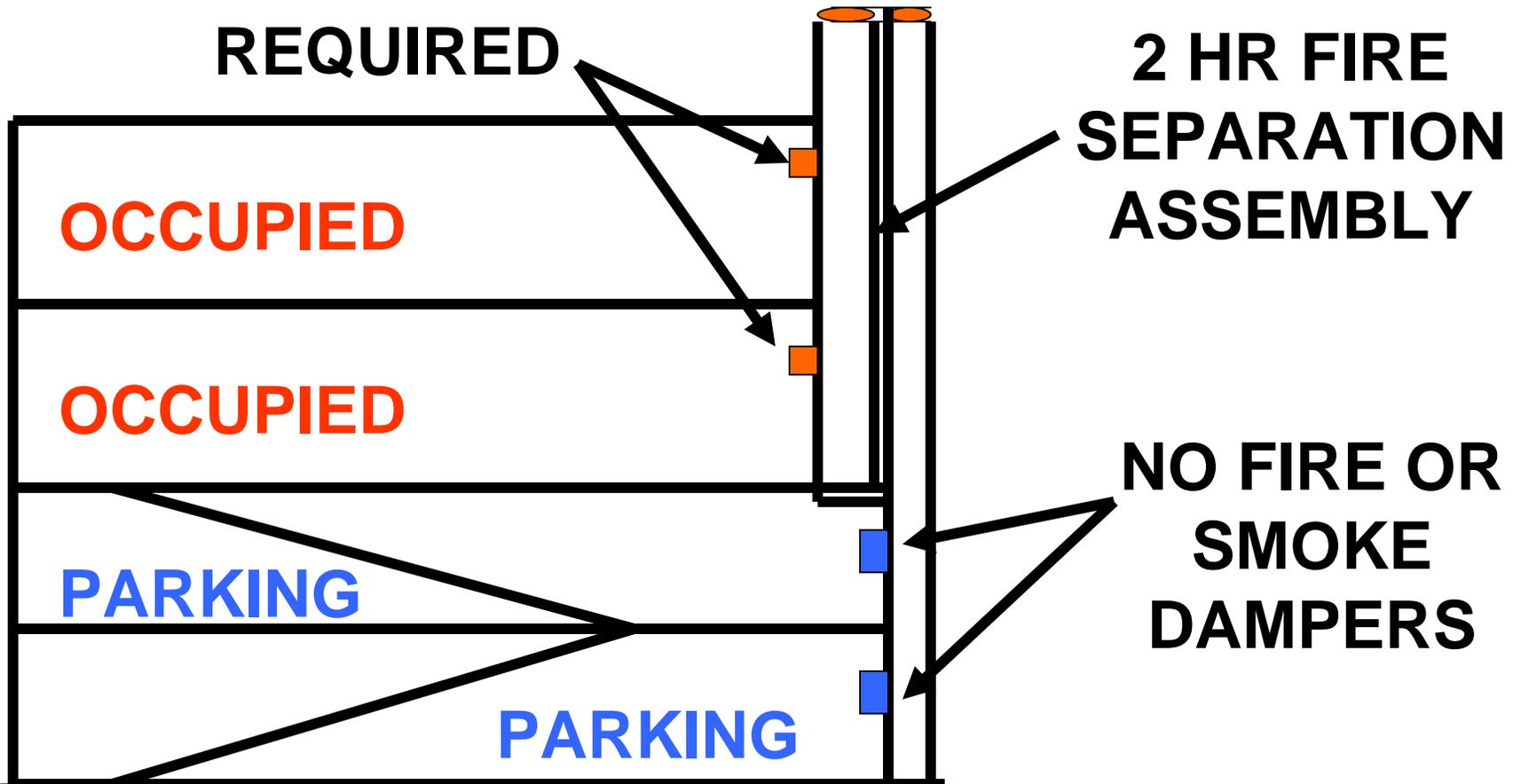
(Cont.)

- Ducts are part of smoke control system per IBC 909
- Penetrations in parking garage exhaust or supply shafts that are separated from other building shafts by ≥ 2 hr fire resistance construction

Fire & Smoke Dampers

IMC 607.5.5, IBC 702, 716.5.3 Exception 3

FIRE & SMOKE DAMPERS REQUIRED



Fire Dampers

IMC 607.6.1, IBC 702, 716.6.1



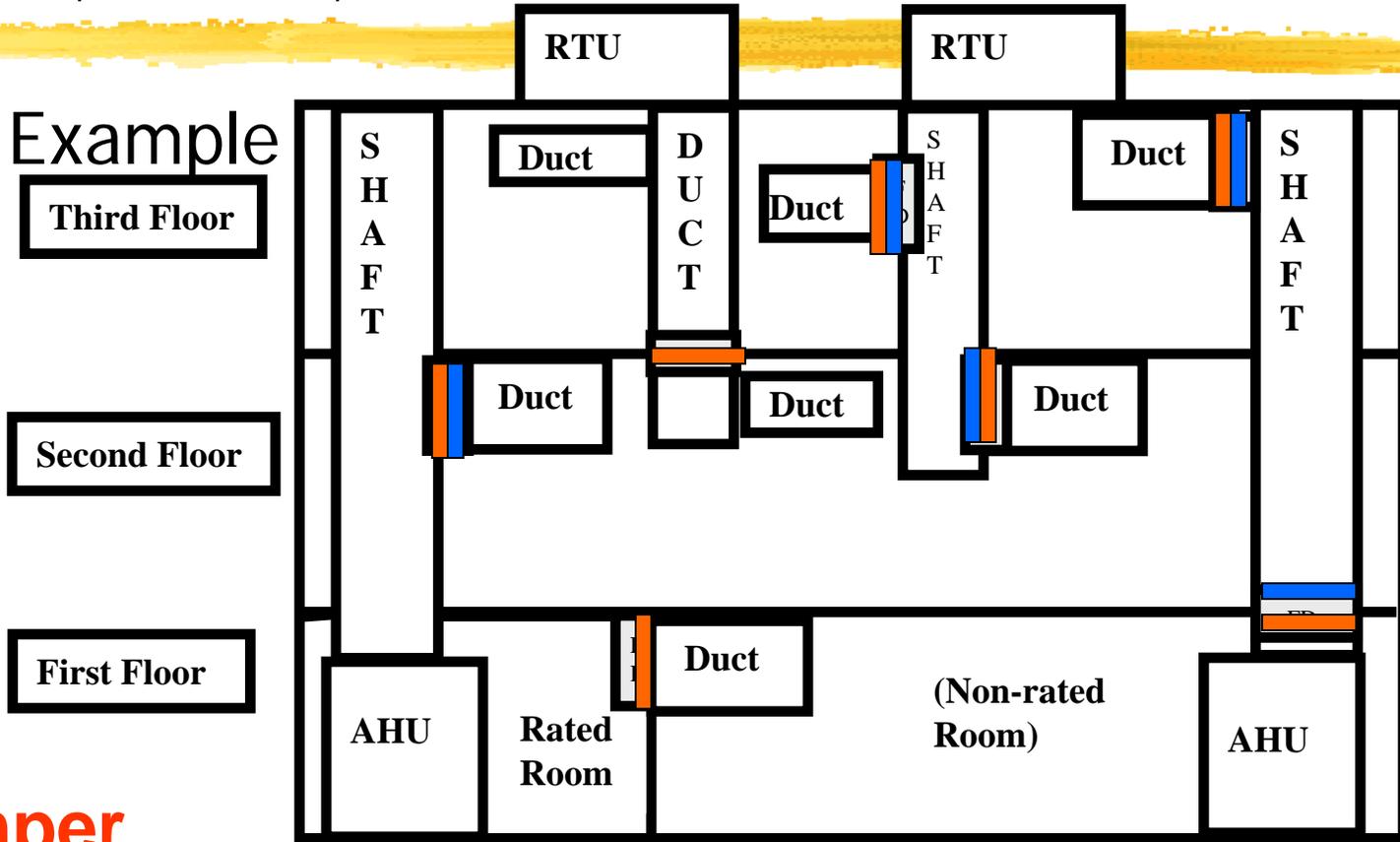
- **Shaft Enclosure** Rated Fire Damper and Shaft--
Exceptions (Cont.)
- Duct and transfer air systems that penetrate a fire rated floor ceiling assembly & connects not more than 2 stories is permitted without shaft enclosure protection provided a fire damper is installed at the floor line

Fire & Smoke Dampers

IMC 607.6.1, IBC 702, 716.5.3 & 716.6.1

Shaft Example

General locations that may have exceptions



Fire Damper

Smoke Damper

RTU - Rooftop Unit
 FD - Fire Damper
 Shaft - Fire-rated shaft
 AHU - Air Handling Unit

Fire & Smoke Dampers

IMC 607.6.1, IBC 716.6.1 Exception



- Ducts in Group R Occupancies (hotels, motels, apartments, townhouses, condominiums, etc.) may penetrate 3 fire rated floors or less **Without a Shaft & Without Fire Dampers** when ALL five (5) requirements in the code are met:

Fire & Smoke Dampers

IMC 607.6.1, IBC 716.6.1 Exception

- Steel Duct in wall cavity w/min. 0.019" (26 ga) thickness
- Duct open to ONLY 1 dwelling/sleeping unit & is continuous to the exterior
- Duct is ≤ 4 " diam, with penetrations ≤ 100 sq.in. for any 100 sf of floor area
- Annular space is protected
- Ceiling Membrane Protections (Radiation Dampers) per IBC 716.6.2.1 used

Fire Dampers

IMC 607.5.3, IBC 702, 708.1 & 716.5.4

■ Required for

- **Fire Partitions**--Vertical assembly designed to restrict the spread of fire--May be required with:
 - | Walls separating dwelling units
 - | Walls separating guestrooms in occupancies in Group R1
 - | Walls separating tenant spaces in covered mall bldgs
 - | Corridor walls
 - | Elevator lobby separation
 - | Residential aircraft hangars

Fire Dampers

IMC 607.5.3, IBC 702, 708 & 716.5.4 Exception 1.



- **Not Required for Fire Partitions** when used as a tenant separation and corridor walls in bldgs sprinklered per NFPA 13 or 13R & the duct is protected as a through penetration in accordance to IBC 712.
- **Except:** In Group H occupancies

Fire Dampers

IMC 607.5.3, IBC 702 & 716.5.4 Exception 2.



■ Not req'd for Fire Partitions

- Tenant partitions in covered mall bldgs where the walls are not required by provisions elsewhere in the code to extend to the underside of the floor or roof deck above.
- Except: In Group H occupancies

Fire Dampers

IMC 607.5.3, IBC 702 & 716.5.4 Exception 3.

- **Not req'd for Fire Partitions** when ALL req'ts listed below are met **Except:** In Group H occupancies:
 - Duct \leq 100 in² in cross section
 - Duct Metal \geq 0.0217" thickness (24 ga steel)
 - Duct may not have openings to corridor with adjacent spaces or rooms
 - Duct must be located above a ceiling
 - Duct may not terminate at a wall register in a fire rated wall
 - 12" long sleeve w/ 15 ga metal to be installed et al.

Smoke Dampers

IMC 607.5.4, IBC 716.5.4.1

- Req'd at each point that a duct or air transfer opening penetrates smoke barrier wall or a **rated corridor enclosure** required to have draft doors by IBC 716.4.3 **Except:**
 - When a smoke control system per IBC 909 is used, and they are not necessary for operation
 - Corridors where the duct is constructed of steel ≥ 0.019 (25 ga) **& no openings serve the corridor**

Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.6.2, IBC 716.6.2

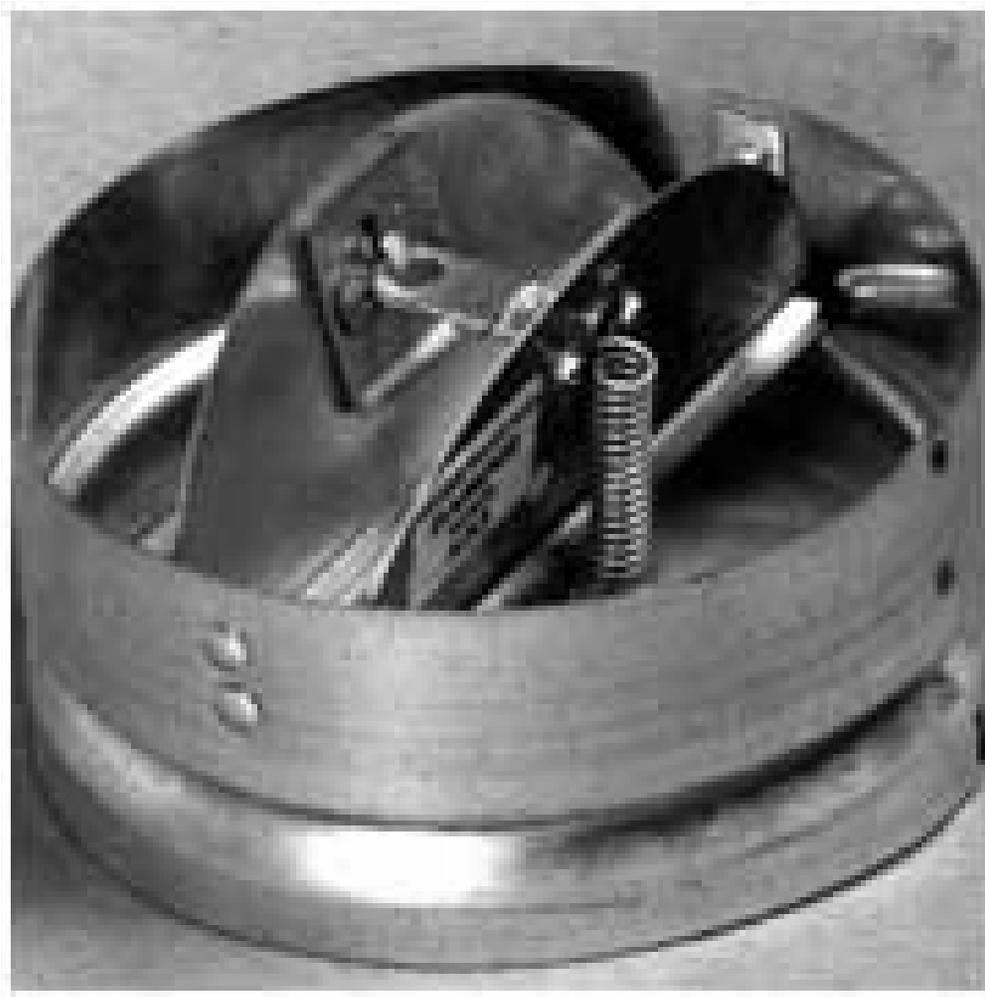


- Where duct systems constructed of approved materials in accordance with the IMC penetrate a ceiling of a fire rated floor/ceiling or roof/ceiling assembly, shaft enclosure protection is **NOT** required provided an approved ceiling radiation damper is installed at the ceiling line

Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.6.2, IBC 716.6.2

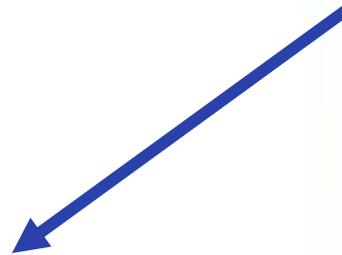
- **What is a Ceiling Radiation Damper?**
 - Same as a fire damper, but used in a fire rated floor ceiling or roof ceiling assembly to impede the migration of high temperatures into and through a duct system.
 - A device installed in the throat of ceiling diffuser or return air grille.



Ceiling Radiation Damper Example

Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.6.2, IBC 716.6.2



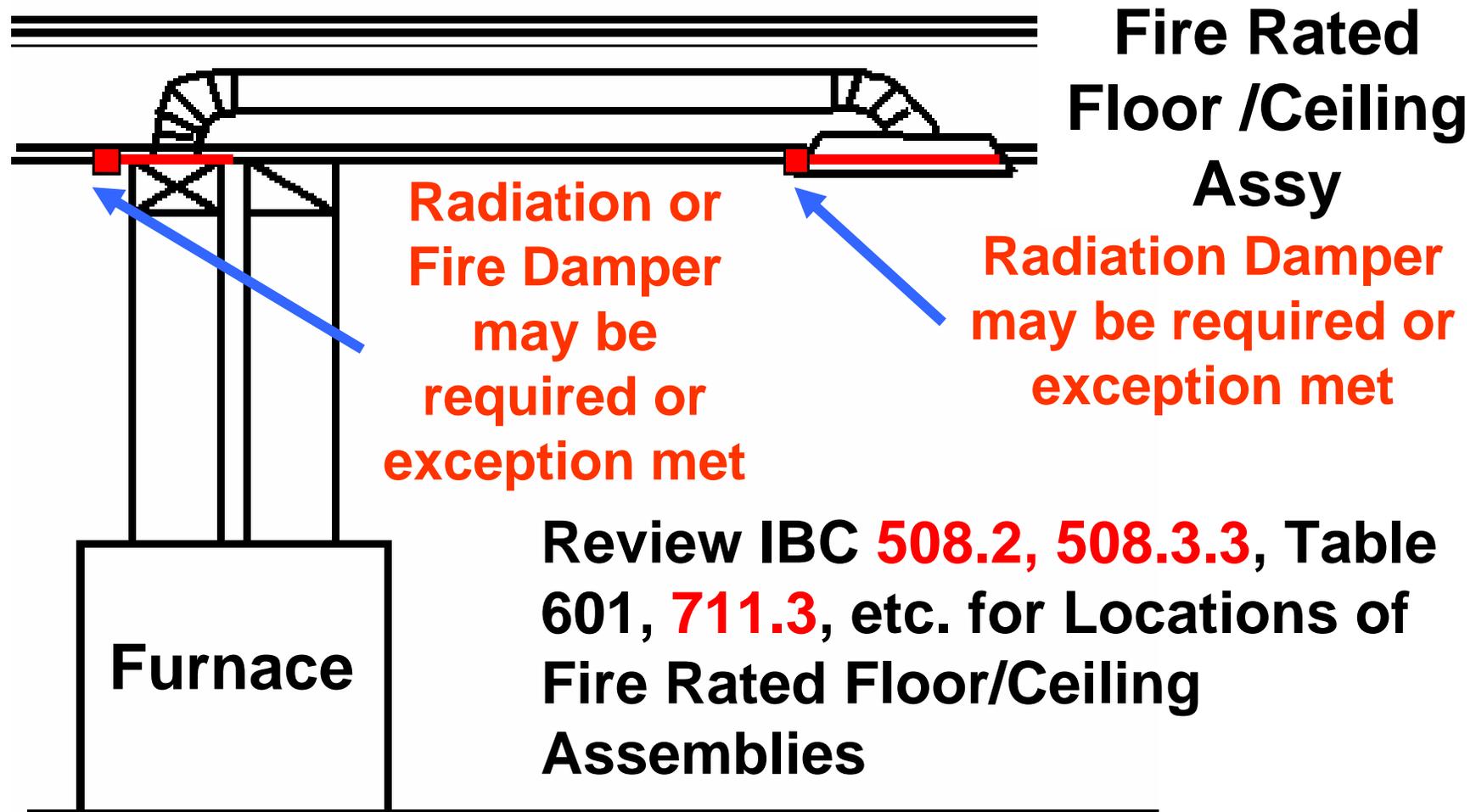
Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.3, 607.6.2.1, IBC 716.3, 716.6.2

- Ceiling Radiation Dampers to meet UL 555C
- Ceiling Radiation Dampers **NOT** required where ASTM E 119 fire test have shown that ceiling radiation dampers are not necessary in order to maintain fire resistance rating of the assembly

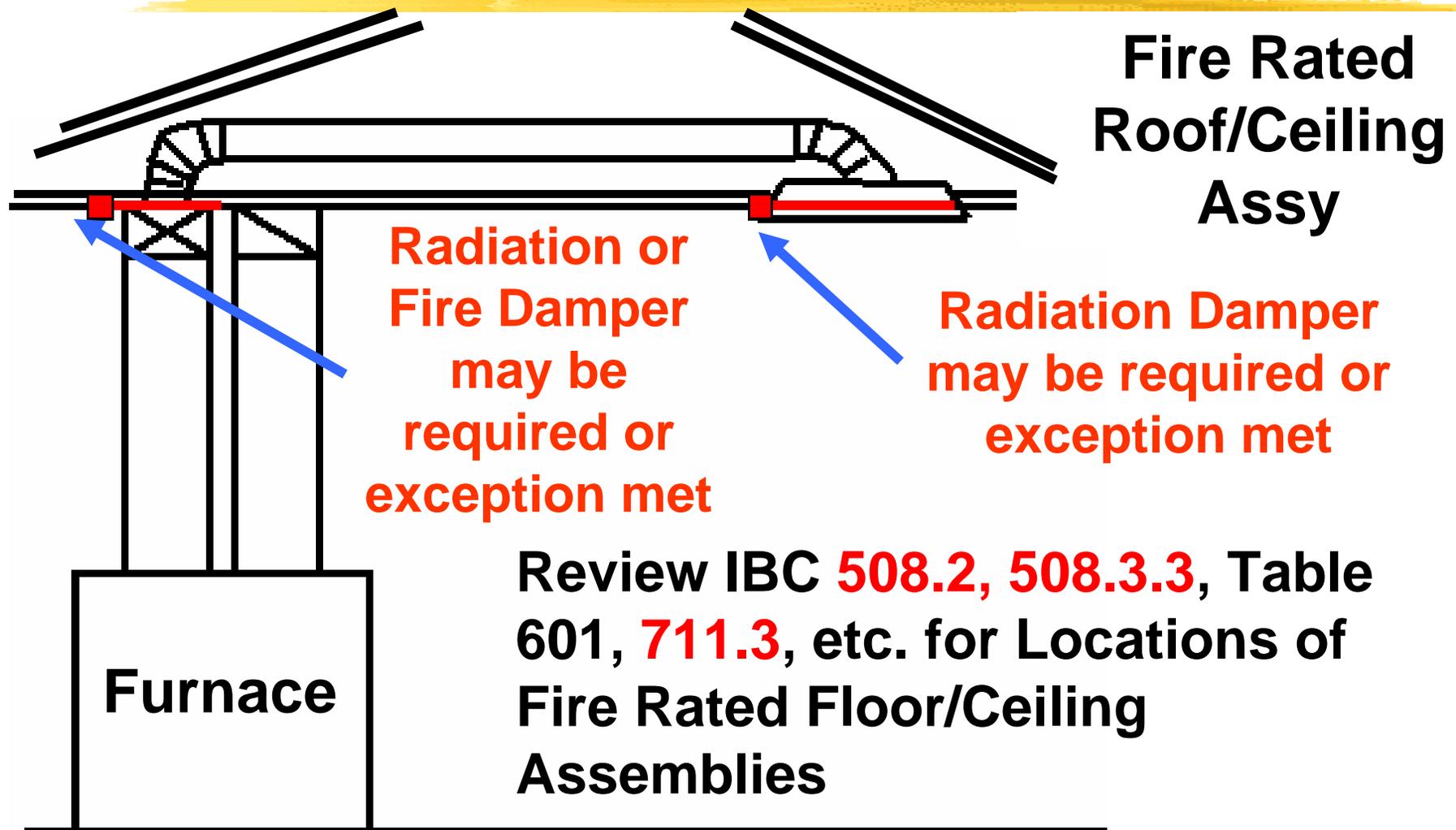
Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.6.2.1, IBC 716.3, 716.6.2



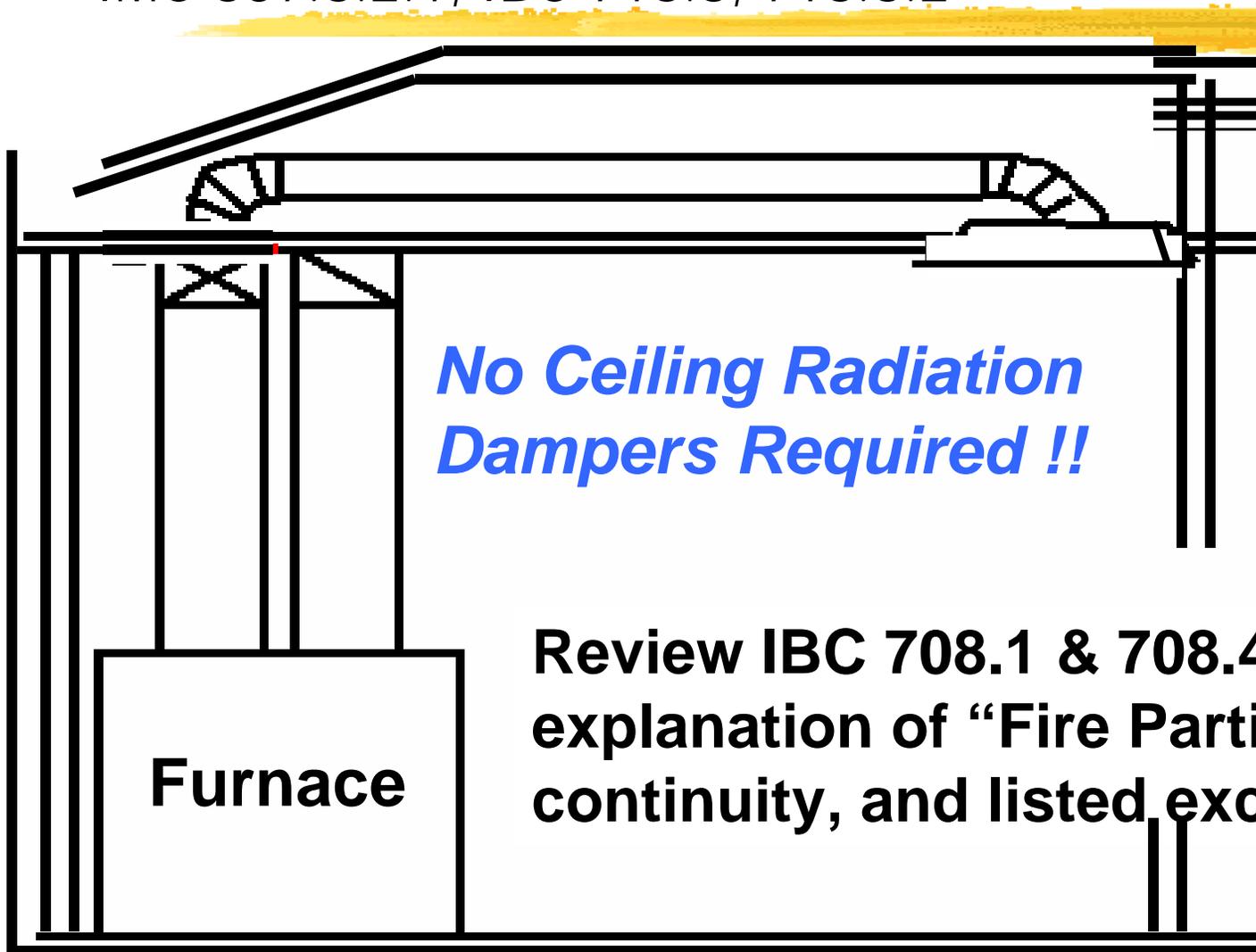
Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.6.2.1, IBC 716.3, 716.6.2



Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.6.2.1, IBC 716.3, 716.6.2



No Ceiling Radiation Dampers Required !!

Review IBC 708.1 & 708.4 for explanation of "Fire Partitions", continuity, and listed exceptions

Apt. with Non-Fire Rated Roof/Ceiling Assy WITH separation per IBC 708.4 to the roof deck

Furnace

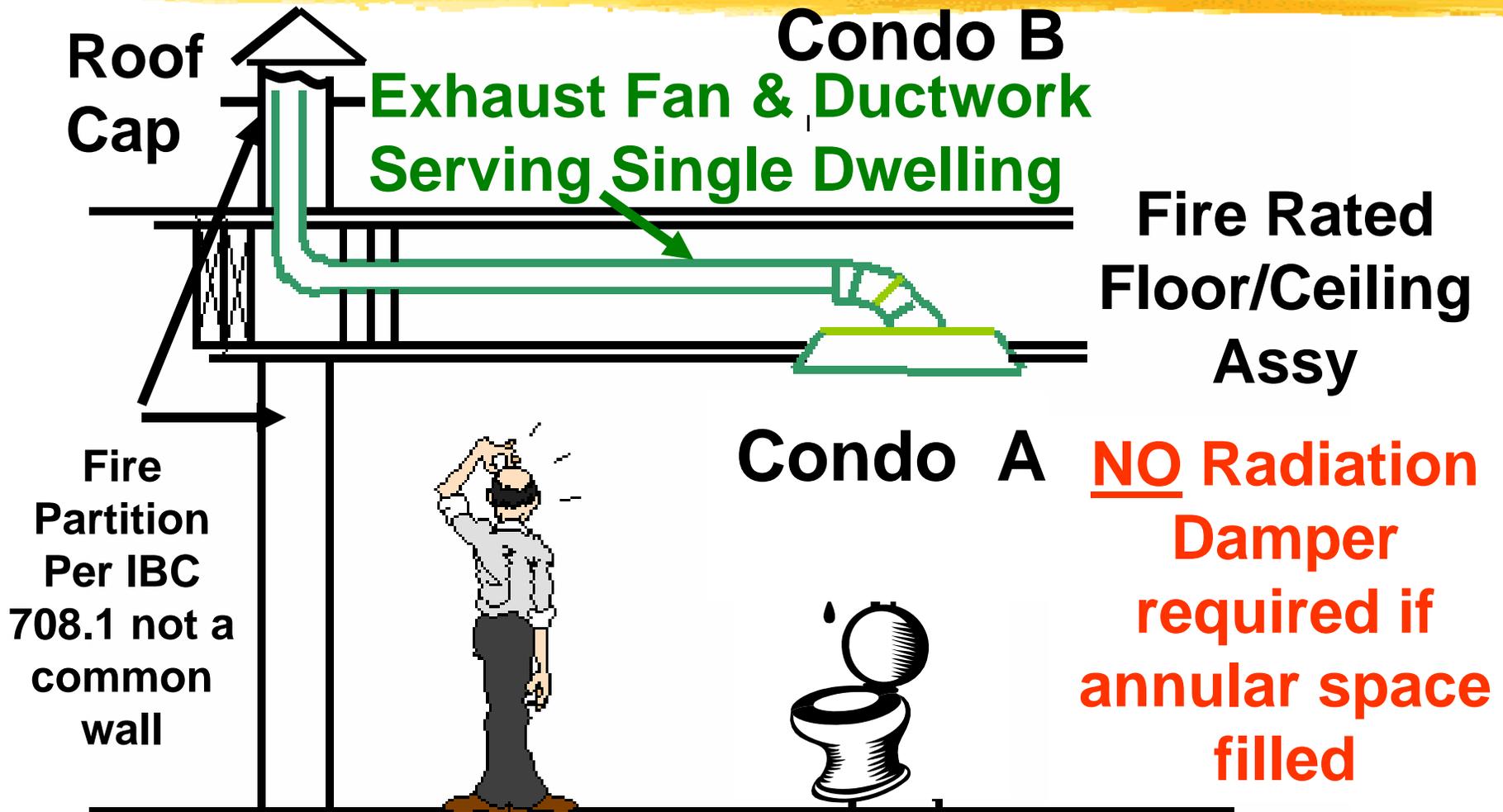
Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.3, 607.6.2.1, IBC 716.3, 716.6.2

- **Not Required** for Fire rated Floor/Ceiling or Ceiling/Roof Assys when:
 - **Exhaust** duct penetrations are protected per IBC 712.4.2 & the exhaust ducts are located within the cavity wall (includes floor/ceiling), and **do NOT pass through another dwelling unit or tenant space**

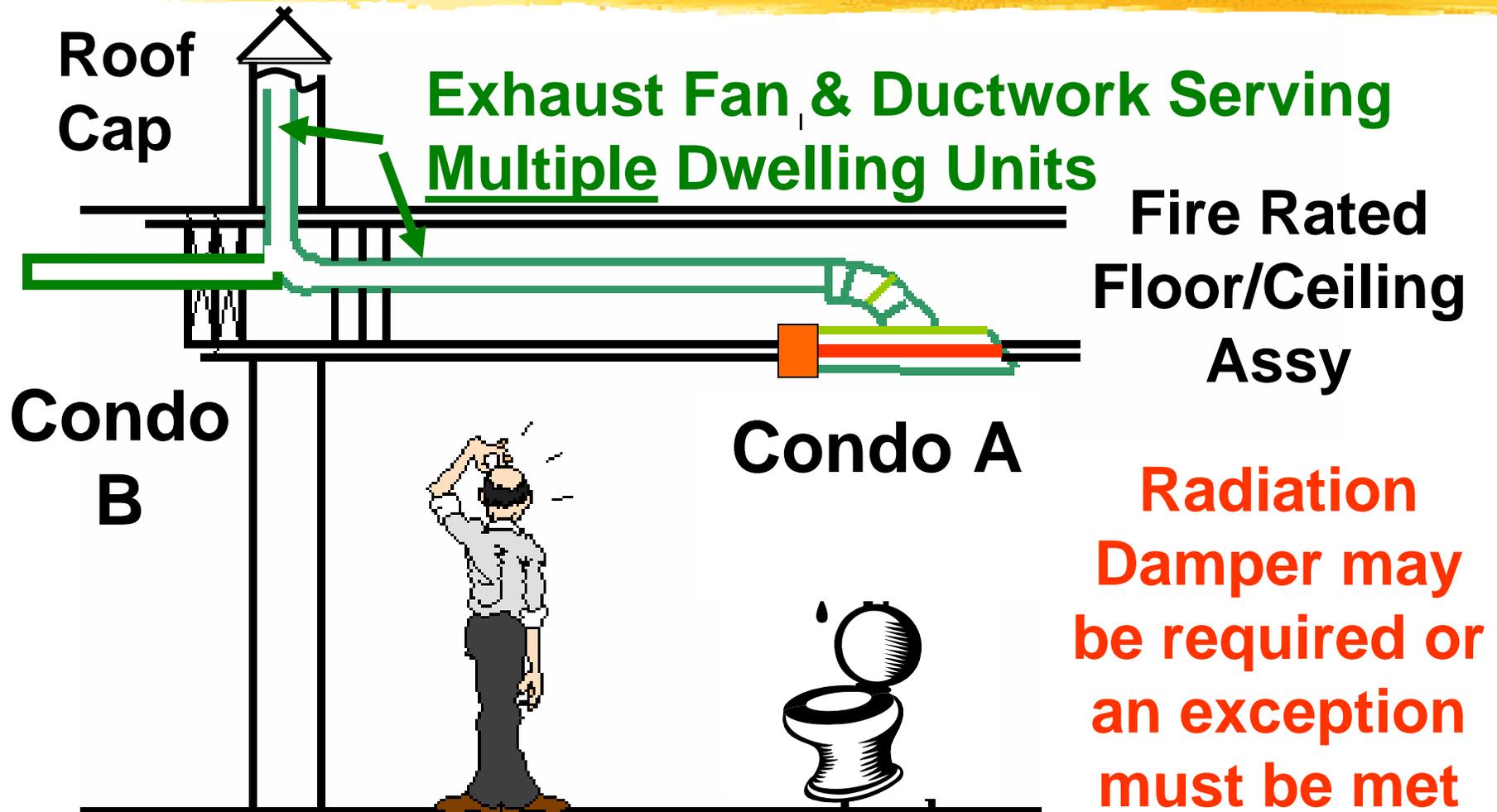
Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.6.2.1, IBC 716.6.2.1 Exception 2.



Ceiling Radiation Dampers for Membrane Penetrations

IMC 607.6.2.1, IBC 716.6.2.1



Ceiling Radiation Dampers for Membrane Penetrations

IMC & IFGC 202; IBC 712.4.1 Exc. 1. & 712.4.2 Exc. 1.

- VENT: A pipe or conduit composed of factory made components, containing a passageway for **conveying combustion products** and air to the atmosphere, listed and labeled for use with specific type of class or appliance.
- AN EXHAUST SYSTEM IS **NOT** NECESSARILY A "VENT"

Smoke Detection System

IMC 606.2.1 & 606.4.1



- Req'd in **RETURN** air systems with > 2,000 cfm design capacity **Except**:
 - When air distribution is incapable of spreading smoke beyond the enclosing walls/floors and ceiling of the room OR SPACE in which the smoke is generated
- Must be connected to fire alarm system if a fire alarm system exists

Smoke Detection System

IMC 606.4



- Upon activation, smoke detectors shall shut down the air distribution system
- If part of a smoke control system, the system shall switch to smoke control mode
- Activation shall set off visible & audible supervisory signals-- **Exceptions**

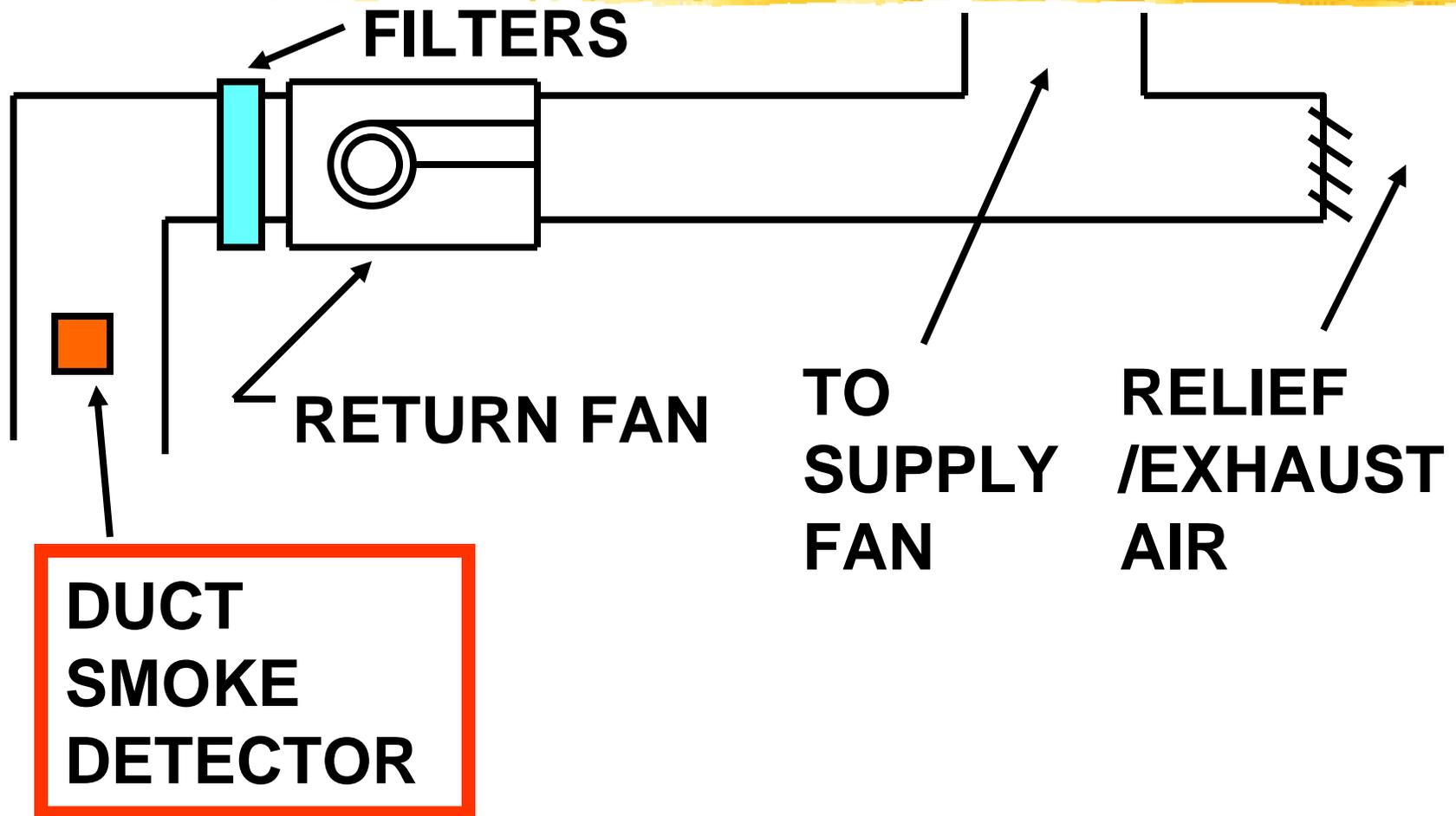
Smoke Detection System

IMC 606

- **Located in the return air duct or plenum** upstream of any filters, exhaust air connections, outdoor air connections or decontamination equipment
- Note: A common listing requirement for such systems is a minimum air flow of 400 ft/minute

Smoke Detection System

IMC 606



Smoke Detection System

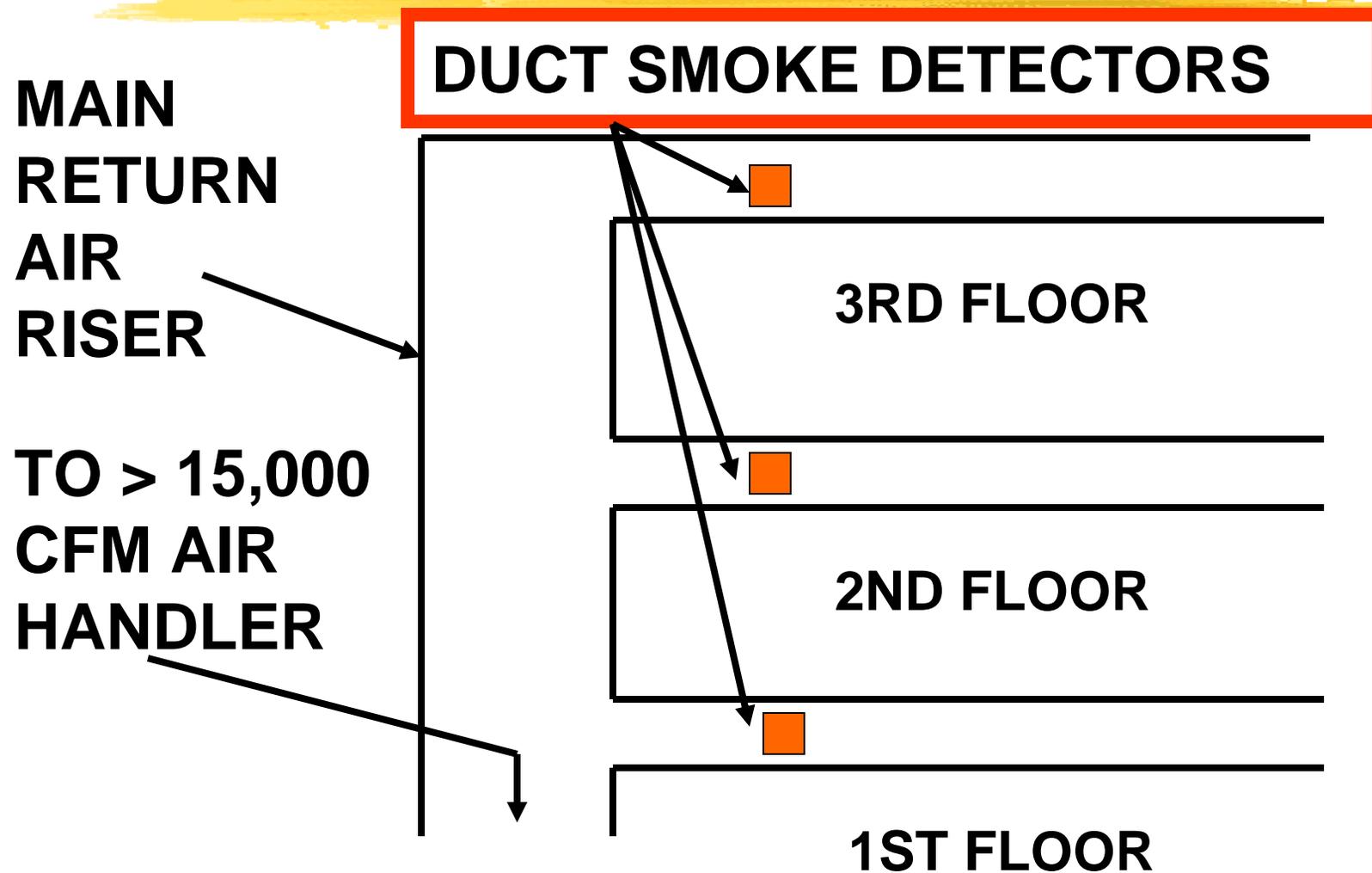
IMC 606



- Systems serving ≥ 2 stories and have $> 15,000$ cfm capacity require detectors at each story
 - Detectors in this situation to be located upstream of the connection between the return air riser and any air ducts or plenums

Smoke Detection System

IMC 606.2.3



Fuel Burning Appliances Require Venting IMC 801.2



- **Every** fuel burning appliance shall discharge the products of combustion to a vent, factory built chimney or masonry chimney unless an exception can be met
- IE gas or wood stoves may **NOT** vent combustion products via a kitchen hood unless the hood is listed as a chimney or vent

HVAC Equipment Listing and Installation Reqts IMC Ch. 9



- For Fuel Gas Equipment, Review **IFGC**
Ch. 6-- Natural & LP Gas
- Includes, but is not limited to incinerators, vented wall furnaces, floor & duct furnaces, direct-fired make-up & industrial air heaters, saunas, unit heaters, etc.

HVAC Equipment Listing and Installation Reqts IMC Ch. 9



- For *Non-Fuel Gas Equipment*, Review **IMC Ch. 9**-- Electric; wood, pellet, & fuel oil burning equipment
- Includes, but is not limited to fireplaces, pellet burning appliances sauna heaters, duct furnaces, forced-air warm-air furnaces, infrared radiant heaters etc.

Cooling Tower Equipment

IMC 908, IBC 1509

- Must be $< 1/3$ supporting roof area
- Must be supported by, and composed of noncombustible construction, if size criteria is met
- Where enclosed, the exterior walls & ceiling is to be rated as required for the rest of the building
- To be located to prevent discharge vapor plumes from entering occupied spaces



**Cooling
Tower**

we

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.

Furnace Room Enclosure (Applicable ONLY if Furnace is placed in a Non-occupied Enclosure) IBC 508.2 & 1015.3

- 1 hr Fire Enclosure if any one piece of equipment is over 400,000 Btu/hr input
- No Rated Enclosure required if automatic fire extinguishing system is installed
- **Requires two (2) exits** from enclosure if > 500 sf **AND** any piece of furnace/air handling equipment is > 400,000 Btu/hr

Boiler Enclosure (Applicable ONLY if Boiler is placed in a Non-occupied Enclosure)

IBC 508.2, 1015.3 / COMM 41

- IBC Boilers over 15 psi & 10 hp (335,000 Btu/hr output)
 - 1 hr Fire Enclosure
 - No Rated Enclosure required if automatic fire extinguishing system is installed
- WI has kept COMM 41, Boiler Code
- **Requires two (2) exits** from enclosure if > 500 sf **AND** any piece of boiler equipment is > 400,000 Btu/hr

Refrigerant Machinery Room Enclosure

IBC 508.2, 908.6 & 1015.4 for equipment covered by COMM 45

- 1 hr Fire Enclosure
- No Rated Enclosure required if automatic fire extinguishing system is installed unless considered a "Special Mechanical Room" under COMM 45.19(13).
- Based on Comm 45 refrigerant amounts
- **Requires two (2) exits** from enclosure if > 1,000 sf [open in egress direction per Comm 45.36(4)]
- Refrigerant detector to be installed--Exception

Questions -----



■ ??????????

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:**
- **COMMERCE.STATE.WI.US/SB**

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

IFGC



- All requirements for fuel & gas appliance connections and venting are listed in this code
- Do not use the IMC for these requirements

Prohibited Gas Equipment Locations

IFGC 303.3

- Sleeping Rooms, Bathrooms, Toilet Rooms, Storage Closets, Surgical Rooms or spaces that open to such rooms
- Exceptions:
 - Direct Vent/Sealed Combustion
 - Vented room heaters, wall furnaces, vented decorative appliances, vented gas fireplaces/fireplace heaters for installation in vented solid fuel burning fireplaces that meet the volume criteria of 304.5

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 \leq 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 Volume_{other} \geq
(21 ft³/ACH) (I_{other} /1,000 Btu/hr)

Where:

I_{other}- 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 Volume_{fan} \geq
(15 ft³/ACH) (I_{fan} /1,000 Btu/hr)

Where:

I_{fan}- 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 in²/1,000 Btu/hr input (min. 100 in²)
 - 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 in² per 1,000 Btu/h of total input rating of all appliances. (See IBC 707.2)

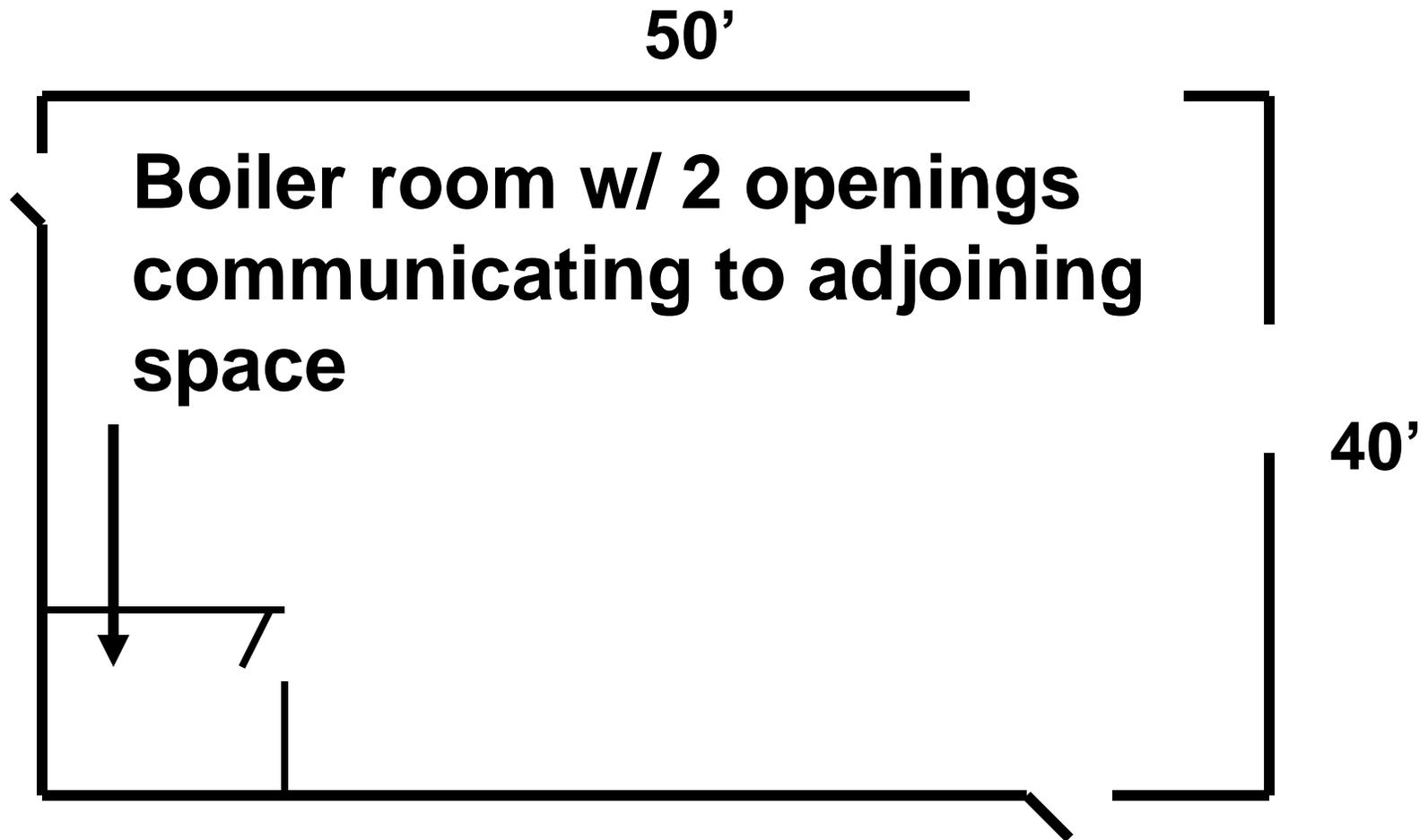
Example- Combustion Air From Inside the Building

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

- $50,000 \text{ Btu/hr} \times 50 \text{ ft}^3 / 1,000 \text{ Btu/hr} = 2,500 \text{ ft}^3$ 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

$$\text{Req'd Volume}_{\text{fan}} \geq (15 \text{ ft}^3/\text{ACH}) (I_{\text{fan}} / 1,000 \text{ Btu/hr})$$

$$\text{Req'd Volume}_{\text{fan}} \geq (15 \text{ ft}^3/0.45) (50,000/1,000 \text{ Btu/hr}) = \underline{\underline{1,667 \text{ ft}^3}}$$

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.

Combustion Air-Outside Bldg

IFGC 304.6

- Total input rating of ALL equipment used to determine required minimum volume
- Opt. 1 High opening required starting within 12" of Top
- Opt. 2 High & low openings required starting within 12" of top and bottom
- **BEWARE:** Although the code **ALLOWS** use of 1 or 2 openings, MANY PRODUCT LISTINGS will **REQUIRE** 2 openings

Combustion Air-Outside Bldg

IFGC 304.6.2

■ For 1 Opening

- Opening requires $1 \text{ in}^2/3,000 \text{ Btu/hr}$
- Locate within 12" of top of enclosure
- Minimum dimension of air openings $\geq 3"$
- Appliance to have a minimum 1" clearance from the sides & back, and min. 6" from the front.

Combustion Air-Outside Bldg

IFGC 304.6.1

■ For 2 Openings

- Each opening requires 1 in²/4,000 Btu/hr when *directly communicating* to the outdoors, or using *vertical ducts*
- Each opening Requires 1 in²/2,000 Btu/hr for *horizontal ducts*
- Locate within 12" of top & bottom of space
- Minimum dimension of air openings $\geq 3''$

Prorated Inside & Outside Air

IFGC 304.7



- Allows for use of interior space air to be used in combination with outside air
- Outside air is “Prorated” as allowed by code

Example-Prorated Inside & Outside

Air IFGC 304.5, 304.6 & 304.7

- Verify that combined indoor/outdoor provisions are ≥ 1

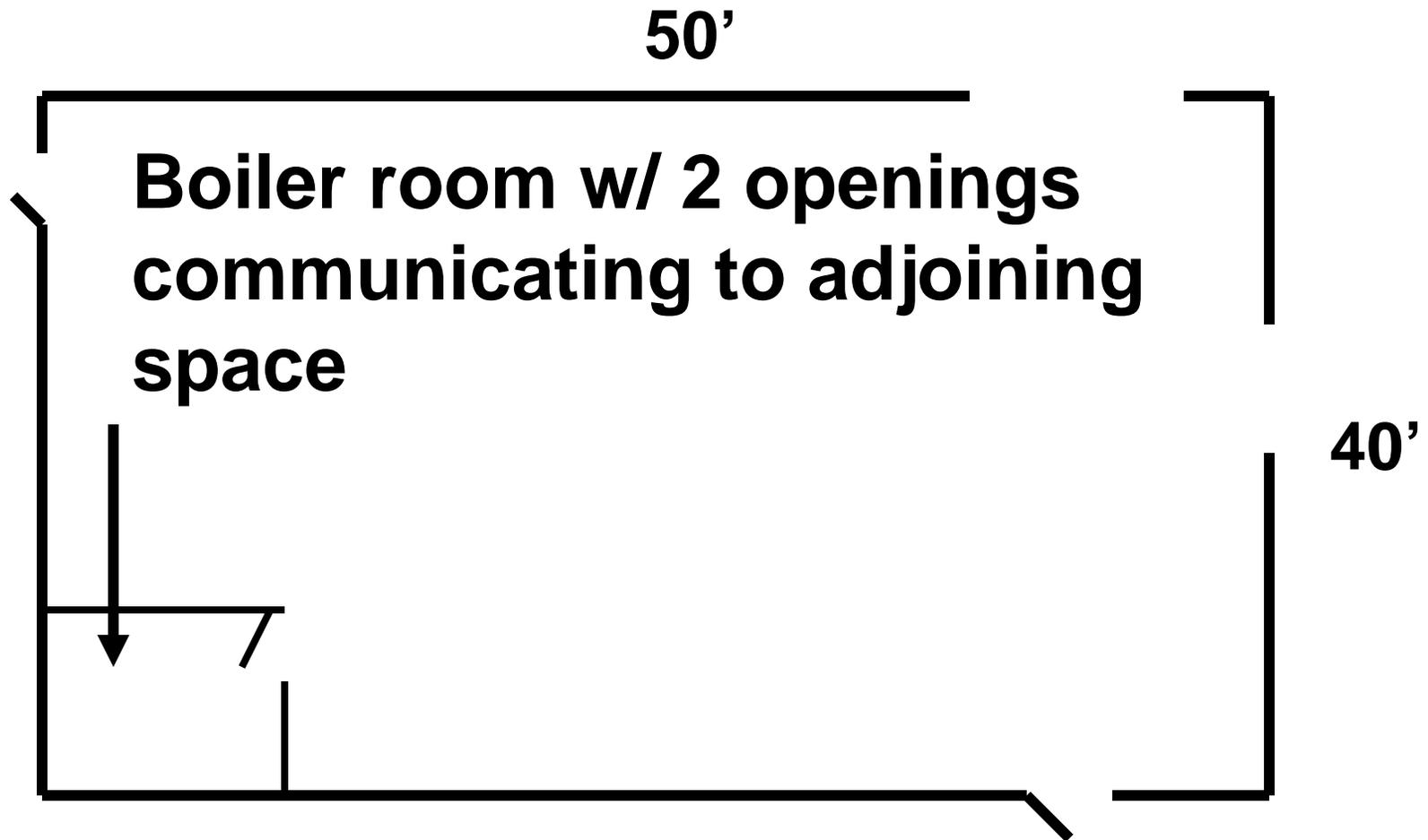
$$\text{Indoor Air Credit} + \frac{\text{Direct (Proposed)}}{\text{Direct (Required)}} + \frac{\text{Vertical (Prop.)}}{\text{Vertical (Req)}} + \frac{\text{Horiz (Prop.)}}{\text{Horiz (Req.)}} \geq 1$$

Example-Prorated Inside & Outside Air IFGC 304.7

- 50' x 40' bldg w/10' ceiling (20,000 cu. ft)
- 400,000 Btu/hr boiler & 100,000 Btu/hr water heater (confined)
- Use 2 interior permanent openings, 1 in²/1,000 btu/hr (100 in² minimum) communicating directly w/other spaces of volume but combined volume of all spaces fails to meet the criteria for either interior options

Example- Prorated Air From Inside & Outside the Building

IBC 304.7



Example- Prorated Inside & Outside Air IFGC 304.5, 304.6 & 304.7



- Determine “Indoor Air Credit”
- Room Volume (ft³)/[Equipment Input (Btu/hr) x 50 cu ft/1,000 Btu/hr]
- Calculate outdoor openings (use 2 openings)
 - 1 in²/4,000 Btu/hr Direct Communication
 - 1 in²/4,000 Btu/hr Vertical Ducts
 - 1 in²/2,000 Btu/hr Horizontal Ducts

Example- Prorated Inside & Outside Air
IFGC 304.5, 304.6 & 304.7

$$\text{Indoor Air Credit} + \frac{\text{Direct (Proposed)}}{\text{Direct (Required)}} + \frac{\text{Vertical (Prop.)}}{\text{Vertical (Req)}} + \frac{\text{Horiz (Prop.)}}{\text{Horiz (Req.)}} \geq 1$$

$$20,000 \text{ ft}^3 / [500,000 \text{ Btu/hr} \times (50 \text{ ft}^3 / 1,000 \text{ Btu})] = 0.80$$

Add outdoor louvers w/ horizontal ducts (high/low)

Assume 50 sq.in. of free area proposed for each high & low outdoor louver (minimum 3" dimension required)

$$50 \text{ sq in.} / [500,000 \text{ Btu/hr} \times (1 \text{ in}^2 / 2,000 \text{ Btu/hr})] = \underline{0.20}$$

1.00

OK!!!!

Combustion Air Ducts

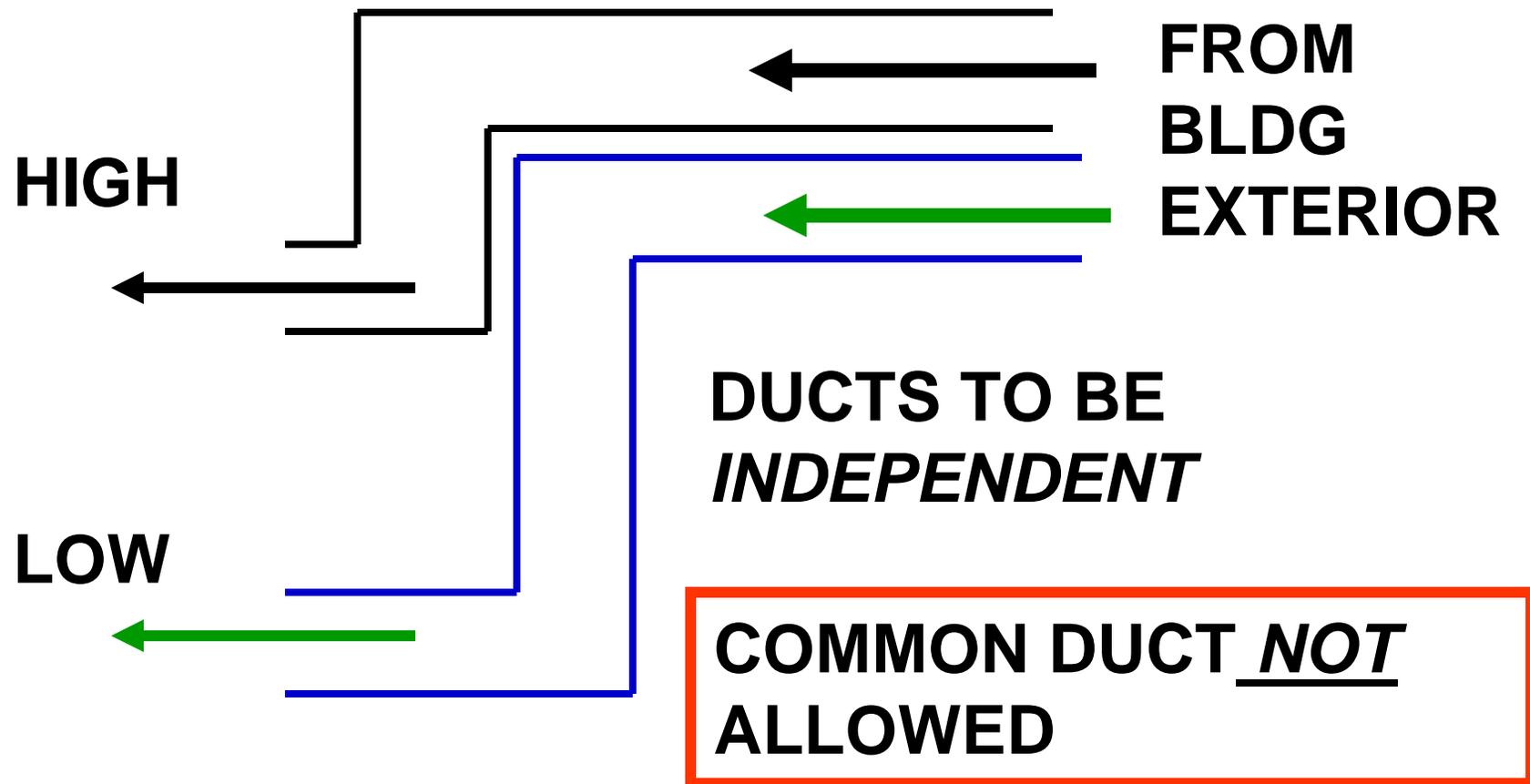
IFGC 304.11



- **Dwelling Units** may convey combustion air via stud & joist spaces provided not more than 1 fire block is removed.
- Such ducts may serve **only 1** enclosure
- May NOT serve both top/bottom combustion air openings

Combustion Air Ducts

IFGC 304.11



Elevation of Ignition Sources

IFGC 305.3

- Equipment & appliances w/ ignition sources shall be elevated $\geq 18''$ above the floor.
Exception if appliance is listed as **flammable vapor ignition resistant** (This is NOT necessarily a Direct Vent Sealed Combustion Appliance)
- Locations include hazardous areas, public/private garages, repair garages, automotive service stations & parking garages

Access & Service Requirements

Defined For: IFGC 306



- Rooms
- Attics
- Under floors
- Roofs & elevated structures

Clearance Reduction

IFGC 308



- Section allows reduction to required clearances to combustible materials and assemblies
- Clearance requirements are associated w/chimneys, vents, kitchen exhaust equipment, fuel gas appliances, and fuel gas devices/equipment

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

Acceptable Metallic Pipe

IFGC Ch. 4 / NFPA 54 -5.6.1

- Black pipe (schedule 40)
- Copper & brass (**ONLY** if hydrogen sulfide content meets content limitations)
- Aluminum (**ONLY** if the proper ASTM test and alloys are used) --**NEVER** use in exterior locations or underground unless protected
- Cast iron may **NOT** be used

Acceptable Metallic Tubing & Plastic Pipe

IFGC Ch. 4 / NFPA 54-5.6.3

- Steel tubing must meet ASTM A539 & A254
- Copper tubing must meet Type K ASTM B88 or B280--(used **ONLY** if sulfur content is acceptable)
- Aluminum tubing must meet ASTM B210 or B241--**NOT** for use in exterior locations or underground
- Corrugated stainless steel must meet ANSI/ AGA LC 1
- Plastic pipe-- **outside-underground (Both)** **ONLY--** must have marking ASTM D2513 and "GAS"

Underground Piping

Protection IFGC Ch. 4 / NFPA 54-6.1.2.1.

- Requires $\geq 18''$ of cover
- $\geq 12''$ is permitted if external damage to the pipe is not likely to result
- If 12" or more cannot be maintained, the pipe must be installed with a conduit or bridged (shielded)

Interior Gas Piping Support

IFGC Ch. 4 / NFPA 54-6.2.6.2

| Support of Piping | | | |
|--|---|---|---|
| Steel Pipe, Nominal Size of Pipe (Inches) | Spacing of Supports (Feet) | Nominal Size of Tubing (Inch O.D.) | Spacing of Supports (Feet) |
| 1/2 | 6 | 1/2 | 4 |
| 3/4 or 1 | 8 | 5/8 or 3/4 | 6 |
| ≥1-1/4 or larger (horizontal) | 10 | 7/8 or 1 | 8 |
| ≥1-1/4 or larger (vertical) | every floor level | | |



No Support of Gas Line
In conflict w/ NFPA 54

Concealed Piping in Buildings

IFGC Ch. 4 / NFPA 54-6.3.2

- **May NOT install:** Unions, tubing fittings, running threads, right & left couplings, bushings, swing joints and compression couplings made by combinations of fittings. Also note “valves” are also not allowed per the Dept.
- **May install:** Elbow, tees, and couplings

Tubing in Partitions

IFGC Ch. 4 / NFPA 54-6.3.4

- Tubing shall be permitted to be installed vertically & horizontally inside hollow walls or partitions without protection along its entire length provided:
 - A steel striking barrier ≥ 0.0508 " thick, or similar is installed between the tubing and the finished wall and extends at least 4" beyond concealed penetrations of plates, fire stops, wall studs, etc
 - The tubing is installed in single runs and is not rigidly secured

Tubing in Partitions

IFGC Ch. 4 / NFPA 54-6.3.4 Fails 4" extension



Gas Test Pressure

IFGC Ch. 4 / NFPA 54-7.1.4.2.

- Must be \geq 1.5 times the proposed maximum working pressure, **but not less the 3 psig** irrespective of design pressure
- Test duration must be \geq 1/2 hr for each 500 cu ft of pipe volume or fraction thereof
 - If the system is < 10 cu ft, duration can be reduced to 10 min
 - If the system is $> 24,000$ cu ft, duration is not required to exceed 24 hrs

Equipment Shutoff Valves and Connections

IFGC Ch. 4 / NFPA 54-8.5.4



- Gas equipment connected to a piping system must have an **ACCESSIBLE** manual shutoff valve with nondisplacable valve or a listed gas convenience outlet
- **MUST** be installed **within 6 ft** of the equipment it serves
- Valves shall be installed **upstream** of the connector



Gas Equipment Shutoff Valve

Sediment Trap

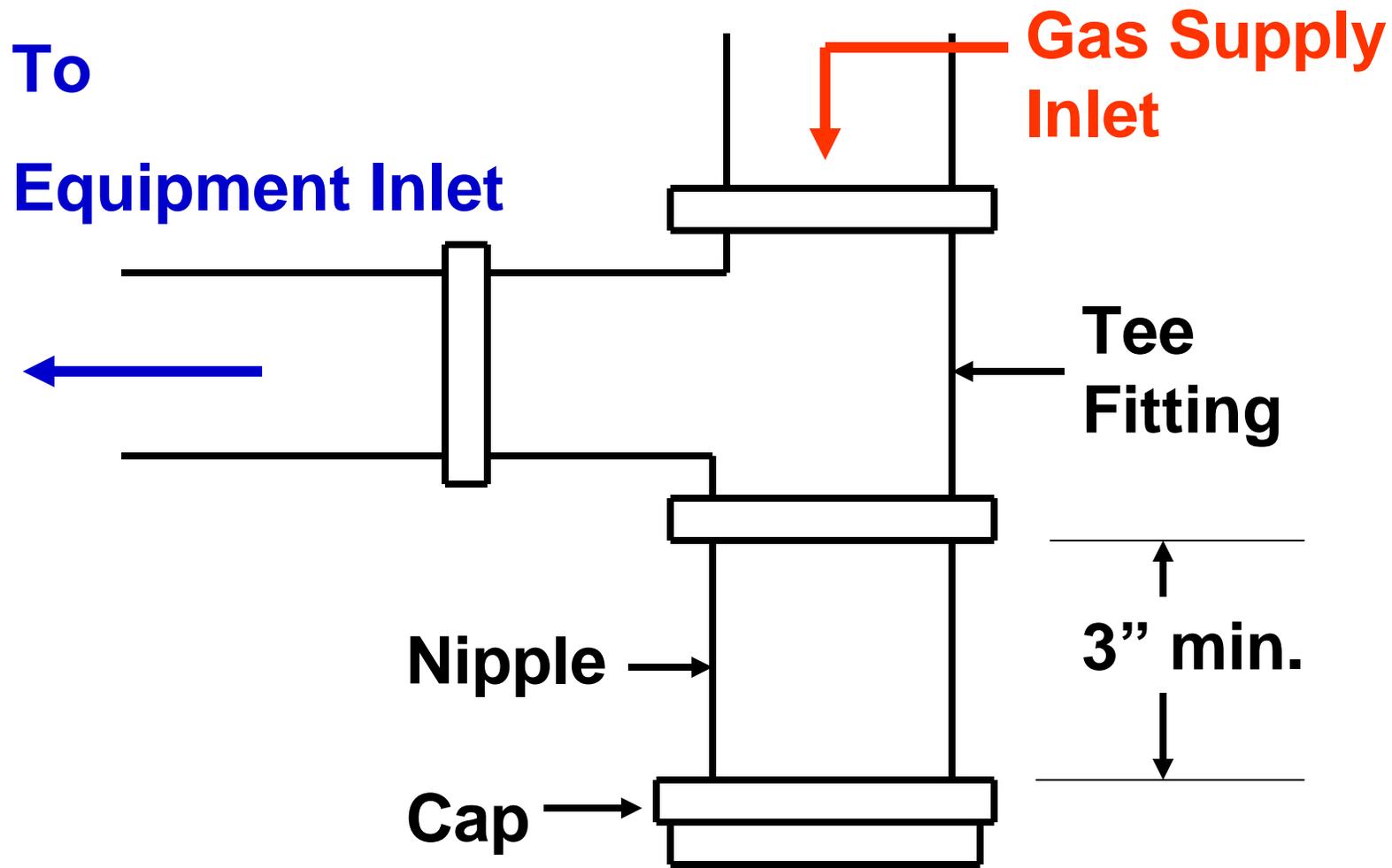
IFGC Ch. 4 / NFPA 54-5.5.7



- Required if not part of equipment
- To installed as close to the inlet of the equipment at the time of installation
- **NOT** required for illuminating appliances, ranges, clothes dryers, and outdoors grills

Sediment Trap

IFGC Ch. 4 / NFPA 54 5.5.7





Sediment Trap on a Furnace

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** or **removed** to an existing chimney or vent, the process of a new installation, the chimney or vent shall comply with IFGC 501.15.1 through 501.15.4 (ie. the chimney liner **shall** be replaced as applicable to the change of use)

Venting System Termination

IFGC 503.8



- Mechanical draft venting system (except for DVSC) shall terminate ≥ 4 ft horizontally from, or ≥ 1 ft above, any door, operable window, or gravity air inlet into any building.
- The bottom of the vent terminal shall be located ≥ 12 " above grade

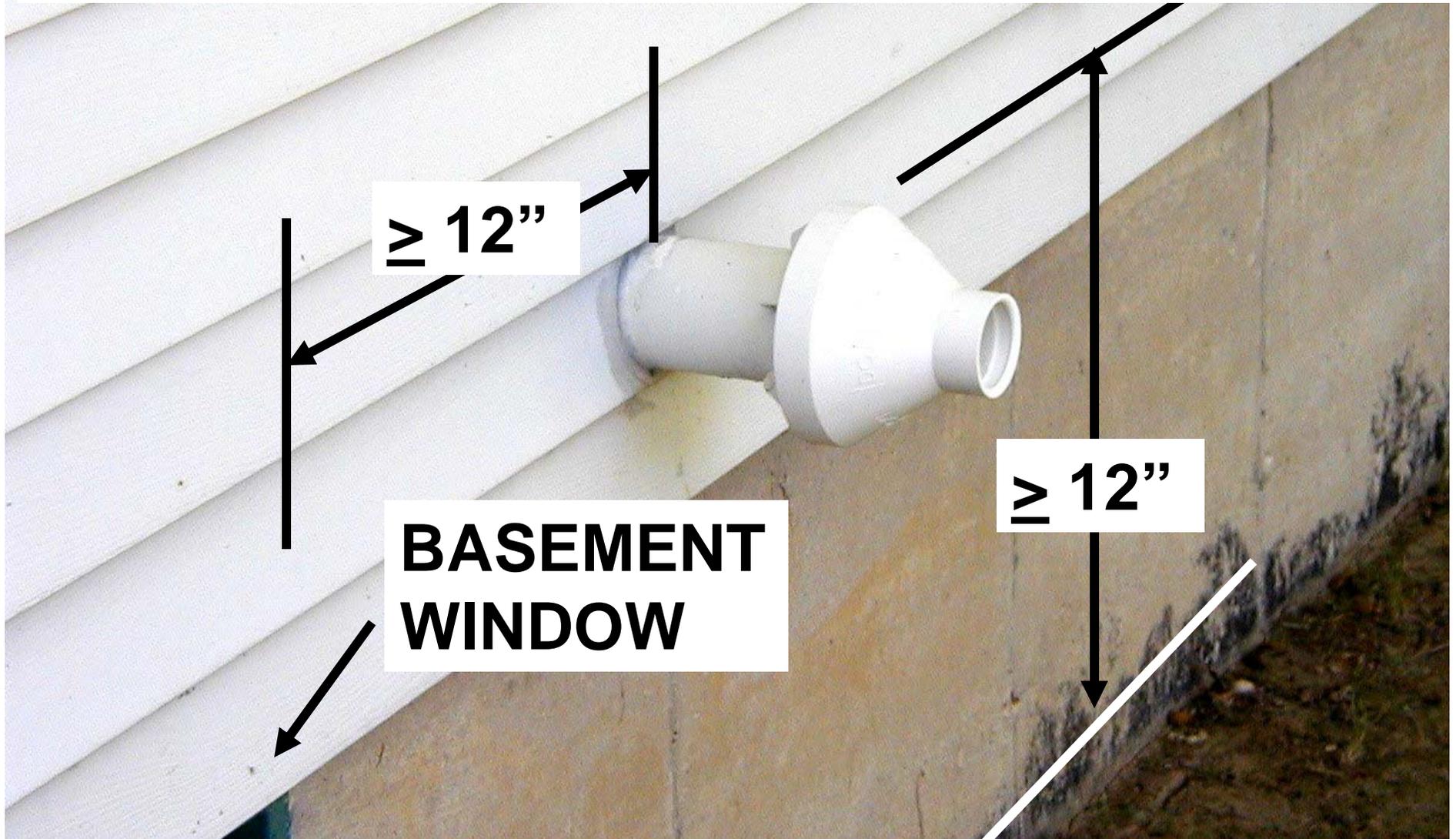
Venting System Termination

IFGC 503.8



- Direct Vent appliance vent clearances to building openings:
- $\leq 10,000$ Btu/h requires minimum 6"
- $> 10,000$ Btu/h $\leq 50,000$ 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



Venting System Termination

IFGC 503.3.3 #6 / COMM 64.0401(4)

- Must be $\geq 7'$ above adjacent public walkways (this includes DVSC units)
- Must be $\geq 10'$ from intake opening **OR** **minimum 2 ft above intake**
- Must be $\geq 10'$ from lot line

Chimney Termination - Low/Medium Heat Gas

IFGC 503.5.4/IMC 802.5

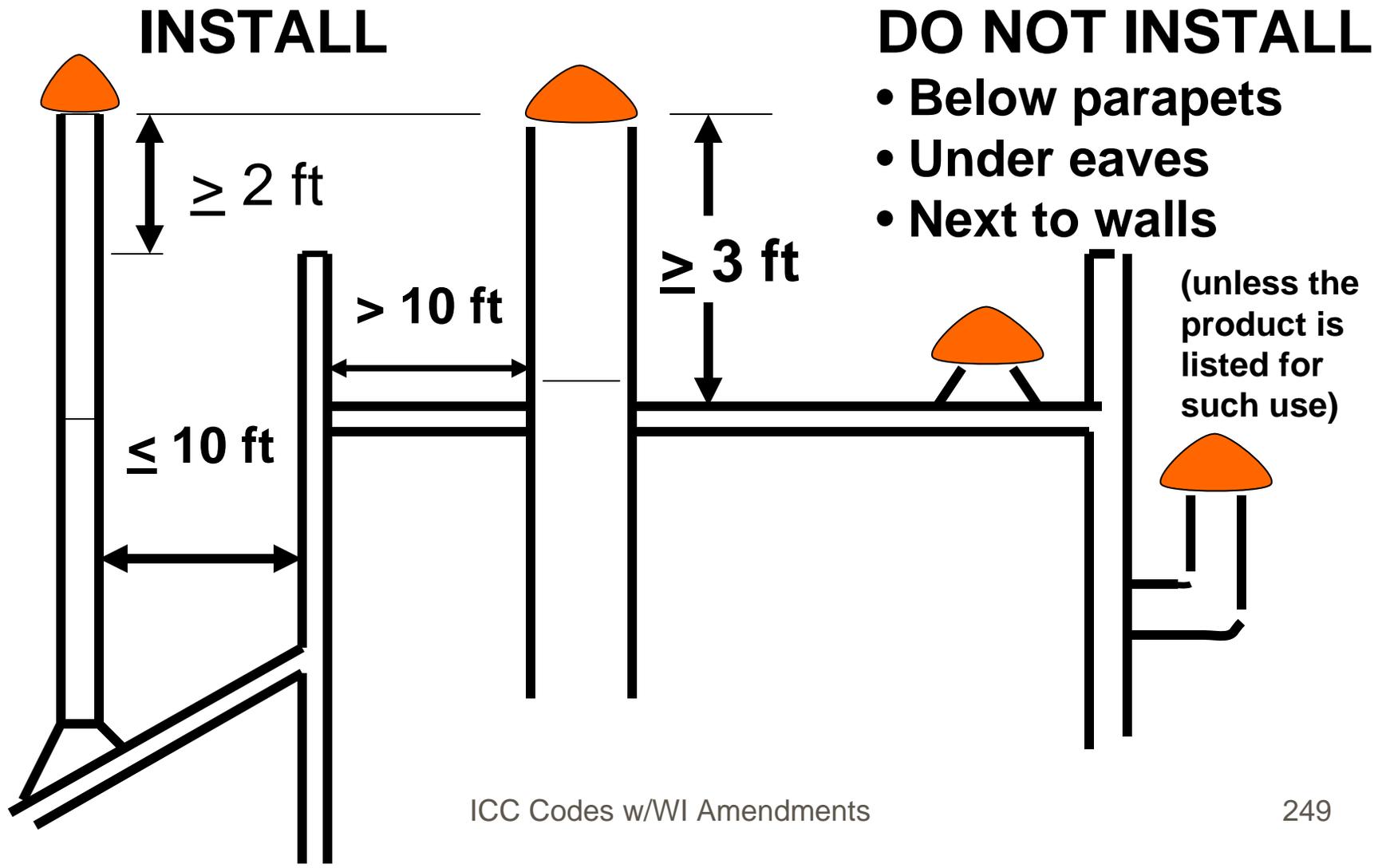
- Low Heat $\leq 1,000^{\circ}\text{F}$ - Extend Minimum 3 ft above highest point where chimney passes through roof ("B" vent)
- Low Heat - Extend Chimney Min. 2 ft higher than any other portion of the building w/10 ft
- Med. Heat Between $1,000^{\circ}\text{F}$ & $2,000^{\circ}\text{F}$ - Extend chimney Min. 10 ft higher than any other portion of the building within 25 ft
- Chimneys to Extend ≥ 5 ft above the highest connected equip. draft hood outlet/flue collar

Chimney Termination - Low/Medium Heat Gas

IFGC 503.6.6

- Gas vents termination heights could be **LESS** than previously listed IF:
 - 12" in size or smaller with listed caps installed/terminated per IFGC 503.6.6 **AND**
 - Such vents are \geq 8 ft from a vertical wall or similar obstruction

Chimney Termination - Low Heat Gas IFGC 503.5.4





Per the Vent Product Listing?

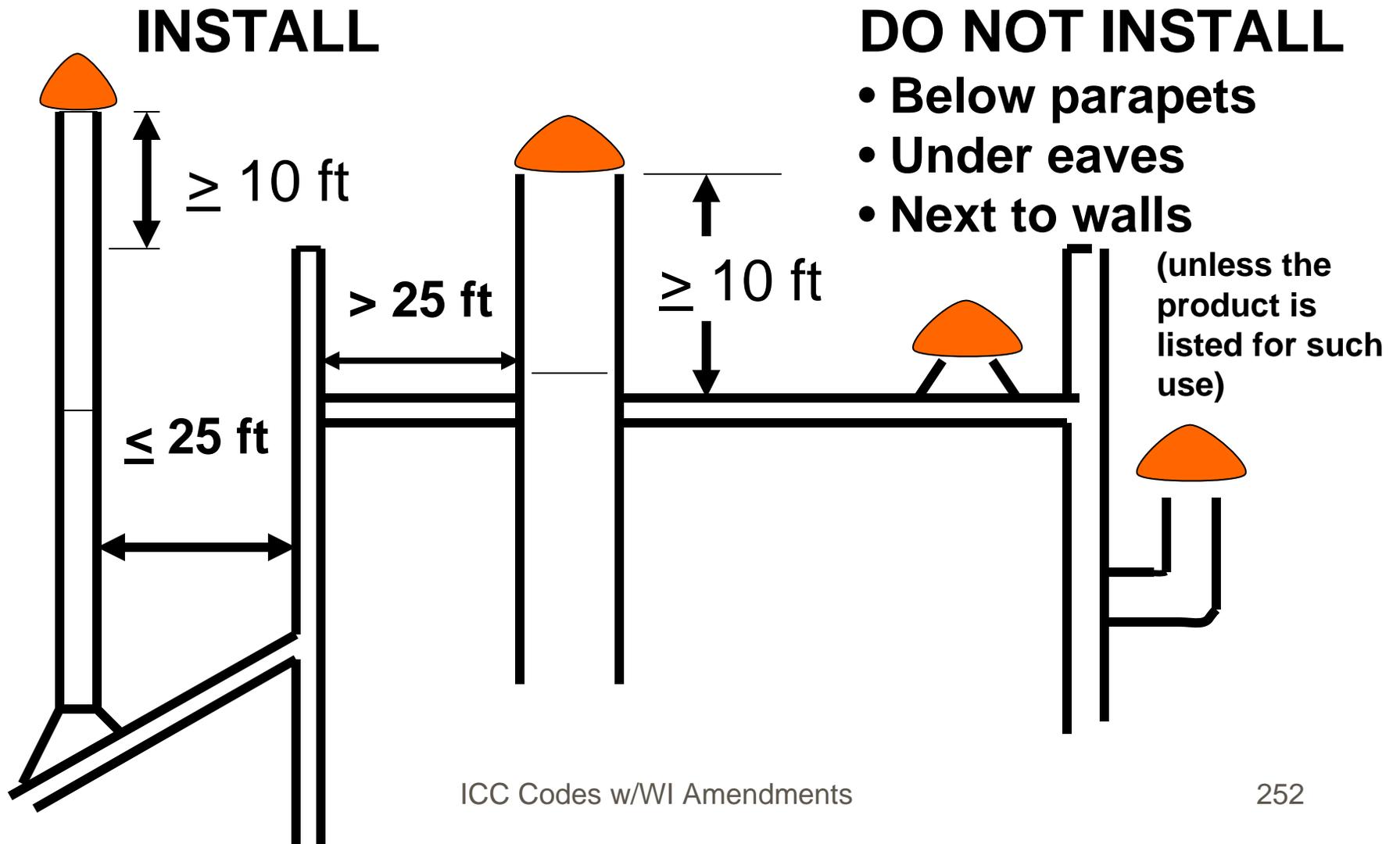


Too dumb for words

Photo: Bob Mulloy, Allsafe Home Inspection Service

This picture speaks for itself!

Chimney Termination - Medium Heat Gas IFGC 503.5.4



Vent Connector Requirements

IFGC 503.10.7, 8, & 9

- No dips or sags, fasten to flue collars and hood outlets with screws or other acceptable means
- Must slope upward to vent or chimney at least 1/4" per 1 ft
- Max horizontal length for single wall is 75% of height
- Max horizontal length for "B" double wall or chimney vent, is 100% of height



**Chimney Liner
attached with no
cleanout, improper
extension, etc.**



■ Details, Details

Photo: Lon
Grossman,
Technihouse
Inspections, Inc.

Flashing—who
needs flashing?!



The good news

Photo: Jack Koelling,
Advantage Home
Inspections, LLC

Harry Homeowner installed this CPVC pipe touching the flue pipe. The fix? Slip some cardboard between the warm flue pipe and meltable plastic! The good news? The gas was turned off and repairs were recommended by a licensed plumber before re-inspection.



FOILED!

Photo: C. John
Limongello,
Southern Home
Inspection Services

This section of water
heater flue pipe is
made entirely out of
aluminum foil!

WRONG!!!!

Connector Requirements

IFGC 504.2.3

- Capacities associated with code tables include allowance for two (2) 90° elbows.
- For each additional elbow up to and including 45°, the maximum vent connector capacity listed in the venting table is to be reduced by 5%.
- For each elbow between 45° & 90°, the maximum vent connector capacity listed in the venting tables to be reduced by 10%

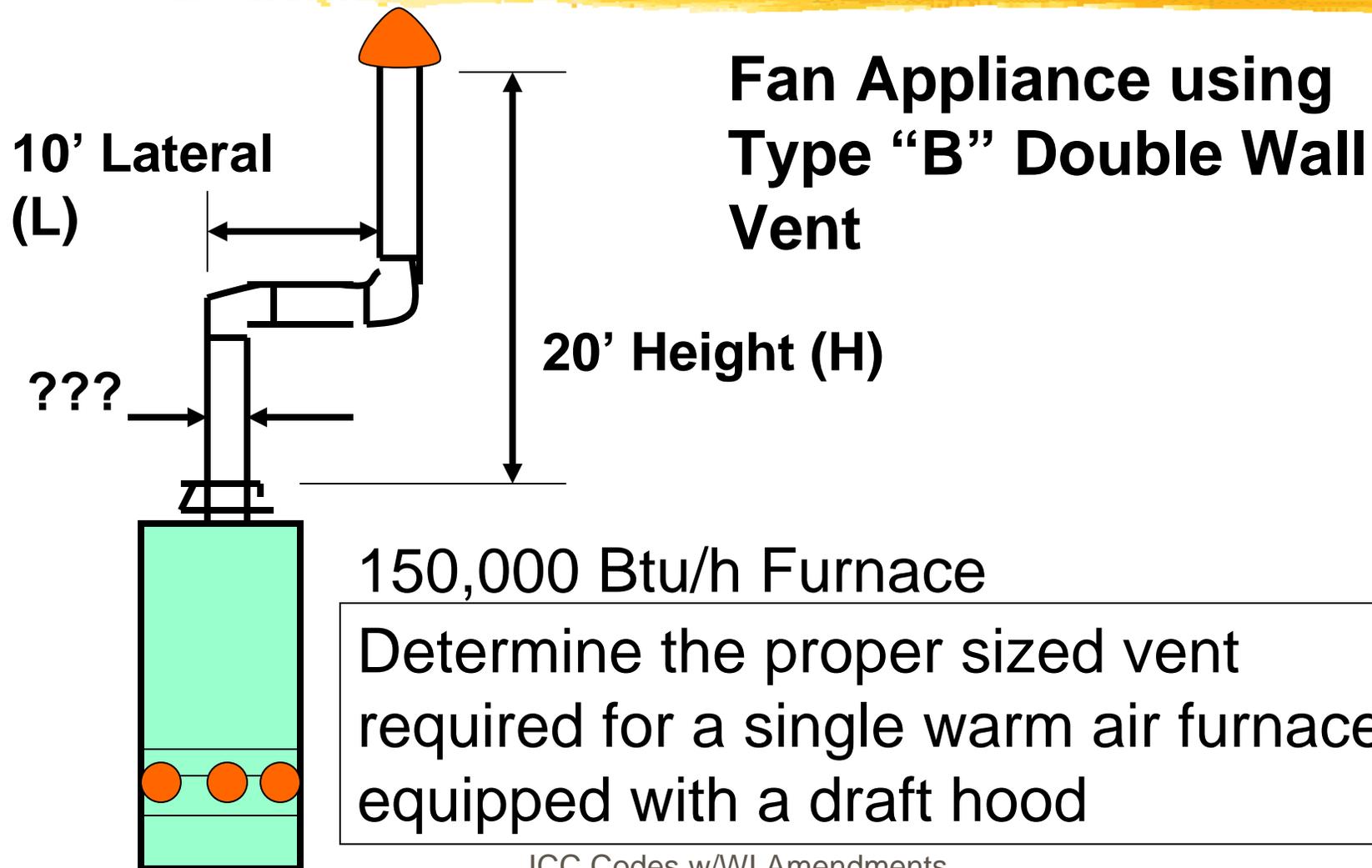
Chimney & Vent Locations



- Use listed tables if chimneys & vents are not exposed to the outdoors below the roof line.
- A Type B vent or listed chimney lining system passing through an unused masonry chimney flue is not considered to be exposed the outdoors.
- Type B vent is not “exposed” when it passes through an unventilated enclosure insulated

1 Appliance Connected To a Single Vent

IFGC 504.2, Vent Table 504.2.(1)



1 Appliance Connected To a Single Vent

IFGC Table 504.2(1)

- Define "Appliance Input"
- Define Minimum Vent Capacity @ 20' Height with 10' lateral
- Determine Maximum Vent Capacity @ 20' Height with 10' lateral

1 Appliance Connected To a Single Vent

IFGC Table 504.2(1)

- Furnace is 150,000 Btu/h
- Estimate 5" vent diameter
- Min. Vent Capacity @ 20' = 50,000 Btu/h
- Max. Vent Capacity @ 20' = 229,000 Btu/h **OK!!**
 - | Note: A 4" diameter would have a 133,000 Btu/h maximum capacity thus be too small- it would have insufficient capacity, with possible positive pressure to occur within the vent.
 - | Note: A 6" will fail to produce sufficient draft & can be subject to continuous formation of water vapor condensation on the interior vent surfaces.

1 Appliance Connected To a Single Vent

IFGC Table 504.2(1)

| Height (H) | Lateral (L) | Vent Diameter | | | | | |
|---------------|----------------|---------------------------------------|------|------|------|-----|------|
| | | 4" | | 5" | | 6" | |
| | | Appliance Input Rating in 1,000 Btu/h | | | | | |
| (feet) | (feet) | Fan | | Fan | | Fan | |
| | | Min. | Max. | Min. | Max. | Min | Max. |
| | 5 | 29 | 143 | 38 | 242 | 47 | 367 |
| 20 | 10 | 38 | 133 | 50 | 229 | 62 | 351 |
| | 15 | 46 | 124 | 59 | 217 | 73 | 337 |

2 or More Appliances Connected To a Single Vent (Same Fuel)

IFGC 503.10.4, 504.3, Tables 504.3 (1 thru 8)

- Must correctly apply tables 504.3(1-8)
- Subject to the requirements of 504.3.1 through 504.3.23

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.

2 or More Appliances Connected to a Single Vent (*DIFFERENT* Fuel)

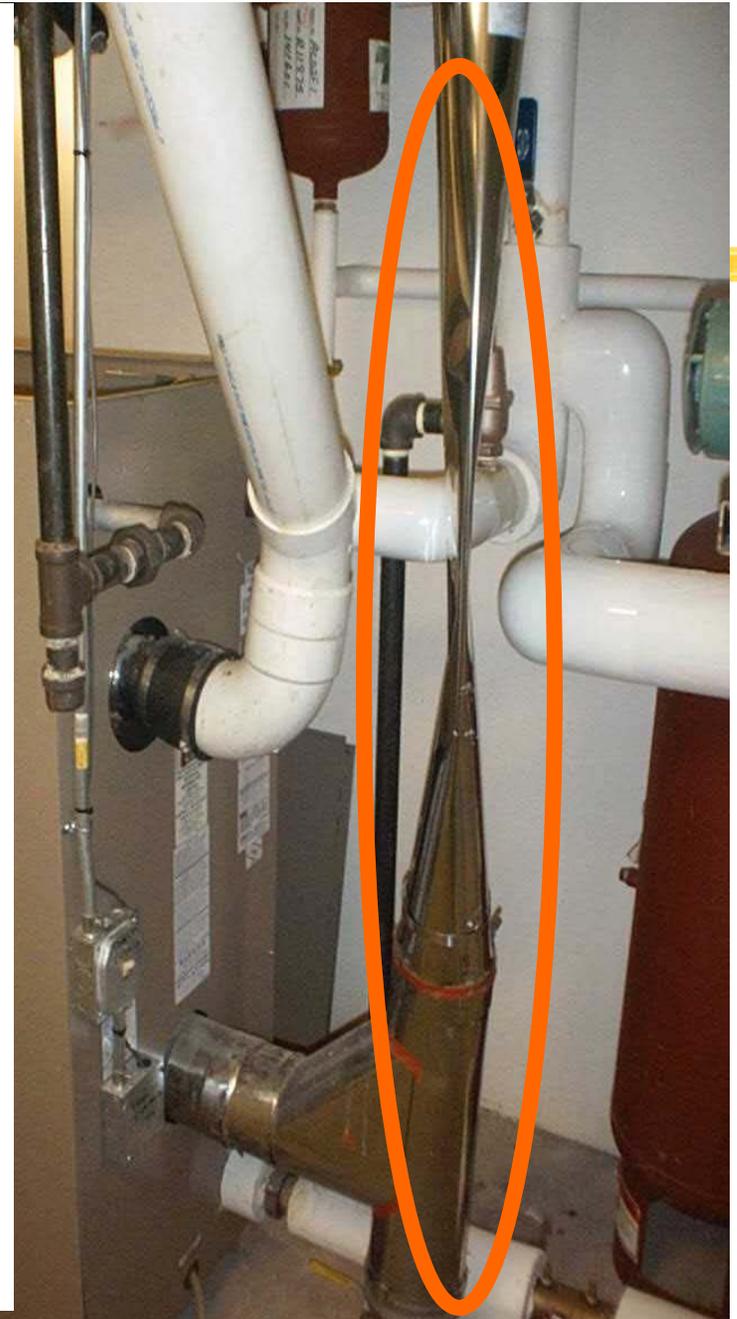
- Allowed by code. See IFGC 503.5.7.4 & 503.10.4
- Oil & gas **OK**
- Gas utilization equipment shall not be connected to a chimney flue serving an appliance designed to burn solid fuel (wood, corn, pellets, etc.) --See IFGC 503.5.7.1 **NOT ALLOWED**

Boiler in hospital mechanical room with PVC intake; and collapsed "B" vent Note difference in "B" vent size!!!!

Manufacturer stated double walled vent "cavitated".

Boiler was AGA listed for 500,000 btu/hr output; power exhaust vent sized for 750,000 btu/hr.

Picture by Terrence Waldbillig, Boiler inspector 5/5/04



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"

Unvented/No Vent Room/Vent Free Heaters

COMM 65.0621



■ PROHIBITED

Water Heaters For Potable & Space Heating

IFGC 624 / IMC Ch. 12

- Shall be listed and labeled for such applications
- Installed per Manufacturer Instructions, WI Plumbing Code
- **WI Boiler Code:** This code does not require all water appliances used for space heating to be considered boilers and to comply with boiler standards



Infrared Radiant Heaters

IFGC 630 / COMM 65.0630



- Spaces served must have ≥ 4 cfm outside air per 1,000 Btu/hr input of installed heaters
- Unvented units may be used in Groups F & S
- Unvented units may be used with Groups U & H ONLY WITH WRITTEN APPROVAL BY THE WI DEPT. OF COMMERCE

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
 - 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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