RICHMOND
INTERNATIONAL CODE COUNCIL 2018

Welcome to the

2018 Annual Conference Educational Sessions

Session: Installation & Inspection of Grease Duct Wrap Material

Sponsored by ORACLE

INSTALLATION AND INSPECTION OF GREASE DUCT WRAP MATERIAL

INTRODUCTIONS

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PACKET INFORMATION

- Morgan Thermal Ceramics
- 3M
- Frywrap
- IFC EJ (GDW and Air)
- IFC on duct protection
- Other products (dryer wrap, plenum wrap)
- ASTM E2336
- Tests for GDW- list
- Boston Fire
- Evaluation (class info/instructor)

TODAYS AGENDA?

- Install duct wrap (banding not pins)
- Learn how it is tested, so you know how it can fail
- Learn about some of the more challenging scenarios
- Based on what you know, we will discuss what to do during your next inspection.
- ~~Hoods, fans, duct installation, sprinklers~~

FIRES RELATED TO COOKING EQUIPMENT REPRESENT THE LARGEST CATEGORY OF EATING AND DRINKING ESTABLISHMENT FIRES IN THE US

HOW DID WE PROTECT GREASE DUCTS IN THE PAST?

HISTORICAL SOLUTIONS

ASTM E119

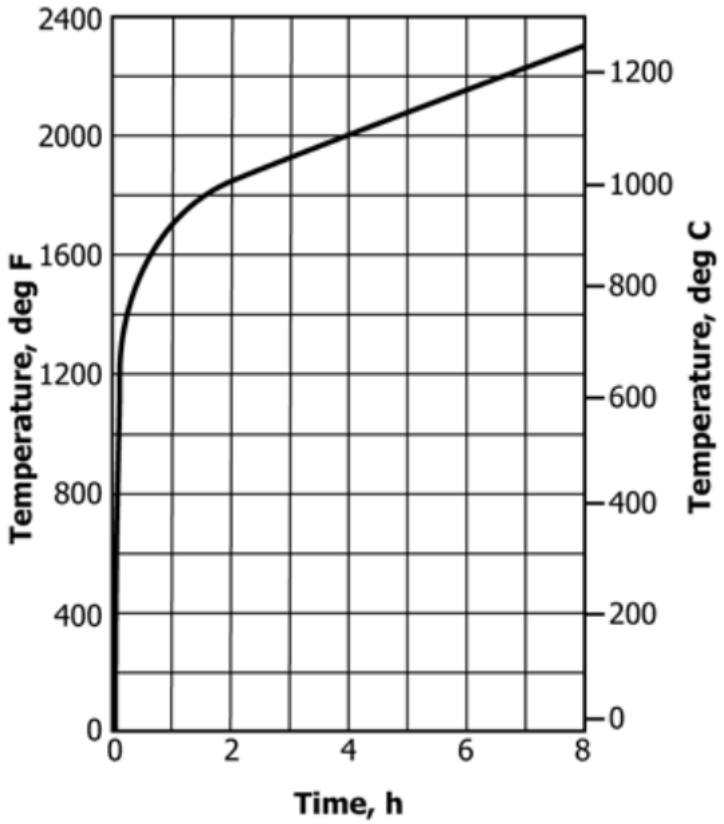

FIG. 1 Time-Temperature Curve

ASTM E119

1000°F (538°C)	at 5 min
1300°F (704°C)	at 10 min
1550°F (843°C)	at 30 min
1700°F (927°C)	at 1 h
1850°F (1010°C)	at 2 h
2000°F (1093°C)	at 4 h

HISTORICAL SOLUTIONS

NFPA- 2015

- 1,345,500 fires
- 3,280 caused death
- 15,700 injury

2010-2014

- Est ave 7,410 fires

- 3 death
- 110 injured
- $165 million

WHAT ARE YOU HOPING TO ACHIEVE WHEN YOU WRAP THE DUCTS?

Hint there are 4 main goals.

IMC

- 506.3.10 2015 IMC
- Grease duct enclosure- a grease duct serving a type I hood that penetrates a ceiling, wall or floor shall be enclosed from the point of penetration to the outlet terminal

OPTIONS

- ~~Shaft wall~~
- Rigid board systems?
- Flexible duct wrap
- Factory built enclosures
- Factory built ducts

PERFORMANCE REQUIREMENTS

- Contain internal duct fires and prevent heat transfer to adjacent combustibles
- Repel External fires
- Block fire propogation through penetration openings
- Limit enclosure materials surface flamability

WHY DO YOU PROTECT DUCTS

- Contain potential internal fires that might occur in ducts
- Protect the stability and integrity of the duct when exposed to external fire
- Prevent ingnition of combustible material inside the duct when exposed to external fire
- Prevent heat from igniting combustibles in adjacent compartments

HOW DO YOU PROTECT THE GREASE DUCTS NOW THAT WE HAVE ASTM E2336?

GREASE DUCT WRAP

FACTORY INSULATED DUCTS

- Metal Fab
- Michigan Air
- AMPCO
- others

UL CLASSIFICATION

- Grease (HNKT)
- Air Duct (HNLJ)
- Fire Stop (XHEZ)
- Product Flammability (BHWV)

ASTM E2336

- **Section 16.1- non-combustibility to ASTM E136**
- Section 16.2- 2 hr ATM E119 wall panel test
- Section 16.3- durability test modeled after ASTM C518
- Section 16.4- Internal- long term exposure to service conditions 500F/4hr 2000F/30mn
- Section 16.5- Engulfment test ASTM E119 time/temp curve

ASTM E136

Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750°C

ASTM E136

- Temperature in furnace 1382F which is 750C for 30 minutes

- Hinges on 50% weight loss of test material
- If more than 50% there can be no flaming of the test sample
- If less than 50% there can be no flame after 30 seconds

ASTM E2336

- Section 16.1- non-combustibility to ASTM E136
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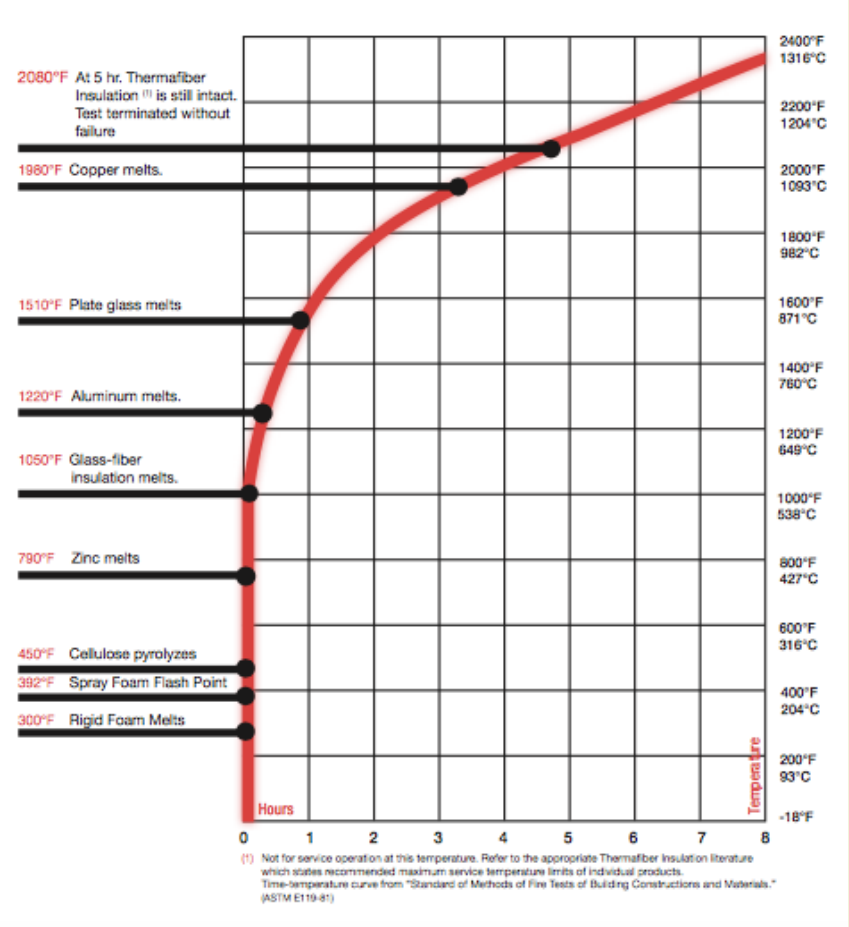
ASTM E119

- 10ft
- Time temp curve
- Hose stream
- https://www.youtube.com/watch?v=4AoGEbNYzOo

- Structural failure or collapse
- Flame penetration
- Temp raise

TIME TEMPERATURE CURVE



ASTM E2336

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ASTM C518

Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus

ASTM C518

- Hot plate – sample – Cold plate
- Mean temperature 35 to 110
- Typical differential 40-50F

- Measures K value- Thermal conductivity
- Measures R value- Thermal resistance

ASTM E2336

- Section 16.1- non-combustibility to ASTM E136
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UL 1978- INTERNAL FIRE TEST

- 500°F (260°C) 4 hours
- Max. Single TC rise is 117°F (65°C) if not in contact with duct or 90°F if enclosure is in contact with duct
- 2000°F (1093°C) 1/2 hour; Max. single TC rise is 250°F (121°C)
- Accepted by ICCES (BOCA, SBCCI) in East and Mid-West U.S.

AC101

- Grease Duct Enclosure Assemblies (Internal)
- **500°F (260°C) gasses into duct for 4 hours; max. temperature on surface under insulating pad is 117°F (65°C) above ambient**
- **2000°F (1093°C) at duct test area for 1/2 hour; max. average temperature rise surface under insulating pad is 250°F (121°C), max individual temperature rise 325°F (198°F)**

ASTM E2336

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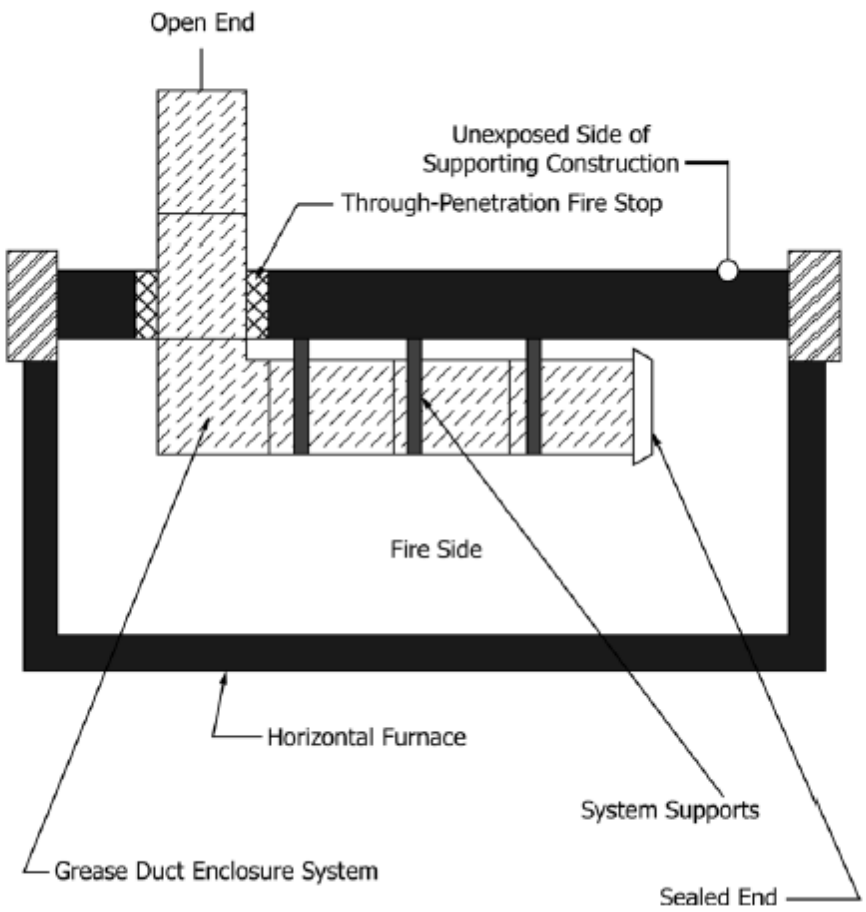


FIG. 8 Fire-Engulfment Test Arrangement

ASTM E-119

- Standard Test Methods for Fire Tests of Building Construction and Materials (External)
- 2 Hour engulfment for integrity of duct
- Time Temperature curve
- Hose Stream

AFTER ENGULFMENT = HOSE STREAM

OMEGA POINT LABORATORIES

- Grease Duct (GD)
- Air Duct (VAD)
- Fire Stop (FS)
- Product Flammability (Division 7)

SALES PITCH

- Durable Aluminum foil scrim cover
- Resists tearing
- Resists grease or condensation absorption
- Minimizes fiber exposure

BREAK

INSTALLATION VIDEO

- https://wwuXz_pu7ivgcw.youtube.com/watch?v=

INSTALLATION

- Measure Duct
- Cut duct wrap
- Tape edges
- Wrap duct and tape (butt joints)
- Repeat with second layer (overlap joints and layer seams 3”)
- Band and clip outer layer
- Install doors

REVIEW INSTALLATION STEPS

1. Lay out all materials
2. Safety Measures
3. Measure Duct and add 12”
4. Lay out insulation, measure, cut, tape
5. Wrap, beat, confirm overlap, tape in place
6. Repeat steps 4 & 5, beating to close but joint or confirm overlap
7. Measure Duct and add 12”
8. Repeat steps 4-6
9. Band 3” from edge and 10.5” on center

TOOLS

- Duct
- Duct wrap
- Foil tape
- Fiber tape
- Box cuter
- Tape measure
- Marker
- ½” banding material
- Tensioner
- Tin snips
- Clips
- Gloves
- Safety glasses

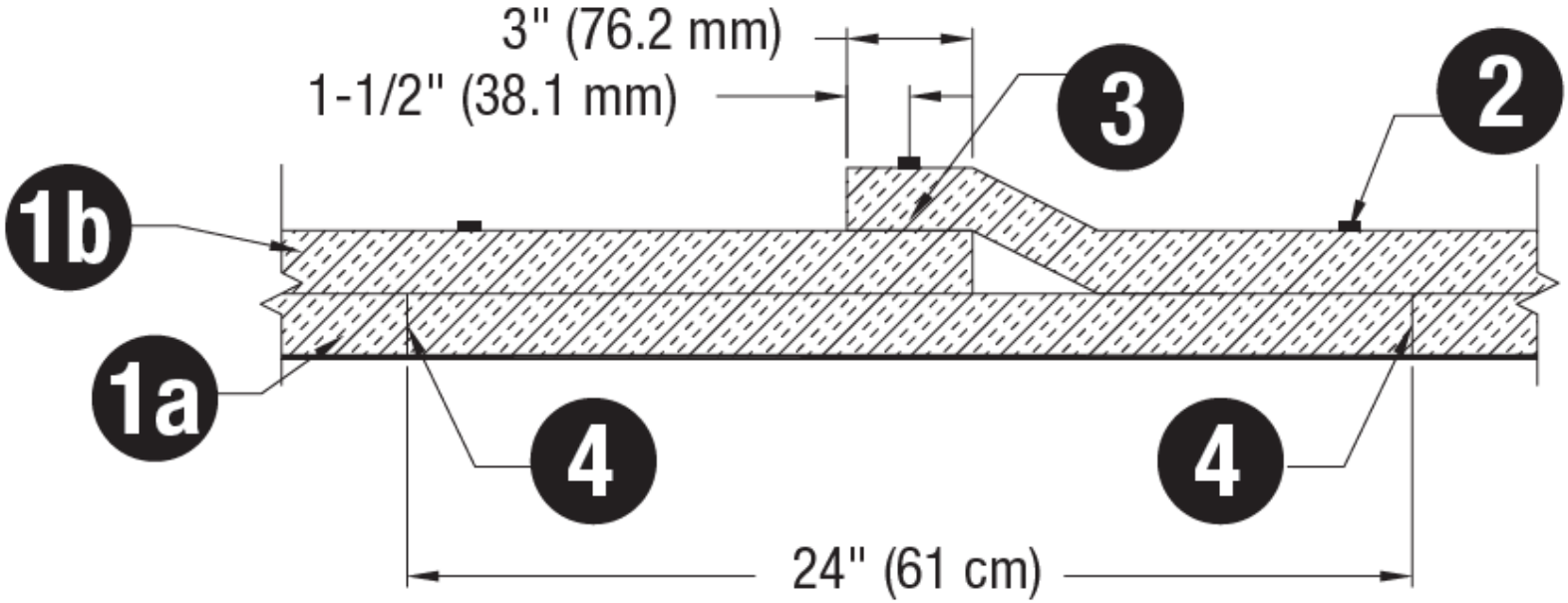
LETS SEE WHAT YOU CAN DO!

WHAT DID YOU THINK?

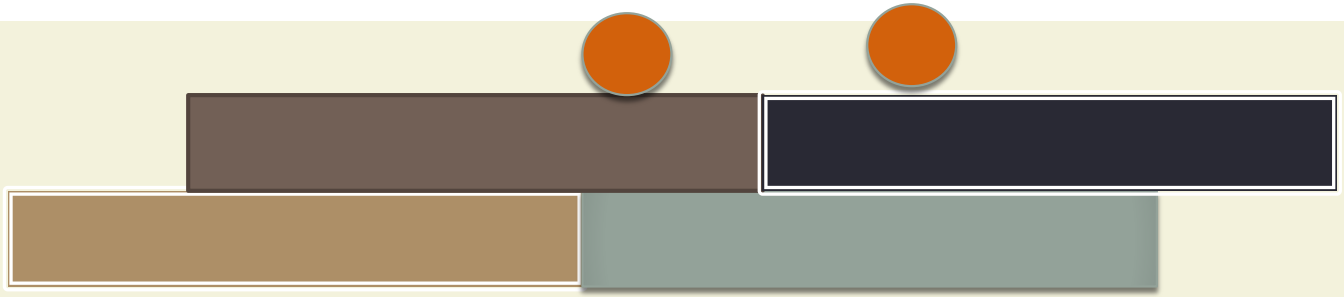
Biggest take away?

BUTT JOINT AND TELESCOPING

Figure 2A Butt Joint Layer with Telescoping Outer Layer
(Cross Section View)



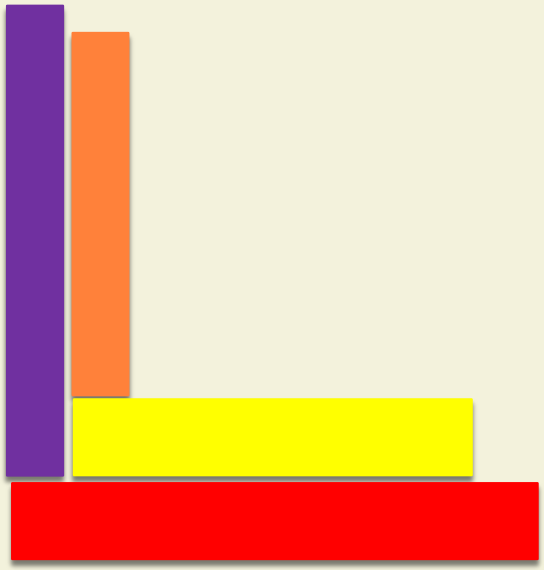
BUTT JOINTS



CAUTIONS

- Sag
- Butt joints vs overlaps
- Placement of joints
- Tight vs overtight banding
- Bend ends

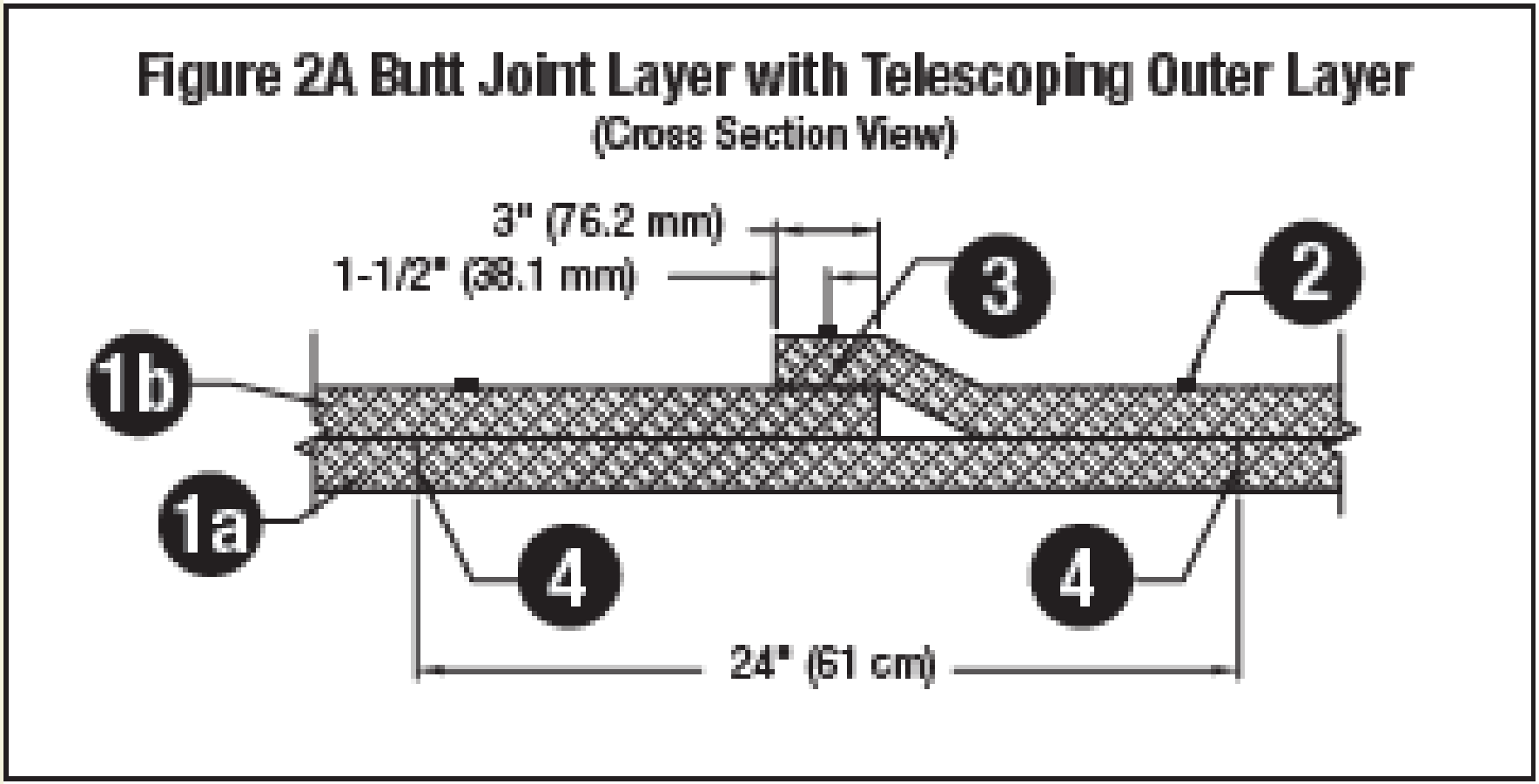
SHAFT WALL
LOG CABIN THE CORNERS



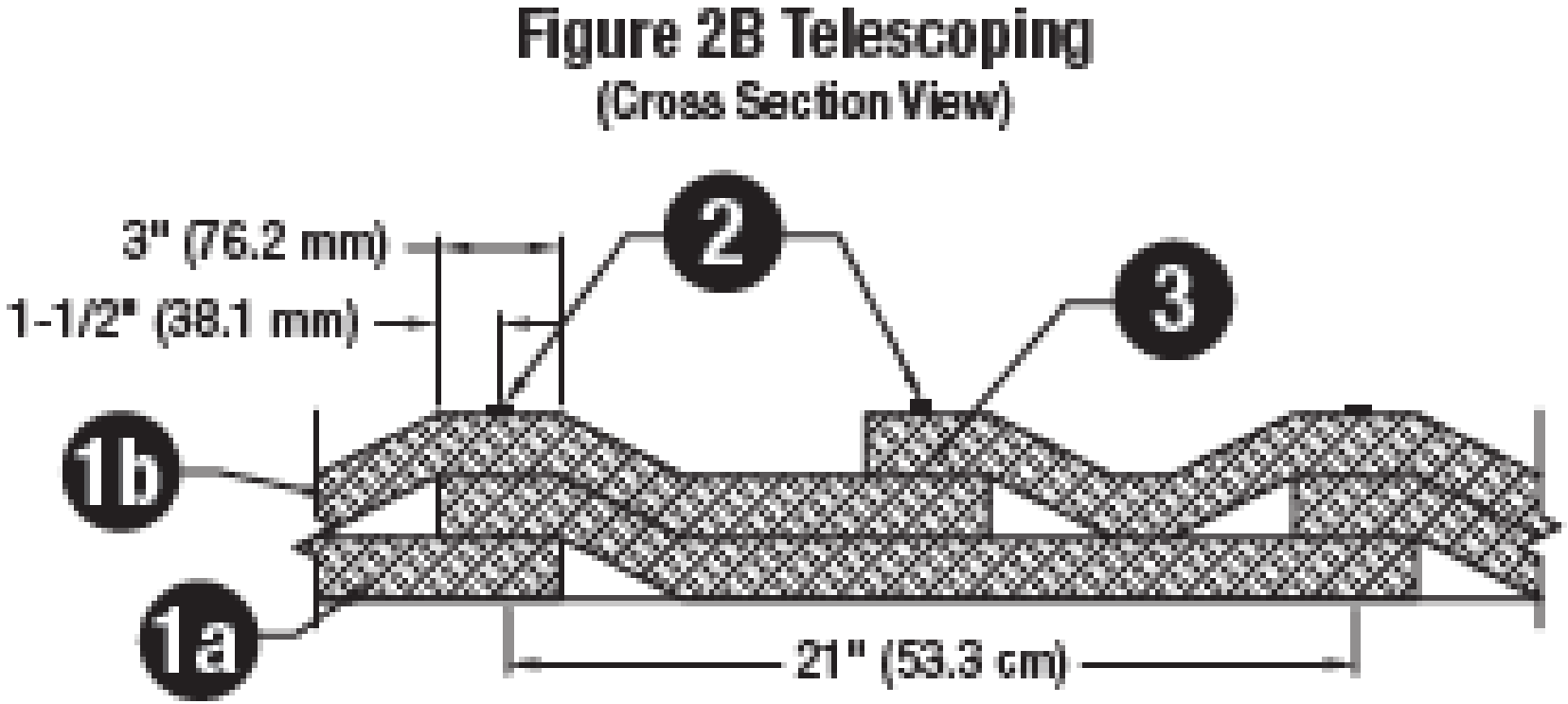
LET'S GET TRICKY

- Variations on lap
- Duct Doors
- Corners
- Pair of pants
- Duct through a wall/floor
- Penetrations through duct wrap
- Hole too small for duct and wrap
- Duct too tight to adjacent duct
- Duct to tight to adjacent wall or floor

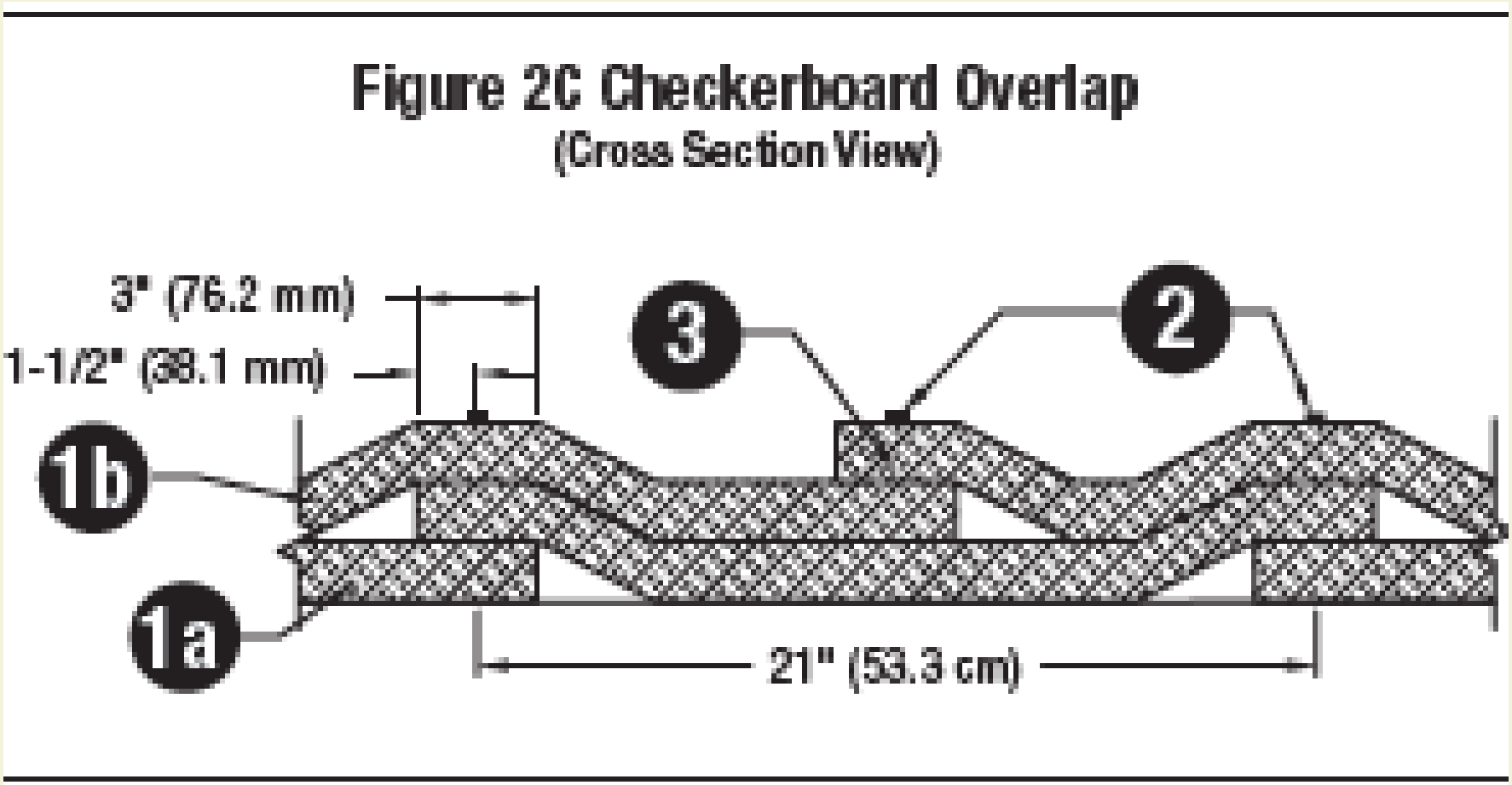
VARIATIONS ON LAP



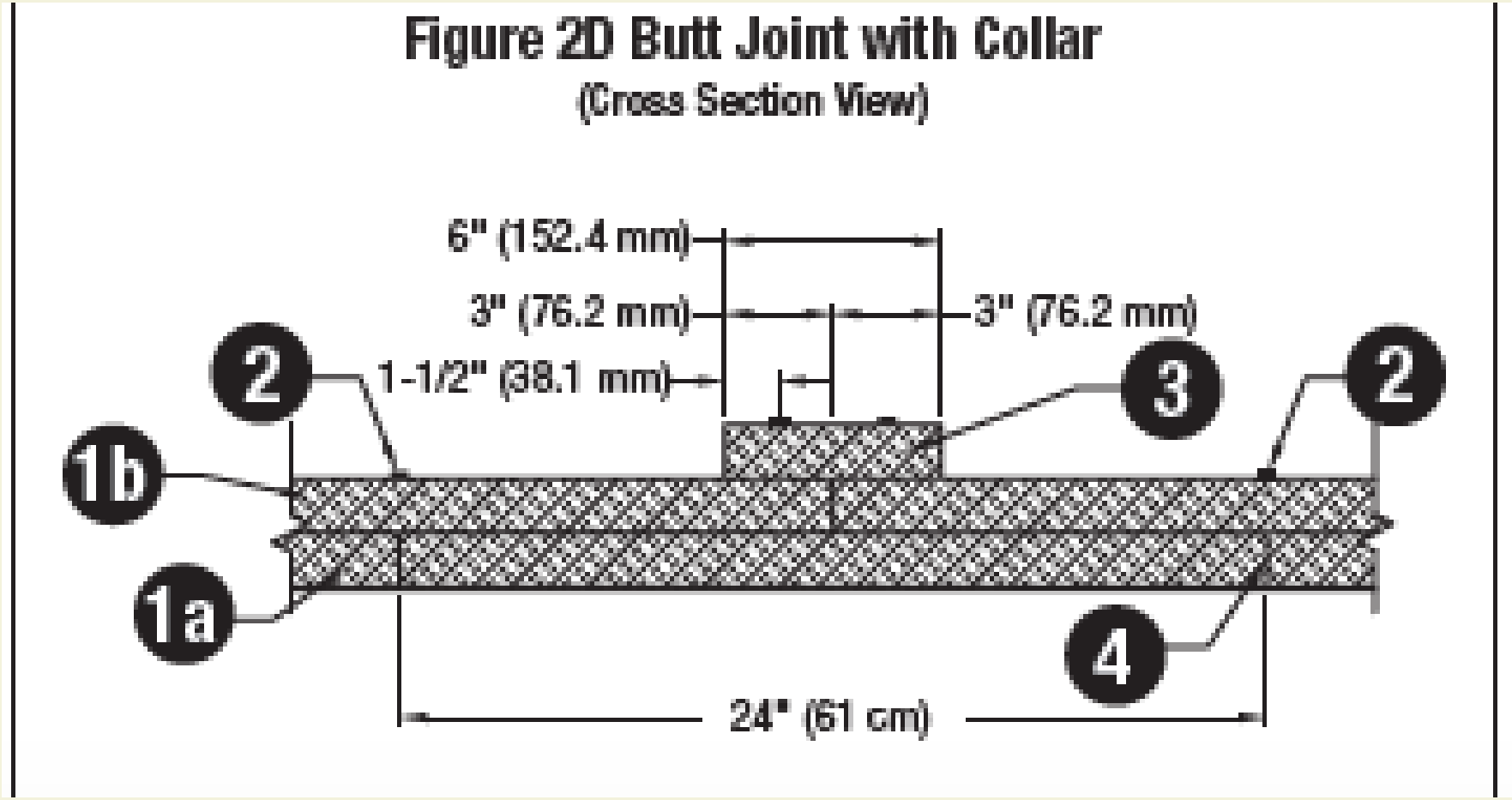
VARIATIONS ON LAP



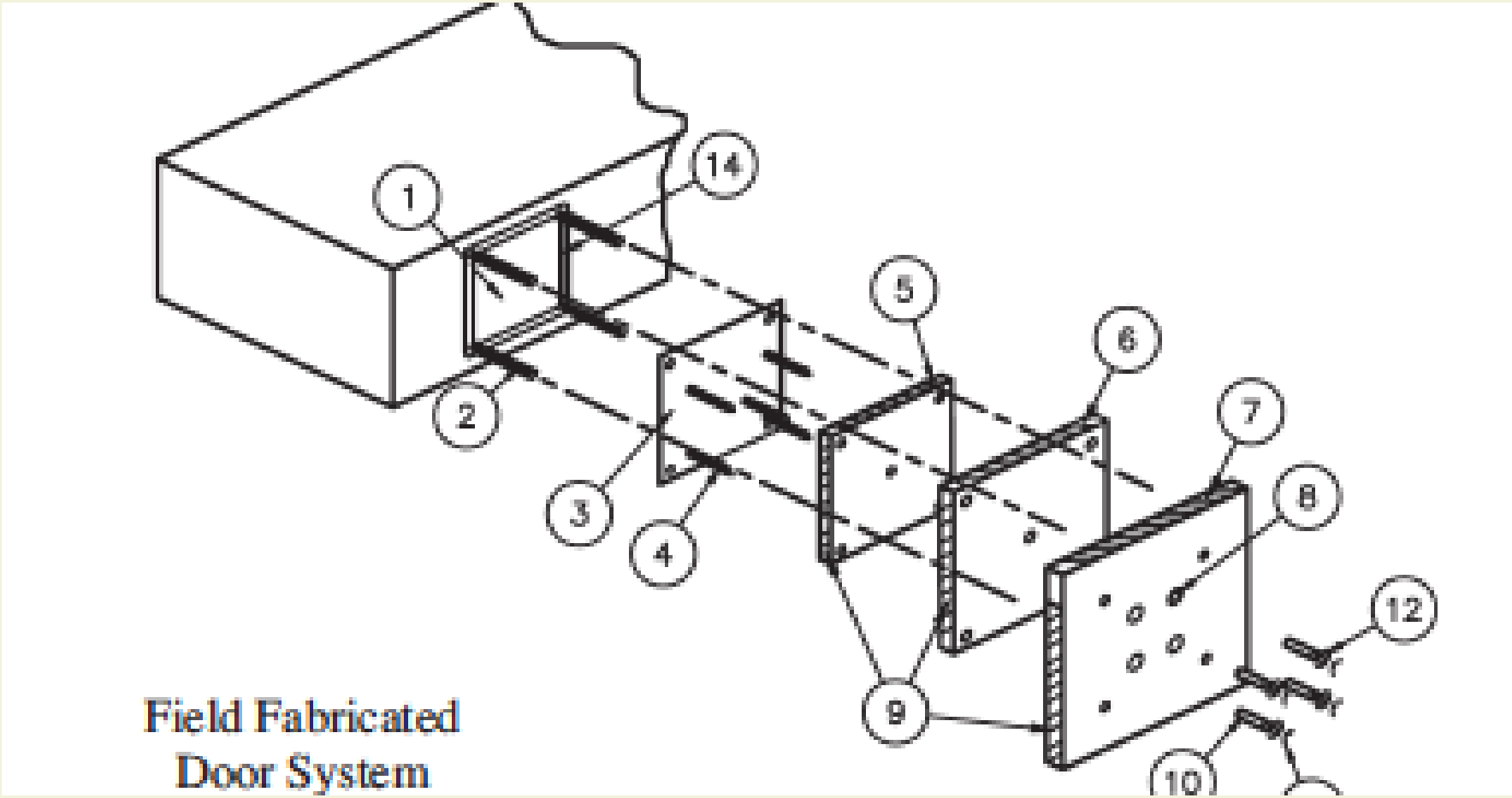
VARIATIONS ON LAP



VARIATIONS ON LAP



DUCT DOORS

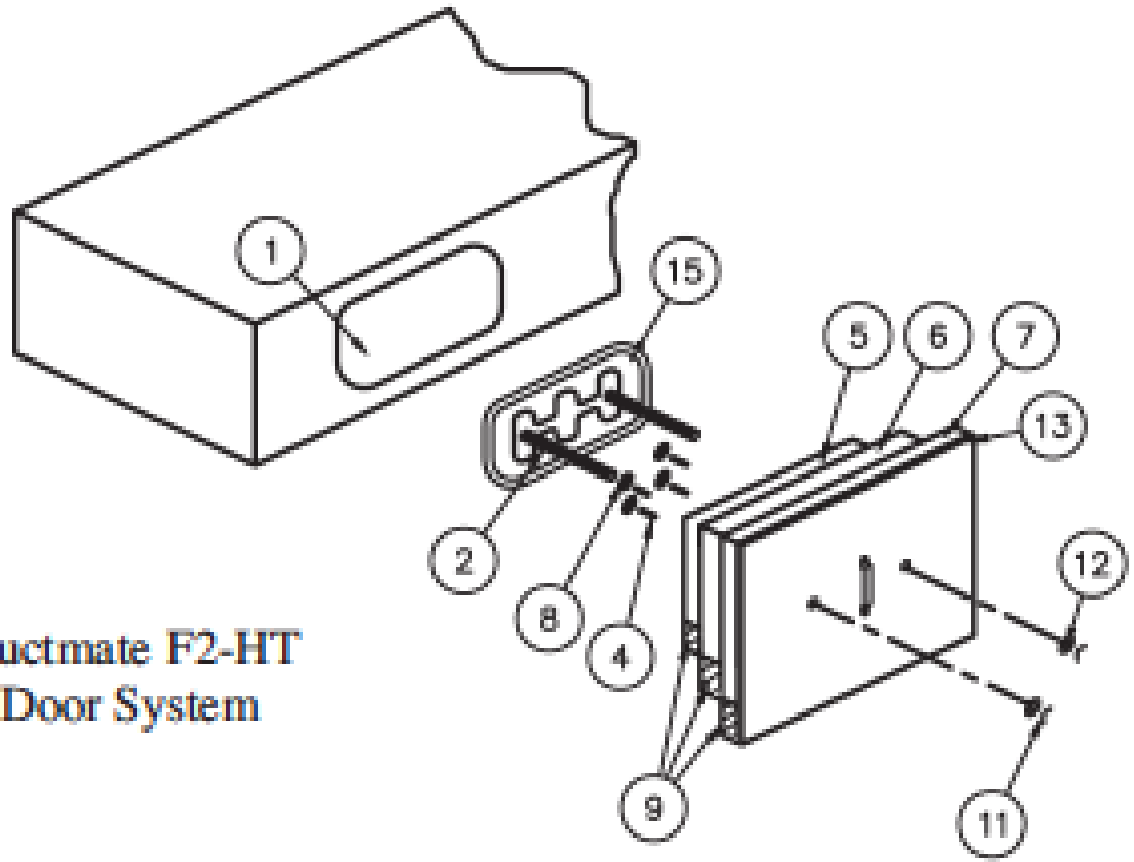


Field Fabricated
Door System

DUCT DOORS

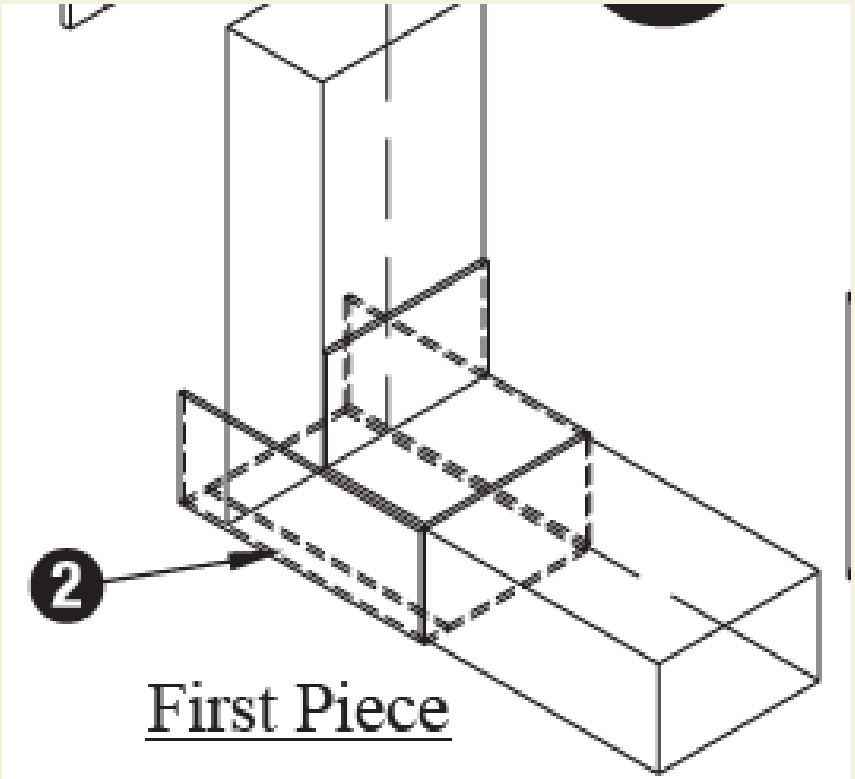
2	All Thread Rods
3	Access Door Cover Panel 16 Gauge (field fab. only)
4	Insulation Pins – Welded to Cover
5	First Layer FyreWrap® Elite® 1.5
6	Second Layer FyreWrap® Elite® 1.5, 1" Overlap
7	Third Layer FyreWrap® Elite® 1.5, 1" Overlap
8	Speed Clips/Washers
9	Cut Edges Sealed With Aluminum Foil Tape
10	Spool pieces for threaded rods (optional field fab. only)
11	Wing Nuts
12	Washers
13	Insulation plate

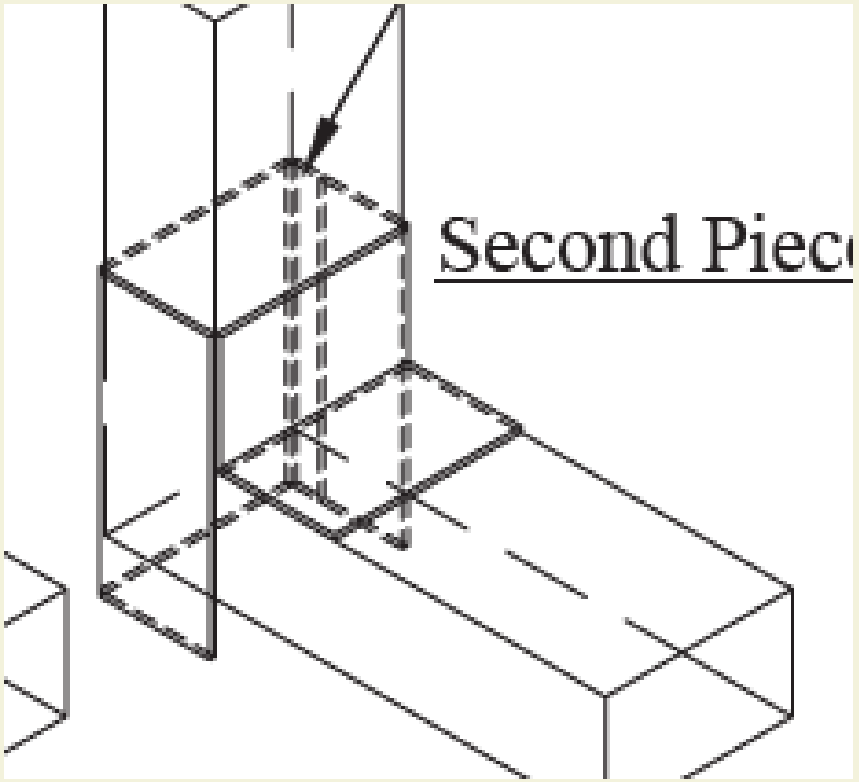
DUCT DOORS



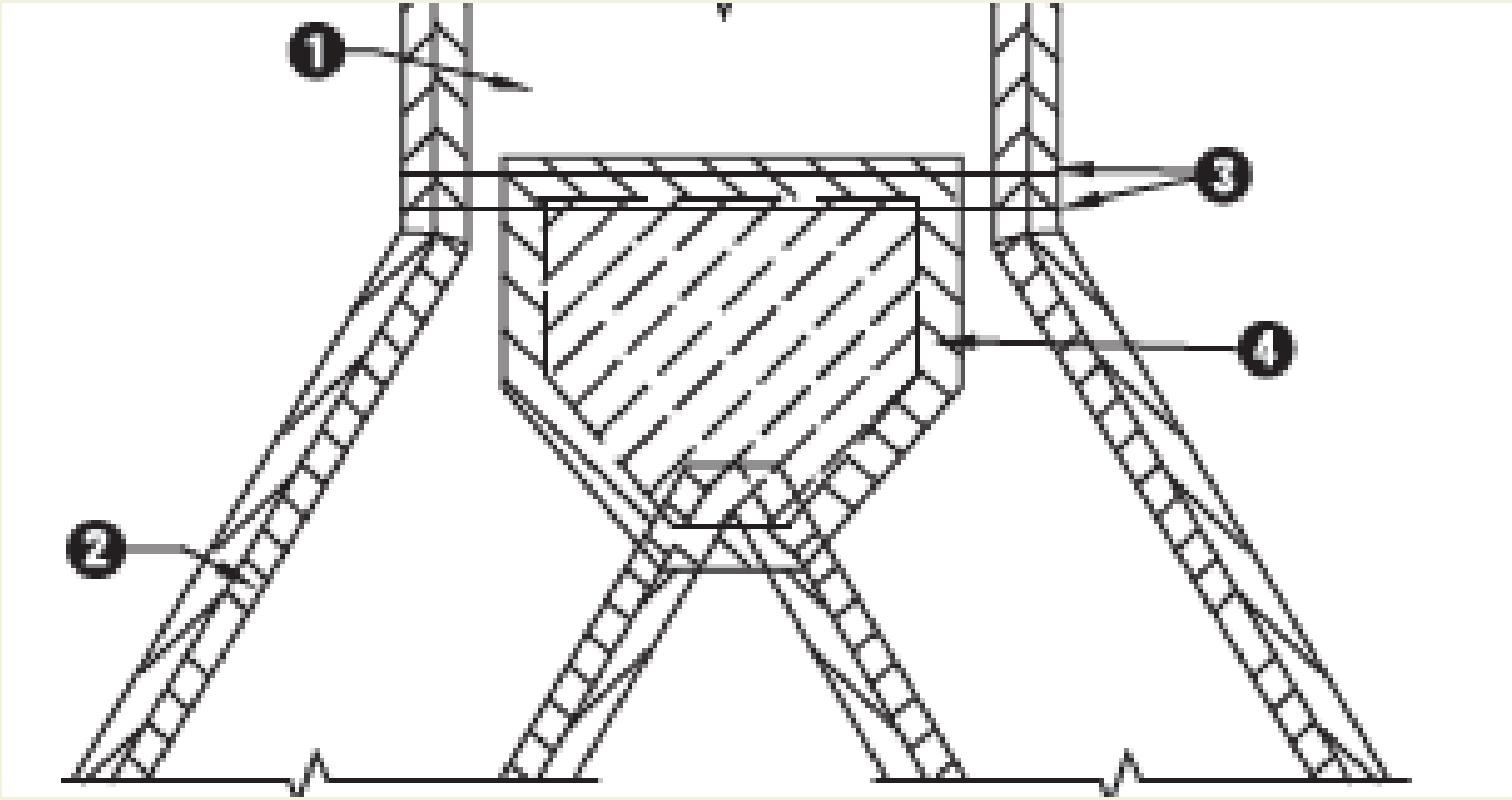
Ductmate F2-HT
Door System

CORNERS

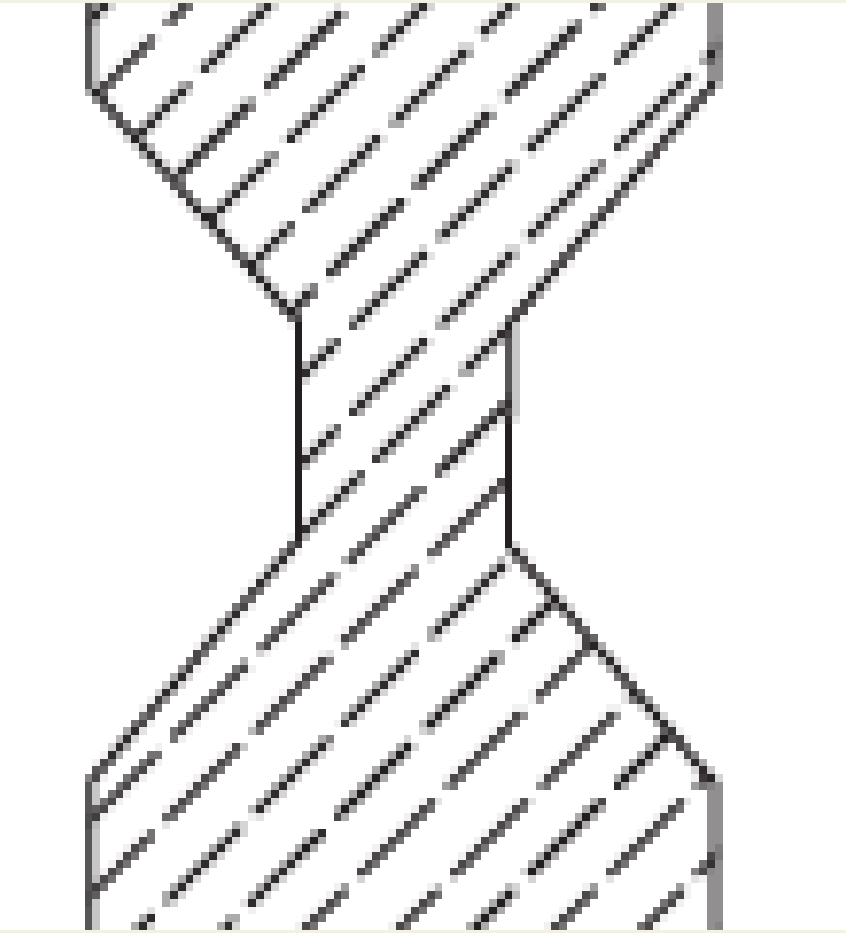


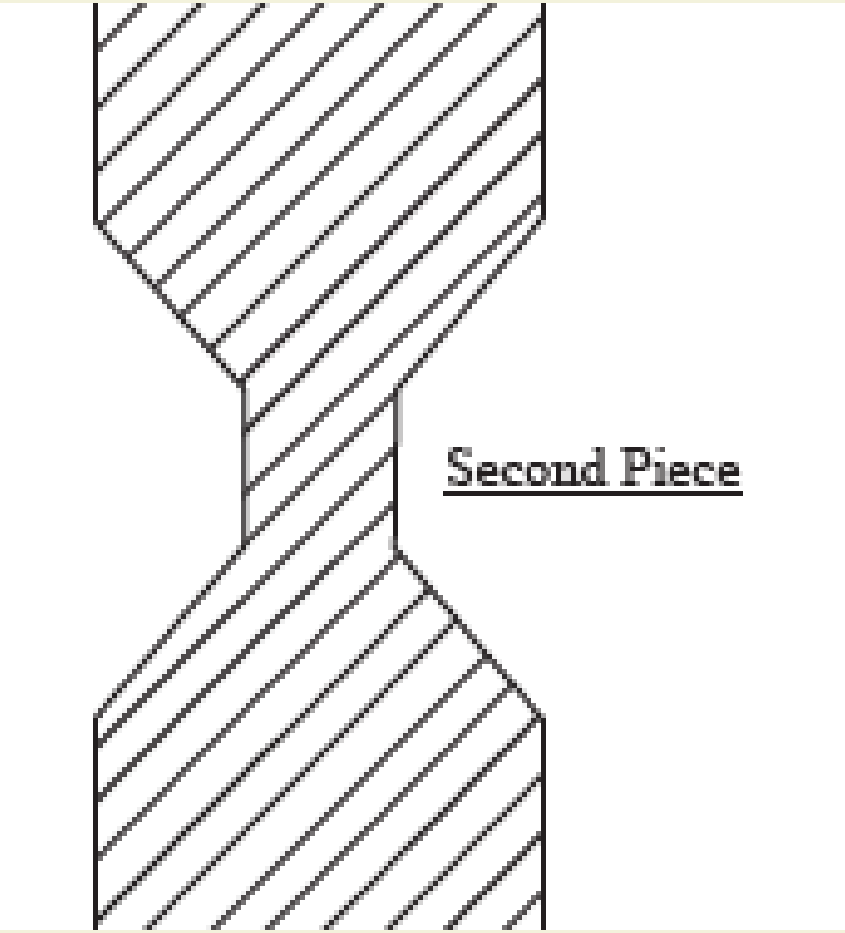


PAIR OF PANTS

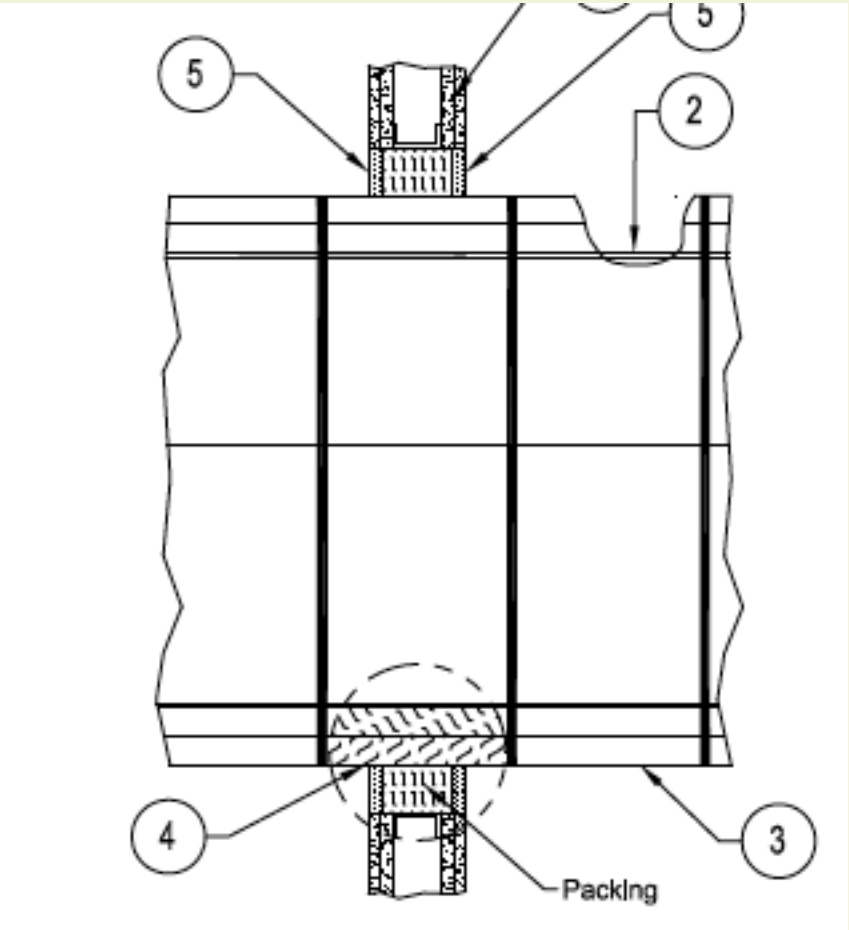


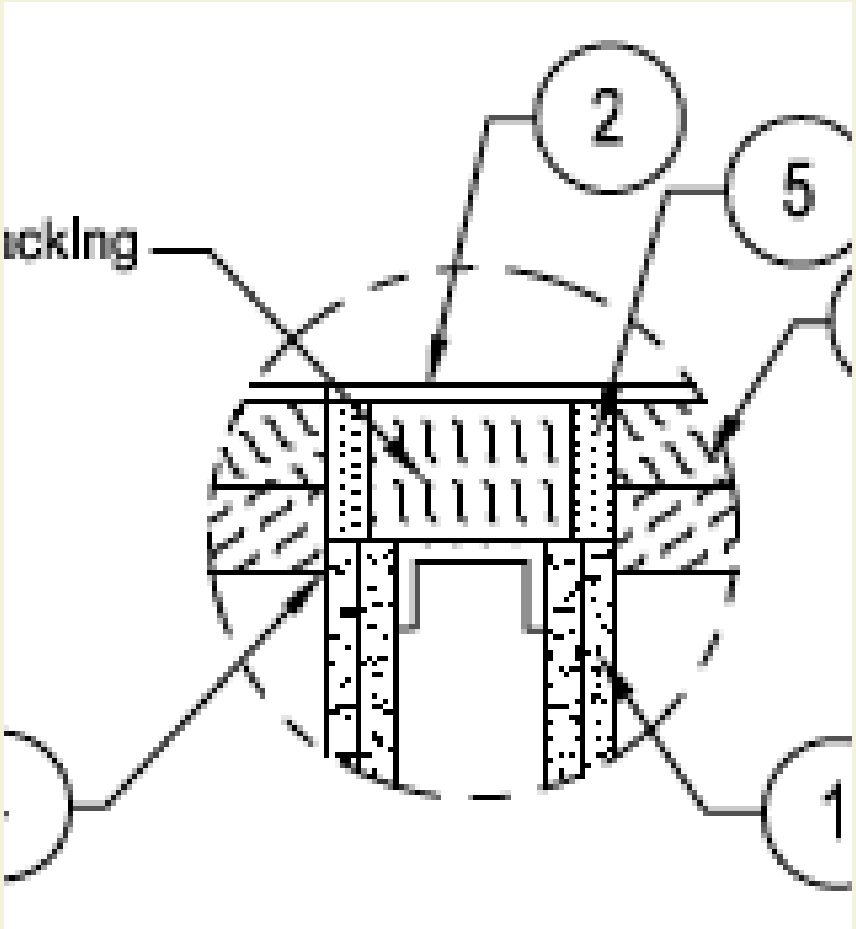
PAIR OF PANTS





DUCT THROUGH A WALL/FLOOR





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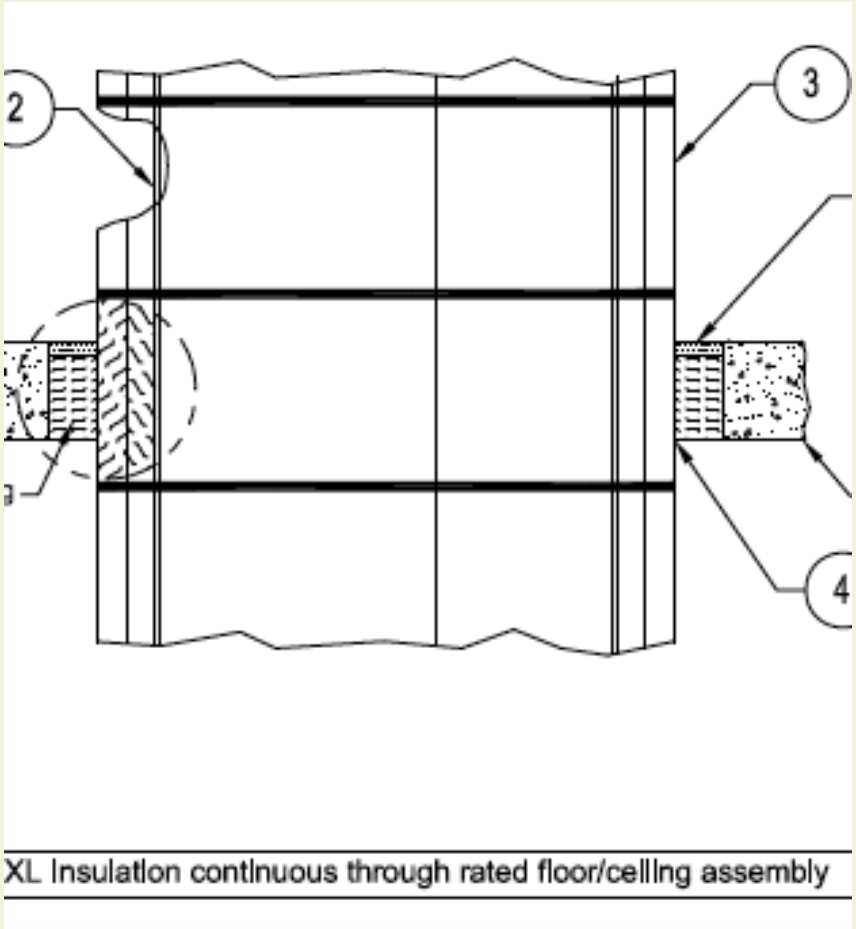
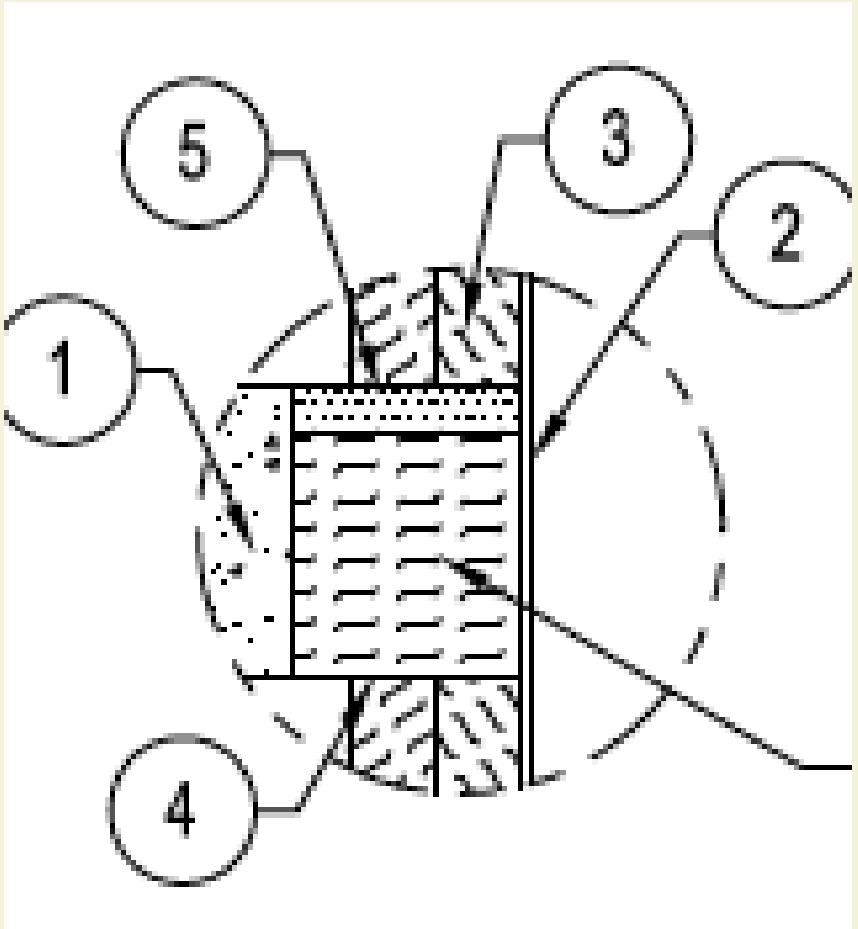
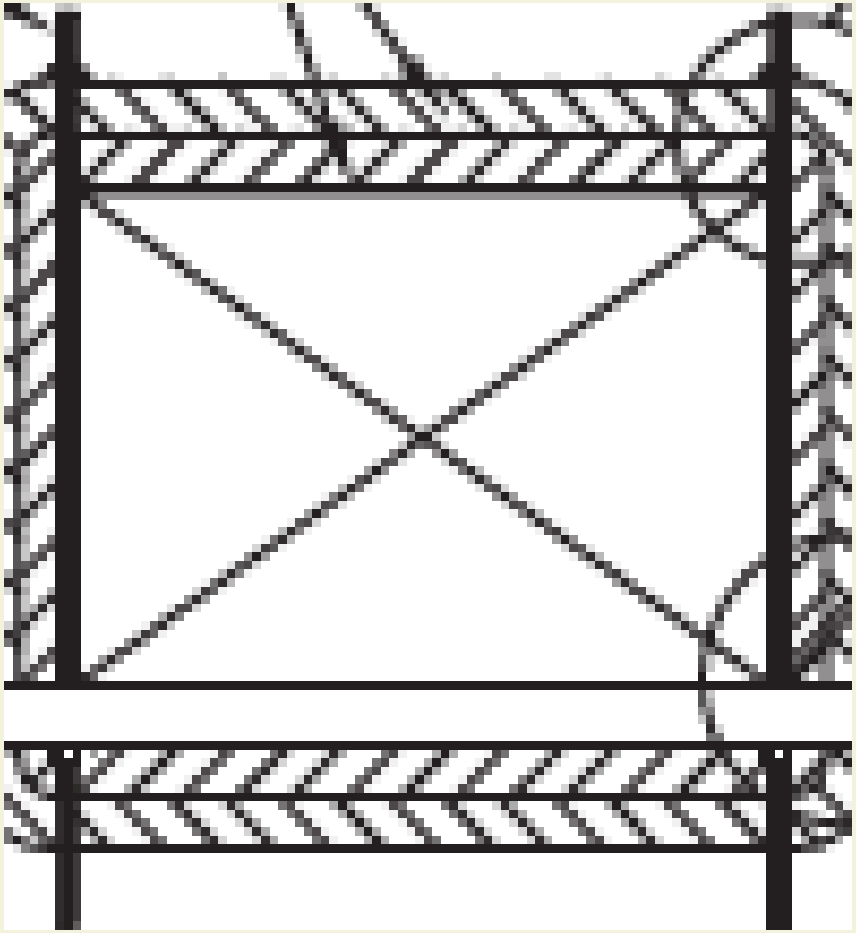
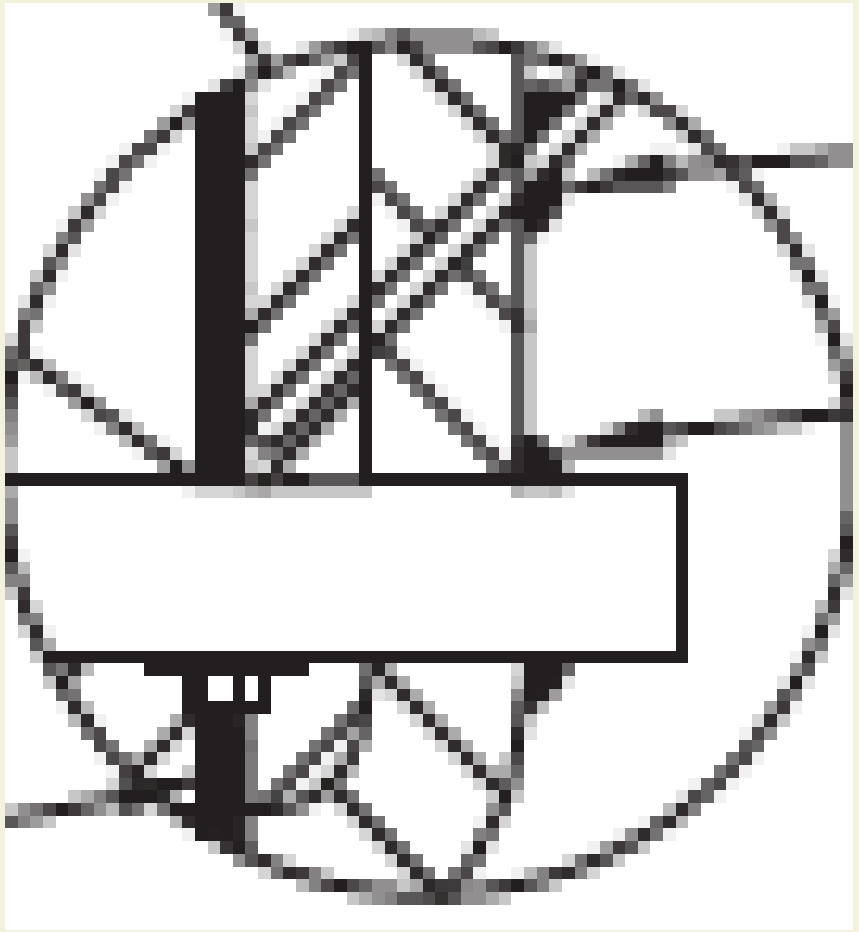




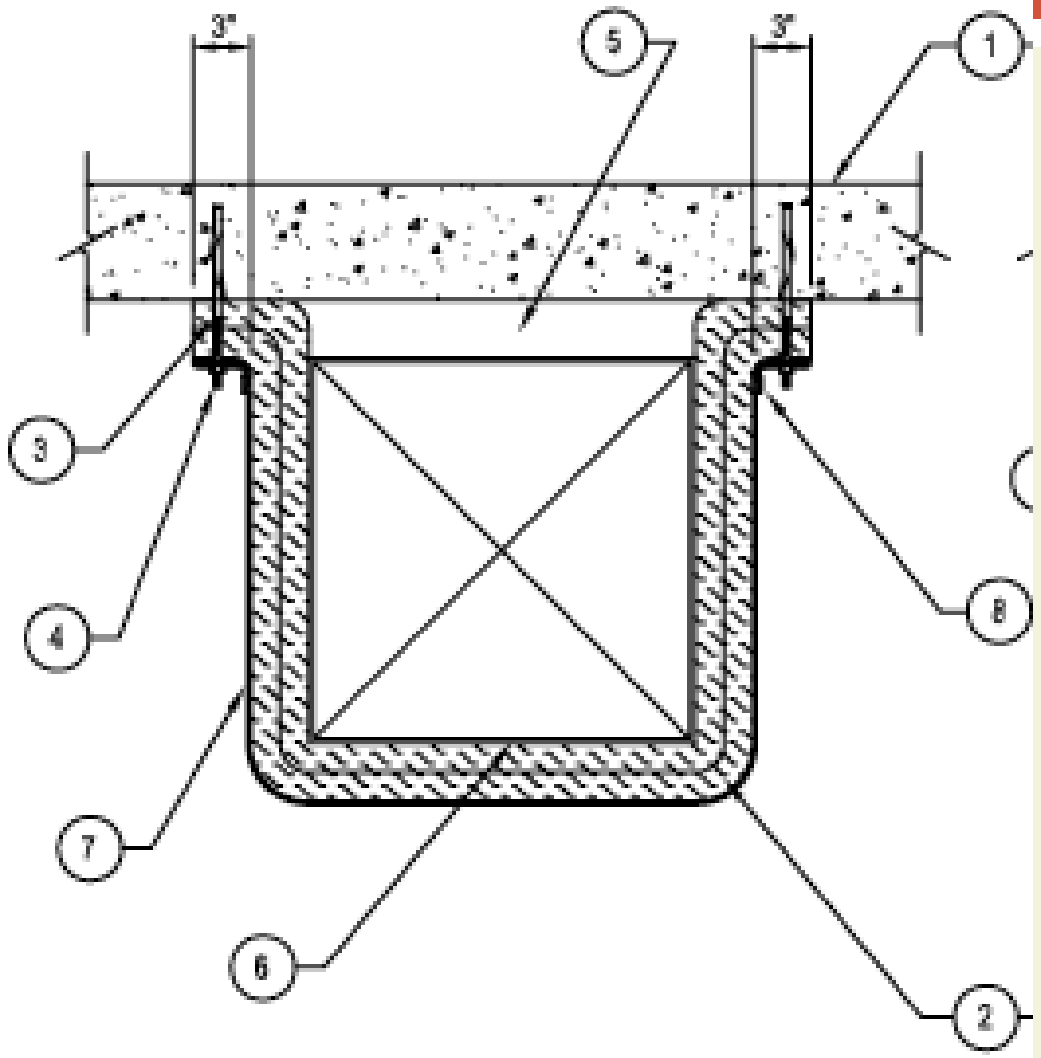
PENETRATIONS THROUGH DUCT WRAP





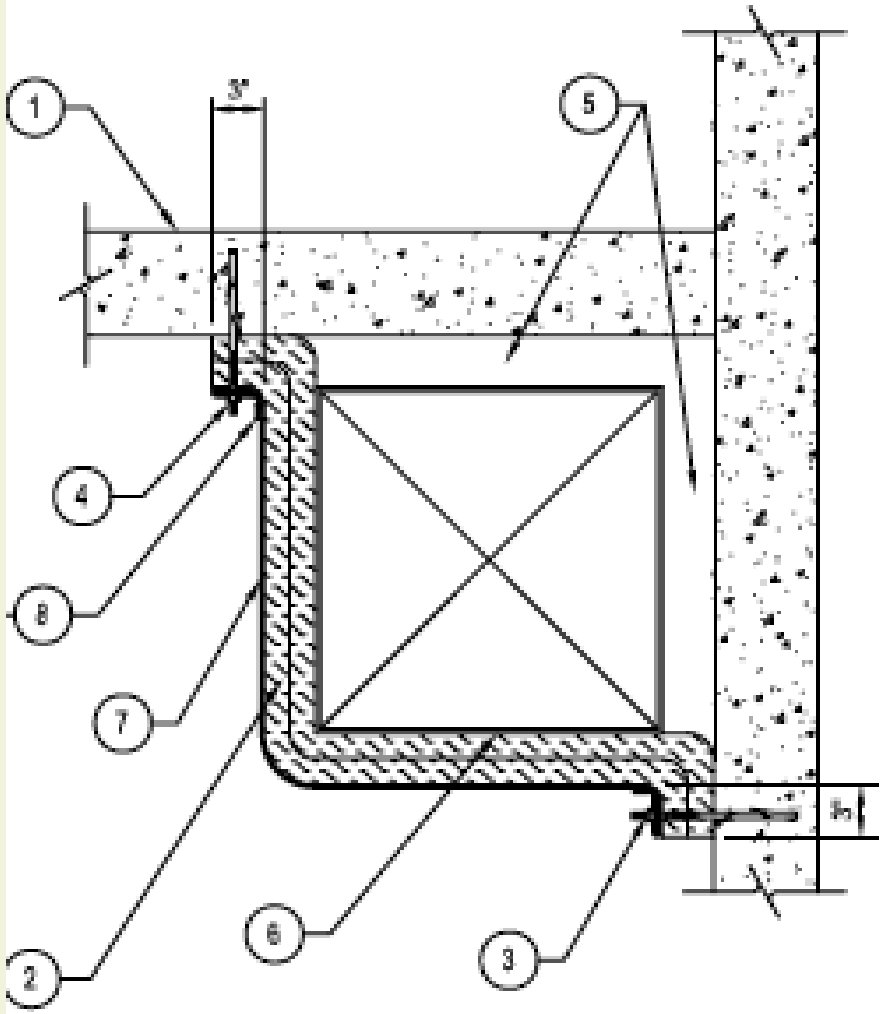
DUCT TOO TIGHT TO ADJACENT DUCT

DUCT TO TIGHT TO ADJACENT FLOOR



Note: Ducts must be Independently supported per code

DUCT TO TIGHT TO ADJACENT WALL



HOLE TOO SMALL FOR DUCT AND WRAP

UNIVERSAL

- Wrap comes in 2 ft length and 4 ft length
- 2 layers of 1.5” wrap
  - .5” wrap is plenum wrap or other
- Overlaps min 3”
- When butt joints allowed TIGHT
- ***Banding 10.5” OC

3M PAGE 4

- Lateral perimeter joints offset a minimum of 3” from inner layer perimeter joints
- Offset outler layer longitudinal joints a minimum of 10.5” from inner layer ongitudinal joints
- Outer layer longitudinal must have 3” overlap (exception- joint collar)
- Ducts over 24” require pinning on bottom side of horizontal ducts and on one side of a vertical duct
- 48” Vertical ducts require pinning on all sides

3M PAGE 5 TO 8

- Run through various lap options –page 5
- Explain doors- page 6
- Connecting to the hood- page 7
- VAD- page 8

FYREWRAP PAGE 2

- Butt joints for both layers (24”x24”)
  - Still requires 3” longitudinal overlap
    - Must be on top stagger joints
  - Longitudinal joints staggered 12” from first to second layer
  - Banding to be 2.5” from joint on each side and then 9” OC (needs 1” long clips
  - BONUS REQUIREMENT- tape transverse butt joints with foil tape

FYREWRAP

- Vertical Duct Runs
  - Can run the wrap the length of the duct BUT
    - 3” overlaps
    - Joints can be within 6” of corner
    - second layer centered over seam of first layer
    - Pins 8”oc places at centerline of all vertically oriented overlaps

FYREWRAP BANDING (P3)

- 24” or less
  - 1.5” from edge
  - 10.5”OC
- 49” or less
  - 12 ga steel insulation pins
    - Underside of horizontal runs
    - Backside of vertical runs
    - 12” rows and 10.5” OC
  - Banding
    - 1.5” from seams
    - 10.5”OC

FYREWRAP BANDING (P4)

- 49” or more – pins only
  - Pins in each row perp to length of duct 10.5” OC
  - Pins in each row are max 6-3/4” from edge
  - Max 12”OC
  - 2.5” square or 1.5” round galv steel speed clips

INSPECTION

- What is the overlap requirement for the diagonal lap on layer one?
  - Seam placement
- Requirement for the longitudinal lap on layer one

INSPECTION

- Lap requirement on the second layer- diagonal….longitudinal
- Which layer requires banding
- What is the banding spacing
- What is the pin spacing

PERFORMANCE REQUIREMENTS

- Contain internal duct fires and prevent heat transfer to adjacent combustibles
- Repel External fires
- Block fire propogation through penetration openings
- Limit enclosure materials surface flamability

WHY DO YOU HAVE DAMPERS IN DUCTS?

DAMPERS PROHIBITED

- Grease Ducts
- Stair Pressurization Ducts
- Hazardous Exhaust Ducts
- Dryer Exhaust Ducts
- Laundry Chutes
- Refuse Chutes

VAD TESTS

- External Engulfment Air Duct Test (ISO 6944)
  - Test representative of maximum width to height ratio intended for use
- Fire Stop Test (ASTM E814/UL 1479)
  - Establishes F & T rating
- Surface Flammability (ASTM E-84/UL723)
- ASTM E2816- Standard test system for fire resistive metallic HVAC duct systems (insulation, stability, integrity)

ASTM E 814

- 2 Hour through
- Through Penetration Firestop Test

ASTM E84 SURFACE BURNING CHARACTERISTICS

- **Flame Spread Rating must be < 25**
- **Smoke Developed Rating must be < 450**
- **Covers Core Insulation and Covering Material**

- **Steiner Tunnel Test**
- **24 ft x 20 in**
- **10 minutes**

OTHER USES

- Plenum Wrap
  - Plastic Pipe, Concealed Spaces
- Conduit Wrap
  - Emergency Feeder Lines
- Cable Tray Wrap
  - Industrial Control Systems

CAUTIONS

WHAT'S NEXT

- Connect on Linked In
- Subscribe to blog posts
- Ask questions
- Keep learning
- Share your knowledge

- www.halpertlifesafety.com

ASSESSMENT

TO DO

- Create assignment sticks- depending on class size
- Prepare all materials
- Send document to be printed list to Rutgers (Rutgers to identify individual)

CLEANING INFO TO ADD TO CLASS

RICHMOND ICC
INTERNATIONAL CODE COUNCIL 2018

Thank You For Attending

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