



Office of Education and Data Management  
Fall 2018 Career Development Seminar  
November 2018

### Above Ceiling Inspections

*Presented by  
Joseph J. Summers, MCP, CBO, Senior Project Inspector, 4LEAF*

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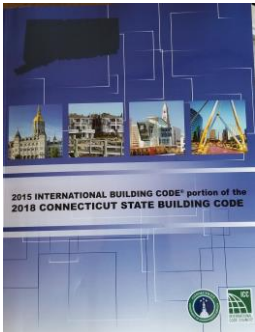
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**2018 CT State  
Building Code  
books are  
available**

2015 INTERNATIONAL BUILDING CODE® portion of the  
2018 CONNECTICUT STATE BUILDING CODE

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**Online Governmental Consensus Vote  
(OGCV)  
Cdpaccess.com**

**Opens approximately Nov. 15-30**

**Your vote does count**

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**Reference Code:**

- 2018 CT State Building Code
- 2015 IBC
- 2015 IMC
- 2015 IPC
- 2017 NEC

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**Objectives:**

- Identify key building elements that require inspections above the ceiling.
- Review codes and other standards that should be referenced during above ceiling inspection process.
- Discuss inspection related issues.

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**What are we doing?**

- Reinspection of all the rough-ins and the grid lay-out of the ceiling
- Check for approved inspections from plumbing, mechanical, electrical, fuel gas, sprinkler, framing and fire marshal if required

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**Is this a Required Inspection?**

- **110.3.8 Other inspections.** In addition to the inspections specified in Sections 110.3.1 through 110.3.7, the building official is authorized to make or require other inspections of any construction work to ascertain compliance with the provisions of this code and other laws that are enforced by the department of building safety.

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**Access for Inspection**

- **110.5 Inspection requests.**
- It shall be the duty of the holder of the building permit or their duly authorized agent to notify the building official when work is ready for inspection.
- It shall be the duty of the permit holder to provide access to and means for inspections of such work that are required by this code.

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**Reference Codes and Standards**

- **IBC section 808 ACOUSTICAL CEILING SYSTEMS**
- Installed per manufactures installation instructions [808.1.1]
- Installed in accordance with ASTM C635 & C636 [808.1.1.1]

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### Reference Codes and Standards

- ASTM C635/C636
  - Main runners supported max. 4'-0" on center
  - Hanger wires shall be min. 12 ga
  - Max. 1 in 6 out of plumb
  - Wires shall not press against ducts or pipes

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### Reference Codes and Standards

- ASTM C635/C636
  - Three turns in three inches
  - Bottom of hanger wires cut close or bent upwards

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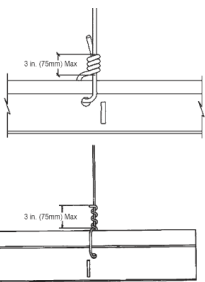
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ASTM C636

Wire loops tightly wrapped and sharply bent to prevent vertical movement

Wire wrapped min. 3 full turns within 3 inches

FIG. 2 Hanger Wire / Wire Detail

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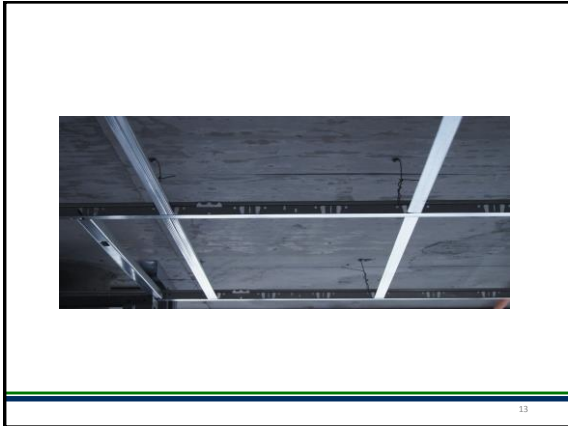
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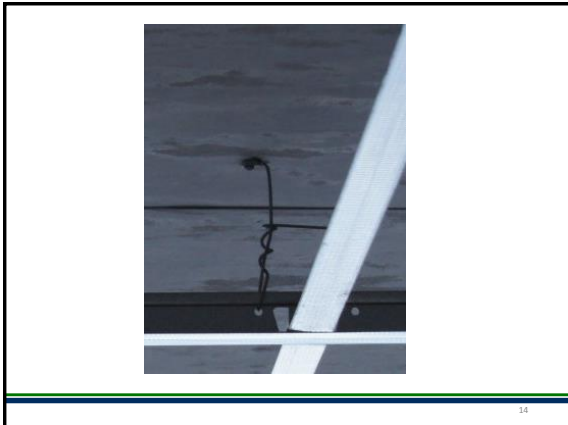
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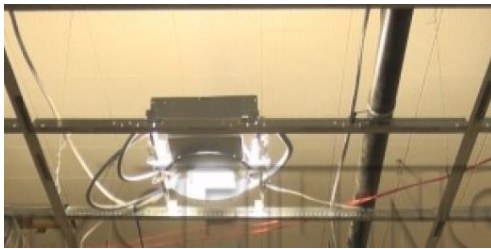
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**NEC 300.11(A)** Raceways, cable assemblies, boxes, cabinets and fittings shall be securely fastened in place.

**NEC 300.11(B) Wiring Systems Installed Above Suspended Ceilings.** Wire that do not provide secure support shall not be permitted as sole support.

Independent support wires shall be secured at both ends.

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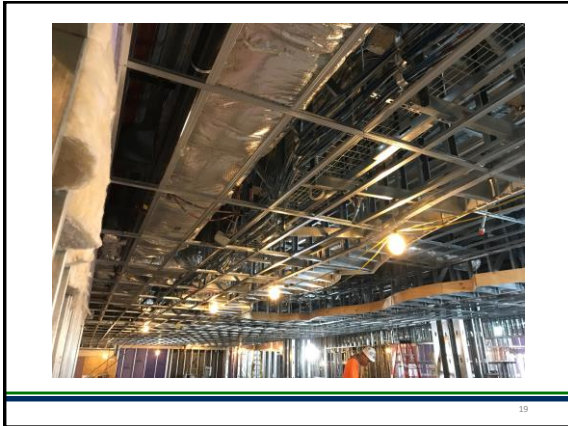
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Cables and raceways shall not be supported by ceiling grids.

**Fire-Rated Assemblies. (NEC 300.11(B)(1))**

Shall not be secured to , or supported by, the ceiling assembly, including support wires.

Independent support wires shall be distinguished by color, tagging, or other effective means from those that are part of the fire-rated design.

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**Non-Fire-Rated Assemblies. (NEC 300.11(B)(2))**

Shall not be secured to , or supported by, the ceiling assembly, including support wires.

Independent support wires shall be distinguished by color, tagging, or other effective means from those that are part of the fire-rated design.

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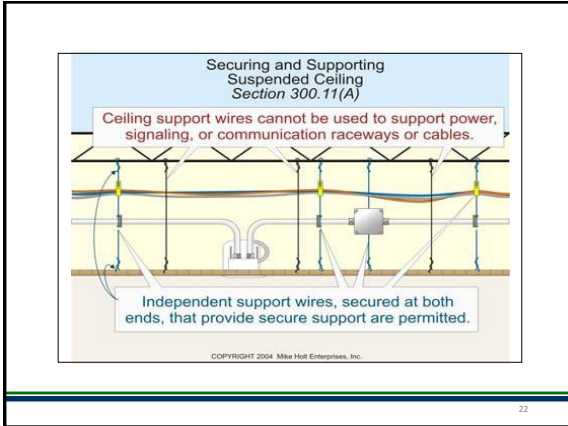
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**When is Seismic Bracing **NOT** Required?**

- ASCE 7 (2010) 13.1.4 The following non-structural components are exempt from the requirements;
  - Mech & Elec components in SDC B
  - Mech & Elec components in SDC C with  $I_p \leq 1.0$

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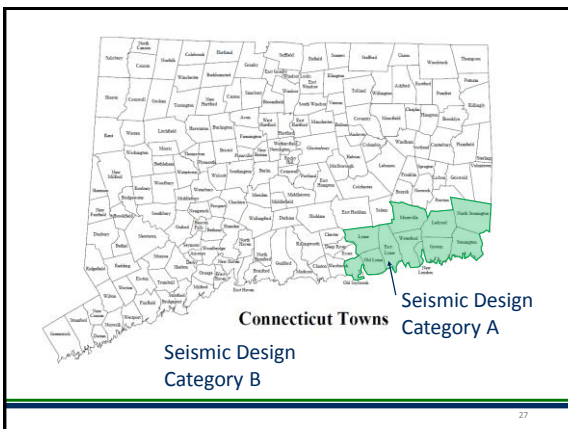
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**Is Sway Bracing required for Automatic sprinkler systems?**

- Only required if SDC C or worse
  - NFPA 13-2010 – 9.3 refers back to the building code and AHJ
  - IBC 1613.1 – SDC determined in accordance with IBC section 1613 or ASCE 7

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**Is Sway Bracing required for Automatic sprinkler systems?**

- ASCE 7-2010 – SDC A & B exempt from the requirements

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**When is Seismic Bracing Required?**

- Seismic Design Category C
- Risk Category IV [IBC 1604.5]
- Component Importance Factor ( $I_p$ ) > 1.0 [ASCE 7 13.1.3]

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### When is Seismic Bracing Required?

- Fire protection sprinkler systems
- Egress stairways
- Toxic, highly toxic, or explosive substances with qty. > than permitted
- Risk Category IV structure, needed for continued operation of the facility.

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### How did we get to Seismic Design Category C?

- Risk Category IV, Table 1604.5
- Determine the MCE Spectral Acceleration value for the Municipality. Appendix N
- Refer to Table 1613.3.5(1) and Table 1613.3.5(2)

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**Example:**

- Municipality: **Ashford**
- Obtain MCE Spectral Acceleration values from Appendix N
- Public safety Complex

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**(Add) APPENDIX N MUNICIPALITY – SPECIFIC STRUCTURAL DESIGN PARAMETERS**

Municipality	Ground Snow Load (psf)	Wind Design Parameters											Municipality Debris Regions
		MCE Spectral Accelerations (kg)		Ultimate Design Wind Speeds, V <sub>u</sub> (mph)			Nominal Design Wind Speeds, V <sub>n</sub> (mph)			Wind Borne Debris Regions			
		S <sub>s</sub>	S <sub>1</sub>	Risk Cat I	Risk Cat II	Risk Cat III-IV	Risk Cat. I	Risk Cat. II	Risk Cat. III-IV	Wind Borne Debris Region I	Risk Cat II Group I-28 mph Cat IV	Wind Borne Debris Region II	
Andover	30	0.176	0.063	120	130	140	93	101	108				Yes
Andover	30	0.195	0.064	115	125	135	89	97	105				Yes
<b>Ashford</b>	<b>35</b>	<b>0.173</b>	<b>0.063</b>	<b>120</b>	<b>130</b>	<b>140</b>	<b>93</b>	<b>101</b>	<b>108</b>				<b>Yes</b>
Avon	35	0.181	0.064	110	120	130	85	93	101				Yes
Eastford	40	0.177	0.065	110	120	125	85	93	97				Yes
Easton Falls	30	0.112	0.054	115	125	115	82	87	105				Yes

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- $S_s = 0.173, S_1 = 0.063$
- Public safety Complex would be a Risk Category IV structure as per Table 1604.5

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**TABLE 104.1  
RISK CATEGORY OF BUILDINGS AND OTHER STRUCTURES  
BY OCCUPANCY**

RISK CATEGORY	SEVERE DEFICIENCIES
I	Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to: • Agricultural facilities. • Certain temporary facilities. • Minor storage facilities.
II	Buildings and other structures except those listed in Risk Categories I, III and IV. Buildings and other structures that represent a moderate hazard to human life in the event of failure, including but not limited to: • Buildings and other structures where primary occupancy is public assembly with an occupant load greater than 500. • Buildings and other structures containing Group E occupancies with an occupant load greater than 250. • Buildings and other structures containing selected educational occupancies for students above the 12th grade with an occupant load greater than 500. • Group 2-3 occupancies with an occupant load of 50 or more resident care recipients but not having surgery or emergency treatment facilities. • Group 1-2 occupancies. • Any other occupancy with an occupant load greater than 5,000. • Power generating stations, water treatment facilities for potable water, wastewater treatment facilities and other public utility facilities not included in Risk Category III. • Buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area as appropriate with the International Fire Code; and Are sufficient to pose a threat to the public if released.
III	Buildings and other structures designated as essential facilities, including but not limited to: • Group 2-3 occupancies having surgery or emergency treatment facilities. • Fire, rescue, ambulance and police stations and emergency vehicle garages. • Designated earthquake, hurricane or other emergency shelters. • Designated emergency preparedness, communications and operations centers and other facilities required for emergency response. • Power generating stations and other public utility facilities required as emergency holding facilities for Risk Category IV structures. • Buildings and other structures containing quantities of highly toxic materials that: Exceed maximum allowable quantities per control area as given in Table 307.1(1) or 307.1(2) or per outdoor control area as appropriate with the International Fire Code; and Are sufficient to pose a threat to the public if released. • Aviation control towers, air traffic control centers and emergency aircraft hangars. Buildings and other structures having critical national defense functions. • Waste storage facilities and pump structures required to maintain water pressure for fire suppression.

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Buildings and other structures designated as essential facilities, including but not limited to:

- Group I-2 occupancies having surgery or emergency treatment facilities.
- Fire, rescue, ambulance and police stations and emergency vehicle garages.
- Designated earthquake, hurricane or other emergency shelters.
- Designated emergency preparedness, communications and operations centers and other facilities required for emergency response.

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**TABLE 104.2.1(1)  
SEISMIC DESIGN CATEGORY BASED ON SHORT PERIOD (0.2 second) RESPONSE ACCELERATION**

VALUE OF $S_a$	RISK CATEGORY			
	I, II, III	IV	V	VI
$S_a \leq 0.10g$	A	A	A	A
$0.10g < S_a \leq 0.25g$	B	B	C	C
$0.25g < S_a \leq 0.50g$	C	C	D	D
$0.50g < S_a$	D	D	D	D

**TABLE 104.2.1(2)  
SEISMIC DESIGN CATEGORY BASED ON 1-SECOND PERIOD RESPONSE ACCELERATION**

VALUE OF $S_a$	RISK CATEGORY			
	I, II, III	IV	V	VI
$S_a \leq 0.10g$	A	A	A	A
$0.10g < S_a \leq 0.15g$	B	B	C	C
$0.15g < S_a \leq 0.30g$	C	C	D	D
$0.30g < S_a$	D	D	D	D

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1613.3.5 - Each building and structure shall be assigned to the more sever *seismic design category*.

Public Safety complex in Ashford shall be designed to Seismic Design Category C

ASTM E580 – ceilings < 1,000 sf are exempt from lateral force bracing requirements

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### Special Inspections

- Required for **Seismic Design Category C**
- For the following plumbing, mechanical and electrical components
  - Anchorage of electrical equipment for emergency and standby power

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- Installation and anchorage piping systems, ductwork and equipment carrying hazardous materials
- Vibration isolation systems, if <1/4 inch between equipment support and restraint.
- Where automatic sprinklers installed, all mechanical and electrical equipment shall be braced.

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Basic Installation Requirements (SDC C)

- Minimum 7/8" wall molding
- Suspension system must not be attached to the wall molding
- Minimum 3/8" clearance on all sides
- Minimum 3/8" overlap of the suspension system on the wall molding

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Basic Installation Requirements (SDC C)

- Ends of main beams and cross tees must be tied together to prevent their spreading
- Safety wires required on light fixtures

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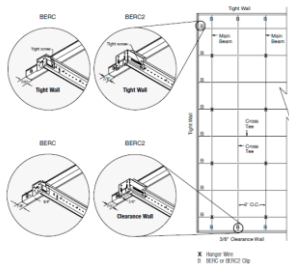
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Armstrong Ceiling

SEISMIC RX® APPROACHES TO CATEGORY C INSTALLATIONS



Seismic Rx Code Compliant Solutions and Benefits (ESR-1308)

- Meets code requirements
- Easy to square the system
- Eliminates stabilizer bars
- Better access to the plenum
- Narrow, sleek aesthetic with standard 7/8" molding
- Suspension system can be tight on two adjoining walls – can use the BERCC or BERCC2
- Intermediate-duty suspension system

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### Armstrong Ceiling

#### IBC APPROACH TO CATEGORY C INSTALLATIONS

- 7/8" molding
- 3/8" clearance on all sides, 3/8" overlap of the suspension system on the wall molding
- Prevents the spread of main beams/cross tees with stabilizer bars
- Intermediate-duty suspension system

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### Armstrong Ceiling

Cloud ceilings installed in Seismic Design Categories A, B, and C do not require lateral force bracing.

Ceilings designed to allow movement and designed to resist minimal seismic forces.

Grid ends on all four walls must be free to move

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### Armstrong Ceiling

Closure angle with a supporting shelf < 7/8 inch, perimeter runners must be supported by vertical hanger wires within 8 inches from the wall, or proprietary solutions

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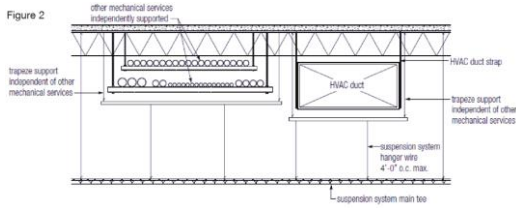
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Wires may not attach to or bend around interfering equipment. (ASTM C635)



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**Light Fixtures in Seismic Design Category C [ASTM E580]**

- Positively attached to the grid by at least 2 connections
- Clamping devices for surface fixtures, safety wires required

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**Light Fixtures in Seismic Design Category C [ASTM E580]**

- $\leq 10\#$  - One #12 gage hanger wire from housing to structure above, wire may be slack
- $< 56\#$  - Two #12 gage hanger wires from fixture housing to structure above, wires may be slack
- $\geq 56\#$  - Independent support from the structure above by approved hanger wires

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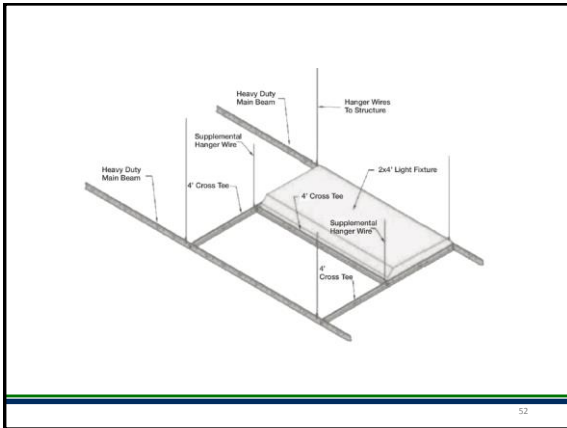
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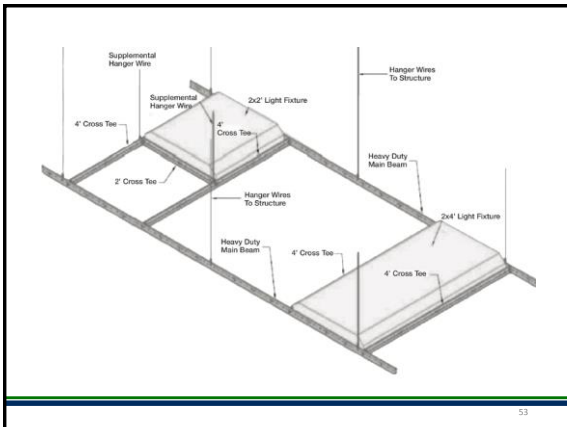
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**Light Fixtures in Seismic Design Category C [ASTM E580]**

- Pendant-hung fixtures supported, minimum one #9 gage wire or other approved support
- Rigid conduit is not permitted for the attachment of fixtures

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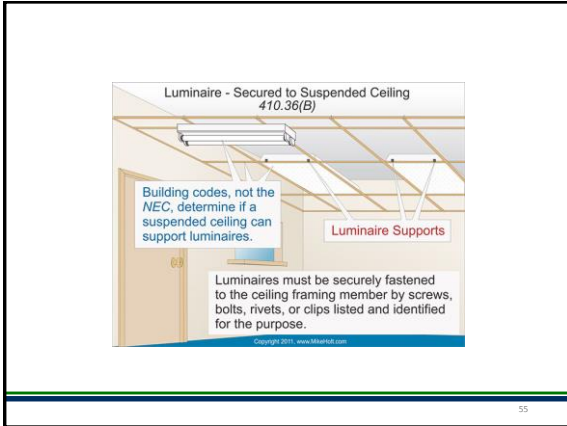
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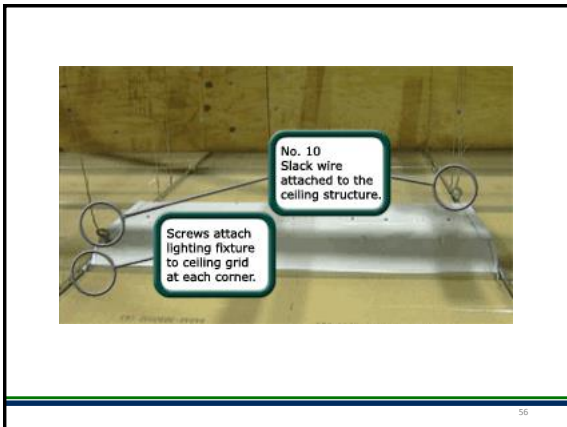
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**Mechanical in Seismic Design Category C [ASTM E580]**

- Flexibly mounted services
  - $\leq 20\#$  must be positively attached to runners
  - $< 56\#$  Two #12 gage hanger wires, wires may be slack
  - $\geq 56\#$  require direct support from the structure

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- Flexible sprinkler hose fittings, air terminals or other services weighing > 20 lbs. but < 56 lbs. shall have two #12 ga safety wires and positively attached to the ceiling suspension runners
- Flexible sprinkler hose fittings, air terminals or other services weighing > 56 lbs. shall be supported directly from structure above

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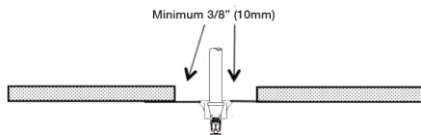
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All ceiling penetrations must have a 3/8-inch min. clearance on all sides



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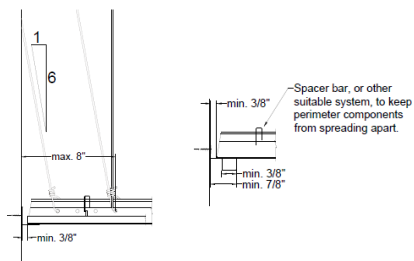
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Ceiling may not provide lateral support to partitions

Partitions attached must use flexible connections to avoid transferring force to the ceiling

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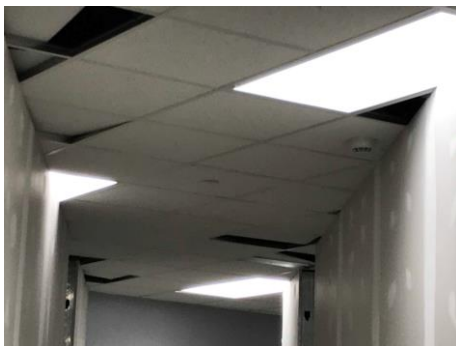
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Ceiling weight must be 2.5# per square foot or less (includes members, panels, fixtures, air terminals, sprinklers)

Ceilings > 2.5# per square foot shall follow the requirements for SDC D, E and F

We will not go into these requirements

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How do we get to a research report?

**104.11 Alt. materials, design and methods of construction and equipment.** Shall be approved by the building official.

**104.11.1 Research reports.** Where necessary to assist in the approval of materials or assemblies not specifically provided in this code.

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What are some of the testing agencies

**ICC-ES** ([www.icc-es.org](http://www.icc-es.org))

**Intertek** ([www.Intertek.com](http://www.Intertek.com))

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ICC-ES Evaluation Report ESR-1308  
 DIVISION: 09 00 00—FINISHES  
 SECTION: 09 22 26—SUSPENSION SYSTEMS  
 SECTION: 09 53 00—ACOUSTICAL CEILING SUSPENSION ASSEMBLIES

REPORT HOLDER:  
 WORTHINGTON ARMSTRONG VENTURE (WAVE)  
 301 LINDENWOOD DRIVE, SUITE 350  
 MALVERN, PENNSYLVANIA 19355

EVALUATION SUBJECT:  
 FIRE- AND NONFIRE-RESISTANCE-RATED SUSPENDED CEILING FRAMING SYSTEMS

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ARMSTRONG WORLD INDUSTRIES, INC.  
 POST OFFICE BOX 3001  
 LANCASTER, PENNSYLVANIA 17604

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2015, 2012, and 2009 International Building Code® (IBC)
- 2013 Abu Dhabi International Building Code (ADIBC)<sup>1</sup>

<sup>1</sup>The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

Properties evaluated:

- Interior finish
- Fire resistance
- Structural

2.0 USES

The Worthington Armstrong Venture (WAVE) ceiling framing systems described in this report are suspended, exposed framing systems of ceiling assemblies used in fire-resistance-rated and nonfire-resistance-rated construction for interior applications.

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4.0 DESIGN AND INSTALLATION

4.1 General:

The suspended ceiling framing system must be installed in accordance with this report and the manufacturer's published installation instructions. The suspended ceiling framing system must be installed in accordance with the 2015, 2012, and 2009 IBC Sections 808, 1613 and 2506.2.1 for ceiling systems up to 4 psf (19.5 kg/m<sup>2</sup>).

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**4.9 Special Inspection:**

Suspended ceilings in Seismic Design Categories C, D, E and F are subjected to periodic special inspections during the installation of the suspended ceiling systems and their anchorage in accordance with the following requirements:

- For installations in accordance with Section 4.4.2 of this report, special inspection must be conducted as indicated in 2015 IBC Sections 1704.3, 1704.5, 1705.1.1 and 1705.13.2; 2012 IBC Sections 1704.3, 1705.1.1, 1705.11.4 and Item 3 of Section 1705.12, and 2009 IBC Section 1704.15, Item 3 of Section 1708.1, and 1708.4, as applicable.
- For installation in accordance with Section 4.4.1 of this report, special inspection must be in compliance with the following: Section 11A.1.3.9, Item 2, of ASCE 7-10 for the 2015 and 2012 IBC [Section 13.5.6.2.2 (h) of ASCE 7-05, and 2009 IBC Section 1703.3.4, Item 3 for the 2009 IBC; Section 13.5.6.2.2 (h) of ASCE 7-05, as applicable].
- The special inspector must verify that the ceiling framing systems are as described in this report, and comply with the this report and the approved construction documents.

A statement of special inspection must be provided as required by 2015 and 2012 IBC Section 1704.3 (2009 IBC Sections 1705.2 and 1705.3 for the 2009 IBC).

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**Check if there are any rated assemblies in the area**

- Draftstopping requirements?
- Firestopping requirements?
- Are special inspections required?

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**3M PRODUCTS RECOMMENDED FOR USE WITH CPVC PIPE:**

- 3M™ Fire Barrier Sealant IC 15WB+
- 3M™ Fire Barrier Water Tight Sealant 3000 WT
- 3M™ Fire Barrier Water Tight Sealant 1000 NS

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**3M PRODUCTS NOT RECOMMENDED FOR USE WITH CPVC PIPE:**

- 3M™ Fire Barrier Sealant CP25WB+
- 3M™ Fire Barrier Sealant 1003 SL
- 3M™ Fire Barrier Sealant FD 150+ 3M™ Fire Barrier Sealant 2000+
- 3M™ Fire Barrier Sealant 2000
- 3M™ Fire Block Sealant FB 136

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**703.7 Marking and identification.**

Where there is an accessible concealed floor, floor-ceiling or attic space, fire walls, fire barriers, fire partitions, smoke barriers and smoke partitions or any other wall required to have protected openings or penetrations shall be effectively and permanently identified with signs or stenciling in the concealed space. Such identification shall:

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**703.7 Marking and identification (cont.)**

1. Be located within 15 feet (4572 mm) of the end of each wall and at intervals not exceeding 30 feet (9144 mm) measured horizontally along the wall or partition.
2. Include lettering not less than 3 inches (76 mm) in height with a minimum 3/8-inch (9.5 mm) stroke in a contrasting color incorporating the suggested wording, "FIRE AND/OR SMOKE BARRIER—PROTECT ALL OPENINGS," or other wording.

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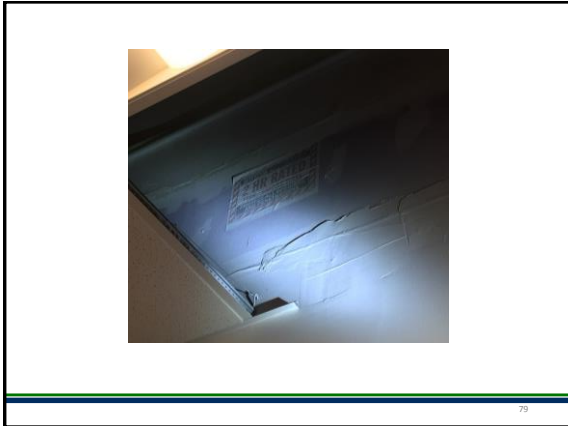
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**Have fire and smoke dampers been tested and approved and properly labeled? [717.4]**

Access points permanently identified on the exterior

Labeling lettering at least ½" high

Reading FIRE/SMOKE DAMPER, SMOKE DAMPER or FIRE DAMPER

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**Use of NM Cable? [334]**

Types III, IV and V construction. Cables shall be concealed within walls, floors, or ceilings that provide a 15-minute thermal barrier.

Not permitted to be exposed in dropped or suspended ceilings in other than one- and two-family and multifamily dwellings [334.12(A)(2)]

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**Use of NM Cable? [334]**

**2017 NEC** – Not permitted to be exposed within a dropped or suspended ceiling cavity in other than one- and two-family and multifamily dwellings.

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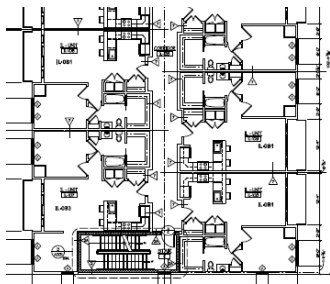
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IS NM Cable permitted above the suspended ceiling in this situation?



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Is it permitted if a Group R?

Is it permitted if a Group I?

The clarification of NM cable above suspended ceilings was introduced in the 2002 NEC.

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**DEFINITION:**

**Dwelling Unit (NEC)** – A single unit, providing complete and independent living facilities for one or more persons, including permanent provisions for living, sleeping, cooking, and sanitation.

**Multifamily Dwelling** – A building that contains three or more dwelling units.

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**RESIDENTIAL:**

- Boarding Houses (transient)
- Congregate Living Facilities
- Hotels
- Motels
- Apartment Houses
- Boarding Houses (nontransient)
- Convents
- Dormitories

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**RESIDENTIAL (cont.):**

- Fraternities and sororities
- Live/Work units
- Monasteries
- Vacation timeshare properties
- Lodging houses

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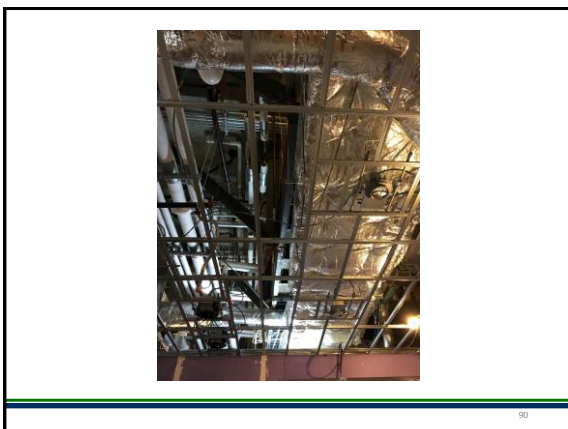
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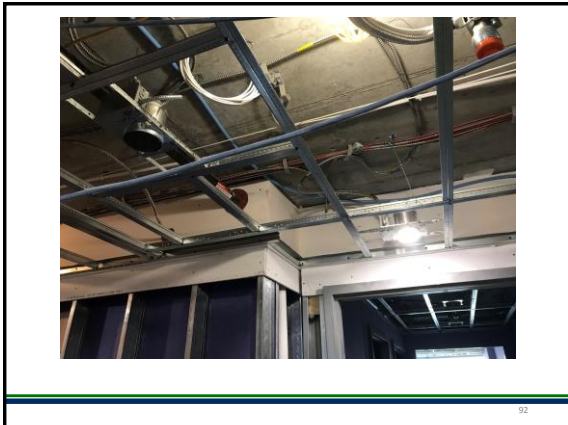
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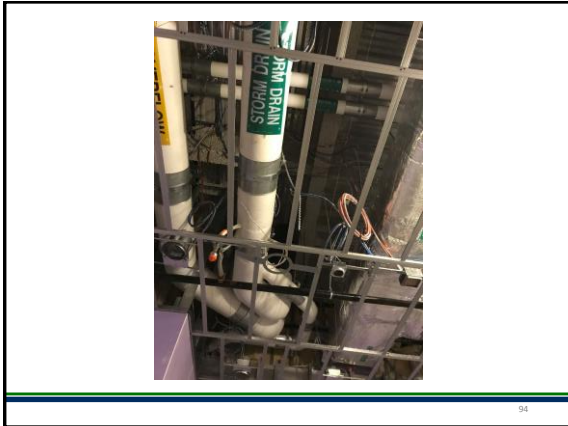
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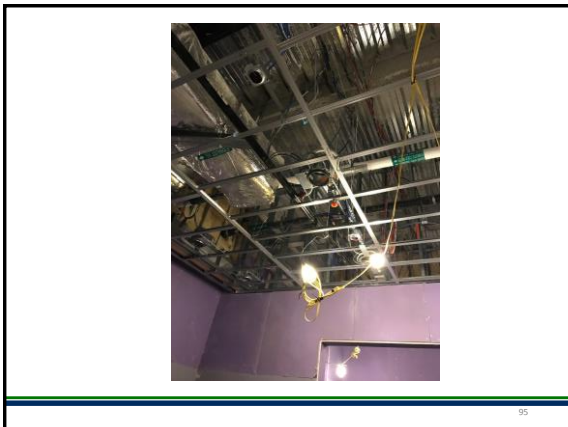
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	<b>TECHNICAL DATA</b>	<b>COIN® QUICK RESPONSE UPRIGHT SPRINKLER VK950 (SPECIFIC APPLICATION)</b>
The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058 Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com Visit the Viking website for the latest edition of this technical data page: www.vikinggroupinc.com		
<b>2. LISTINGS AND APPROVALS</b>		
cULus Listed: Category V/NIV Refer to the Approval Chart and Design Criteria in this technical data sheet for cULus Listing requirements that must be followed. The COIN® Sprinkler has been tested to address the proper application density for shallow concealed combustible space fire protection when installed in accordance with this technical data page. The COIN® Sprinkler must be installed in the upright position as specified in the appropriate application described in Figures 3-5. The clearance from the sprinkler deflector to the roof is critical to operation of the sprinkler (refer to Figures 3-5). The clearances from pipe to lower ceiling for CPVC pipe is critical for protection of CPVC pipe. For open truss and joist spaces, the maximum detection area is important for proper installation. Draft curtains or heat collection baffles or solid walls are required using wood or other product that will not allow heat to escape. The maximum detection space shall be limited to 1000 ft² (93 m²). The draft curtain is required to protrude down from the top deck surface as specified herein.		

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**Concealed space limitations**

- For open truss construction and non-combustible filled solid or composite wood joists
- Draft curtain required to confine heat to an area of 1,000 sf
- Shall be minimum third the depth or 8", whichever is greater
- Constructed of at least ¼" plywood
- Maximum height of space is 60"
- Minimum height is 6"

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### Temporary Electrical Installations

- Temporary electric power and lighting installations shall be permitted during the period of construction, remodeling, maintenance, repair, or demolition of buildings, structures, equipment, or similar activities [NEC 590.3(A)]
- Temporary wiring shall be removed immediately upon completion of construction or purpose for which the wiring was installed. [NEC 590.3(D)]

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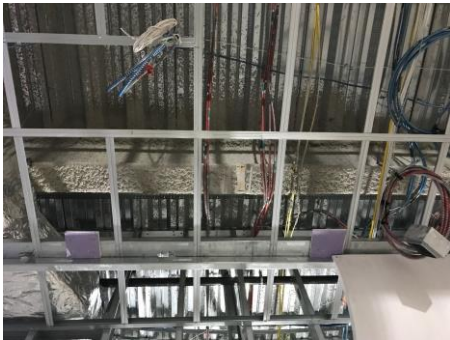
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### Concealed fittings and equipment

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**Fire Resistance Rated Floor/Ceiling Assembly**

**711.2.5 Ceiling panels.** Where the weight of lay-in ceiling panels, used as part of fire-resistance-rated floor/ceiling or roof/ceiling assemblies, is not adequate to resist an upward force of 1 pound per square foot (48 Pa), wire or other approved devices shall be installed above the panels to prevent vertical displacement under such upward force.

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**Fire-Resistance Rated Ceilings  
2-Hour Fire-Resistance-Rated Floor-Ceiling Assembly**

- Hanger wires located at all four-corners of light fixtures
- Next to each main runner splice

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**Fire-Resistance Rated Ceilings**

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**Flexible Air Connectors**

**FLEXIBLE AIR CONNECTOR.** A conduit for transferring air between an air duct or plenum and an air terminal unit or between an air duct or plenum and an air inlet or air outlet. Such conduit is limited in its use, length and location. (IMC Definitions)

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**Flexible Air Connectors**

Shall be tested in accordance with UL 181 as Class 0 or Class 1 (IMC 603.6.2)  
Air connectors shall not be greater than 14 ft in length (IMC 603.6.2.1)  
Shall not pass through any wall, floor or ceiling (IMC 603.6.2.2)

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**Flexible Ductwork**

Shall be tested in accordance with UL 181, Class 0 or 1 (IMC 603.6.1)

Shall not be limited in length (IMC 603.6.1.1)

Air temperature < 250°F (IMC 603.6.3)

Repair torn or damaged jackets with tape listed/labeled to UL 181B.

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**Flexible Ductwork**

Internal core penetrated, replace or treat as a connection.

Install ducts fully extended.

Do not install in the compressed state or use excess length, increases friction loss.

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**What is the difference between an Air Duct and Air Connector?**

Both Air Ducts and Air Connectors are tested per the UL 181 standard. Air Ducts are required to pass fifteen (15) UL 181 tests whereas an Air Connector is only required to pass twelve (12) tests. Air Connectors are not required to pass UL-181 impact, small scale flame penetration or impact tests. As a result, Air Connectors can only be installed in lengths of up to 14 feet. There are no installation length restrictions on Air Ducts.

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**How can I tell the difference between an air duct and air connector?**

In many cases Air Ducts and Air Connectors look similar in appearance. The only way to truly distinguish between the two products is to examine the **label** on the product. The words "Air Duct" or "Connector" will also be specifically referenced on the label (see blue arrow below).

**FYI** – Air Connectors can be produced with or without fiberglass insulation and vapor-barrier

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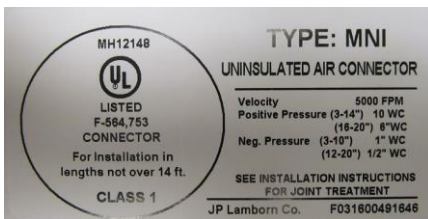
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Air Connector will have a circle within the label



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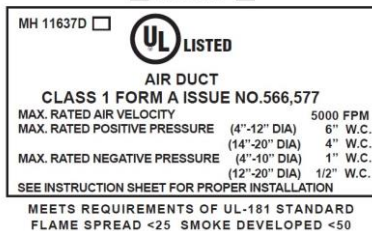
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An Air Duct has a rectangle or square within the label.

TYPE:MHP



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### Flexible Ductwork

Manufacturers follow the Flexible Duct Performance & Installation Standards as published by the Air Diffusion Council ([www.flexibleduct.org](http://www.flexibleduct.org))

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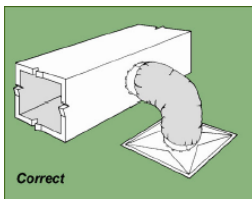
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### Flexible Ductwork



Minimum duct length and bend radius reduces pressure drop and improves airflow.

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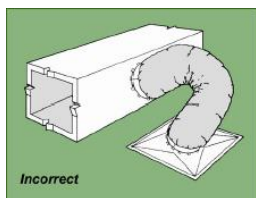
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### Flexible Ductwork



Excess length and tight bend radius increases pressure drop and reduces airflow.

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### Flexible Ductwork



The bend radius at the center line of ducts shall be equal to or greater than one duct diameter

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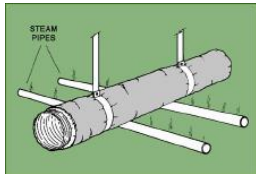
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### Flexible Ductwork



Avoid contact with metal fixtures, water lines, or conduits.

Do not install near hot equipment

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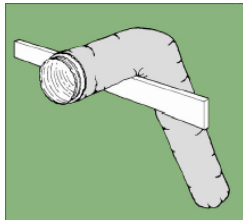
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### Flexible Ductwork



Ducts shall not be crimped against joist or truss members, pipes, wires, etc.

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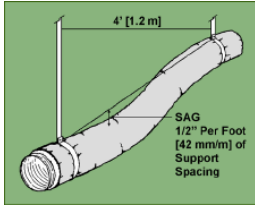
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### Flexible Ductwork



Care shall be taken to minimize sagging or snaking of the duct between supports.

Shall be supported  $\leq 4$  ft

Maximum centerline sag is  $\frac{1}{2}$ " per foot between supports

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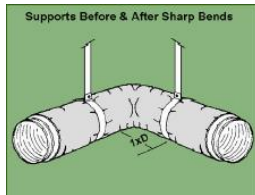
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### Flexible Ductwork



Long horizontal duct runs with sharp bends shall have additional supports before and after the bend, approx. one duct diameter

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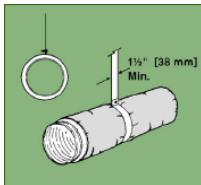
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### Flexible Ductwork



Hangers or saddle material in contact with duct shall of sufficient width to prevent any restriction and not less than 1 1/2" wide

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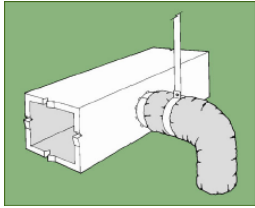
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### Flexible Ductwork



Support between metal connection and bend

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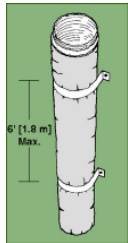
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### Flexible Ductwork



Vertically installed ducts shall be stabilized by straps at a max 6 ft on center

Shall not be used for vertical risers serving more than two stories in height.

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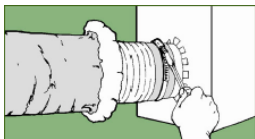
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### Flexible Ductwork



Slide at least 1" of core over fitting.

Seal core  $\geq$  2 wraps of duct tape.  
Secure connection with clamp over tape and core

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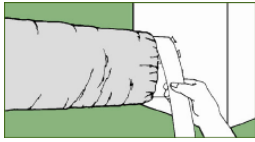
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### Flexible Ductwork



Pull insulation over core, tape jacket with  $\geq 2$  wraps of duct tape, or use a clamp

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### Above Ceiling Inspection Checklist

- Check for approved inspections from plumbing and/or electrical and/or fire dept. inspectors if required (if there is ANY plumbing or electrical in this ceiling, it is required)
- Check if there are any rated walls in this area.
- If rated, is there proper labeling

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- If rated, are all penetrations sealed by approved fire or smoke stop/block methods



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- If rated, is top of wall properly sealed by approved fire or smoke stop methods
- If rated, does a duct pass through, is wall opening around duct properly sealed by approved fire or smoke stop/block method
- If rated, does duct have fire or smoke damper in place, has damper been tested and approved, is damper labeled

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- Check for acoustical sealant if required at top of walls
- Although not necessarily required, check for “independent” support of any MC, lighting, piping or embeds
- Although not necessarily required, check for labeling of piping
- Check for “independent” support of any ductwork, speakers, and/or diffusers
- Check for required access panels
- Check any required insulation of duct work

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- Check if this a grease duct
- If grease duct, has welding been tested and approved
- If grease duct, are all required cleanouts in place
- If grease duct, has fire wrap been inspected and approved
- Check flexible duct, does it meet length and flow requirements, is it secured
- Check grid support of drop ceiling 3 twists in 3”

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- Check framing construction of hard ceiling against approved shop drawings
- If hard ceiling, is access panel framing provided
- Check for covers on any electrical junction boxes
- Check for any required column, beam or decking fireproofing patching
- Check for combustible materials in a non-combustible construction
- Check to see that all temp. utilities have been removed

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## Questions?

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