



# Welcome

## Building and Fire Officials

**Educational Conference | November 3, 2017 | Aqua Turf, Plantsville, CT**

### Program Overview

This year's conference will explore building mechanical systems, identification of HVAC system components and their importance in fire life safety and building ventilation. The proper inspection, installation and maintenance of the entire system are critical to the public's health and safety, and are important to both building and fire officials.

### Program Schedule

**8:00 am** Registration and Refreshments

**9:00 am** Welcoming Remarks

- *Bonnie Becker, OEDM Director*
- *Pasquale "Bud" Salemi, DAS Deputy Commissioner*
- *Joseph V. Cassidy, State Building Inspector*
- *William Abbott, State Fire Marshal*
- *Peter Zvingilas, CBOA President*
- *Roger Martin, CFMA Vice President*

**9:15 am** Duct Construction and Installation

Ducts Using in Building Ventilation Systems

**10:15 am** Break

**10:30 am** Ducts Used in Building Ventilation Systems *continued*

**12:00** Luncheon

**1:00 pm** Ducts Used for Fire Life Safety Systems

**2:15 pm** Break

**2:30 pm** Ducts Used for Fire Life Safety Systems *continued*

**3:30 pm** Program Adjournment

### Instructor Bios

#### Mark S. Mastropasqua

Mark is the Training Coordinator at the Sheet Metal Workers Union (SMART) Local #40 Training Center, and is a Licensed Sheet Metal Worker, Certified Welder, Certified Welding Inspector, Certified Fire Life Safety Level 1 Technician, Certified OSHA Instructor and a Certified Infection Control and Risk Assessment (ICRA) Instructor. Mark is a member of the Building Code Training Council, Code Training and Education Fund Board of Control, and the Codes & Standards Committee.

**Jeremy Zeedyk** is the Business Representative at the SMART Local Union #40, and is a Licensed Sheet Metal Worker, Certified Testing Adjusting and Balancing Technician, and a Certified Fire Life Safety Level 1 & 2 Technician. Jeremy is a member of the State of Connecticut Heating, Piping, Cooling and Sheet Metal Work Examining Board.

### Continuing Education Credits

Five continuing education credits will be awarded for participation in the entire program.

### Acknowledgements



The Office of Education and Data Management would like to thank the SMART Local Union #40 for sharing Mark's and Jeremy's knowledge, time and expertise with Connecticut's Code officials. Their in-kind contribution is greatly appreciated.

*This conference is made possible through the Code Training and Education Fund. Revenue for the Fund comes from assessments on the construction value of building permits.*




Department of Administrative Services  
Office of Education and Data Management  
(OEDM)



Connecticut Building Official's Association  
(CBOA)




Connecticut Fire Marshals Association  
(CFMA)



NOVEMBER 3, 2017

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



### Mechanical Systems for Fire Life Safety and Building Ventilation

**Mark Mastropasqua,**  
Training Coordinator, Sheet Metal Workers Union  
**Jeremy Zeedyk,**  
Business Representative, SMART Local Union

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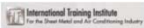
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## HVAC Duct Construction & Installation

An Introduction to HVAC Safety Awareness



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### What is the ITI?

- Educational arm of the unionized sheet metal industry
- Labor Management Trust Fund
- Jointly sponsored by:
  - International Association of Sheet Metal Air, Rail and Transportation Workers (SMART)
  - Sheet Metal and Air Conditioning Contractors' National Association (SMACNA)





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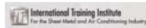
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What is SMART?

- Formerly the Sheet Metal Workers International Association
- Labor organization with approximately 150,000 members
- 1/2 of the ITI trustees



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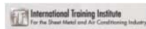
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What is SMACNA?

- Publishes Technical Manuals
- Tested and Practical method for Fabrication & Installation
- Recognized and used by Engineers
- 1/2 of the ITI Trustees



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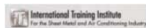
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What is the purpose of an inspection?

To determine if the construction and installation comply with the documents for which the inspector is responsible.



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### What is the value of an inspection?

The assurance that the materials and assemblies purchased are either provided and available or that defects and omissions are documented.



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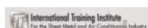
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### How does the timing of inspection affect construction costs?

- Inspections should occur while work is in progress
  - Work may be concealed or inaccessible
- Delay in construction may occur if further work has to be suspended pending inspection
- Correcting deficiencies after installations are complete is expensive and time consuming
  - This type of correction could affect several trades
- Can cause delays in occupancy or delayed use of facility



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### HVAC Duct Systems Inspection Guide

*Is intended to acquaint inspection officials, designers and contractors with the basic features of:*

- duct construction
- equipment connections to ducts
- items inserted in ducts as they are found in the SMACNA manuals

*Is NOT intended to:*

- constitute contract requirements
- be a substitute for familiarity with all of the provisions in the other SMACNA manuals
  - SMACNA provides many alternative construction methods



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### Today's Goals

- To make your job as an inspector easier
- Make sure the customer gets what they pay for in terms of quality, performance and efficiency
- Protect the public's safety
- To familiarize you with delivery systems
  - Different types and efficiencies
  - Proper fabrication methods
  - Internal Components
  - External Components
  - Accessories
- What you see is not always what you get



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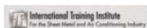
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QUIZ – How much do you know about the HVAC industry?



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**Morning Session**

**OEDM**  
**CBOA**  
**CFMA**  
NOVEMBER 3, 2017

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

**Mechanical Systems for  
Fire Life Safety and Building Ventilation**

**Ducts Used in Building Ventilation Systems**

**Mark Mastropasqua,**  
Training Coordinator, Sheet Metal Workers Union

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**Inspector's Program**

**Ducts used in  
Building Ventilation Systems**

**HVAC Basics**

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For the Sheet Metal and Air Conditioning Industry

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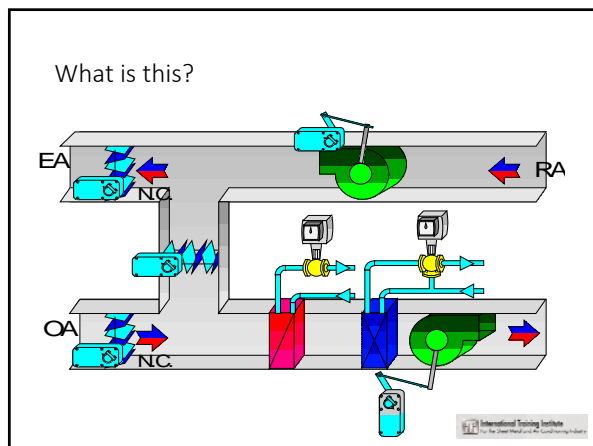
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Survey Says....

In 1970, a government study reported that we could save 25% of our energy by correcting:

- ✓ Poor duct design
- ✓ Leaks
- ✓ Proper Insulation



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Poor Duct Design

Components of poor duct design:

- Improper fittings
- No turning vanes
- Undersized Duct
- Excessive flex duct

*It is important to keep the HVAC system as fluid as possible.*



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Typical Air Systems Components

- Outside Air
- Supply Air
- Return Air
- Relief Air
- Exhaust Air



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### Outside Air

- Generally 5 - 10 CFM per person
- Old codes were 10% or 25 CFM per person
- Reduced for energy conservation in the 70's
- **ASHRAE standard is back to 15-25 CFM per person**



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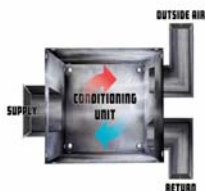
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### Outside Air

Produces needed fresh air and a means of energy conservation.



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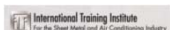
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### Supply Air

A means of carrying conditioned air to a desired location.



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### Return Air

A means of returning supply air to the conditioning unit.



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### Relief Air

A means of relieving building pressure, both negative and positive.



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### Exhaust Air

A means of collecting and exhausting undesirable air or elements.



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Types of Pressure

|                   |  |
|-------------------|--|
| STATIC PRESSURE   | THE FORCE BEING EXERTED IN ALL DIRECTIONS BY AIR ON THE INSIDE SURFACE OF DUCT |
| VELOCITY PRESSURE | THE PRESSURE THAT RESULTS FROM AIR MOTION IN DUCT                              |
| TOTAL PRESSURE    | THE SUM OF THE VELOCITY PRESSURE AND STATIC PRESSURE                           |

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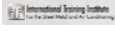
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Static Pressure

- The pressure exerted in all directions
- Restrictions in the duct system cause static pressure
- Static pressure, if not by design, is the number one enemy of the duct system

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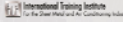
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Increasing Static Pressure

- Friction Loss
- Dynamic Loss

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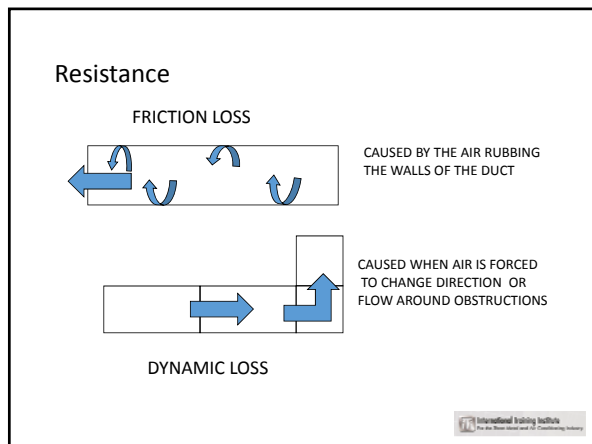
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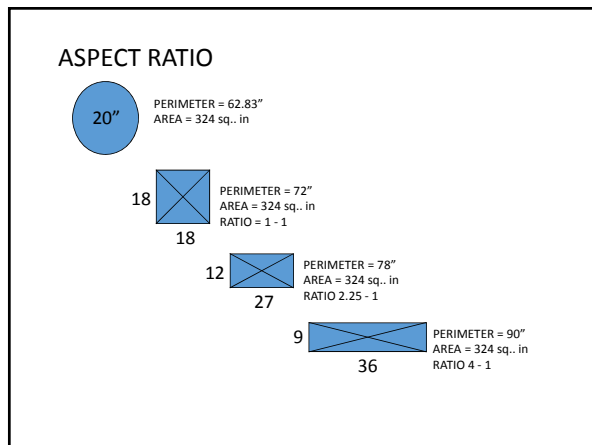
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**SMACNA Friction Loss in Settings**

The next slides are based on:

- a typical low pressure system
- Duct area = 650 Sq. In. or approximately 36" by 18"
- CFM = 6580 at 1850 FPM
- shown in equivalent feet of duct

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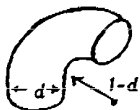
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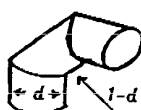
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Round Elbows

Radius elbows should use a minimum of 1 duct diameter for the throat radius



Stamped Elbow  
10' of Duct



3 Gore Elbow  
22' of Duct

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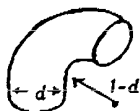
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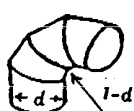
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Round Elbows



Stamped Elbow  
10' of Duct



4 Gore Elbow  
18' of Duct

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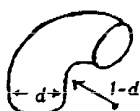
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Round Elbows



Stamped Elbow  
10' of Duct



5 Gore Elbow  
16' of Duct

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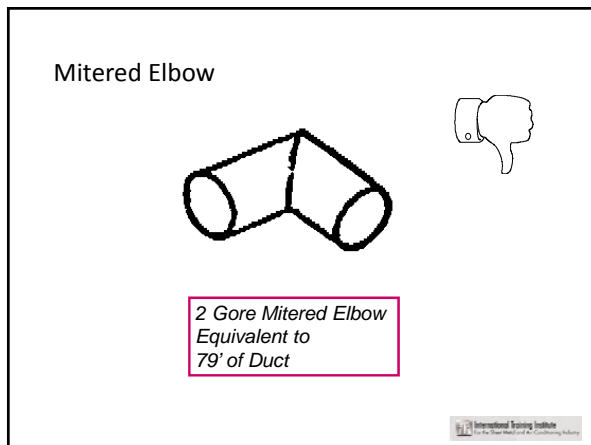
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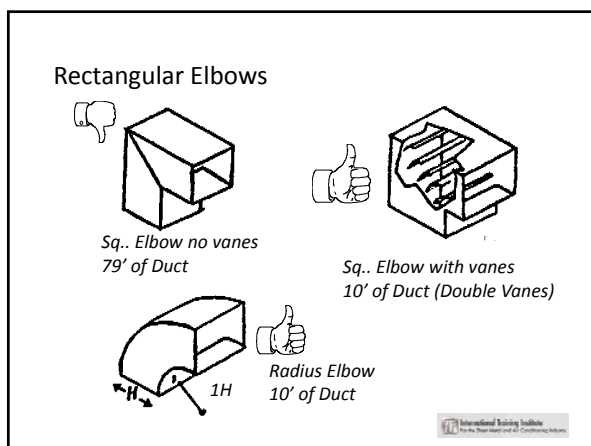
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Turning Vanes



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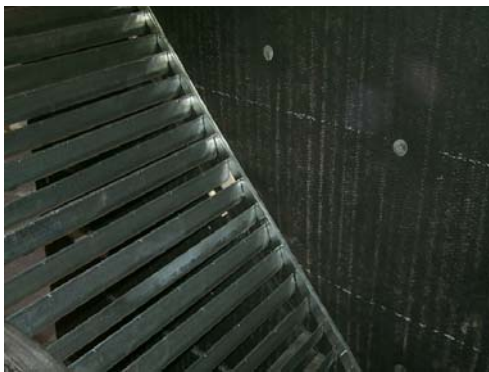
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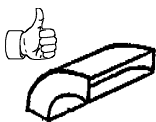
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Rectangular Elbows



Rectangular Radius  
Elbow  
10' of Duct



Rectangular Elbow  
No Vanes  
79' of Duct

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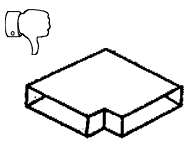
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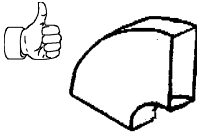
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Rectangular Elbows



*Rectangular Elbow  
No Vanes  
85' of Duct*



*Rectangular Elbow  
Radius Throat and Heel  
14' of Duct*

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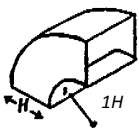
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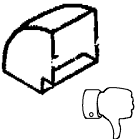
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Rectangular Elbows



*Radius Elbow  
10' of Duct*



*Radius Heel Elbow  
W/ Square Throat  
79' of Duct*

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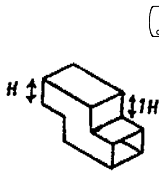
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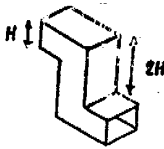
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Rectangular Elbows



*Double Elbow  
No Vanes  
171' Duct*



*Double Elbow  
No Vanes  
276' Duct*

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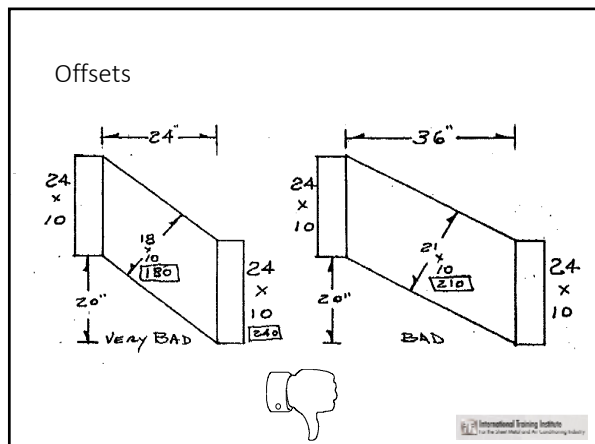
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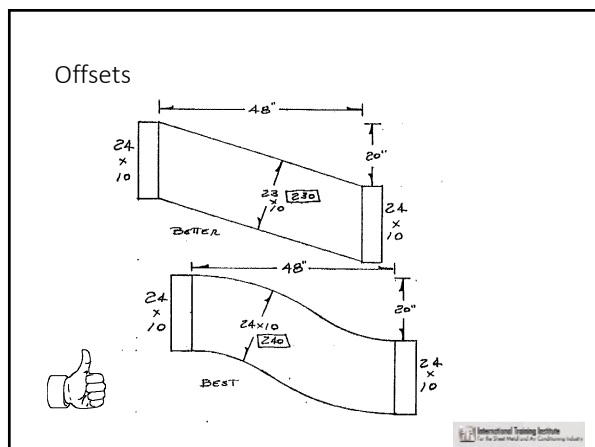
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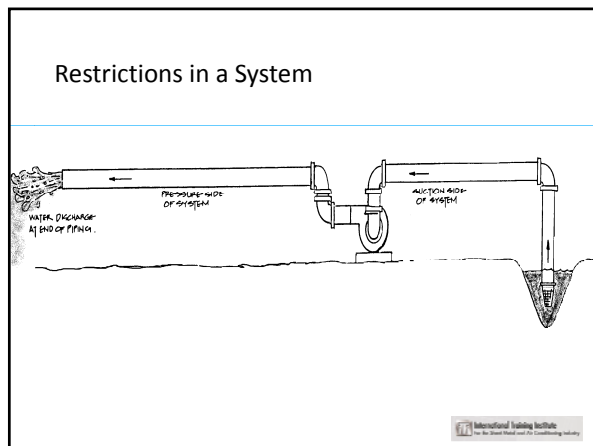
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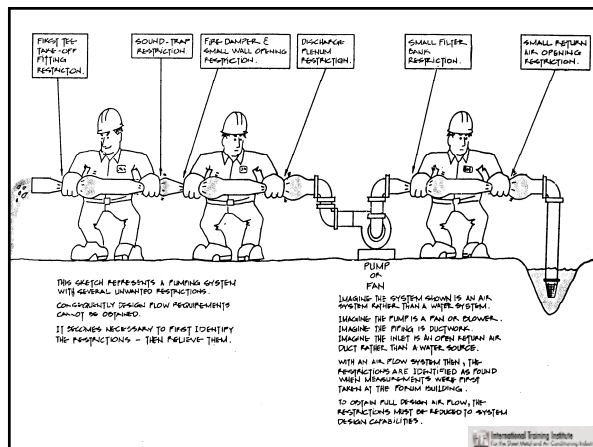
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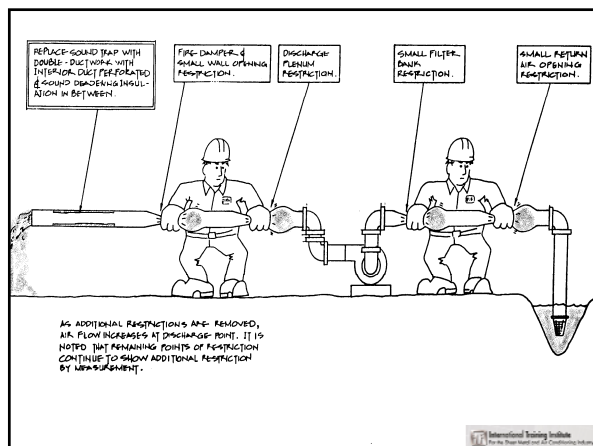
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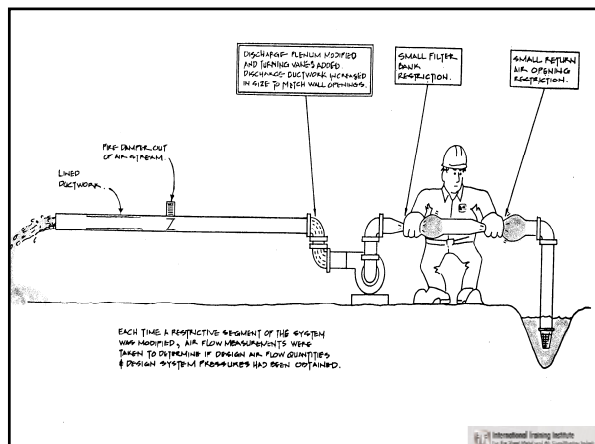
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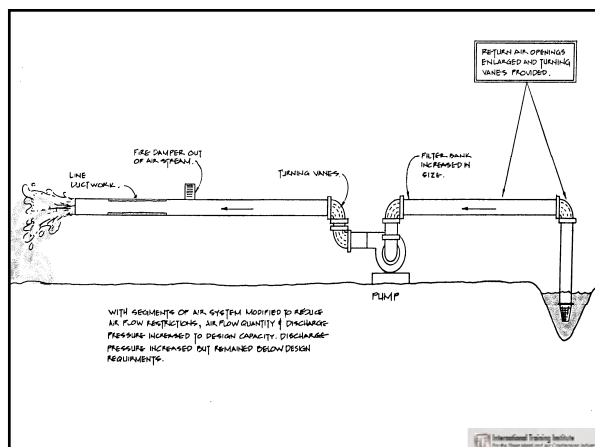
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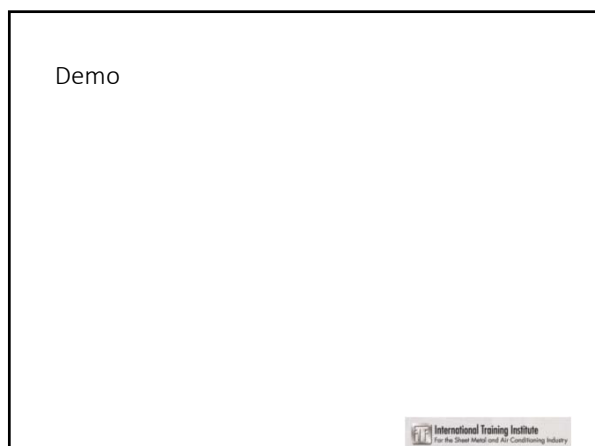
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**Inspectors Program**

**Building Ventilation Systems**

Duct Construction and Materials



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Commonly Used Materials



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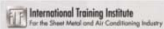
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Galvanized Steel

| <b>Applications</b>   | <b>Advantages</b>  |
|---|--|
| Widely used as duct material for most air handling systems. | <ul style="list-style-type: none"><li>• High strength</li><li>• Rigidity</li><li>• Durability</li><li>• Rust resistant</li><li>• Availability</li><li>• Non-porous</li><li>• Workability</li><li>• Weldability</li></ul> |



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### Carbon Steel

#### Applications

- Breechings
- Flues
- Stacks
- Hoods
- Other high temperature duct systems
- Kitchen exhaust systems
- Ducts requiring paint or a special coating.

#### Advantages

- High strength
- Rigidity
- Durability
- Availability
- Paintability
- Weldability
- Non-porous

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## Aluminum

### Applications

Duct systems for:

- Moisture laden air
- Louvers
- Special exhaust systems
- Ornamental duct systems

### Advantages

- Light weight
- Resistance to moisture and corrosion
- Availability

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### Aluminum Duct



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### Stainless Steel

#### Applications

Duct systems for:

- Kitchen exhaust
- Moisture laden air
- Fume exhaust

#### Advantages

- High resistance to corrosion from moisture and most chemicals
- Ability to take a high polish

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Stainless Steel Ductwork



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Welded Stainless Steel with # 4 Finish



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Stainless Steel with # 8 Finish



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### Copper

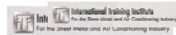
#### Applications

Duct systems for:

- Exposure to outside elements and moisture laden air
- Certain chemical exhaust
- Ornamental ductwork
- Hoods
- Architectural sheet metal

#### Advantages

- Accepts solder readily
- Durable
- Resists corrosion
- Non-magnetic




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### Copper Copula



Fabricated by apprentices at Local 19 in Philadelphia, PA.




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### Fiberglass Reinforced Plastic

#### Applications

- Chemical fume exhaust
- Scrubbers
- Underground duct systems

#### Advantages

- Resistance to corrosion
- Strength




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### Polyvinyl Chloride (PVC)

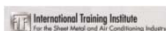
#### Applications

Exhaust systems for:

- Chemical fumes and hospitals
- Underground duct systems

#### Advantages

- Resistance to corrosion
- Weight
- Weldability
- Ease of modification



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### Polyvinyl Steel

#### Applications

- Underground duct systems
- Moisture laden air
- Corrosive air systems.

#### Advantages

- Resistance to corrosion
- Availability



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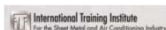
### Concrete

#### Applications

- Underground ducts
- Air shafts

#### Advantages

- Compression strength
- Corrosion resistance



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### Asbestos Cement (Transite)

#### Applications (former)

- Underground duct systems
- Kitchen exhaust
- Chemical exhaust
- High temperature duct systems
- Flues
- Vents

#### Advantages

- Resistance to most chemicals
- Can be used up to 2000 degrees Fahrenheit




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### Sheetrock

#### Applications

- Ceiling plenums
- Corridor air passageways
- Air shafts

#### Advantages

- Cost
- Availability




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### Duct Sealants




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Sealing Requirements Table 1-2

| TABLE 1-2<br>DUCT SEALING REQUIREMENTS |  |  |
|--|--|--|
| SEAL CLASS                             | SEALING REQUIRED   | STATIC PRESSURE<br>CONSTRUCTION<br>CLASS |
| A                                      | All transverse joints,<br>longitudinal seams and<br>duct wall penetrations | 4" w.g. and up                           |
| B                                      | All transverse joints and<br>longitudinal seams                            | 3" w.g.                                  |
| C                                      | Transverse joints  | 2" w.g.                                  |

In addition to the above any variable air volume system duct of 1" and 1/2" w.g. construction class that is upstream of the VAV boxes shall also meet Seal Class "C"

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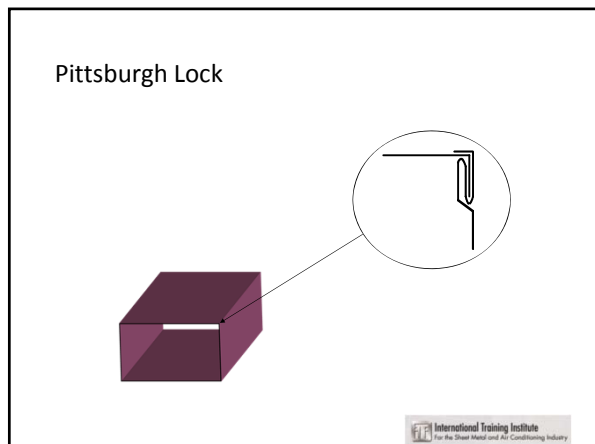
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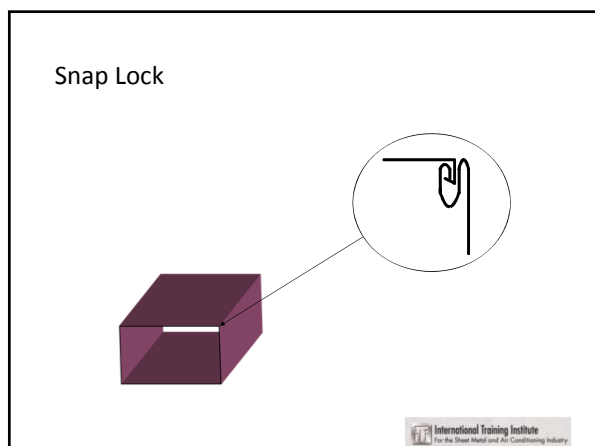
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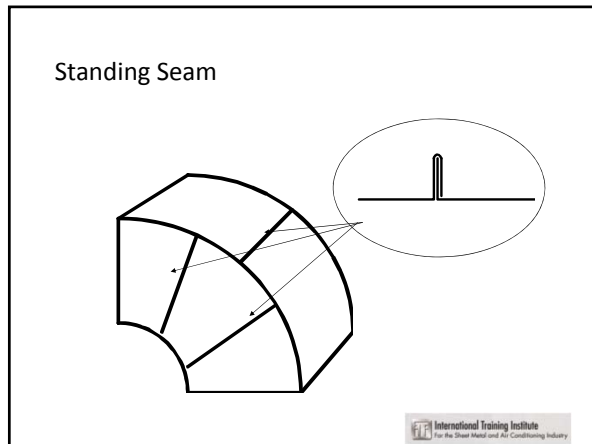
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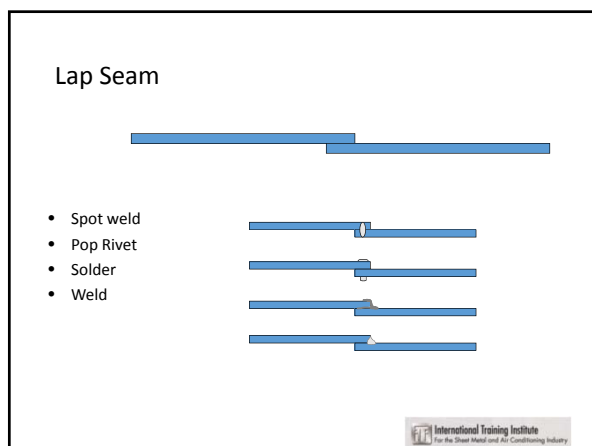
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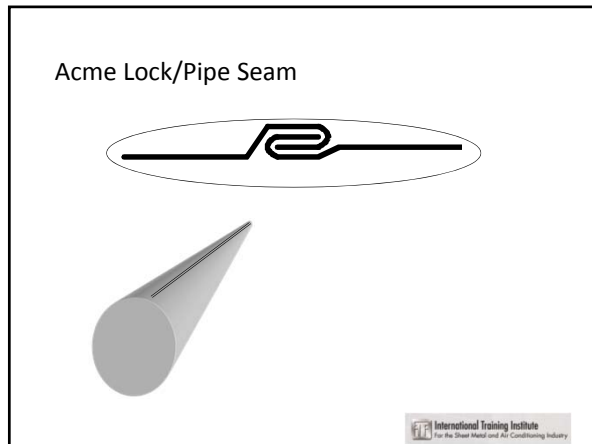
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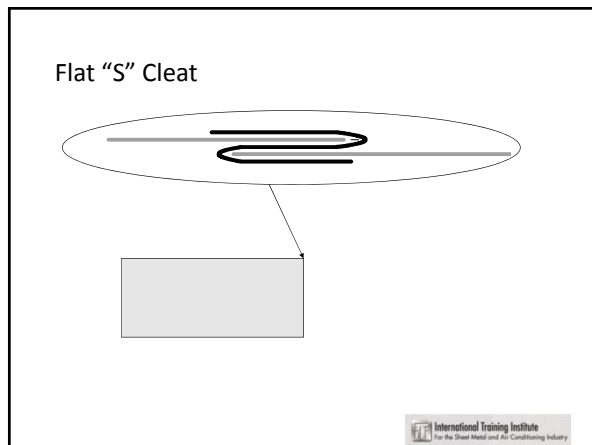
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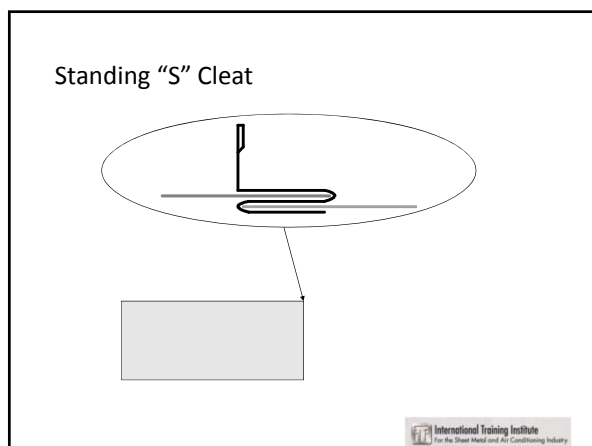
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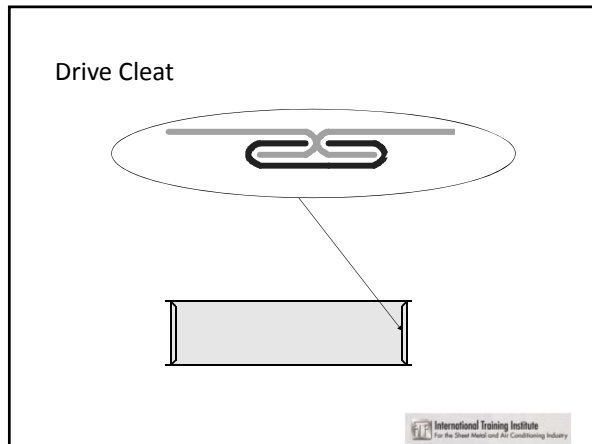
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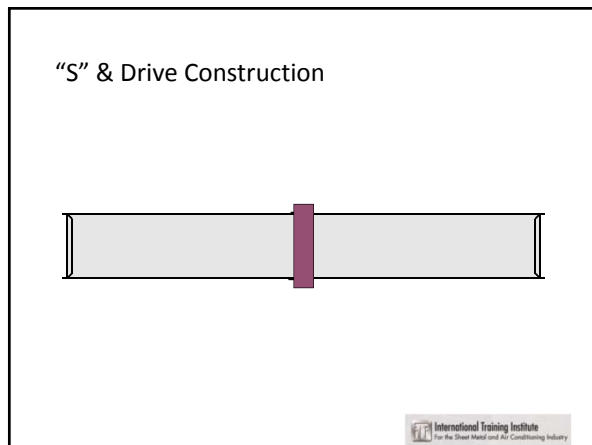
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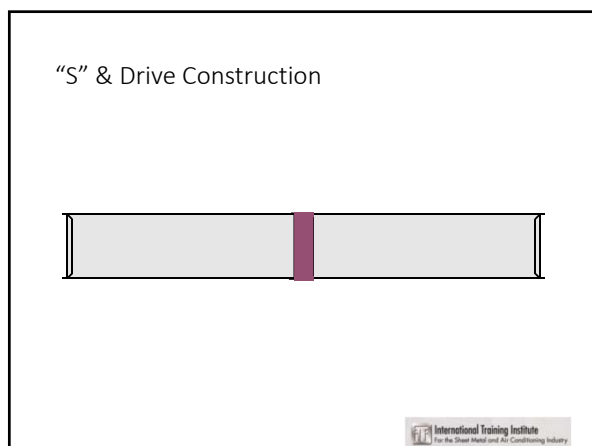
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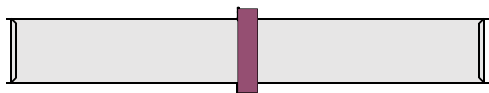
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Standing "S" & Drive Construction



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Standing "S" & Drive Construction



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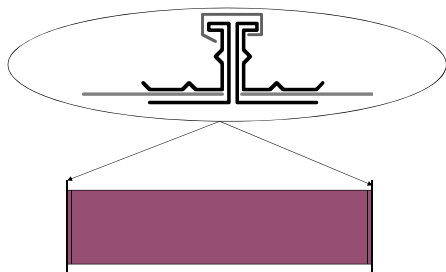
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Duct Mate



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Ductmate Construction



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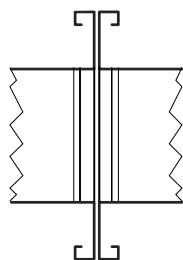
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Transverse Duct Connector (TDC)



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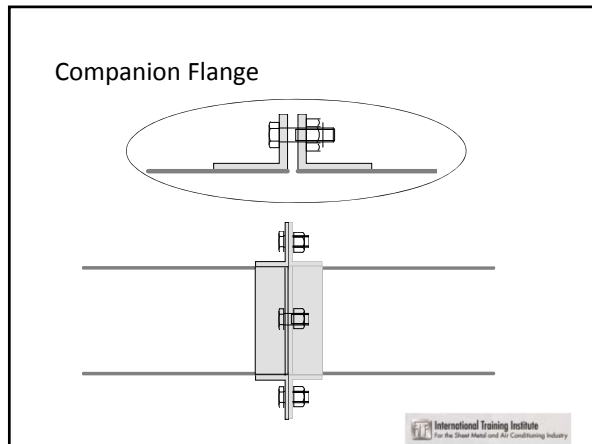
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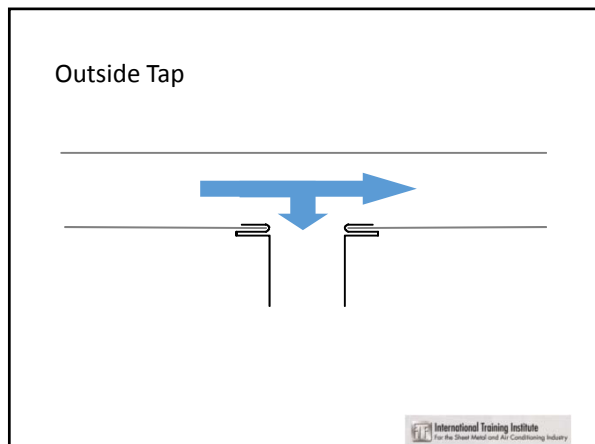
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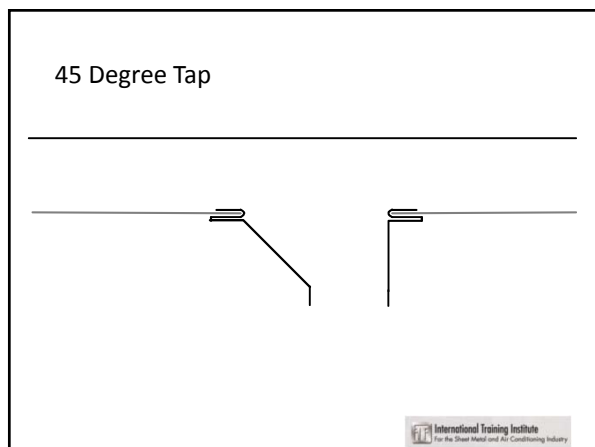
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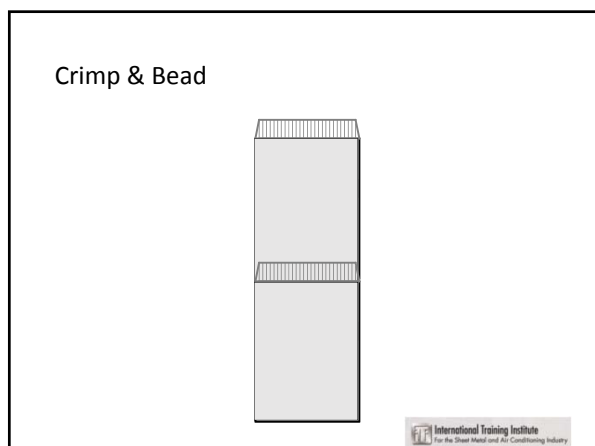
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Beaded Collar



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Rectangular Duct Reinforcement

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### Cross Breaking

Must be Cross Broken if:

- 19" wide and larger and have more than 10 square feet
- Applicable to 20 gage or less and 3" w.g or less
- It is unnecessary to break or bead all sides unless each duct dimension requires it

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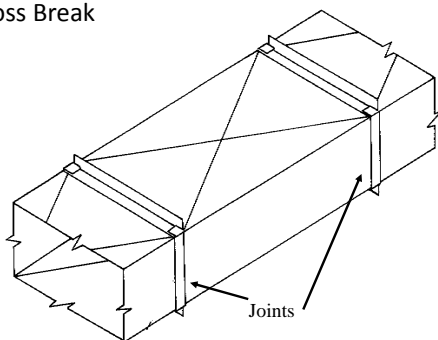
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### Cross Break



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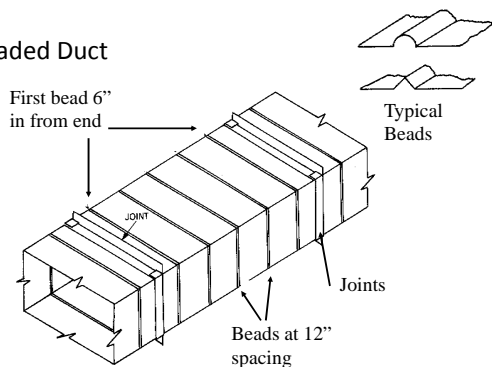
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### Beaded Duct



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Beaded Duct



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Beaded Sheets



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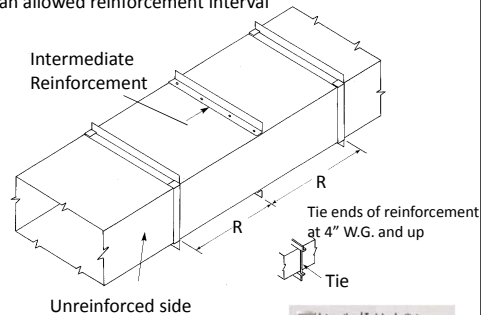
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Transverse Joint Reinforcement

R is an allowed reinforcement interval



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Reinforcement



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| 2" W.G.           |                                       | TABLE 1-5<br>RECTANGULAR DUCT REINFORCEMENT |    |    |    |    |        |    |
|-------------------|---------------------------------------|---|----|----|----|----|--------|----|
| DUCT<br>DIMENSION | NO<br>REINFORCE-<br>MENT<br>DUCT GAGE | MINIMUM RIGIDITY CLASS ON MINIMUM GAGE DUCT |    |    |    |    |        |    |
|                   |                                       | REINFORCEMENT SPACING                       |    |    |    |    |        |    |
|                   |                                       | 10'   | 8' | 5' | 4' | 3' | 2 1/2' | 2' |
| ①                 | ②                                     | ③   | ④  | ⑤  | ⑥  | ⑦  | ⑧      | ⑨  |
| 10" dn.           | 26 ga.                                |   |    |    |    |    |        |    |
| 11, 12"           | 24 ga.                                |   |    |    |    |    |        |    |
| 13, 14"           | 22 ga.                                |   |    |    |    |    |        |    |
| 15, 16"           | 20 ga.                                |   |    |    |    |    |        |    |
| 17, 18"           | 20 ga.                                |   |    |    |    |    |        |    |
| 19, 20"           | 18 ga.                                |   |    |    |    |    |        |    |

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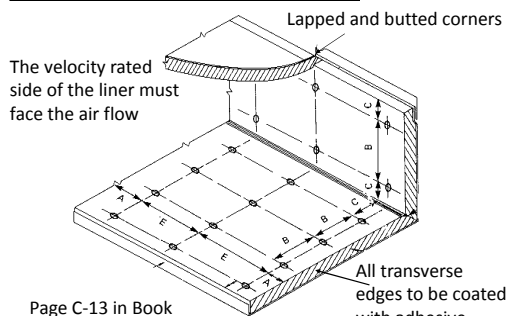
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| Velocity      | Dimensions |     |    |     |
|---------------|------------|-----|----|-----|
|               | A          | B   | C  | E   |
| 0-2500 FPM    | 3"         | 12" | 4" | 18" |
| 2501-6000 FPM | 3"         | 6"  | 4" | 16" |

Maximum spacing  
 for fasteners



Page C-13 in Book

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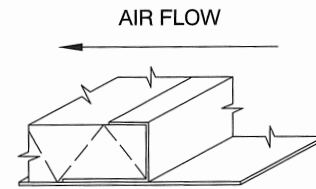
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**NOTE:**

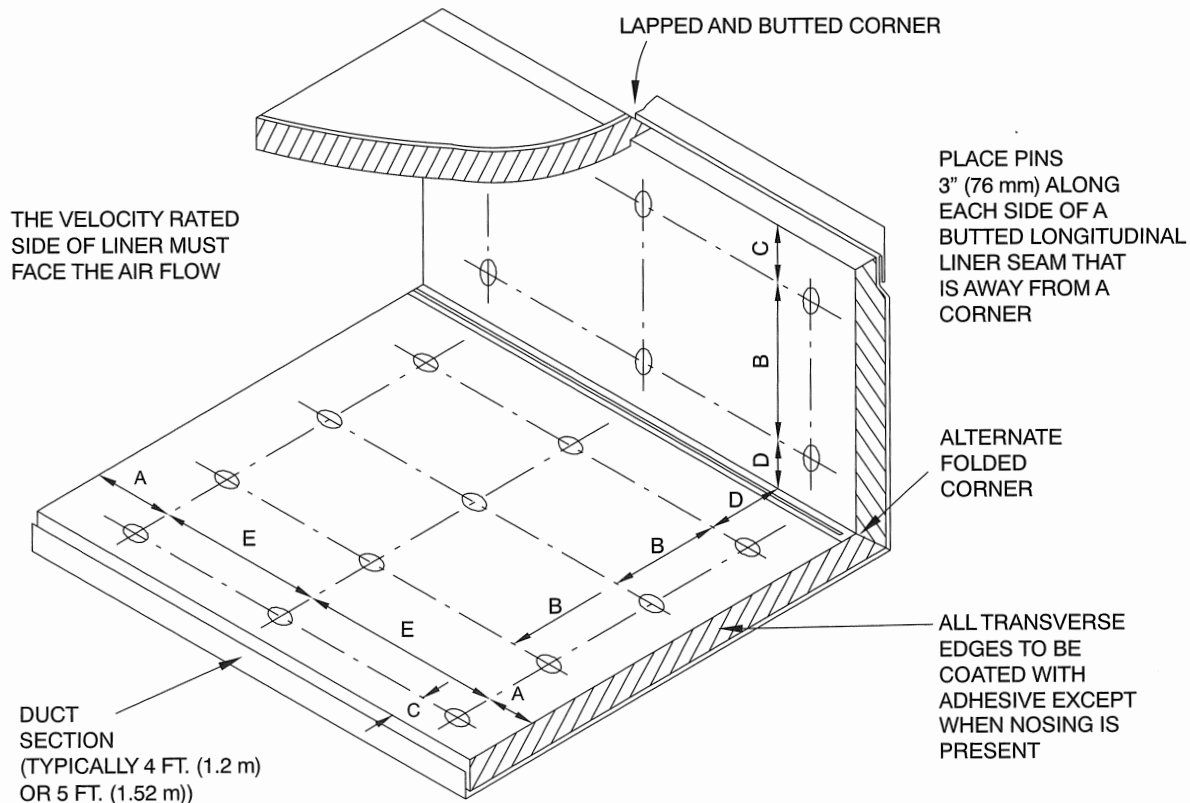
SEE TYPICAL DUCT BRANCH ENTRY CONDITION IN FIG. 4-6.

METAL NOSING MUST BE USED WHEREVER LINER IS PRECEDED BY UNLINED METAL; OTHERWISE WHEN VELOCITY EXCEEDS 4000 FPM (20.3 MPS) USE METAL NOSING ON EVERY LEADING EDGE. NOSING MAY BE FORMED ON DUCT OR BE CHANNEL OR ZEE ATTACHED BY SCREWS, RIVETS OR WELDS.



DETAIL - A  
METAL NOSING  
CHANNEL OR ZEE

INTERIOR WIDTH OF 8" (200 mm) AND LESS DOES NOT REQUIRE PINS.



MAXIMUM SPACING FOR FASTENERS.  
ACTUAL INTERVALS ARE APPROXIMATE.

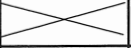

"A" PIN ROW MAY BE OMITTED WHEN METAL NOSING IS USED. "E" THEN STARTS FROM THE NOSING.

| Velocity *                           | Dimensions   |              |             |             |              |
|--------------------------------------|--------------|--------------|-------------|-------------|--------------|
|                                      | A            | B            | C           | D           | E            |
| 0 - 2500 FPM<br>(0 - 12.7 MPS)       | 3"<br>(76.2) | 12"<br>(305) | 4"<br>(102) | 6"<br>(152) | 18"<br>(457) |
| 2501 - 6000 FPM<br>(12.7 - 30.5 MPS) | 3"<br>(76.2) | 6"<br>(152)  | 4"<br>(102) | 6"<br>(152) | 16"<br>(406) |

\* UNLESS A LOWER LEVEL IS SET BY MANUFACTURER OR LISTING AGENCY

**FIGURE 7-11 FLEXIBLE DUCT LINER INSTALLATION**



| 2 in. wg<br>Static<br>Pos. or Neg. | 6 ft Joints         |                 |                         | 6 ft Joints w/3 ft Reinf. Spacing |                 |                         |   |                |
|------------------------------------|---------------------|-----------------|-------------------------|-----------------------------------|-----------------|-------------------------|---|----------------|
|                                    | Min<br>ga           | Joint<br>Reinf. | Alt.<br>Joint<br>Reinf. | Joints/Reinf.                     |                 |                         | Int. Reinf.   |                |
|                                    |                     |                 |                         | Min<br>ga                         | Joint<br>Reinf. | Alt.<br>Joint<br>Reinf. | Tie Rod   | Alt.<br>Reinf. |
| 10 in. and under                   | 26                  | N/R             | N/A                     | <b>Use 6 ft Joints</b>            |                 |                         |   |                |
| 11 – 12 in.                        | 26                  | N/R             | N/A                     |                                   |                 |                         |   |                |
| 13 – 14 in.                        | 26                  | N/R             | N/A                     |                                   |                 |                         |   |                |
| 15 – 16 in.                        | 26                  | N/R             | N/A                     |                                   |                 |                         |   |                |
| 17 – 18 in.                        | 26                  | N/R             | N/A                     |                                   |                 |                         |   |                |
| 19 – 20 in.                        | 26                  | N/R             | N/A                     |                                   |                 |                         |   |                |
| 21 – 22 in.                        | 26                  | N/R             | N/A                     |                                   |                 |                         |   |                |
| 23 – 24 in.                        | 26                  | N/R             | N/A                     |                                   |                 |                         |   |                |
| 25 – 26 in.                        | 24                  | N/R             | N/A                     | 26                                | N/R             | N/A                     | MPT   | C              |
| 27 – 28 in.                        | 22                  | N/R             | N/A                     | 26                                | N/R             | N/A                     | MPT   | D              |
| 29 – 30 in.                        | 22                  | N/R             | N/A                     | 26                                | N/R             | N/A                     | MPT   | D              |
| 31 – 36 in.                        | 22                  | N/R             | N/A                     | 24                                | N/R             | N/A                     | MPT   | E              |
| 37 – 42 in.                        | 20                  | N/R             | N/A                     | 24                                | N/R             | N/A                     | MPT   | E              |
| 43 – 48 in.                        | 20                  | JTR             | (2) E                   | 22                                | N/R             | N/A                     | MPT   | F              |
|                                    | 18                  | N/R             | N/A                     |                                   |                 |                         |   |                |
| 49 – 54 in.                        | 18                  | JTR             | (2) H                   | 22                                | JTR             | (2) C                   | 2 MPT   | G              |
|                                    |                     |                 |                         | 20                                | N/R             | N/A                     | 2 MPT   | G              |
| 55 – 60 in.                        | 18                  | JTR             | (2) H                   | 22                                | JTR             | (2) C                   | 2 MPT   | G              |
|                                    |                     |                 |                         | 20                                | N/R             | N/A                     | 2 MPT   | G              |
| 61 – 72 in.                        | 16                  | JTR             | (2) H                   | 22                                | JTR             | (2) E                   | 2 MPT   | H              |
| 73 – 84 in.                        | <b>Not Designed</b> |                 |                         | 20                                | JTR             | (2) H                   | 2 MPT   | I              |
| 85 – 96 in.                        |                     |                 |                         | 18                                | JTR             | (2) H                   | 2 MPT   | I              |
| 97 – 108 in.                       |                     |                 |                         | 18                                | JTR             | (2) I                   |  | K              |
| 109 – 120 in.                      |                     |                 |                         | 16                                | JTR             | (2) I                   |  | K              |

**Table 2–24 6 ft Coil/Sheet Stock/T25a/T25b (TDC/TDF) Duct Reinforcement**

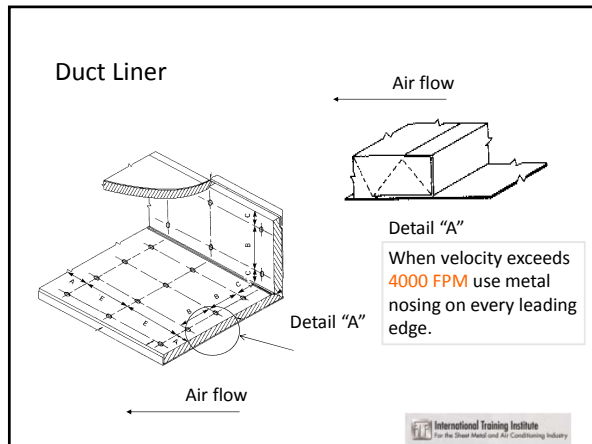
N/R - Not Required

N/A - Not Applicable

JTR - Joint Tie Rod

MPT - Mid Panel Tie Rod(s)

(2) (X) - Indicates 2 external reinforcements of class (X) to be used in lieu of Joint Tie Rods



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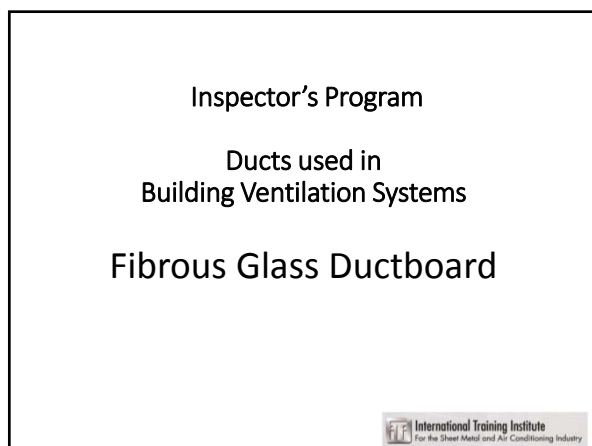
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**Rigid Fibrous Glass**

| <u>Applications</u>   | <u>Advantages</u>   |
|---|---|
| <ul style="list-style-type: none"><li>• Interior HVAC low pressure duct systems</li></ul> | <ul style="list-style-type: none"><li>• Light weight</li><li>• Thermal insulation and vapor barrier</li><li>• Acoustical qualities</li><li>• Ease of modification</li><li>• Inexpensive tooling for fabrication</li></ul> |

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### Rigid Fibrous Glass

#### Limitations:

Maximum static pressure in duct  
2" W.G., positive or negative

Maximum air velocity in duct  
2,400 feet per minute

Maximum allowable deflection  
Duct width/100 (for rectangular duct wall)



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### Rigid Fibrous Glass

#### Restrictions (should not be used in the following applications):

- Kitchen exhaust
- Installation in concrete or buried below grade
- Outdoors
- Immediately adjacent to high temperature electric heating coils without radiation protection (Refer to NFPA Standard 90A)
- In more than two stories of riser
- With equipment of any type that does not include automatic maximum temperature controls
- With coal or wood fueled equipment
- As penetrations in construction where fire dampers are required
- Where normal operating pressure or occasional over pressure would exceed product rating
- Where moisture would collect in duct



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### Mounting Accessories

When mounting equipment, such as dampers, control motors, etc., the duct system must be adequately reinforced and supported to accommodate the additional weight of the material and equipment without damage to the duct material.



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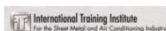
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### Health Aspects

- International Agency for Research on Cancer (IRAC)
- Has classified fibrous glass wool as "possible carcinogenic to humans"
- Occupational Safety and Health Administration (OSHA)
- Regulates fibrous glass particle exposure as nuisance dust
- United States Department of Health
- Prohibits the use of duct linings in systems supplying:
    - Operating rooms
    - Delivery rooms
    - Recovery rooms
    - Nurseries
    - Isolation rooms
    - Intensive care units




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### Fiberglass Duct

| TOOL NO | CUT PROFILE | DESCRIPTION        |
|---------|-------------|--------------------|
| 1       |             | LH FM SHIPLAP      |
| 2       |             | LH MOD COR SHIPLAP |
| 3       |             | RH MOD COR SHIPLAP |
| 4       |             | RH CLOSURE FLAP    |
| 5       |             | LH CLOSURE FLAP    |
| 6       |             | 90° V GROOVE       |




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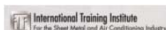
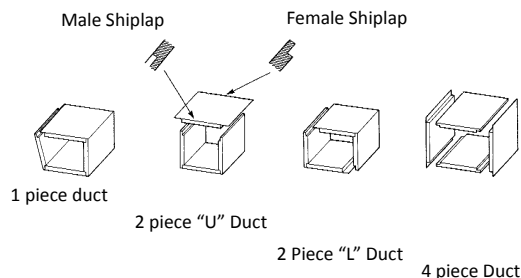
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### Closure Configurations




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### Closure System

The closure system is a vital part in the proper assembly of a fibrous glass duct system.

- Must comply with UL 181 or UL 181A
  - Pressure sensitive aluminum tape
  - Heat activated aluminum foil tape
  - Mastic and glass fabric tape system

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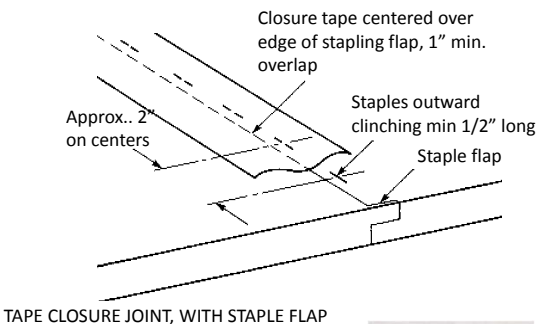
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### Joint and Seam Preparation



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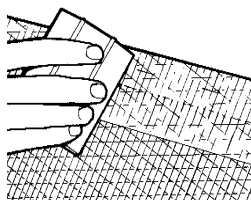
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### Pressure Sensitive Tape

- Corner Seams are closed with staples
- Tape is centered over the edge of the flap
- Tape must be free of wrinkles, uniformly adhered and pressed sufficiently to show duct facing reinforcement impressions in the tape



International Training Institute  
For the Sheet Metal and Air Conditioning Industry

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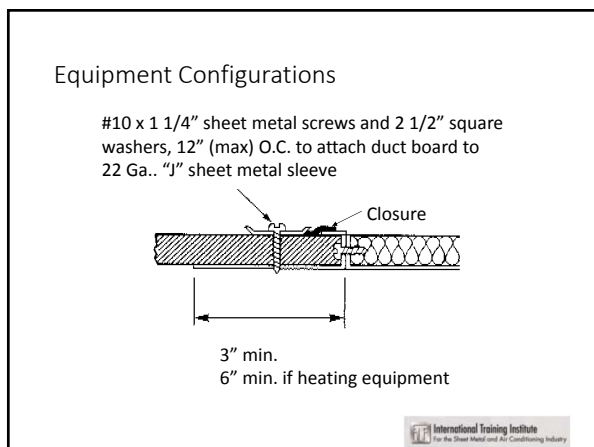
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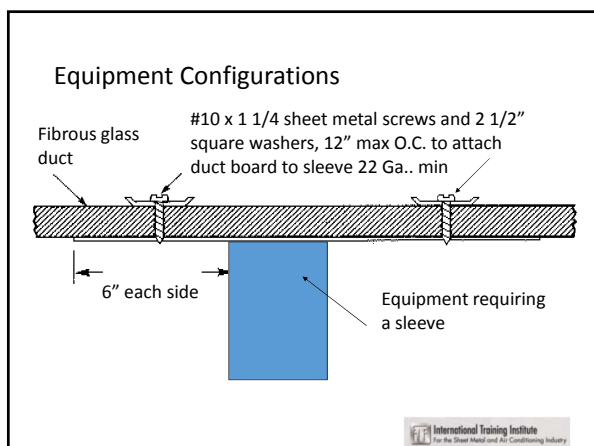
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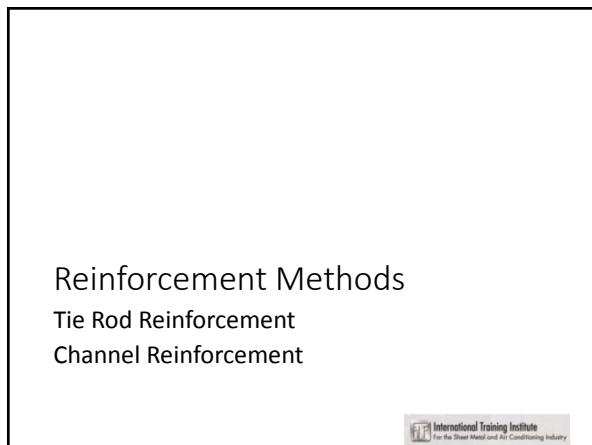
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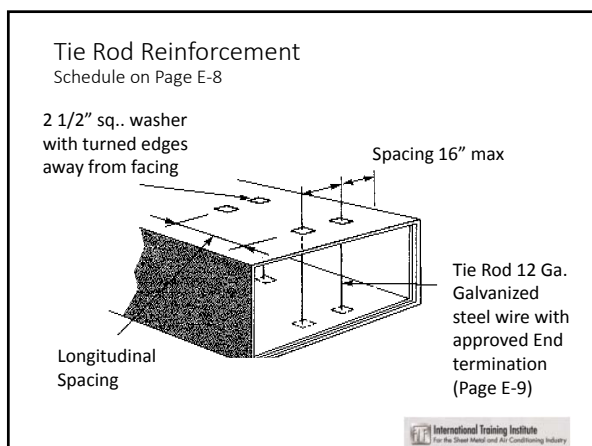
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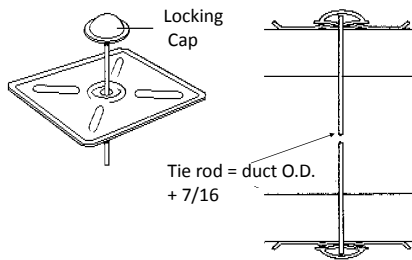
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Typical Tie Rod Termination



LOCKING CAP TERMINATION

International Training Institute  
 For the Sheet Metal and Air Conditioning Industry

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TIE ROD SYSTEM REINFORCEMENT SCHEDULE

| Positive Static Pressure | Maximum Inside Duct Dimension, Inches | TYPE 475 BOARD            |                              |                            | TYPE 800 BOARD            |                              |                            |
|--------------------------|---------------------------------------|---------------------------|------------------------------|----------------------------|---------------------------|------------------------------|----------------------------|
|                          |                                       | No. Rods Across Dimension | Maximum Longitudinal Spacing | No. Rods Per 4 Ft. Section | No. Rods Across Dimension | Maximum Longitudinal Spacing | No. Rods Per 4 Ft. Section |
| 0 thru 1/2" W.G.         | 0-36                                  | NOT REQUIRED              |                              |                            | NOT REQUIRED              |                              |                            |
|                          | 37-42                                 | 2                         | 24"                          | 4                          | 2                         | 48"                          | 2                          |
|                          | 43-48                                 | ↓                         |                              | ↓                          | ↓                         |                              | ↓                          |
|                          | 49-60                                 | 3                         |                              | 6                          | 3                         | ↓                            | 3                          |
|                          | 61-64                                 | ↓                         |                              | ↓                          | ↓                         | 24"                          | 6                          |
|                          | 65-80                                 | 4                         |                              | 8                          | 4                         | ↓                            | 8                          |
|                          | 81-96                                 | 5                         | ↓                            | 10                         | 5                         | ↓                            | 10                         |

PAGE E-8

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 For the Sheet Metal and Air Conditioning Industry

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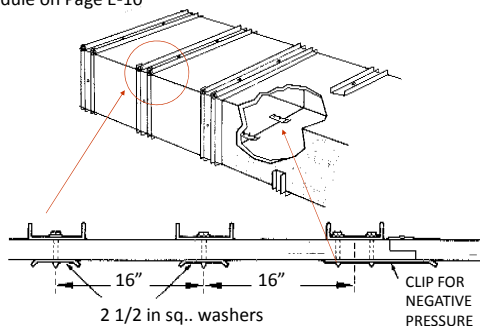
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Channel Reinforcement  
 Schedule on Page E-10



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 For the Sheet Metal and Air Conditioning Industry

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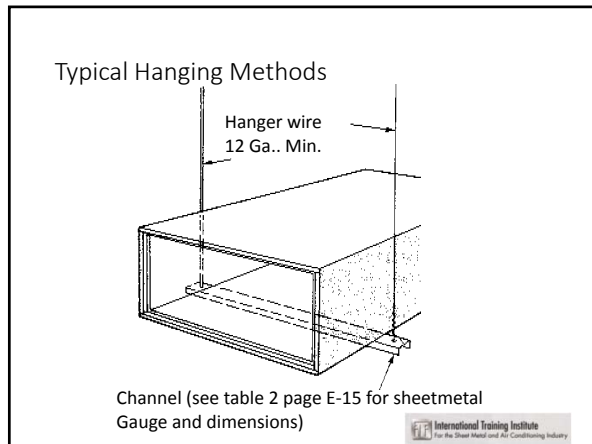
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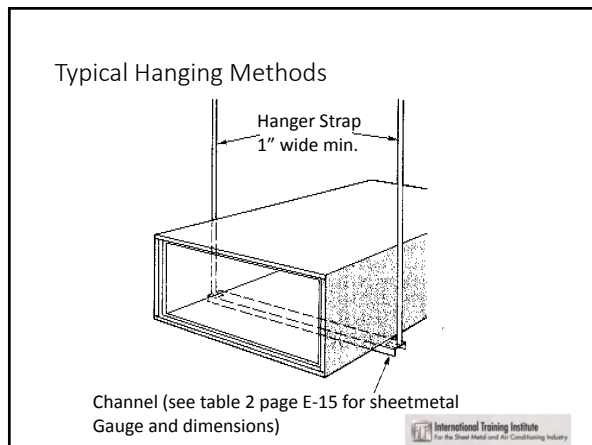
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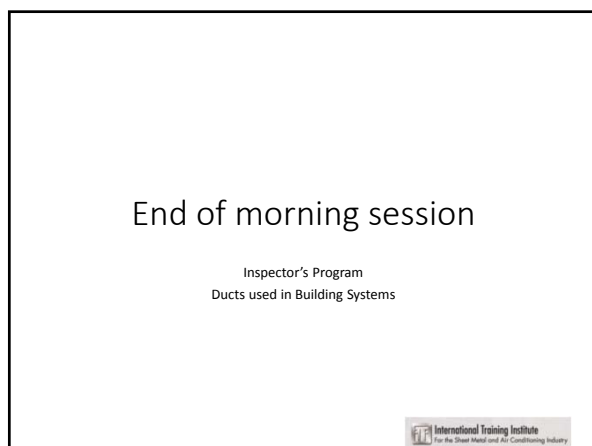
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Afternoon Session

**OEDM**  
**CBOA**  
**CFMA**  
NOVEMBER 3, 2017

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

**Mechanical Systems for  
Fire Life Safety and Building Ventilation**

**Ducts Used for Fire Life Safety Systems**

**Mark Mastropasqua,**  
Training Coordinator, Sheet Metal Workers Union

**Jeremy Zeedyk,**  
Business Representative, SMART Local Union

Use of Office of Education and Data Management (OEDM) training materials must be approved in writing by the State of Connecticut,  
Department of Administrative Services' Office of Communications.

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## HVAC Fire Life Safety

Proper installation, inspection, and maintenance of HVAC Life Safety Dampers (Fire Dampers, Smoke Dampers, Combination Fire Smoke Dampers, Ceiling Dampers and Corridor Dampers)

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## What To EXPECT?

1. What is a Life Safety Damper and why they are important?
2. Brief Video Clips
3. About our Certifications and the Codes
4. Wrap-up

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## The HVAC SYSTEM AND FIRE LIFE Safety

"The primary purpose of the HVAC system is to maintain a desired environmental condition by regulating temperature, humidity, air motion, and air quality... the smoke and fire features of the HVAC system are inextricably linked to the fire protection design. The HVAC system generally penetrates every occupiable space of every floor, compartment, and sometimes the concealed spaces of modern buildings, potentially conveying fire, lethal smoke, and toxic gases to areas remote from the origin of the fire."

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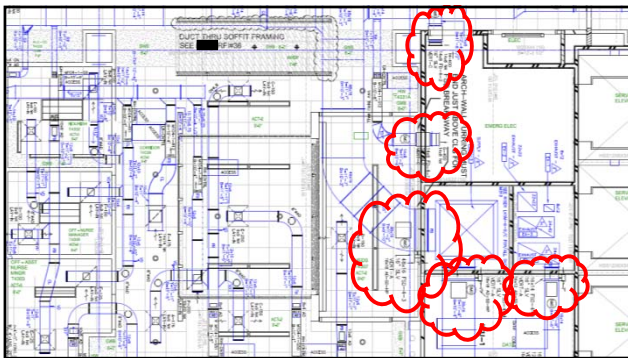
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## The HVAC SYSTEM AND FIRE LIFE Safety Continued...

"The successful operation of all building systems, including fire and smoke dampers, can mean the difference between a nuisance fire and a catastrophe. Proper installation, compliance with codes and standards, inspection and regular maintenance are inextricably linked to the successful operation of such dampers in the event of a fire incident...most fire disasters are the result of small deficiencies working in a 'domino effect' resulting in total building failure. According to renowned fire expert Vytenis Babrauskas, PhD, there 'have been very few major fire disasters which did not involve a series of failures.'"

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### A Couple Short Video CLIPS

**HVAC Fire Life Safety:**  
Reducing the Risk- FLS Level 1 Technician

**HVAC Fire Life Safety:**  
Controlling Smoke- FLS Level 2 Technician

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THIS IS ALL ABOUT SAFETY AND IT  
IS MORE IMPORTANT NOW THAN  
EVER.

Modern Building Materials VS. Legacy Building  
Materials

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## What are HVAC life safety dampers?

HVAC Life Safety Dampers include:

- Fire Dampers
- Smoke Dampers
- Combination Fire and Smoke Dampers
- Ceiling (radiation) Dampers
- Corridor Dampers

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## Fire Dampers

The 2012 ICC International Building Code States:

### CHAPTER 2 DEFINITIONS

**FIRE DAMPER.** A listed device installed in ducts and air transfer openings designed to close automatically upon detection of heat and resist 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.

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## UNDERWRITERS LABORATORIES (UL)

UL is a global independent safety science company with more than a century of expertise innovating safety solutions from the public adoption of electricity to new breakthroughs in sustainability, renewable energy and nanotechnology.

Dedicated to promoting safe living and working environments, UL helps safeguard people, products and places in important ways, facilitating trade and providing peace of mind.

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## Fire Dampers


The process of selecting a fire damper involves significant consideration of the following factors:



DFD35: UL 555 1.5 hr. Dynamic, V-Groove Blade, 2,000 fpm and 4" w.g. max, Optional Sleeve

- Hourly Fire-Resistance Rating
  - Operability
- Mounting Orientation
- Pressure Drop (air flow)
  - Space Envelope
- Dynamic Closure

DIBD630: UL 555 3 hr. Dynamic, Curtain Type, 4,000 fpm and 4" w.g. max, 16" Integral Frame/Sleeve



Fire Dampers  
 Fire dampers are UL555 tested and labeled devices installed in ducts and air transfer openings or air distribution systems, designed to close upon the detection of heat.

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## UL555

The Tests Dampers must endure to earn the UL555 Labeling are the following:

- Fire Endurance and Hose Stream Test
- Spring Closing Force Test (2.5x force to successfully close damper)
- Salt-Spray Exposure Test (opened & salt spray 5 days-dry 24hours-must cycle)
- Cycling Test (after salt spray-without actuators 250x, with 20,000 OR 100,000 if balancing)
- Dynamic Closure Test (heated air flows both directions & close (2400fpm 4.5" w.g. = 2000fpm 4" w.g. rating)
- Duct Impact Test
- Hydrostatic Strength Test for Pneumatic Actuators

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## UL555

**UL555 Duct Impact Test:**  
**UL555 Damper Fire Test:**

- According to UL 555's Scope:

"1.3....a fire damper is subjected to a standard fire exposure, controlled to achieve specified temperatures throughout a specified time period, followed by the application of a specified standard hose stream. This exposure by itself is not representative of all fire conditions; conditions vary with changes in the amount, nature, and distribution of fire loading, ventilation, compartment size and configuration, and heat sink characteristics of the compartment. These requirements provide a relative measure of fire performance of fire damper assemblies under these specified fire exposure conditions. Any variation from the construction or conditions that are tested such as method of installation and materials has the potential to substantially change the performance characteristics of the fire damper assembly."

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## Smoke Dampers

The 2012 ICC International Building Code States:

### CHAPTER 2 DEFINITIONS

**SMOKE DAMPER.** A listed device installed in ducts and air transfer openings designed to resist the passage of smoke. The device is installed to operate automatically, controlled by a smoke detection system, and where required, is capable of being positioned from a fire command center.

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## Smoke Dampers

Factors involved in selecting a smoke damper include its:

- Leakage
- Temperature rating
- Operability under heat/ flow and pressure
- Mounting configuration
- Control Function
- Actuating Device

### Smoke Dampers

Smoke dampers are UL555S tested and labeled, low leak damper and actuator assemblies constructed to restrict the spread of smoke in HVAC systems that are designed to be automatically shut down in the event of a fire, or opened to control the movement of smoke within a building when the HVAC system is part of an engineered smoke control system.



SD60: UL 555S Class I, Galvanized, Airfoil Blade, 4,000 fpm and 8" w.g. max

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## UL555S

The Tests Dampers must endure to earn the UL555S Labeling are the following:

- Cycling Test (after salt spray-without actuators 250x, with 20,000 OR 100,000 if balancing)
- Temperature Degradation Test (250°F inc. of 100°F for 30min immediately cycled 3x)
  - Leakage Tests (measure CFM/ ft<sup>2</sup> damper area)
- Operation Test (heat 250°F or 350°F min airflow 2400 4.5 w.g. for 15 min-cycled-cooled-cycled 3x ambient temp.)
- Salt-Spray Exposure Test Fire Exposure Test (opened & salt spray 5 days-dry 24hours-must cycle)
  - Accelerated Aging Test
  - Performance Tests for Actuators

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## Combination Fire and Smoke Dampers

**Combination Fire and Smoke Dampers must meet the requirements of both a dynamic fire damper and a smoke damper. (Commonly called Fire/Smoke damper)**

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## Combination Fire and Smoke Dampers

The Selection factors for Fire Dampers and Smoke Dampers also apply to Combination Fire/Smoke Dampers. These Factors are:

- Hourly Fire Resistance Rating
- Leakage
- Temperature Rating
- Operational Rating
- Blade Style
- Space Envelope

FSD35: UL 555/555S 1.5 hr./Class III, V-Groove Blade, 2,000 fpm and 4" w.g. max, Optional Sleeve



Combination Fire & Smoke Dampers  
 Combination Fire/Smoke dampers are low leak damper and actuator assemblies that have passed the UL555 and UL555S test requirements.

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## Ceiling Dampers

**Ceiling (radiation) Dampers** protect HVAC penetrations in fire-resistive ceiling/floor or ceiling roof assemblies. They are designed with fabric, sheet rock or other similar insulation material to limit the radiation of heat to the joists above the ceiling.

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## Ceiling Dampers

Factors involved in selecting a Ceiling (radiation) Damper include its:

- Type
- Floor/ ceiling or roof/ ceiling assembly design
- Space Envelope
- Mounting Configuration

CFD8: UL 555C Classified, Rectangular, Low-Profile



CFD5: UL 555C Classified, Rectangular




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## UL555C

- Fire Endurance Test (exposed to fire situation & compared to benchmark trial damper hinged door sheet metal damper)
- Closing Reliability Test (cycled 250x)
- Salt-Spray Exposure Test (opened & salt spray 5 days-dry 24 hours-must cycle)
- Spring Closing Force Test (2.5x force to successfully close damper)
- Dynamic Closure Test

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## HVAC Corridor Dampers

Corridor Dampers are one-hour rated combination fire/smoke dampers specifically designed for installation in corridor ceiling construction.

### Corridor Dampers

Corridor dampers are tested in accordance to UL555 and are Class 1 and Class 2 leakage rated per UL555. The dampers are for use where air ducts penetrate or terminate at horizontal openings in the ceilings of wood stud or metal stud constructed interior tunnel corridors.

FSD60C: UL 555/555S 1 hr./Class I, Airfoil Blade, Corridor Damper




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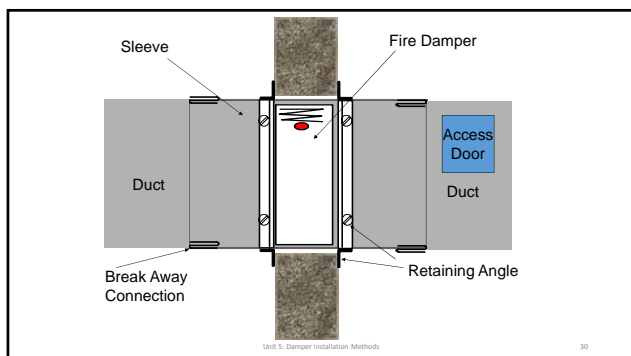
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Retaining Angles



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Damper Shapes



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Airflow



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THE Department of consumer  
protection (DCP) and Its  
Importance

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THE DCP- "ABOUT US"

We License: Each year, the Department of Consumer Protection issues over 200,000 licenses, registrations, and permits for more than 200 types of jobs and businesses, including pharmacies, liquor stores, casinos, mobile home parks, electricians, home improvement contractors, lottery agents and real estate brokers, to name just a few. We also oversee food and beverage industries, to ensure safety and wholesomeness. We regulate gasoline retailers and home heating fuel dealers, and oversee the production and distribution of all prescription medication in the state.

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THE DCP- "ABOUT US" CONT.

We Regulate: We enforce many federal and state laws, investigate consumer complaints and mediate disputes between consumers and businesses. The Connecticut Unfair Trade Practices Act gives us broad authority over unfair business activity and offers the possibility of financial restitution for consumers who have been unfairly treated. The Pure Food, Drug and Cosmetic Act, the State Child Protection Act and the Weights and Measures Act also help us safeguard residents from harmful products and from unfair or dishonest treatment.

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### THE DCP- "ABOUT US" CONT.

**We Monitor:** To protect citizens from unfair businesses and unsafe products, we continually monitor the marketplace and remove tainted, fraudulent, and dangerous products from store shelves. We inspect gasoline pumps, scales and all measuring devices used in business to ensure their accuracy. We prevent the illegal sale or prescribing of prescription drugs, and we work to put scam artists out of business and to keep alcoholic beverages away from minors and intoxicated persons. We also ensure the integrity of all forms of legalized gaming.

<http://www.ct.gov/dcp/cwp/view.asp?a=4303&q=506440>

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### THE DCP- "ABOUT US" Lastly

**We Protect:** A written complaint is the first step a consumer must take to alert us of a problem. We carefully review each complaint, investigate as needed, and work to find a solution that restores fairness, ensures legal compliance, and wherever possible and appropriate, provides monetary restitution to the consumer.

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FROM ONE OF OUR  
CONTRACTORS...

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## The Goal...

Sheet Metal Worker's Local Union 40's goal is to partner with The Office of the State Fire Marshal, The Office of the State Building Inspector, The Connecticut State Fire Marshal's Association, and the Department of Consumer Protection to help bring buildings within our state into existing Code compliance.

We are concerned about building occupants safety throughout the state. It is our goal to raise awareness about damper inspections and ensure they are being performed correctly. We are not looking to create more work for any Fire Marshal or Building Inspector. In fact, we are looking to perform the work with ANSI accredited certified individuals to bring peace of mind that the job is being done correctly.

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We have ANSI accredited technicians, supervisors, and contractors available to perform inspections and fix any deficiencies should they be found. Life Safety Dampers are integral components to HVAC systems and are installed by sheet metal workers. Sheet metal in the state of Connecticut is a licensed trade. Therefore, we believe the most qualified candidates to help bring buildings into code compliance are licensed sheet metal workers who underwent training to become ANSI accredited Fire Life Safety Technicians, Supervisors, and Contractors.

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- Please note the use of an ANSI accredited certification. ANSI is a nationally recognized institute that "oversees the creation, promulgation and use of thousands of norms and guidelines that directly impact businesses in nearly every sector." Anyone can create an ANSI accredited certification as long as they put the time and effort into it. The sole purpose of recognizing an ANSI accredited certification is to ensure it is not just any certification that someone can draft up overnight. This allows for a certification to carry weight and guarantees that certifications conform to ISO/IEC 17024 standards.

For more information about ANSI please visit:

[https://www.ansi.org/about\\_ansi/overview/overview.aspx?menuid=1](https://www.ansi.org/about_ansi/overview/overview.aspx?menuid=1)

For more information on to ISO/IEC 17024 standards please visit:

<https://www.iso.org/obp/ui/#iso:std:iso-iec:17024:ed-2:v1:en>

- Through education and cooperation with the Fire Marshals and Building Inspectors, and acceptance of an ANSI accredited Fire Life Safety certification, we would like to gain the support of The Connecticut Fire Marshals Association

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What the codes say about  
fire life safety.

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OFFICE OF THE STATE FIRE  
MARSHAL

OFFICE OF THE STATE  
BUILDING INSPECTOR

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THE OFFICE OF THE STATE  
FIRE MARSHAL

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## The State Fire Marshal

**Mission Statement:** The Office of State Fire Marshal is part of the Department of Administrative Services. This Office is responsible for promulgating and enforcing codes, standards and regulations to reduce the harm associated with fires, explosions, and mechanical failures. Connecticut General Statutes Chapter 541, Section 29-291 gives the statutory authority to the Office of State Fire Marshal.

<http://www.ct.gov/dcs/cwp/view.asp?a=4489&q=530894&dcsNav=1>

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<http://www.ct.gov/dcs/cwp/view.asp?a=4489&q=530894>

| Regulations Administered by the Office of State Fire Marshal   |                                   |   |
|--|-----------------------------------|---|
| Public Safety and State Police                                 |                                   |   |
| Regulation   | Connecticut General Statutes Ref. | Effective Date                                    |
| State Fire Safety Code   | 29-292                            | December 31, 2001                                 |
| Amendments to State Fire Safety Code                           | 29-292                            | August 1, 2008                                    |
| Code on Issuance of Fire Entrepreneurs and Entrepreneur Agents | 29-311                            | June 15, 1994                                     |
| Regulations on Hotels and Motels                               | 29-312                            | December 31, 1988                                 |
| Gas Burning & Equipment Code                                   | 29-317                            | January 24, 1997                                  |
| Flammable & Combustible Liquids Code                           | 29-320                            | January 24, 1997                                  |
| Gas Cleaning Regulations                                       | 29-325                            | June 15, 1994                                     |
| Gas Equipment & Piping Code                                    | 29-329                            | January 24, 1997                                  |
| Compressed Gases Gas & Liquid Natural Gas Code                 | 29-330                            | January 24, 1997                                  |
| Flammable Chemicals Code                                       | 29-337                            | December 31, 1997                                 |
| Storage, Transportation & Use of Explosives & Blasting Agents  | 29-340                            | April 18, 1972<br>Reinstated on December 24, 1987 |
| Fireworks & Special Effects Code                               | 29-347                            | December 24, 1989                                 |
| Model Building Code  | 29-347                            | March 26, 1981                                    |
| Moving Picture Theater Code                                    | 29-350                            | July 21, 1997                                     |
| Mechanical Assessment Rule & Device Code                       | 29-329                            | March 3, 1998                                     |
| Door & Portable Shelter Code                                   | 29-348                            | December 2, 1999                                  |
| Chemistry Based for Case Operators                             | 29-323                            | August 17, 1999                                   |
| Phone Disconnection Code                                       | 29-401                            | March 26, 1981                                    |
| State Fire Prevention Code                                     | 29-291a                           | July 1, 2010                                      |

[Go to the Regulations of CT State Agencies, click link](#)

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## CT FIRE CODE DOCUMENTS

Connecticut Fire Code Documents

CT State Fire Safety Code

2016 CT Fire Safety Code **NEW**

2012 Amendment

2002 Amendment

2005 CT State Fire Safety Code

OSFM Regulations

Fire Safety Code Modifications

Fire Safety Code Alerts

CT State Fire Prevention Code

2015 CT State Fire Prevention Code **NEW**

2010 CT State Fire Prevention Code (Note: This code has been superseded by the 2015 Code)

Fire Prevention Code Advisory Committee

[Where to Purchase Model Code Books](#)

**Free access to all NFPA Codes and Standards**

<http://www.ct.gov/dcs/cwp/view.asp?a=4489&q=530894>

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### Regulations of the Office of the State Fire Marshal

- The CT Fire Code is comprised of 2 regulations:

- **1. The CT State Fire Safety Code**

- Most recently adopted version became effective October 1, 2016 and incorporates the 2012 ICC International Fire code as well as 2012 NFPA Standard 101.

- **2. The CT State Fire Prevention Code**

- Most recently adopted version became effective May 7, 2015. Incorporates NFPA 80 (2010 Edition) NFPA 90A (2012 Edition) and NFPA 105 (2010 Edition) and includes them as part of the CT State Fire Prevention Code itself.

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### 2016 CT State Fire Safety Code

The 2016 CT State Fire Safety Code states the following:

**C H A P T E R 7 FIRE-RESISTANCE-RATED CONSTRUCTION** (of the 2012 ICC International Fire code)

(Del) **CHAPTER 7 FIRE-RESISTANCE-RATED CONSTRUCTION.**

Delete Chapter 7 in its entirety and replace with the following:

**C H A P T E R 7 FIRE AND SMOKE PROTECTION FEATURES**

(Amd) **701.1 Scope.** The provisions of Chapter 7 of the 2012 International Building Code as amended in this Chapter shall govern the materials, systems and assemblies used for fire resistance-rated construction of adjacent spaces to safeguards against the spread of fire and smoke within a building and the spread of fire to or from buildings

[http://www.ct.gov/dcs/lib/dcs/office\\_of\\_state\\_building\\_inspector\\_files/2016\\_ct\\_state\\_fire\\_safety\\_code\\_effective\\_10-1-2016.pdf](http://www.ct.gov/dcs/lib/dcs/office_of_state_building_inspector_files/2016_ct_state_fire_safety_code_effective_10-1-2016.pdf)

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### 2016 CT State Fire Safety Code

The 2016 CT State Fire Safety Code's inclusion of the ICC 2012 International Building Code states the following:

**"Section 717.2 Installation. Fire Dampers, Smoke Dampers, Combination Fire and Smoke Dampers, and ceiling radiation dampers located within air distribution and smoke control systems shall be installed in accordance with the requirements of this section, the manufacturer's installation instructions, and the damper's listing."**

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2016 CT State Fire Safety Code

**Most if not all Fire Life Safety Damper's  
Installation Instructions point back to  
Maintenance per the NFPA standards.**

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The following is an excerpt from a Ruskin FSD35 Combination Fire and  
Smoke Damper's installation instructions:

8 .Installation and Maintenance To ensure optimum operation and performance, the damper must be installed so it is square and free from racking. Each fire/smoke damper should be maintained, cycled and tested at intervals not less than every six months and in accordance with the latest editions of NFPA 90A, 92A, UL864, local codes and in accordance with actuator manufacturer recommendations. Care should be exercised to ensure that such tests are performed safely and do not cause system damage.

<http://www.ruskin.com/catalog/servefile/id/969>

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Ruskin FSD35 Combination Fire and Smoke Damper's installation  
instructions example continued:

The latest version of NFPA 90A is the 2015 edition and it states:

**"5.4.8 Maintenance**

5.4.8.1 Fire dampers and ceiling dampers shall be maintained in accordance with NFPA 80, *Standard for Fire Doors and Other Opening Protectives*.

5.4.8.2 Smoke dampers shall be maintained in accordance with NFPA 105, *Standard for Smoke Door Assemblies and Other Opening Protectives*."

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### 2015 CT State Fire Prevention Code

- NFPA 90A (2012 Edition) section 5.4.8 addresses Maintenance. Subsection, 5.4.8.1 states, "Fire dampers and ceiling dampers shall be maintained in accordance with NFPA 80." Subsection 5.4.8.2 states, "Smoke Dampers shall be maintained in accordance with NFPA 105."
- The CT State Fire Prevention Code's NFPA 80 (2010 Edition) inclusion states the following:
  - 19.4 Periodic Inspection and Testing
  - 19.4.1. Each damper shall be tested and inspected 1 year after installation.
  - 19.4.1.1. The test and inspection frequency shall then be every 4 years, except in hospitals, where the frequency shall be every 6 years.
- The CT State Fire Prevention Code's NFPA 105 (2010 Edition) inclusion states the following:
  - 6.5. Periodic Inspection and Testing
  - 6.5.2. Each damper shall be tested and inspected one year after installation. The test and inspection frequency shall then be every 4 years, except in hospitals, where the frequency shall be every 6 years.

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## THE OFFICE OF THE STATE BUILDING INSPECTOR

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### The State Building Inspector

- The Office of the State Building Inspector is part of the Division of Construction Services. The Office of the State Building Inspector establishes and enforces building, electrical, mechanical, plumbing and energy code requirements necessary to promote the health and safety of the people of Connecticut by reviewing, developing, adopting and administering the State Building Code.

<http://www.ct.gov/dcs/cwp/view.asp?a=4447&q=521446>

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### 2016 Connecticut State Building Code

The former Connecticut State Building Code incorporated the International Code Council's International Mechanical Code 2003 edition.

The new 2016 Connecticut State Building Code effective October 1, 2016 incorporates the International Code Council's International Mechanical Code 2012 edition.

Both editions of the International Mechanical Code state the following:

- "Section 607.2 Installation. Fire Dampers, smoke dampers, combination fire/smoke dampers and ceiling dampers located within air distribution and smoke control systems shall be installed in accordance with the requirements of this section, and the manufacturer's installation instructions and listing."
- Most if not all Fire Life Safety Damper's Installation Instructions point back to Maintenance per the NFPA standards.

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The following is an excerpt from a Ruskin FSD35 Combination Fire and Smoke Damper's installation instructions:

8 .Installation and Maintenance To ensure optimum operation and performance, the damper must be installed so it is square and free from racking. Each fire/smoke damper should be maintained, cycled and tested at intervals not less than every six months and in accordance with the latest editions of NFPA 90A, 92A, UL864, local codes and in accordance with actuator manufacturer recommendations. Care should be exercised to ensure that such tests are performed safely and do not cause system damage.

<http://www.ruskin.com/catalog/servefile/id/969>

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**Both the current Office of the State Fire Marshal Regulations and the current Connecticut State Building Code mandate inspections, maintenance, and proper installation of Life Safety Dampers.**

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Questions?

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Thank you all for  
attending.

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



**Mechanical Systems for  
Fire Life Safety and Building Ventilation**

**Mark Mastropasqua,**  
Training Coordinator, Sheet Metal Workers Union  
**Jeremy Zeedyk,**  
Business Representative, SMART Local Union

Use of Office of Education and Data Management (OEDM) training materials must be approved in writing by the State of Connecticut,  
Department of Administrative Services' Office of Communications.

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