State of Connecticut
Department of Administrative Services
Division of Construction Services
Office of Education and Data Management

Office of Education and Data Management
Spring 2017 Career Development Series

Significant Changes to the International Mechanical Code

Presented by
John Tye
Office of the State Building Inspector, DAS

"2012" International Mechanical Code Update

The following presentation contains "significant" code changes which took place in the International Mechanical Code from 2003 through 2012.

Office of Education and Data Management
2

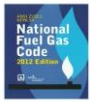
IMC update 2012

- ***Many code changes have taken place in the IMC since 2003. This seminar will only be able to identify a small number of these changes.***
- ***Confusion still exists between proper code use such as the IRC versus the IMC for fuel gas installations.***
- ***The IMC does not address gas or gas related equipment.***

Office of Education and Data Management
3

IMC update

(continued)



- ***The IRC uses both its Chapter 24(based on the IFGC) and the 2012 NFPA 54 document for gas piping and equipment installations. The Ct. supplement to the IRC includes the NFPA 54 document. Section 101.4.1 (Add)***
- ***As I stated in the previous slide the IMC references the International Fuel Gas Code (IFGC) (member of the ICC family of codes). The State of Connecticut did not adopt the IFCG and instead references the NFPA 54 document, currently the 2012 edition for gas piping and equipment installations.***

Office of Education and Data Management

4

IMC update (continued)

- ***Any reference to the IFGC in either the IMC or IRC shall be considered a reference to NFPA 54, NFPA 2, and NFPA 58.***
- ***Connecticut has currently adopted the 2011 edition of NFPA 58 for propane installations and the 2011 edition of NFPA 2, Hydrogen Technologies Code. Changed through the Ct. Supplement IMC Section (Add) 101.2.2. The IRC (Add) Section 101.4.1.***

Office of Education and Data Management

5

IMC update (continued)

- ***In addition to the Chapter 13 of the IMC the installation, construction and repair of fuel-oil storage and piping systems must also comply with the 2011 edition of the NFPA 31 document.***

Office of Education and Data Management

6

IMC update (continued)

- ***The addition of the NFPA 31 document was also changed through the Ct. Supplement IMC Section (Add) 101.2.3.***

Office of Education and Data Management

7

Content of the IMC Code

- ***Heating***
- ***Ventilation***
- ***Air conditioning***
- ***Refrigeration***
- ***Equipment Accessories***

Office of Education and Data Management

8

Chapter 1
Administration

The provisions of Chapter 1 address the scope, application, enforcement, and administration of subsequent requirements of the code.

Office of Education and Data Management

9

Chapter 1

(continued)

Numerous Sections of the Chapter have been modified by Connecticut.

- ***101.1 Title (Amd)***
- ***101.2 Scope (Amd)***
- ***101.2.1 Appendices (Amd)***
- ***101.2.2 Fuel Gas (Add)***
- ***101.2.3 Oil Burning Equipment, Piping and Storage (Add)***

Office of Education and Data Management

10

Chapter 1

(continued)

- ***101.2.3.1 Local Regulations (Add)***
- ***101.2.4 Electrical (Add)***
- ***101.2.5 Fire Prevention (Add)***
- ***102.6 Historic Buildings. (Amd)***

Office of Education and Data Management

11

Chapter 1

(continued)

- ***Section 103 Department Of Mechanical Inspection***
  - ***Has been "deleted."***
- ***The Section has been "replaced" with***
  - ***Section 103***
    - ***Enforcement Agency***

Office of Education and Data Management

12

Chapter 1

(continued)

- *103.1 Creation of enforcement agency (Add)*
- *103.2 Appointment (Add)*
- *103.3 Employees (Add)*
- *103.4 Restriction of employees (Add)*

Office of Education and Data Management

13

Chapter 1

(continued)

- *104.1 General (Amd)*
- *104.1.1 Rule making authority (Add)*
- *104.4 Right of entry (Amd)*

Office of Education and Data Management

14

Chapter 1

(continued)

- *105.1 Modifications (Amd)*
- *Only by the State Building Inspector*
- *105.1.1 Records (Add)*
  - *Modification request to be in writing*
  - *To become part of building permit permanent records*
- *105.1.2 Accessibility Exemptions*
  - *(Add)*

Office of Education and Data Management

15

Chapter 1

(continued)

- 106.1.1 By whom application is made (Add)
- 106.2.1 State agency exemptions (Add)
- 106.4 Permit issuance (Amd)
- 106.4.6 Retention of construction documents
- 106.5.1 Work commencing before permit issuance (Del)

Office of Education and Data Management 16

Chapter 1

(continued)

- 106.5.2 Fee schedule (Amd)
- 106.5.3 Fee refunds (Amd)
- 107.2.6 Posting of required inspections (Add)
- 107.7 Notification of inspection and testing results (Add)
- 108.4 Violation penalties (Amd)
- 108.5 Stop work orders (Amd)

Office of Education and Data Management 17

Chapter 1

(continued)

Section 109 "Means of appeal" has been "deleted" in its entirety.

The Section has been "replaced" with

- 109.1 Means Of Appeal
- Means of appeal shall be in accordance with Section 113 of the IBC portion of the State Building Code.

Office of Education and Data Management 18

Chapter 2 Definitions

The chapter provides an alphabetical listing for terms commonly used throughout the International Mechanical Code.

Office of Education and Data Management

19

Chapter 2

(continued)

Ct. Supplement changes to Chapter 2.

- ***201.3 Terms defined in other codes. (Amd)***
- ***202.1 Definitions (Add) Add or amend the following definitions:***
- ***Building Official (Add)***
- ***Registered Design Professional (Amd)***

Office of Education and Data Management

20

Chapter 2 New Words

- **Air Dispersion System.** Any diffuser system designed to both convey air within a room, space or area and diffuse air into that space while operating under negative pressure. Systems are commonly constructed of, but no limited to, fabric or plastic film. **Associated with Chapter 6.**
- **Breathing Zone.** The region within an occupied space between planes 3 and 72 inches (76 and 1829 mm) above the floor and more than 2 feet (610 mm) from the walls of the space or from fixed air-conditioning equipment. **Associated with Chapter4.**
- **Ceiling Radiation Damper.** A listed device installed in a ceiling membrane of a fire-resistance-rated floor/ceiling or roof/ceiling assembly to limit automatically the radiative heat transfer through an air inlet/outlet opening. **Associated with Chapter 6.**

Office of Education and Data Management

21

Chapter 2 (continued)

- **Combination Fire/Smoke Damper.** A listed device installed in ducts and air transfer openings designed to close automatically upon the detection of heat and resist the passage of flame and smoke. The device is installed to operate automatically, be controlled by a smoke detection system, and where required, is capable of being positioned from a fire command center. **Associated with Chapter 6.**
- **Environmental Air.** Air that is conveyed to or 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. **Associated with Chapter 5, Section 501.3.1, #3.**

Office of Education and Data Management 22

Chapter 2

(continued)

- **Fire Damper.** A listed device installed in ducts and air transfer openings designed to close automatically upon detection of heat and to restrict the passage of flame. Fire dampers are classified for use in either static systems that will automatically shut down in the event of a fire, or in dynamic systems that continue to operate during a fire. A dynamic fire damper is tested and rated for closure under elevated temperature airflow. **Associated with Chapter 6.**
- **Interlock.** A device actuated by another device with which it is directly associated, to govern succeeding operations of the same or allied devices. A circuit in which a given action cannot occur until after one or more other actions have taken place. **Associated with Chapter 5.**

Office of Education and Data Management 23

Chapter 2 (continued)

- **Mechanical Joint.**

1. A connection between pipes, fittings or pipes and fittings that is not welded, brazed, caulked, soldered or solvent cemented.
2. A general form of gas or liquid-tight connections obtained by the joining of parts through a positive holding mechanical construction such as but not limited to, flange, screwed, clamped or flared connections. **Associated with Chapters 11 and 12.**

- **Net Occupiable Floor Area.** The floor area of an occupiable space defined by the inside surfaces of its walls but excluding shafts, column enclosures and other permanently enclosed, inaccessible and unoccupiable areas. Obstructions in the space such as furnishings, display or storage racks and other obstructions, whether temporary or permanent, shall not be deducted from the space area. **Associated with Chapter 4, Table 403.3.**

Office of Education and Data Management 24

Chapter 2 (continued)

- **Occupiable Space.** An enclosed space intended for human activities, excluding those spaces intended primarily for other purposes, such as storage rooms and equipment rooms, that are only intended to be occupied occasionally and for short periods of time. **Associated with Chapter 4.**
- **Press Joint.** A permanent mechanical joint incorporating an elastomeric seal or an elastomeric seal and corrosion resistant grip ring. The joint is made with a pressing tool and jaw or ring approved by the fitting manufacturer. **Associated with Chapter 12.**
- **Push-Fit Joints.** A type of mechanical joint consisting of elastomeric seals and corrosion-resistant tube grippers. Such joints are permanent or removable depending on the design. **Associated with Chapter 12.**

Office of Education and Data Management

25

Chapter 2 (continued)

- **Sleeping Unit .** A room or space in which people sleep, which can also include permanent provisions for living, eating, and either sanitation or kitchen facilities but not both. Such rooms and spaces that are also part of a dwelling unit are not sleeping units.
- **Associated with Chapter 6.**
- **Smoke Damper.** A listed device installed in ducts and air transfer openings designed to resist the passage of smoke. The smoke detection system, and where required, is capable of being positioned from a fire command center. **Associated with Chapter 6.**
- **Third-Party Certification Agency.** An approved agency operating a product or material certification system that incorporates initial product testing, assessment and surveillance of a manufacturer's quality control system. **Associated with Chapter 3.**

Office of Education and Data Management

26

Chapter 2 (continued)

- **Third-Party Certified.** Certification obtained by the manufacturer indicating that the function and performance characteristics of a product or material have been determined by testing and ongoing surveillance by an approved third-party certification agency. Assertion of certification is in the form of identification in accordance with the requirements of the third-party certification agency. **Associated with Chapter 3.**
- **Third-Party Tested.** Procedure by which an approved testing laboratory provides documentation that a product, material or system conforms to specified requirements. **Associated with Chapter 3.**

Office of Education and Data Management

27

Chapter 2

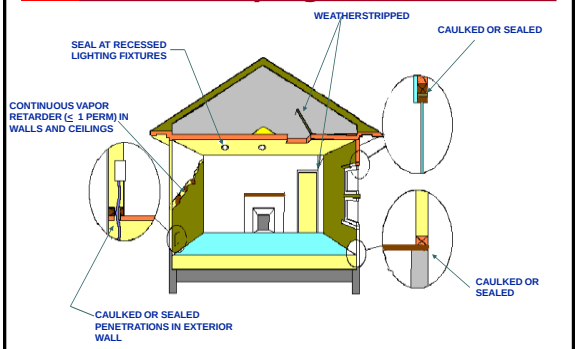
(continued)

- **Zone.** One occupiable space or several occupiable spaces with similar occupancy classification (see Table 403.3), occupant density, zone air distribution effectiveness and zone primary airflow rate per unit area. Associated with Chapter 4.

Office of Education and Data Management

28

Removed from Chapter 2
OLD – "Unusually Tight Construction"



Chapter 3
General Regulations

Chapter 3 includes general requirements for listed equipment, appliance location, protection for personnel servicing mechanical equipment, access requirements for appliances in various locations, and condensate disposal.

Office of Education and Data Management

30

Chapter 3
(continued)

- Ct. Supplement changes to Chapter 3
- 301.1 Scope (Amd)
- 301.6 Gas (Amd)

Office of Education and Data Management
31

Section 301.3 Identification. NEW

- Each length of pipe and tubing and each pipe fitting shall bear the identification of the manufacturer.

Office of Education and Data Management
32

Section 301.4 NEW
Plastic pipe, fittings and components.

- Plastic pipe, fittings and components shall be third-party certified as conforming to NSF 14.

Office of Education and Data Management
33

Section 301.5 NEW

Third-party testing and certification.

- Piping, tubing and fittings shall comply with the applicable referenced standards, specifications and performance criteria of this code and shall be identified in accordance with Section 301.3. Piping, tubing and fittings shall either be tested by an approved third-party testing agency be tested by an approved third party testing agency or certified by an approved third party certification agency.

Office of Education and Data Management 34

Section 303.5

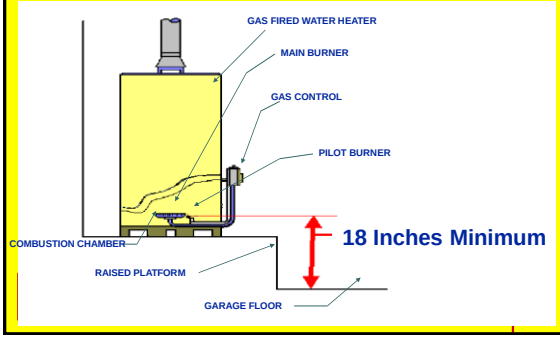
Indoor locations

The section "added" "fuel-fired" water heaters to the list of appliances located in closets and alcoves that must be listed for that application. Previously only furnaces and boilers were identified.

Office of Education and Data Management 35

Section 304.3

Elevation of Ignition Source



Section 304.3

Elevation of ignition source

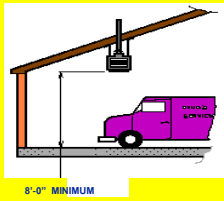
New exception added:

Elevation of the ignition source is "not required" for appliances that are listed as "flammable vapor ignition resistant."

Office of Education and Data Management

37

Public Garages
Section 304.6



- ***Where frequented by motor vehicles***
  - ***Units to be installed 8 feet above the floor***
  - ***"Revised section"***
  - ***Not Less than 1 Foot higher than tallest vehicle garage door opening.***

Office of Education and Data Management

38

Section 304.10
Clearances from grade.

A minimum height of 3 inches above the adjoining grade was "added" for supporting slabs for appliances installed at grade.

Office of Education and Data Management

39

Section 304.11 Guards

Previously this Section was 304.10 in the 2003 IMC.

- *Shall be provided if equipment is within 10 feet of a roof edge*
  - Guard to extend 30 inches beyond each end
  - Guard not to be less than 42 inches above elevated surface

Office of Education and Data Management

40

Section 304.11 Guards

The 2012 IMC references the IFGC which is not adopted by Connecticut. Currently the 2012 NFPA 54 National Fuel Gas Code applies to gas equipment. The 2012 NFPA 54 Code requires "guards" when the "gas" equipment is located within "6 feet" of the roof edge. This "6 foot" requirement would only apply to gas equipment. NFPA 54 Section 9.4.2.2.

Office of Education and Data Management

41

Section 306.1 Access for maintenance and replacement.

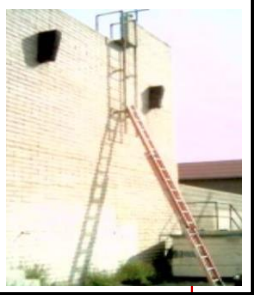
This section was "revised" to clarify that appliances must be accessible for inspection, repair or replacement without having to remove permanent construction or other appliances and their associated ducts, piping or venting systems. A requirement for a level 30 x 30 space on the control side of the appliance for inspection or service was also "added".

Office of Education and Data Management

42

Section 306.5

Equipment and appliances on roofs or elevated structures.



Section 306.5 (continued)

This "change" clarifies that the 16 foot height above grade must include the height of any surrounding parapet walls that must be climbed. Item 6 of the permanent ladder criteria was revised to add dimensions to the required landing and to require a guard on the open sides of the landing. NFPA 54 Section 9.4.3.2 requires an inside means of access to the roof when greater than 15 feet.

Office of Education and Data Management

44

Section 306.5 (continued)

- **Item 7 was reworded and Items 8 and 10 were added.**
- **Item 7 Climbing clearance. The distance from the centerline of the rungs to the nearest permanent object on the climbing side of the ladder shall be a minimum of 30 inches measured perpendicular to the rungs. This distance shall be maintained from the point of ladder access to the bottom of the roof hatch. A minimum clear width of 15 inches shall be provided on both sides of the ladder measured from the midpoint of and parallel with the rungs except where cages or wells are installed.**

Office of Education and Data Management

45

Section 306.5 *(continued)*

- **Item 8** Landing required. The ladder shall be provided with a clear and unobstructed bottom landing area having a minimum dimension of 30 inches by 30 inches centered in front of the ladder.
- **Item 10** Access to ladders shall be provided at all times.

Office of Education and Data Management

46

Section 306.5.1
Sloped roofs.

This section was "revised" to protect service personnel by requiring that the path from the roof access point to the equipment or appliance cannot require walking on roofs having a slope greater than 4:12 or climbing over obstacles greater than 30 inches high. ***Such obstacles must have a permanent ladder or stairs.***

Office of Education and Data Management

47

Section 307.2.1
Condensate disposal.

This section has been"revised" to require horizontal portions of a condensate disposal system must maintain a slope of 1/8 inch per foot.

48

Section 307.2.2
Drain pipe materials and sizes.

A "new" Table 307.2.2 was added to size drain pipes from more than one unit that are manifolded together and a new reference is added to the International Plumbing Code (IPC) for piping joints and connections.

Office of Education and Data Management
49

Section 307.2.3
Auxiliary and secondary drain systems.

The section was revised to "delete" the requirement for a pan because some of the methods allowed rely on other protection methods such as water-level detection devices that shut off the equipment before overflow can occur. *Don't forget if a condensate pump is used it must also have some type of device to shut the unit in the event of a pump failure.*

Office of Education and Data Management
50

Section 307.2.3.1
Water-level monitoring devices.

The section was "revised" to clarify that coils with no secondary drain or means to install an auxiliary drain pan must have a water-level monitoring device to shut off the equipment when the primary drain is clogged.

Office of Education and Data Management

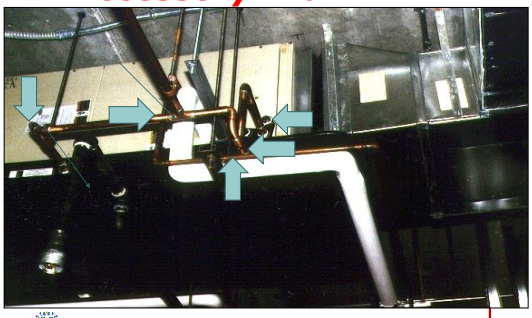
Section 307.2.3.2 New
Appliances, equipment and insulation in pans.

A new section was "added" to require portions of appliances that must be supported within the drain pan must be corrosion resistant and require insulation or components that could be damaged by water be located above the flood rim of the pan.

Office of Education and Data Management

52

Accessory Drain



Office of Education and Data Management

53

Section 312.1
Load calculations

The section "replaces" ASHRAE Handbook of Fundamentals with ASHRAE/ACCA Standard 183 for calculating heating and cooling loads.

Office of Education and Data Management

54

Chapter 4
Ventilation

Chapter 4 includes means for protecting building occupant health by controlling the quality of indoor air and protecting property from the effects of inadequate ventilation. In some cases, ventilation is required to prevent or reduce a health hazard by removing contaminants at their source.

Office of Education and Data Management

55

Section 401.4
Intake opening locations.

The section was reorganized in the *2009 IMC* which placed ventilation intake opening locations in one section and moved exhaust opening requirements to *Chapter 5* with other exhaust requirements.

Office of Education and Data Management

56

Section 401.5
Intake opening protection.

In the 2012 IMC *added* louvers that protect air intake openings in structures located in hurricane-prone regions, as defined in the International Building Code, shall comply with AMCA 550.

Office of Education and Data Management

57

Sections 403.1 thru 403.7 Mechanical ventilation.

Existing sections were replaced with new sections that more closely reflect the outdoor air ventilation requirements of ASHRAE 62-2004.The changes are intended to improve indoor air quality and, in many cases, reduces the quantity of outdoor air required when compared to the 2006 IMC. Equations are provided for calculating values for new terms such as Breathing zone outdoor air flow, Zone air distribution effectiveness, Zone outdoor airflow and System ventilation efficiency.


Office of Education and Data Management

58

Table 403.3 Minimum ventilation rates.

Table 403.3 was "totally revised" with the ventilation rates found in ASHRAE 62-2004.

The existing columns in this table were replaced with the following new headings:


Office of Education and Data Management

59

Continued from the previous slide related to Table 403.3

-People Outdoor Airflow Rate in Breathing Zone

-Area Outdoor Airflow Rate in Breathing Zone

-Default Occupant Density

-Exhaust Airflow Rate

All the ventilation rates in the table have been revised and new variables for use in the equations to determine the minimum outdoor air intake flow rate have been added.


Office of Education and Data Management

60

Section 404.1
Enclosed parking garages

The 2012 IMC has *changed* the section and *added* Items 1 and 2.

Mechanical ventilation systems for enclosed parking garages shall be permitted to operate intermittently in accordance with Item 1, Item 2 or both.

(Continued on the following slide.)

Office of Education and Data Management
61

Section 404.1 (continued)

Item 1

The system shall be arranged to operate automatically upon detection of vehicle operation or the presence of occupants by approved automatic detection devices.

Item 2

The system shall be arranged to operate automatically by means of carbon monoxide detectors applied in conjunction with nitrogen dioxide detectors. Such detectors shall be installed in accordance with their manufacturer's recommendations.

Office of Education and Data Management
62

Section 404.2
Minimum ventilation.

In 2009 the IMC significantly reduced the maximum airflow rate required for ventilation of enclosed parking garages from 1.5 cfm per sq. ft. to 0.75 cfm per sq. ft.

Office of Education and Data Management
63

Chapter 5
Exhaust Systems

The chapter includes mechanical exhaust systems such as:

- **Clothes dryers**
- **Kitchen exhaust**
- **Dust, Stock & Refuse exhaust**
- **Hazardous exhaust**

Office of Education and Data Management

64

Chapter 5

(continued)

- ***Ct. Supplement changes to Chapter 5***
- ***505.2 Makeup air required (Amd)***

Office of Education and Data Management

65

Section 501.2

Independent system required. NEW

Single or combined mechanical exhaust systems for environmental air shall be independent of all other exhaust systems. Dryer exhaust shall be independent of all other systems. Type 1 exhaust systems shall be independent of all other exhaust systems except as provided in Section 506.3.5. Single or combined Type II exhaust systems for food-processing operations shall be independent of all other exhaust systems.

Office of Education and Data Management

66

Section 501.2

(continued)

Kitchen exhaust systems shall be constructed in accordance with Section 505 for domestic equipment and Sections 506 through 509 for commercial equipment.

Office of Education and Data Management

67

Section 501.2.1
Location of exhaust openings.

The "added" exhaust opening locations were "deleted" from Section 401.4. This was done to locate intake and exhaust openings in the appropriate chapters.

Office of Education and Data Management

68

Section 502.10.2
Penetrations

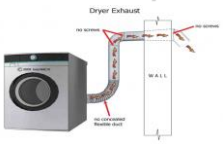
- ***Exhaust ducts penetrating fire barriers constructed in accordance with Section 707 of the IBC or horizontal assemblies constructed in accordance with Section 711 of the IBC shall be contained in a shaft of equivalent fire-resistance-rated construction. Exhaust ducts shall not penetrate fire walls. Fire dampers shall not be installed in exhaust ducts.***

Office of Education and Data Management

69

Clothes Dryer Exhaust

- Section 504.1 Installation
  - *Moisture and by-products are to be conveyed to the outdoors*
  - *Exception*
    - Condensing ductless clothes dryers
  - *Dryer exhaust systems shall be independent of all other systems*



Office of Education and Data Management

Section 504.2 Exhaust penetrations.

The section has been "revised" to require clothes dryer exhaust ducts that penetrate wall or ceiling membranes to have the annular space around the duct sealed with noncombustible materials, fire caulking or a noncombustible wall receptacle. The change is intended to prevent fire from spreading into wall or ceiling cavities.

Office of Education and Data Management 71

Domestic Dryer

- Section 504.6 Domestic Clothes Dryer Ducts
  - *Constructed of metal with smooth interior finish*
    - Diameter minimum of 4"
    - Male end to extend in direction of air flow
    - Transition ducts limited to single 8 foot length
      - *Not concealed*
- Section 504.6.4 Maximum Length
  - *Not to exceed 35 feet*
    - Dryer to outlet terminal
  - *Exception*
    - For MFG Installation instructions

Office of Education and Data Management 72

Section 504.6
Domestic clothes dryer ducts.

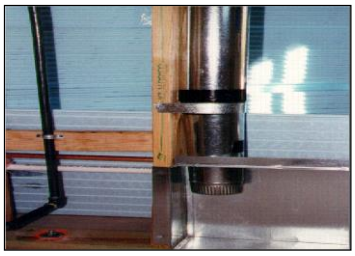
This section was reorganized into smaller "subsections" for clarity and ease of use. Significant changes are addressed in the following slides.

Office of Education and Data Management

73

Rough-In Required

Section 506.6.6



Office of Education and Data Management

74

Section 504.6
subsections continued

Section 504.6.3 NEW Transition ducts. The subsection "adds" that a transition duct must be listed and labeled in accordance with UL 2158A.

Office of Education and Data Management

75

Section 504.6 subsections continued

Section 504.6.4.1 and Table 504.6.4.1 NEW Specified length The subsection "increased" the maximum length of clothes dryer exhaust ducts from 25 to 35 feet. The section "added" a new table for duct fitting equivalent lengths that includes longer radius, smooth elbows with smaller equivalent lengths to be subtracted from the overall duct length.

"continued on next slide".

Office of Education and Data Management

76

Section 504.6.4.1

(continued)

The maximum length of the exhaust duct shall be determined by the dryer manufacturer's installation instructions. The code official shall be provided with a copy of the installation instructions for the make and model of the dryer. Where the exhaust duct is to be concealed, the installation instructions shall be provided to the code official prior to the concealment inspection. In the absence of fitting equivalent length calculations from the clothes dryer manufacturer, Table 504.6.4.1 shall be used.

Office of Education and Data Management

77

Section 504.6.5 NEW *Length identification.*

The section "adds" a requirement for posting the equivalent length of the exhaust duct when the duct is concealed within the building construction. A label or tag must be located within 6 feet of the duct connection to notify inspectors and future occupants.

Office of Education and Data Management

78

Section 504.6.7 NEW *Protection required.*

The section "adds" a requirement for protective shields to protect clothes dryer exhaust ducts from penetration by nails or screws.

Office of Education and Data Management
79

Section 504.8 NEW *Common exhaust systems for clothes dryers located in multistory structures.*

The section "adds" prescriptive requirements for exhausting clothes dryers through a common shaft in multistory buildings. All 12 new requirements must be met.

Office of Education and Data Management
80

Section 504.8 *(continued)*

- **1. The shaft in which the duct is installed shall be constructed and fire-resistance rated as required by the IBC.**
- **2. Dampers shall be prohibited in the exhaust duct. Penetrations of the shaft and ductwork shall be protected in accordance with Section 607.5.5, Exception 2.**
- **3. Rigid metal ductwork shall be installed within the shaft to convey the exhaust. The ductwork shall be constructed of sheet steel having a minimum thickness of 0.0187 inch (26 gage) and in accordance with SMACNA Duct Construction Standards.**

Office of Education and Data Management
81

Section 504.8 *(continued)*

- 4. The ductwork within the shaft shall be designed and installed without offsets.
- 5. The exhaust fan motor design shall be in accordance with Section 503.2.
- 6. The exhaust fan motor shall be located outside of the airstream.
- 7. The exhaust fan shall run continuously, and shall be connected to a standby power source.
- 8. Exhaust fan operation shall be monitored in an approved location and shall initiate an audible or visual signal when the fan is not in operation.

Office of Education and Data Management 82

Section 504.8 *(continued)*

- 9. Makeup air shall be provided for the exhaust system.
- 10. A cleanout opening shall be located at the base of the shaft to provide access to the duct to allow for cleaning and inspection.The finished opening shall not be less than 12 inches by 12 inches.
- 11. Screens shall not be installed at the termination.
- 12. The common multistory duct system shall serve only clothes dryers and shall be independent of other exhaust systems.

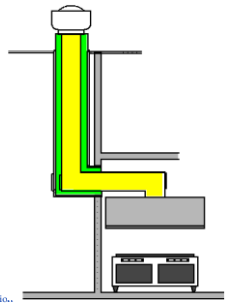
Office of Education and Data Management 83

Section 505.2 NEW
Makeup air required.

The section "adds" a requirement for makeup air to be provided for domestic kitchen exhaust hoods capable of exhausting more than 400 cfm. The makeup air system must be automatically controlled to start and stop simultaneously with the exhaust hood.

Office of Education and Data Management 84

Section 506
Commercial Kitchen Exhausts



Office of Educatio..
and Data Management

85

Section 506.3.1.1
Grease duct materials.

The exception was "revised" to reference UL 1978 for factory-built commercial kitchen grease ducts.

Office of Education
and Data Management

86

Section 506.3.2.3
Duct-to-exhaust fan connections.

The section "added" gasket and sealing materials shall be rated for continuous duty at a temperature of not less than 1500 degrees F. (816 degrees C.)

Office of Education
and Data Management

87

Section 506.3.2.5 NEW
Grease duct test

- Prior to the use or concealment of any portion of a grease duct system, a leakage test shall be performed. Ducts shall be considered to be concealed where installed in shafts or covered by coatings or wraps that prevent the ductwork from being visually inspected on all sides. The permit holder shall be responsible to provide the necessary equipment and perform the grease duct keakage test. (continued)

Office of Education and Data Management 88

Section 506.3.2.5

(continued)

- A light test shall be performed to determine that all welded and brazed joints are liquid tight.
- A light test shall be performed by passing a lamp having a power rating of not less than 100 watts through the entire section of ductwork to be tested. The lamp shall be open so as to emit light equally in all directions perpendicular to the duct walls.

Office of Education and Data Management (continued) 89

Section 506.3.2.5

(continued)

- A test shall be performed for the entire duct system, including the hood-to-duct connection. The ductwork shall be permitted to be tested in sections, provided that every joint is tested. For listed factory-built grease ducts, this test shall be limited to duct joints assembled in the field and shall exclude factory welds.

Office of Education and Data Management 90

Section 506.3.6
Grease duct clearances.

The section "adds" a reference to UL 1978 for factory-built commercial kitchen grease ducts and adds a new exception to allow reduced clearance to combustibles for commercial kitchen grease ducts that are covered with a field-applied grease duct enclosure system listed in accordance with ASTM E 2336.

Office of Education and Data Management

91

Section 506.3.7
Prevention of grease accumulation in grease ducts.

The section was "changed" to require the grease duct to slope toward the hood or toward a grease reservoir designed and installed in accordance with *NEW* Section 506.3.7.1.

Office of Education and Data Management

92

Section 506.3.7.1 NEW
Grease reservoirs.

The "new" section contains 7 requirements.

1. Be constructed as required for the grease duct they serve.
2. Be located on the bottom of the horizontal duct or bottommost section of duct riser.
3. Have a length and width of not less than 12 inches. Where the

(continued on the next slide)

Office of Education and Data Management

93

Section 506.3.7.1 (continued)

grease duct is less than 12 inches in dimension, the reservoir shall be not more than 2 inches smaller than the duct in that dimension.

4.Have a depth of not less than 1 inch.

5.Have a bottom that is sloped to a point for drainage.

6.Be provided with a cleanout opening constructed in accordance with Section

(continued on the next slide)

Office of Education and Data Management

94

Section 506.3.7.1 (continued)

506.3.8 and installed to provide direct access to the reservoir. The cleanout opening shall be located on a side or on top of the duct so as to permit cleaning of the reservoir.

7.Be installed in accordance with the manufacturer's instructions where manufactured devices are utilized.

Office of Education and Data Management

95

Section 506.3.8

Grease duct cleanouts and openings.

- **The Section has been changed and now contains 7 requirements which must all be met.**
- **1. Grease ducts shall not have openings except where required for the operation and maintenance of the system.**
- **2. Sections of grease ducts that are inaccessible from the hood or discharge openings shall be provided with cleanout openings.**
- **3. Cleanouts and openings shall be equipped with tight-fitting doors (continued)**

Office of Education and Data Management

96

Section 506.3.8

(continued)

- Constructed of steel having a thickness not less than that required for the duct.
- 4. Cleanout doors shall be installed liquid tight.
- 5. Door assemblies including any frames and gaskets shall be approved for the application and shall not have fasteners that penetrate the duct.
- 6. Gasket and sealing materials shall be rated for not less than 1500F (816C).
- 7. Listed door assemblies shall be installed in accordance with the manufacturer's instructions.

Office of Education and Data Management 97

Section 506.3.8.2

Cleanouts serving in-line fans.

The section "adds" a requirement for a cleanout to be located within 3 feet of the inlet and outlet of an in-line fan.

Office of Education and Data Management 98

Section 506.3.9

Grease duct horizontal cleanouts.

- ***The section was changed and now contains 6 specific requirements.***
- 1. Be spaced not more than 20 feet apart.
- 2. Be located not more than 10 feet from changes in direction that are greater than 45 degrees.
- 3. Be located on the bottom only

(continued)

Office of Education and Data Management 99

Section 506.3.9 (continued)

- Where other locations are not available and shall be provided with internal damming of the opening such that grease will flow past the opening without pooling. Bottom cleanouts and openings shall be approved for the application and installed liquid-tight.
- 4. Not be closer than 1 inch from edges of the duct. The current code requires 1.5 inches.
- 5. Have opening dimensions of not less than 12" by 12". (continued)

Office of Education and Data Management 100

Section 506.3.9
(continued)

- Where such dimensions preclude installation, the opening shall not be less than 12 inches on one side and shall be large enough to provide access for cleaning and maintenance.
- 6. Shall be located at grease reservoirs.

Office of Education and Data Management 101

Section 506.3.10 NEW
Underground grease duct installation

- The section contains 8 requirements
- 1. Underground grease ducts shall be constructed of steel having a minimum thickness of 0.0575 inch (no. 16 gage) and shall be coated to provide protection from corrosion or shall be constructed of stainless steel having a minimum thickness of 0.0450 inch (18 gage). (continued)

Office of Education and Data Management 102

Section 506.3.10

(continued)

- 2. The underground duct system shall be tested and approved in accordance with section 506.3.2.5 prior to coating or placement in the ground.
- 3. The underground duct system shall be completely encased in concrete with a minimum thickness of 4 inches.
- 4. Ducts shall slope toward grease reservoirs.
- 5. A grease reservoir with a cleanout to allow cleaning (continued)

Office of Education and Data Management

103

Section 506.3.10

(continued)

Of the reservoir shall be provided at the base of each vertical riser.

- 6. Cleanouts shall be provided with access to permit cleaning and inspection of the duct in accordance with Section 506.3.
- 7. Cleanouts in horizontal ducts shall be installed on the topside of the duct.
- 8. Cleanout locations shall be legibly identified at the point of access from the interior space.

Office of Education and Data Management

104

Section 506.3.11
Grease duct enclosures.

This section, formerly Section 506.3.10, was reorganized to delete the three exceptions and add new subsections which provide requirements for grease ducts in shafts, field-applied enclosure systems installed in accordance with ASTM E 2336, factory-built assemblies installed in accordance with UL 2221 and guidance for when a duct enclosure is not required.

Office of Education and Data Management

105

Section 506.3.11

(continued)

- Section 506.3.11.1 Shaft enclosure.
- Section 506.3.11.2 Field-applied grease duct enclosure. Partial application of a field-applied grease duct enclosure system shall not be installed for the sole purpose of reducing clearances to combustibles at isolated sections of grease duct.
- Section 506.3.11.3 Factory-built grease duct assemblies.
- Section 506.3.11.4 Duct enclosure not required.

Office of Education and Data Management

106

Section 506.4.2 NEW

Type II terminations.

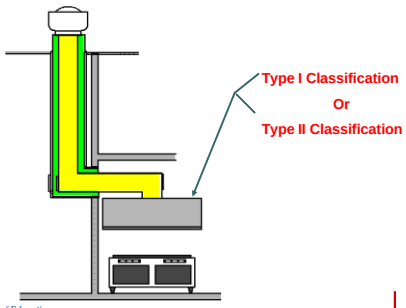
The section adds location requirements for Type II kitchen exhaust terminations.

Office of Education and Data Management

107

Section 507

Commercial Kitchen Hoods



Office of Education and Data Management

108

Section 507.1 General

Exception 2 was revised to require ventilation of kitchen areas in accordance with Table 403.3 where recirculating cooking exhaust hoods are installed.

Office of Education and Data Management

109

Section 507.1 General

Exception 3 was revised to insure that the reduced volume of kitchen hood exhaust during part-load cooking conditions will effectively capture grease and smoke generated by cooking appliances operating in standby mode.

Office of Education and Data Management

110

Section 507.2.2 Type II hoods.

The section was "revised" to "delete" the four exceptions that contained lists of appliances that did not require a Type II hood. Type II hoods are required above dishwashers and light-duty appliances that produce heat or moisture and do not produce grease or smoke, except where heat and moisture loads are incorporated into the HVAC system.

Office of Education and Data Management

111

Section 507.2.2 (continued)

The section now requires ventilation of the kitchen area in accordance with Table 403.3, based on an area of 100 square feet per appliance that is not under a Type II hood.

Section 508.1

Makeup air.

The section was revised to "delete" the requirement to interlock the makeup air with the exhaust hood. The "new" requirement is to automatically control the makeup air system to start and stop simultaneously with the exhaust system.

Hazardous Exhaust

- **Section 510.2 Where Required**
  - ***Whenever lack of may create***
    - **Flammable concentrations exceeding 25% of LFL**
    - **Health hazard rating of 4 or higher**
    - **Presence of vapor, fume or gas**
      - ***With health hazard rating of 1, 2, or 3***
      - ***Present in concentration greater than 1%***
- **Section 510.3 Design & Operation**
  - ***Dilution in noncontaminated air***
    - **Lowering concentration below 25% of LFL**

Section 510.1 General

- The following language was added to the section for clarity.
  - *For the purposes of the provisions of Section 510, a laboratory shall be defined as a facility where the use of chemicals is related to testing, analysis, teaching, research or developmental activities where chemicals are used or synthesized on a non-production basis, rather than in a manufacturing process.*

Office of Education and Data Management

115

Section 510.4 Independent system.

- *The following exception was added.*
- *The provision of this section shall not apply to laboratory exhaust systems where all of the following conditions apply:*
- 1. All of the hazardous exhaust ductwork and other laboratory exhaust within both the occupied space and the shafts are under negative pressure while in operation.
- (continued)

Office of Education and Data Management

116

Section 510.4

(continued)

- 2. The hazardous exhaust ductwork manifolded together within the occupied space must originate within the same fire area.
- 3. Each control branch has a flow regulating device.
- 4. Perchloric acid hoods and connected exhaust shall be prohibited from manifolding.
- 5. Radioisotope hoods are equipped with filtration and/or carbon beds where required by the registered design professional.
- 6. Biological safety cabinets are filtered.
- 7. Provision is made for continuous maintenance of negative static pressure in the ductwork.

Office of Education and Data Management

117

Section 510.7
Suppression required.

- ***Exceptions have been added to the section.***
- **2. Automatic fire suppression systems shall not be required in metallic and noncombustible, nonmetallic exhaust ducts in semiconductor fabrication facilities.**
- **4. For laboratories, as defined in Section 510.1, automatic fire protection systems shall not be required in laboratory hoods or exhaust systems.**

Office of Education and Data Management 118

Section 510.6.1
Fire dampers and smoke dampers. NEW

- **Fire dampers and smoke dampers are prohibited in hazardous exhaust ducts.**

Office of Education and Data Management 119

Section 510.6.1
Fire dampers and smoke dampers.

The section was "revised" to "prohibit" smoke dampers as well as fire dampers in hazardous exhaust ducts.

Office of Education and Data Management 120

Section 511.1.3
Conveying systems exhaust discharge. Changed

- An exhaust system shall discharge to the outside of the building either directly by flue or indirectly through the bin or vault into which the system discharges except where the contaminates have been removed. Exhaust system discharge shall be permitted to be recirculated provided that the solid particulate has been removed at a minimum efficiency of 99.9 percent at 10 microns, vapor concentrations are less than 25 percent of the LFL, and approved equipment is used to monitor the vapor concentration.

Office of Education and Data Management
121

Chapter 6
Duct Systems

The chapter regulates the materials and methods used for the construction and installation of air moving systems such as:

- *Ducts*
- *Systems controls*
- *Exhausts*
- *Fire protection systems*
- *Related components that affect the overall performance of a building's air distribution system.*

Office of Education and Data Management
122

Chapter 6
(continued)

- *Ct. Supplement changes to Chapter 6*
- *Section 606.2 Where required. (Amd)*
- *Section 606.2.1 Supply air systems. (Amd)*
- *Section 606.2.2 Common supply and return air systems. (Amd)*
- *606.2.3 Return air risers. (Amd)*

Office of Education and Data Management
123

Section 601.2
Air movement in corridors.

The section "adds" a fourth exception that allows incidental air movement from pressurized rooms into the corridor in healthcare facilities provided that the corridor is not the primary source of supply or return air to the room. This recognizes that certain rooms in hospitals must be pressurized for sanitation reasons and the transfer air to the corridor is not prohibited.

Office of Education and Data Management

124

Section 603.4.1
Minimum fasteners.

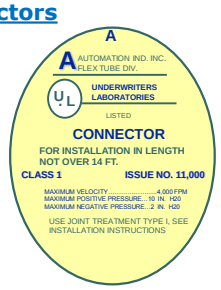
The section "adds" a "new" requirement for a minimum of three fasteners to be spaced equally around duct joints. Where part of the duct is not accessible, such as between joists, the exception allows the fasteners to be equally spaced on the exposed portion of the duct. This requirement is intended to prevent a hinge effect at the joint.

Office of Education and Data Management

125

Section: 603.6
Flexible Air Ducts & Flexible Air Connectors

Flexible Air Duct Label Representation



Flexible Air Connector Label Representation

Office of Education and Data Management

Labels

126

Section 603.7
Rigid duct penetrations.

The section was "revised" to "add" requirements for ducts that penetrate walls or ceilings that separate private garages from residential living spaces. The duct must be constructed of 26 gage galvanized steel and can have no openings into the garage. Dampers are generally not required at the penetration unless required by Chapter 7 of the IBC.

Office of Education and Data Management
127

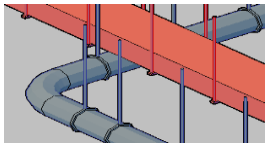
Section 603.9
Joints, seams and connections.

Liquid sealant was "added" as an approved duct sealant. An exception was added to preclude further sealing of ducts that have continuously welded and locking type longitudinal duct seams and joints that operate at static pressures less than 2 inches of water column.

Office of Education and Data Management
128

Section 603.10 Supports

- 603.10 Supports "Changed"
  - *Intervals not to exceed 12 feet . The former requirement was 10 feet.*
    - Shall be in accordance with SMACNA HVAC Duct Construction Standards-Metal and Flexible.
  - *Flexible & factory made duct*
    - Support per MFG installation instructions



Office of Education and Data Management
129

Section 603.17 NEW
Air Dispersion Systems

- Installed Exposed Location
- Systems under Positive Pressure
- Not pass through or penetration of Fire Resistant Rated Construction
- Listed and Labeled UL 2518

Office of Education and Data Management
130

Section 604.7
Identification

The section was "revised" to clarify that ducts insulated with spray polyurethane foam are not required to be marked with the R-value, flame spread index, smoke-developed index and manufacturer's name every 36 inches. Such information must be provided to the customer in writing.

Office of Education and Data Management
131

Section 606.4.1 Supervision.
"Clarification"

The duct smoke detectors shall be connected to a fire alarm system where a fire alarm system is required by Section 907.2 of the International Fire Code. The actuation of a duct smoke detector shall activate a visible and audible supervisory signal at a constantly attended location.

Exceptions:

1. The supervisory signal at a constantly attended location is not required where the duct smoke detector activates the building's alarm-indicating appliances.
2. In occupancies not required to be equipped with a fire alarm system, actuation of a smoke detector shall activate a visible and audible signal in an approved location. Duct smoke detector trouble conditions shall activate a visible or audible signal in an approved location and shall be identified as air duct detector trouble.

Office of Education and Data Management
132

Section 607.1.1.1 NEW
Ducts that penetrate nonfire-resistance-rated assemblies.

The section requires the annular space around a duct that penetrates a nonfire –resistance-rated assembly to be protected by noncombustible material in accordance with "Section 716.6.3 of the IBC.

Section 607.3
Damper testing, ratings and actuation.

The section is reorganized into subsections to place fire, smoke and combination fire/smoke damper testing, ratings and actuation methods together under those headings instead of having separate requirements under the headings of fire and smoke dampers.

Section 607.5.2
Fire barriers.

The section was "revised" to add UL 263 to Exception 2 as another method of testing duct penetrations in a fire-resistance-rated assembly. This standard is added throughout the code whenever testing in accordance with ASTM 119 is required.

Section 607.5.5
Shaft enclosures.

The section was "revised" to add UL 263 to Exception 1.2 as another method of testing duct penetrations in a fire-resistance-rated assembly. "Deleted" kitchen and clothes dryer exhausts from exception 2 and "added a new exception 5 for kitchen and clothes dryer exhausts because they should not be limited to just Group B and R occupancies.

Office of Education and Data Management 136

Section 607.5.5.1 NEW
Enclosure at the bottom.

The section directs the user to Section 707.11 of the IBC when a shaft does not extend to the bottom of the building. This insures that the bottom of the shaft is not left unprotected to allow fire or smoke to enter the shaft.

Office of Education and Data Management 137

Section 607.5.6 NEW
Exterior walls.

The section "adds" a requirement for fire dampers in ducts and air transfer openings that penetrate fire-resistance-rated exterior walls. This coordinates Section 607.5 with Section 704 of the IBC.

Office of Education and Data Management 138

Section 607.5.7
Smoke partitions.

The section "adds" a requirement for smoke dampers in air transfer openings in smoke partitions. This coordinates Section 607.5 with Section 710 of the IBC.

Office of Education and Data Management

139

Chapter 7 "Changed completely"
Combustion Air

Chapter 7

- ***References to NFPA 31-2011 and NFPA 54- 2012 provides provisions for***
  - **Complete combustion of fuel**
  - **Dilution of flue gases**
  - **Ventilation for promoting**
- ***NFPA 31-2011 for Oil Fired Appliances****
- ***NFPA 54-2012 for Gas Fired Appliances****

Office of Education and Data Management

140

Section 701.1
Scope

The prescriptive requirements for combustion air were *"deleted"* from the code. Section 701.1 now refers the user to *"NFPA 31"* for oil fired appliance combustion air requirements and the *manufacturer's installation instructions* for solid-fuel burning appliances.

Office of Education and Data Management

141

Section 701.1

"continued"

The requirements for combustion and dilution air for gas fired appliances shall be in accordance with the 2012 edition of "NFPA 54" Section 9.3.

Office of Education and Data Management

142

NFPA 31- 2011 Chapter 5

Air for Combustion and Ventilation

Section 5.2 Basic Requirements

- Appliances located not to interfere with supply of air within space
- Outside air shall be introduced where tight buildings' normal infiltration does not provide sufficient combustion air
- Ducts from outdoors same cross-sectional area as free area of openings to which they connect
- Smallest dimension of rectangular air ducts not less than 3 in.
- Residential requirements of 5.2.1permitted to be met by either Section 5.3 or 5.4

Office of Education and Data Management

143

NFPA 31- 2011 Chapter 5

Air for Combustion and Ventilation

Section 5.3 Appliances Located in Unconfined Spaces

- Section 5.3.1: In unconfined spaces in buildings of conventional frame, brick or stone construction
  - Air for combustion and ventilation shall be permitted to be supplied by normal infiltration
- Section 5.3.2: If Normal Infiltration is not sufficient because of TIGHT Construction
  - Air for combustion and ventilation shall be obtained directly from outdoors
  - Or from spaces that freely communicate with outdoors by means of permanent opening or openings having a total free are not less than 1 in^2 per 5000 Btu/hr based on input rating of all appliances in space

Office of Education and Data Management

144

NFPA 31- 2011 Chapter 5

Air for Combustion and Ventilation

Section 5.4 Appliances Located in Confined Spaces

- Section 5.4.1: All Air Taken from Inside the Building
  - The confined space shall be provided with 2 openings see figure 5.4.1.1, one near top of space and one near bottom
- Section 5.4.2: All Air Taken from Outdoors
  - The confined space shall be provided with 2 openings, one near top of space and one in or near bottom
  - The openings shall communicate directly or by means of ducts with the outdoors or to spaces such as attics or crawl space that freely communicate with outdoors
- Section 5.4.3: Air Taken from Inside the Building – Combustion Air Taken from Outdoors
  - The confined space shall be provided with 2 openings ...

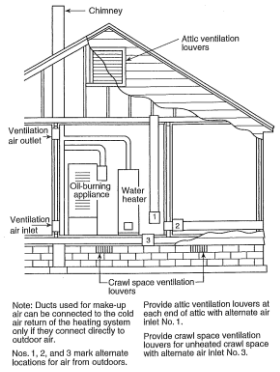
Office of Education and Data Management

145

NFPA 31- 2011 Section 5.4.3

Ventilation Air Taken from Inside the Building – Combustion Air Taken from Outdoors

Office of Education and Data Management



Note: Ducts used for make-up air can be connected to the cold air return of the heating system only if they connect directly to outdoor air.

Nos. 1, 2, and 3 mark alternate locations for air from outdoors.

Provide attic ventilation louvers at each end of attic with alternate air inlet No. 1.

Provide crawl space ventilation louvers for unheated crawl space with alternate air inlet No. 3.

FIGURE 5.4.3.1 Appliances Located in Confined Spaces, with Ventilation Air from Inside Building and Combustion Air from Outside, Ventilated Attic, or Ventilated Crawl Space.

146

2012 NFPA 54 - Section 9.3 Air for Combustion and Ventilation

- Prescribes different methods for supplying
  - Combustion,
  - Ventilation and
  - Dilution Air

Office of Education and Data Management

147

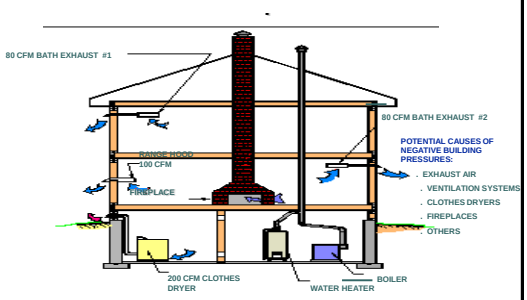
Prohibited Sources

- **Prohibited Sources**
  - **Combustion air shall not be taken from**
    - **Areas adversely affected by a fan**
    - **Hazardous locations**
    - **Refrigeration machinery rooms**
    - **Locations below**
      - ***Design flood elevation***

Office of Education and Data Management

148

Areas Affecting Combustion Air



Equipment & Appliances Affecting Combustion Air Supply

Office of Education and Data Management

149

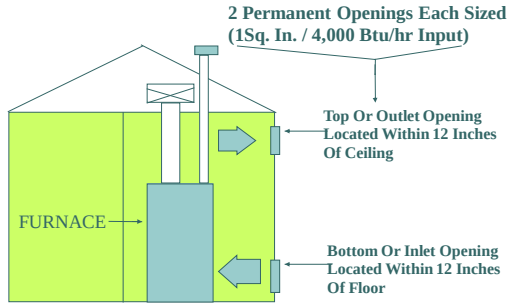
Combustion Air From Inside

- **All Air From Indoors**
  - **Air may be taken from indoors**
    - **If building is "not" of Unusually Tight Construction (less than 0.40 ACH)**
    - **Minimum required volume 50CF/1000Btu**
- **Air From Adjacent Spaces**
  - **Adjacent spaces may be used so**
    - **Combined volume of communicating spaces**
      - ***Meets the volumetric requirement***
      - ***Two openings required***
        - **Each opening at 1 sq in / 1000 btu/h**
        - **Minimum size of 100 sq in each opening**

Office of Education and Data Management

150

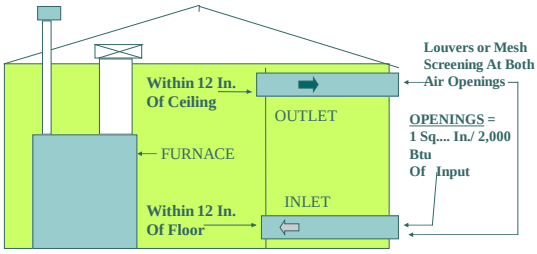
DIRECT OPENINGS (100% Outside Air)



Office of Education and Data Management

151

Combustion Air From Outdoors *Through Horizontal Ducts*



Office of Education and Data Management

152

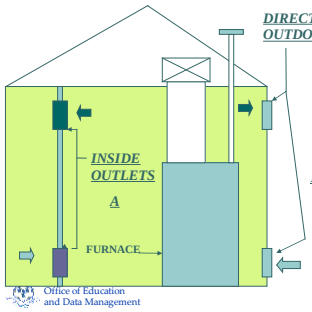
Combined Use of Inside and Outdoor Air

- *Applies only to buildings*
  - *Not meeting the definition of*
    - *Unusually Tight Construction.*

Office of Education and Data Management

153

Combined Inside & Outside Air illustration



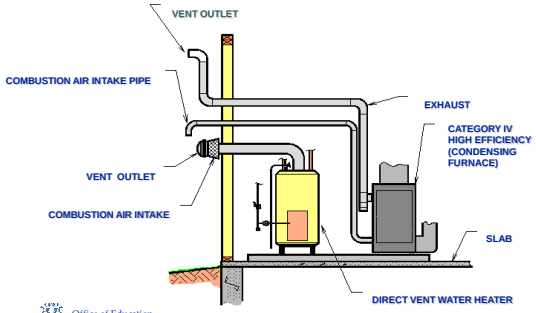
A = Within 12 Inches Of Ceiling And Floor
1 Sq. In / 1,000 Btu/hr. Input
2 Openings Required

B = Within 12 Inches Of Ceiling And Floor
1 Sq... In / 4,000 Btu/hr. Input

Office of Education and Data Management

154

Direct Combustion Air Connection to the Outdoors



Office of Education and Data Management

DIRECT COMBUSTION AIR CONNECTION TO THE OUTDOORS 155

Chapter 8 Chimneys & Vents

This chapter regulates

- **Design, construction, installation, maintenance, repair and approval of**
  - **Chimneys, chimney liners, vents and their associated connections to fuel-burning appliances.**

Office of Education and Data Management

156

Section 801.2
General

The section "adds" a "new" "exception" to clarify that commercial cooking appliances are not required to discharge through vents or chimneys where vented by a Type 1 hood installed in accordance with Section 507.

Office of Education and Data Management

157

Sections 801.18.4 and 801.18.4.1 Clearances.

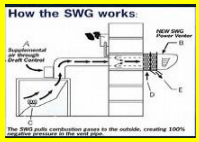
The section was "revised" to move the fireblocking requirement from the exception to Section 801.18.4 to a "new" Section 801.18.4.1 to separate the fireblocking requirement from the clearance requirements for clarity.

Office of Education and Data Management

158

Section 804.3
Mechanical Draft Systems.

Mechanical draft systems of either forced or induced draft design shall be listed and labeled in accordance with UL 378 and shall comply with Sections 804.3.1 through 804.3.7.



Office of Education and Data Management

159

Section 805.3
Factory-Built Chimney Offsets

Where a factory-built chimney assembly incorporates offsets, no part of the chimney shall be at an angle of more than 30 degrees from vertical at any point in the assembly and the chimney assembly shall not include more than 4 elbows.

Office of Education and Data Management

160

Chapter 9
Specific Appliances, Fireplaces & Solid Fuel-Burning Equipment

The chapter regulates the

- ***Design and construction of***
  - **Fireplaces, solid-fuel-burning appliances, barbecue appliances and all of the specifically named appliances.**

Office of Education and Data Management

161

Section 901.4
Fireplace accessories.

The section was "changed" to require listed and labeled fireplace accessories shall be installed in accordance with the conditions of the listing and the manufacturer's instructions. Fireplace accessories "shall" comply with *UL 907*.

Office of Education and Data Management

162

Section 903.2
Hearth Extensions

Office of Education and Data Management
163

Section 903.2
Hearth extensions.

The section has been *changed* to require hearth extensions of approved factory-built fireplaces shall be installed in accordance with the listing of the fireplace. The hearth extension shall be readily distinguishable from the surrounding floor area. Listed and labeled hearth extensions shall comply with *UL 1618*.

Office of Education and Data Management
164

Cooling Towers, Evaporative Condensers and Fluid Coolers

Section 908.1 General

The Section references factory-built cooling towers shall be listed in accordance with UL 1995.

Office of Education and Data Management
165

Chapter 9
Specific Appliances, Fireplaces and Solid Fuel-Burning Equipment

The following sections were *"revised"* to *add* the appropriate *"UL standards"* for various appliances and equipment. Section 908 Cooling Towers, Evaporative Condensers and Fluid Coolers, specifically 908.1. Section 911 Duct Furnaces, specifically 911.1. Section 912 Infrared Radiant Heaters, specifically 912.1. (additional equipment continued on the next slide.)

Office of Education and Data Management
166

Chapter 9

(continued from the previous slide)

Specific Appliances, Fireplaces and Solid Fuel-Burning Equipment

Section 913 Clothes Dryers, specifically 913.1. Section 914 Sauna Heaters, specifically 914.2. Section 915 Engine and Gas Turbine-Powered Equipment and Appliances, specifically 915.1. Section 917 Cooking Appliances, specifically 917.1

Office of Education and Data Management
167

Section 918.6
Prohibited sources.

The wording of the section was *"revised"* to include *"cooling systems". The section formerly referenced only forced air heating systems with no mention of cooling systems.* The section also includes *"revisions"* to the following items. *Item 5* was revised to clarify that *return air* cannot be taken from unconditioned attics; conditioned attics could be an acceptable source.

Exception 5.2 was "added."

Dedicated forced-air systems serving only a garage shall not be prohibited from obtaining return air from the garage.

Office of Education and Data Management
168

Section 918.6 (continued)

Item 6 **was added to** ***prohibit*** **taking outdoor return air from unconditioned crawl spaces by means of direct connection to the return side of a forced air system. Transfer openings in the crawl space enclosure shall not be prohibited.**

Office of Education and Data Management

169

Section 927 NEW *Radiant Heating Systems.*

The new section was added and includes requirements for the proper installation of radiant heating systems on wood or steel framing. The section also includes requirements for installation in concrete or masonry construction.

Office of Education and Data Management

170

Section 927 "continued"

Section 927.1 General

Electric radiant heating systems shall be installed in accordance with the manufacturer's instructions and shall be listed for the application.

Section 927.2 Clearances

Clearances for radiant heating panels or elements to any wiring, outlet boxes and junction boxes used for installing electrical devices or mounting luminaires shall be in accordance with the IBC and NFPA70.

Office of Education and Data Management

171

Section 927 (continued)

Section 927.3 Installation on wood or steel framing.

Radiant panels installed on wood or steel framing shall conform to the following requirements:

1. Heating panels shall be installed parallel to framing members or shall be mounted between framing members.
2. Mechanical fasteners shall penetrate only the unheated portions provided

Office of Education and Data Management (continued)

172

Section 927 (continued)

for this purpose. Panels shall not be fastened at any point closer than ¼" to an element. Other methods of attachment of the panels shall be in accordance with the panel installation instructions.

3. Unless listed and labeled for field cutting, heating panels shall be installed as complete units.

Section 927.4 Installation in concrete or masonry. (continued)

Office of Education and Data Management

173

Section 927.4 (continued)

Radiant heating systems installed in concrete or masonry shall conform to the following requirements:

1. Radiant heating systems shall be identified as being suitable for the installation, and shall be secured in place as specified in the manufacturer's instructions.
2. Radiant heating panels and radiant heating panel sets shall not be installed where they bridge expansion joints unless they are protected from expansion and contraction.

Office of Education and Data Management

174

Section 927 (continued)

Section 927.5 Finish surfaces

Finish materials installed over radiant heating panels and systems shall be installed in accordance with the manufacturer's instructions. Surfaces shall be secured so that fasteners do not pierce the radiant heating elements.

Office of Education and Data Management

175

Section 928 NEW

Evaporative Cooling Equipment.

Section 928.1 General. Evaporative cooling equipment shall:

1. Be installed in accordance with the manufacturer's installation instructions.
2. Be installed on level platforms in accordance with Section 304.10.
3. Have openings in exterior walls or roofs flashed in accordance with the IBC.

(continued on the next slide)

Office of Education and Data Management

176

Section 928.1

(continued)

4. Be provided with potable water backflow protection in accordance with Section 608 of the IPC.
5. Have air intake opening locations in accordance with Section 401.4 of the IMC.

Office of Education and Data Management

177

Chapter 10
Boilers, Water Heaters & Pressure Vessels

***Chapter 10** presents regulations for the proper installation of boilers, water heaters and pressure vessels to protect life and property from the hazards associated with those appliances and vessels.*

Office of Education and Data Management 178

Boilers And Water Heaters

- *Chapter 10 of the IMC*
  - *Is Supplemented By :*
    - The State Building Code, 2016 Connecticut Supplement
- *1001.1.1 Boilers and Water Heaters*
  - *Is added*
    - "Boilers and water heaters shall also be governed by the regulations adopted under authority of chapter 540 of the Connecticut General Statutes".

Office of Education and Data Management 179

Water Heater vs. Boiler

Water heater:
Heats potable water and supplies it to a hot water distribution system.

Boiler:
Heats water or generates steam for space heating, processing or developing power, and is usually a closed system.

Office of Education and Data Management 180

Section 1002
Water Heaters

- Must be listed, labeled and installed
  - In accordance with:
    - Manufacturer's installation instructions
    - The Plumbing Code
    - The International Mechanical Code
    - The Connecticut General Statues

Office of Education and Data Management 181

Section 1002.2.2
Temperature limitation.

The section was "changed." Where a combination potable water-heating and space-heating system requires water for space heating at temperatures higher than 140F(60C), a temperature actuated mixing valve that conforms to ASSE 1017 shall be provided to temper the water supplied to the potable hot water distribution system to a temperature of 140F(60C) or less.

Office of Education and Data Management 182

Section 1003.1
General.

The section was "revised" to "add" the ASME Boiler and Pressure Vessel Code as the appropriate standard for pressure vessels.

Office of Education and Data Management 183

Section 1004
Boilers

Section 1004.1 Standards

Specific standards (Added)

- *Must Meet:*
  - Specified Standards
  - International Mechanical Code Requirements
  - Manufacturer's Installation Instructions
  - Connecticut General Statues

Office of Education and Data Management

184

Section 1004.3.1 *NEW Table*
Top clearance

Clearances from the tops of boilers to the ceiling or other overhead obstruction shall be in accordance with *Table 1004.3.1.*

Office of Education and Data Management

185

Chapter 11
Refrigeration

***Chapter 11** contains regulations pertaining to the life safety of building occupants. These regulations establish minimum requirements to achieve the proper design, construction, installation and operation of refrigeration systems.*

Office of Education and Data Management

186

Section 1101.10 NEW Locking access port caps

A new section was added to the 2009 IMC to require new outdoor HVAC refrigerant circuits to be fitted with locking-type caps to prevent unauthorized access to the refrigerant. This was added to protect the safety and well-being of children and young adults who may attempt to inhale the refrigerant vapors in order to become intoxicated. The language of the section was further changed in the 2012 IMC and omits the locking caps if the equipment is secured to prevent unauthorized access.

Office of Education and Data Management 187

Chapter 11 Table 1103.1

The heading of the last column of the table has been "changed" from TLV-TWA (ppm) to OEL.

The code addresses the hazards of refrigeration systems to building occupants by considering three things: the type of refrigerant, the type of system and the type of building occupancy.

Office of Education and Data Management 188

Chapter 11

Section 1104.2.2 Industrial occupancies and refrigerated rooms.

The sixth requirement of this section has been reworded. All electrical equipment and appliances conform to Class 1, Division 2, hazardous location classification requirements of NFPA 70 where the quantity of any Group A2, B2, A3 or B3 refrigerant, other than ammonia, in a single independent circuit would exceed 25 percent of the lower flammability limit (LFL) upon release to the space.

Office of Education and Data Management 189

Chapter 11
Section1105.6.3 NEW
Ventilation rate.

For other than ammonia systems, the mechanical ventilation systems shall be capable of exhausting the minimum quantity of air both at normal operating and emergency conditions, as required by Sections 1105.6.3.1 and 1105.6.3.2. The minimum required ventilation rate for ammonia shall be in accordance with IIAR2. Multiple fans or multispeed fans shall be allowed to produce the emergency ventilation rate and to obtain a reduced airflow for normal ventilation.

Office of Education and Data Management 190

Chapter 11
Section 1105.9 NEW
Emergency pressure control system.

Refrigeration systems containing more than 6.6 pounds of flammable, toxic or highly toxic refrigerant or ammonia shall be provided with an emergency pressure control system in accordance with Section 606.10 of the International Fire Code.

Office of Education and Data Management 191

Chapter 11
Section 1106.5.1 Newly Reworded
Refrigeration system emergency shutoff.

A clearly identified switch of the break-glass type or with an approved tamper- resistant cover shall provide off-only control of refrigerant compressors, refrigerant pumps, and normally closed, automatic refrigerant valves located in the machinery room. Additionally, this equipment shall be automatically shut off whenever the refrigerant vapor concentration in the machinery room exceeds the vapor detector's upper detection limit or 25 percent of the LEL, whichever is lower.

Office of Education and Data Management 192

Sections 1107.2, 1107.2.1 and 1107.2.2 NEW Sections

1."Piping location." 2."Piping in concrete floors." 3."Refrigerant penetrations."

Adds three new sections with requirements for location of refrigerant piping and penetrations of floors, walls and ceilings by refrigerant piping. These are excerpted from ASHRAE 15.

Office of Education and Data Management

193

Chapter 12 Hydronic Piping

- **Hydronic Piping Systems**
  - ***Part of Heating, Ventilation & Air Conditioning Systems***
  - **Including**
    - **Steam, Hot Water, Chilled Water, Steam Condensate & Ground Water Heat Pump Loops**

Office of Education and Data Management

194

Chapter 12 Materials

Many new sections were added to the chapter relating to new material types. Section 1203.16 through 1203.19.2 are newly created materials such as Polypropylene and raised temperature polyethylene are just a few.

Tables 1202.4 and 1202.5 contain many of these new types of pipe and fittings.

Office of Education and Data Management

195

Chapter 12
Section 1201.3 Standards
NEW

Adds "ASME B31.9" as an alternative to Sections 1202 and 1203 for designing, installing, inspecting and testing of hydronic piping systems.

Office of Education and Data Management 196

Chapter 12
Section 1206.2 System drain down

An exception was "added" to allow portions of hydronic piping that are embedded underground or under floors to be installed without system drains.

Office of Education and Data Management 197

Chapter 12 NEW
Sections 1209.5 through 1209.5.4
Thermal barrier required.

The 2009 IMC adds "new" sections with requirements for thermal barriers for radiant floor heating systems.

Office of Education and Data Management 198

Chapter 13
Fuel Oil Piping & Storage

- 1301.1 Scope
- The chapter governs the design, installation, construction and repair of fuel-oil storage and piping systems.

Office of Education and Data Management

199

Chapter 13
Section 1301.5

Tanks abandoned or removed.

All exterior above-grade fill piping shall be removed when tanks are abandoned or removed. Tank abandonment and removal shall be in accordance with Section 3404.2.13 of the International Fire Code.

Office of Education and Data Management

200

Chapter 14
Solar Systems

- No changes were made to the chapter.

Office of Education and Data Management

201

QUESTIONS???

Office of Education and Data Management

202