INSTALLATION AND INSPECTION OF GREASE DUCT WRAP MATERIAL
INTRODUCTIONS

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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)
TODAY'S 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
FIG. 1 Time-Temperature Curve
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.
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 propagation 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 ignition 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)
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
Standard Test Method for Behavior of Materials in a Vertical Tube Furnace at 750 °C
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
Section 16.1- non-combustibility to ASTM E136

Section 16.2- 2 hr ATM E119 wall panel test

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Section 16.5- Engulfment test ASTM E119 time/temp curve
ASTM E119

- 10ft
- Time temp curve
- Hose stream
- https://www.youtube.com/watch?v=4AoGEbNYz0o

- Structural failure or collapse
- Flame penetration
- Temp raise
TIME TEMPERATURE CURVE

- 2080°F: At 5 hr, Therafiber Insulation is still intact. Test terminated without failure.
- 1960°F: Copper melts.
- 1510°F: Plate glass melts.
- 1220°F: Aluminum melts.
- 1050°F: Glass-fiber insulation melts.
- 790°F: Zinc melts.
- 450°F: Cellulose pyrolyzes.
- 392°F: Spray Foam Flash Point.
- Rigid Foam Melts.

(1) Not for service operation at these temperatures. Refer to the appropriate Therafiber Insulation literature which states recommended maximum service temperature limits of individual products.

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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
- 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
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.
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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ASTM E-119

- 2 Hour engulfment for integrity of duct
- Time Temperature curve
- Hose Stream
AFTER ENGULFMENT = HOSE STREAM
- Grease Duct (GD)
- Air Duct (VAD)
- Fire Stop (FS)
- Product Flammability (Division 7)
Durable Aluminum foil scrim cover
- Resists tearing
- Resists grease or condensation absorption
- Minimizes fiber exposure
INSTALLATION VIDEO

https://wwuXzプu7ivgcw.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
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 cutter
- Tape measure
- Marker
- ½” banding material
- Tensioner
- Tin snips
- Clips
- Gloves
- Safety glasses
LET'S SEE WHAT YOU CAN DO!
WHAT DID YOU THINK?
Figure 2A Butt Joint Layer with Telescoping Outer Layer
(Cross Section View)

3" (76.2 mm)
1-1/2" (38.1 mm)
24" (61 cm)
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 too tight to adjacent wall or floor
Figure 2A Butt Joint Layer with Telescoping Outer Layer
(Cross Section View)

1b

1a

2

3

4

4

24" (61 cm)

3" (76.2 mm)

1-1/2" (38.1 mm)
VARIATIONS ON LAP

Figure 2B Telescoping
(Cross Section View)

3" (76.2 mm)
1-1/2" (38.1 mm)

21" (53.3 cm)
VARIATIONS ON LAP

Figure 2C Checkerboard Overlap
(Cross Section View)

3" (76.2 mm)
1-1/2" (38.1 mm)

21" (53.3 cm)
VARIATIONS ON LAP

Figure 2D Butt Joint with Collar
(Cross Section View)

1. 1b
2. 2
3. 3
4. 4

Dimensions:
- 6" (152.4 mm)
- 3" (76.2 mm)
- 3" (76.2 mm)
- 1-1/2" (38.1 mm)
- 24" (61 cm)
DUCT DOORS

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

**Note:** The table lists items relevant to Duct Doors.
DUCT DOORS

Ductmate F2-HT
Door System
CORNERS

First Piece

Second Piece
PAIR OF PANTS
DUCT THROUGH A WALL/FLOOR
DUCT THROUGH A WALL/FLOOR

XL Insulation continuous through rated floor/ceiling assembly
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
- 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
- Lateral perimeter joints offset a minimum of 3” from inner layer perimeter joints
- Offset outer layer longitudinal joints a minimum of 10.5” from inner layer longitudinal 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
- Run through various lap options – page 5
- Explain doors – page 6
- Connecting to the hood – page 7
- VAD – page 8
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
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
What is the overlap requirement for the diagonal lap on layer one?
- Seam placement
- Requirement for the longitudinal lap on layer one
- 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 propagation through penetration openings
- Limit enclosure materials surface flammability
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
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
WHAT’S NEXT

- Connect on Linked In
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- Ask questions
- Keep learning
- Share your knowledge

www.halpertlifesafety.com
ASSESSMENT
- 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
Thank You For Attending