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APPEAL SUMMARY

Status: Hold for Additional Information

Appeal ID: 22211	Project Address: 555 SE MLK Jr Blvd
Hearing Date: 12/11/19	Appellant Name: Daniel Hannah
Case No.: M-001	Appellant Phone: 503-206-7591
Appeal Type: Mechanical	Plans Examiner/Inspector: Ali Soheili, Kent Hegsted
Project Type: commercial	Stories: 6 Occupancy: B, A-2, S-2 Construction Type: III-A
Building/Business Name:	Fire Sprinklers: Yes - full building fire protection
Appeal Involves: other: Mechanical System design	LUR or Permit Application No.: 17-208768-REV-03-MT
Plan Submitted Option: mail [File 1]	Proposed use: Office

APPEAL INFORMATION SHEET

Appeal item 1

Code Section OMSC 607.5.5. Exception 1.1

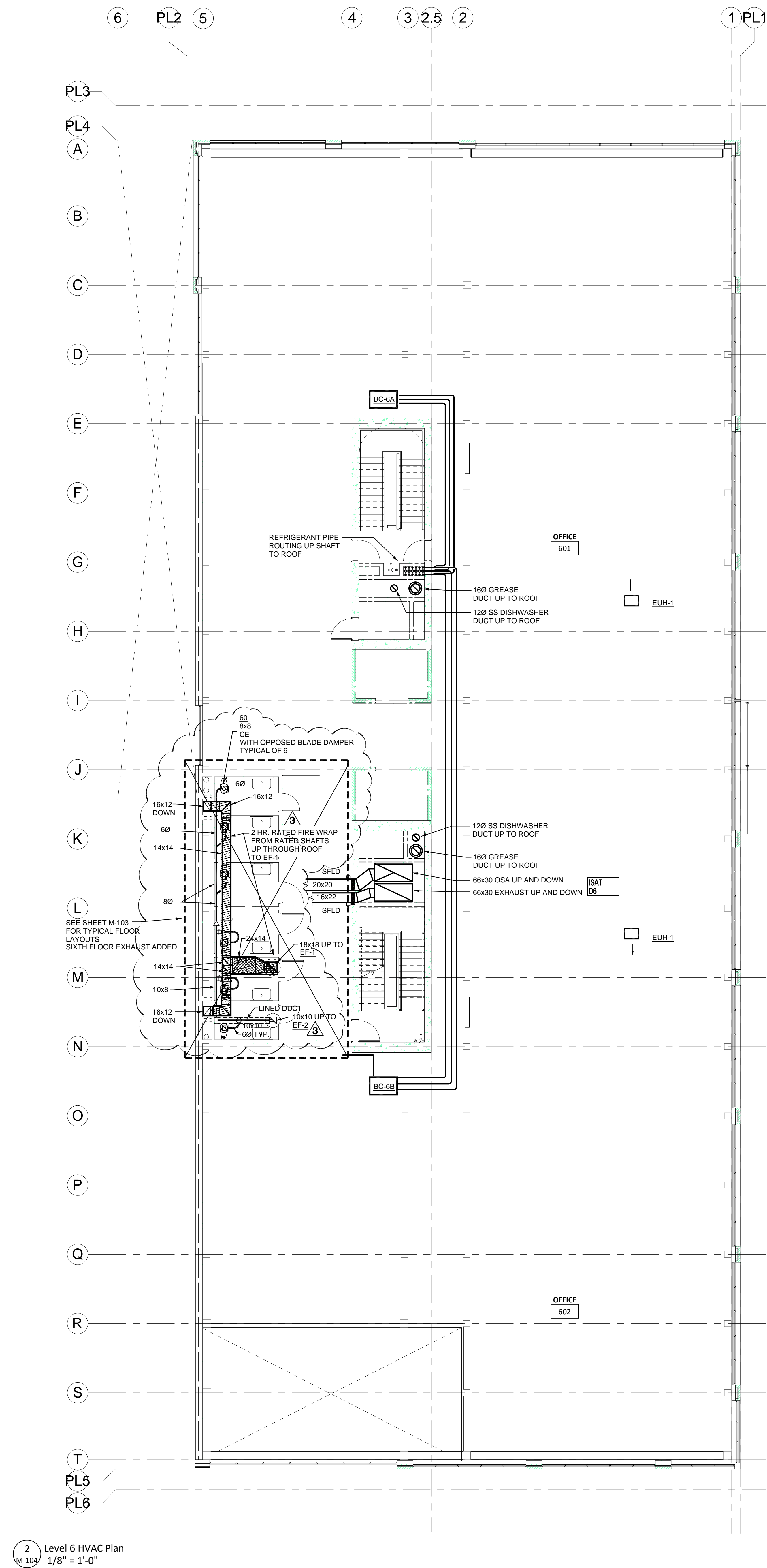
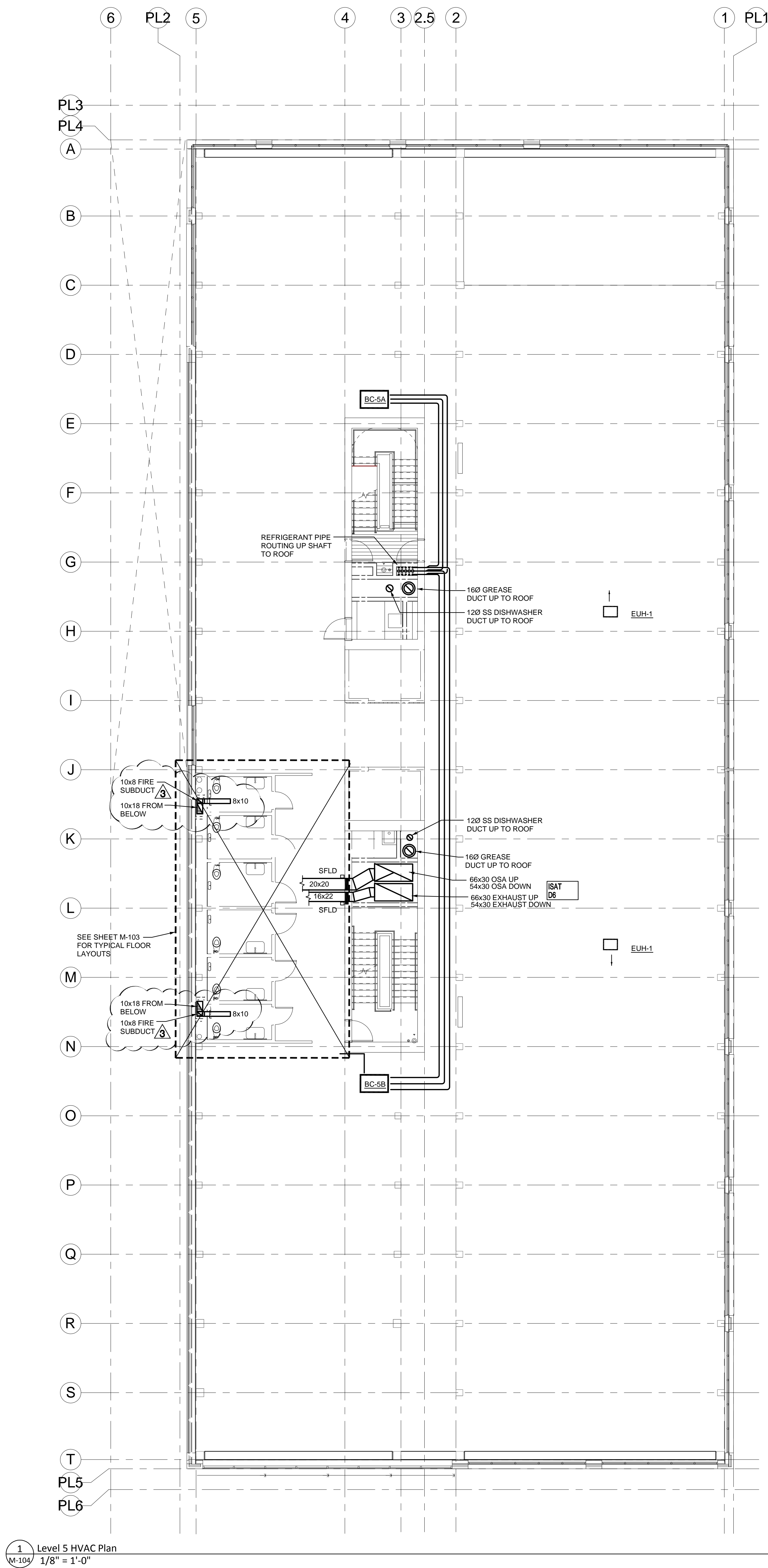
Requires	<p>Fire Dampers are not required at penetrations of shafts where:</p> <p>1.1.:Steel exhaust subducts extend at least 22 inches vertically in exhaust shafts provided that there is continuous airflow upward to the outdoors.</p> <p>Code Modification or Alternate Requested:</p> <p>Summarize the intent of the appeal, preferably in one sentence.</p> <p>The two hour vertical shaft continues up to the roof but needs to offset approximately 10 feet horizontally to the location of the roof exhaust fan. Due to limited ceiling space there is not adequate room to build a two hour rated duct enclosure in the horizontal offset.</p>
Proposed Design	<p>We propose to use an approved 2 hour rated fire duct wrap installed per the manufacturer's installation instructions to enclose the exhaust duct from the shaft penetration horizontally to the location of the roof exhaust fan and up through the roof to the fan.</p> <p>All other portions of the fire subdue! assemblies at each floor comply with the exception 1.1. Per specifications all ductwork is a minimum 26 gage. The roof exhaust fan for this system is connected to the emergency standby power so that it runs continuously.</p>
Reason for alternative	<p>Due to limited ceiling space there is not adequate room to build a two hour rated duct enclosure in the horizontal offset.</p> <p>Listed Fire Wrap is generally listed and approved in lieu of fire rated shafts for grease exhaust ducts and higher hazard conditions that the toilet exhaust ducts that we have in this building at this location. It has been appealed and approved in the past for similar conditions. (Appeal #18939)</p>

APPEAL DECISION

Use of fire barrier wrap as for 2 hour protection of horizontal duct run: Hold for additional information. Appellant may contact John Butler (503 823-7339) with questions.

Additional information is submitted as a no fee reconsideration, following the same submittal process and using the same appeals form as the original appeal. Indicate at the beginning of the appeal form that you are filing a reconsideration and include the original assigned Appeal ID number. The reconsideration will receive a new appeal number.

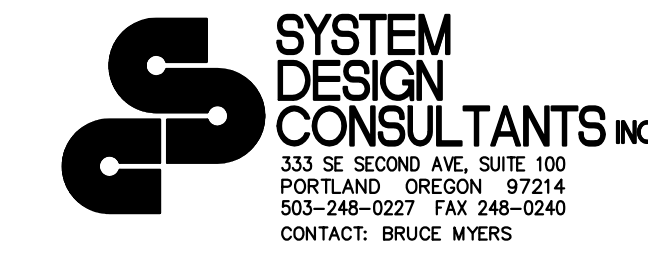
Include the original attachments and appeal language. Provide new text with only that information that is specific to the reconsideration in a separate paragraph(s) clearly identified as "Reconsideration Text" with any new attachments also referenced. No additional fee is required.



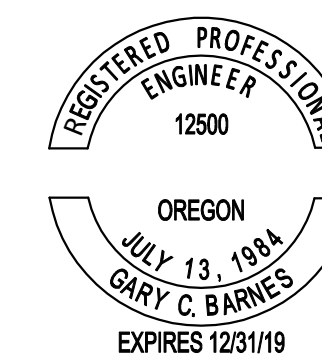
SDC - QUALITY CONTROL
PROJECT:
PRODUCTION:
QUALITY CONTROL:
ENGINEER:

ARCHITECTS

CONSULTANT



STAMP



REVISION NO.	DATE
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2	2-08-2011
3	3-22-2011
4	4-16-2011

KEY PLAN - (NTS)

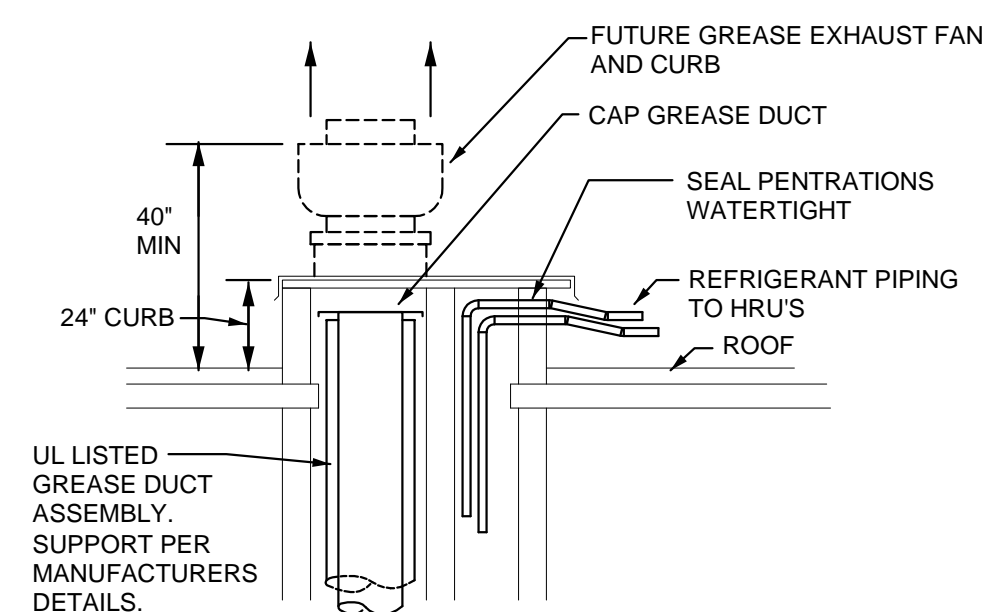


EASTSIDE OFFICE

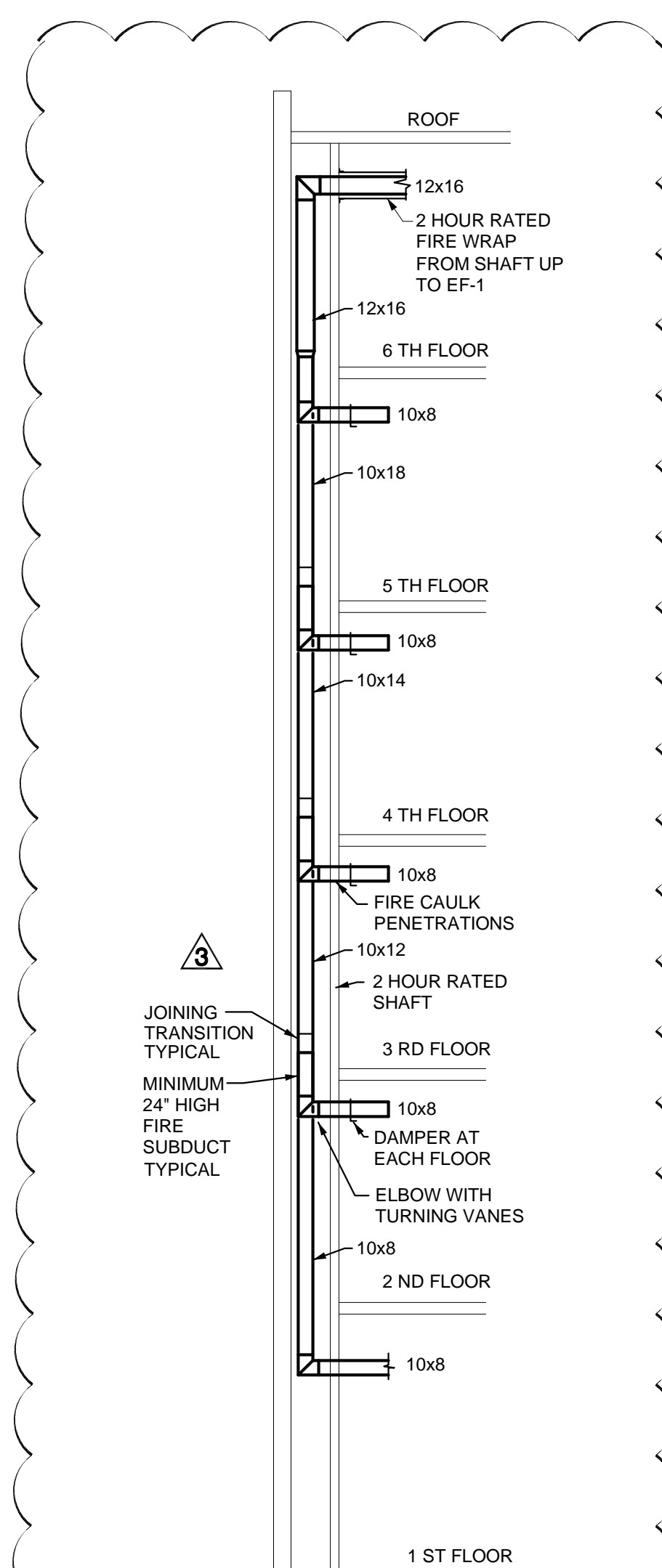
PMC Building LLC
525 SE MLK Jr BLVD
Portland, OR 97214
ISSUANCE
PERMIT
PROJECT NUMBER
01618
DATE
7/16/2018
SCALE
As indicated
DRAWING TITLE
HVAC
FIFTH AND
SIXTH FLOOR
PLANS

SHEET NUMBER

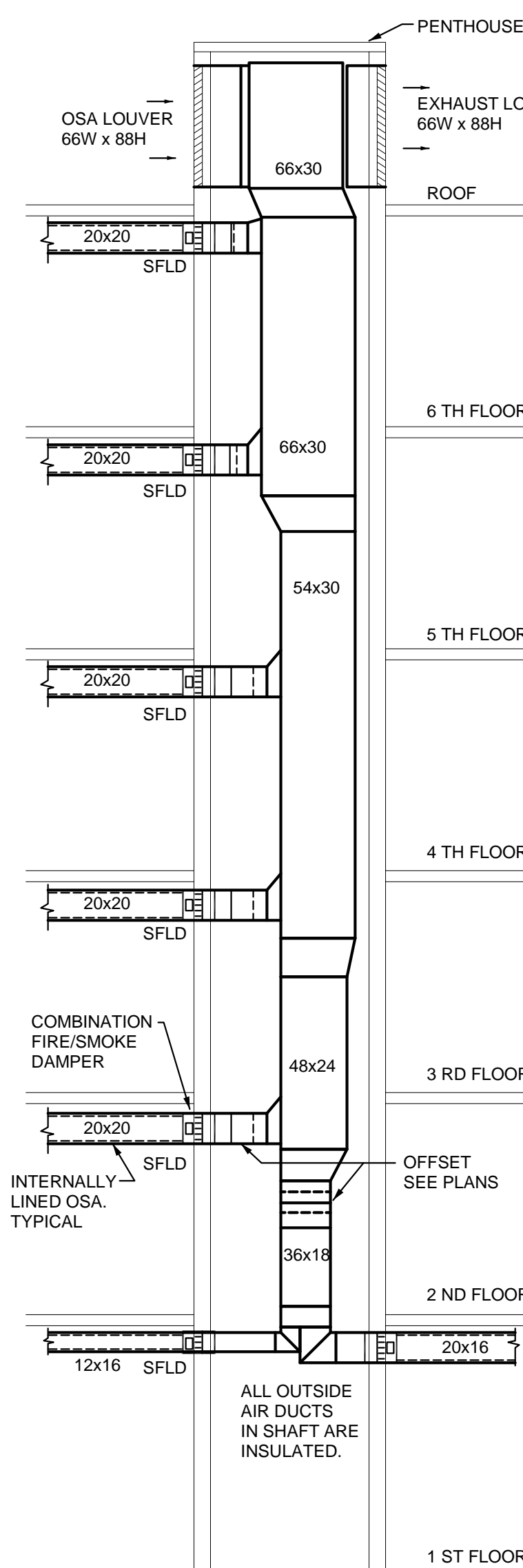
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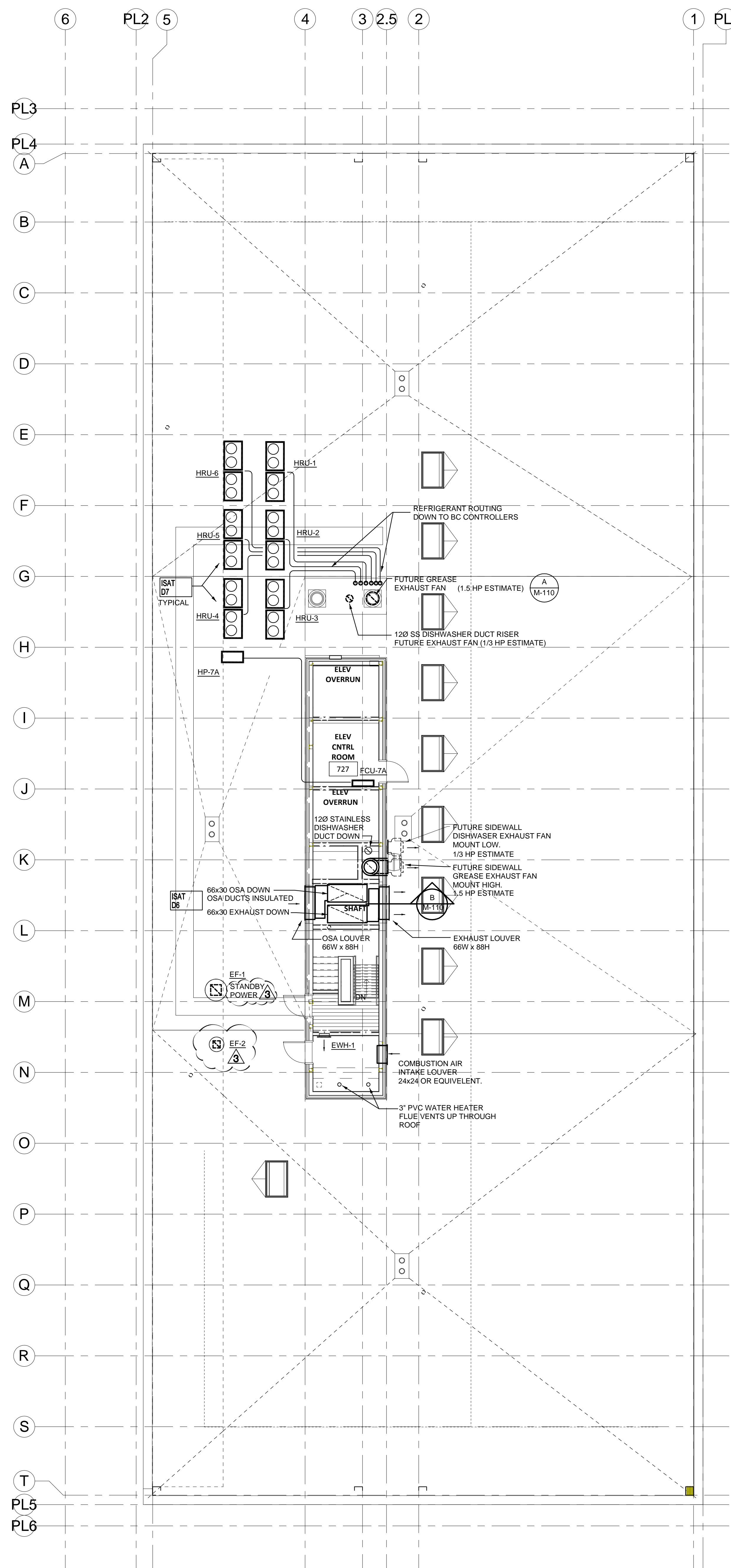
DETAIL AT SHAFT TOP
NO SCALE



3
C EXHAUSTS SHAFT SECTION
M-110 NO SCALE



SHAFT SECTION
NO SCALE



1 Roof
M-110 $1/8" = 1'-0"$



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ESR-1255

Reissued 05/2016

This report is subject to renewal 05/2018.

DIVISION: 07 00 00—THERMAL AND MOISTURE PROTECTION

SECTION: 07 81 33—MINERAL-FIBER FIREPROOFING

REPORT HOLDER:

3M FIRE PROTECTION PRODUCTS

3M CENTER, BUILDING 223-2N-20
ST. PAUL, MINNESOTA 55144-1000

EVALUATION SUBJECT:

3M FIRE BARRIER DUCT WRAP 615+ BLANKET FOR GREASE DUCT ENCLOSURE ASSEMBLIES



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ICC-ES Evaluation Report

ESR-1255

Reissued May 2016

This report is subject to renewal May 2018.

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**DIVISION: 07 00 00—THERMAL AND MOISTURE
PROTECTION**

Section: 07 81 33—Mineral-Fiber Fireproofing

REPORT HOLDER:

3M FIRE PROTECTION PRODUCTS
3M CENTER, BUILDING 223-2N-20
ST. PAUL, MINNESOTA 55144-1000
(651) 733-0973
www.3m.com/firestop

EVALUATION SUBJECT:

**3M FIRE BARRIER DUCT WRAP 615+ BLANKET FOR
GREASE DUCT ENCLOSURE ASSEMBLIES**

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2012 and 2009 *International Building Code*® (IBC)
- 2012 and 2009 *International Mechanical Code*® (IMC)
- 2012 and 2009 IAPMO *Uniform Mechanical Code* (UMC)
- Other Codes (see Section 8.0)

Properties evaluated:

- Durability
- Fire resistance
- Noncombustibility
- Surface burning characteristics

2.0 USES

The 3M Fire Barrier Duct Wrap 615+ is a flexible blanket used to construct zero-clearance, fire-resistance-rated grease duct enclosure assemblies serving Type I kitchen hoods. The duct wrap material complies with 2012 IMC Section 506.3.11.2 (2009 IMC Section 506.3.10.2) and 2012 IAPMO UMC Sections 507.2.5 and 507.2.6 (2009 IAPMO UMC Sections 507.2.6 and 510.7.3.1), and is an alternative to the one- and two-hour fire-resistance-rated enclosure requirements of 2012 IBC Section 713.4 (2009 IBC Section 708.4) and 2012 IAPMO UMC Section 510.7 (2009 IAPMO UMC Section 510.7.1), when installed in accordance with Section 4.0.

3.0 DESCRIPTION

3.1 Materials:

3.1.1 3M Fire Barrier Duct Wrap 615+ Blanket: The blanket consists of a monolithic layer of proprietary soluble,

vitreous alkaline earth oxide (calcium-silicone-, magnesium-oxide) fiber material encapsulated in a foil scrim, having a total nominal thickness of 1¹/₂ inches. It is packaged in rolls 25 feet (7.6 m) long and either 24 inches (610 mm) or 48 inches (1219 mm) wide. The blankets have a nominal density of 6 pcf and have a flame-spread index of 25 or less and a smoke-developed index of 50 or less when tested in accordance with ASTM E84. The 615+ blanket is classified as noncombustible when tested in accordance with ASTM E136.

3.1.2 Banding Material: Banding material must be minimum 1¹/₂-inch-wide (12.7 mm), 0.015-inch-thick (3.8 mm) stainless steel or carbon steel strap. Tools used for banding are a hand tensioner and a clip seal crimping tool.

3.1.3 Duct System: The duct must comply with Section 506.3 of the IMC or Sections 510.1, 510.4 or 510.5 of the UMC, as applicable. Under the IMC, grease ducts serving Type I hoods must be constructed either of minimum 0.0575-inch-thick (1.46 mm) (No. 16 gage) steel or of stainless steel at least 0.045 inch (1.14 mm) thick. Under the UMC, grease ducts serving Type I hoods must be constructed either of minimum 0.054-inch-thick (1.37 mm) (No. 16 MSG) steel or of stainless steel not less than 0.043 inch (1.09 mm) (No. 18 MSG) thick. Joints and seams of grease ducts must comply with Section 506.3.2 of the IMC, or Section 510.5.2 of the UMC. Duct supports must comply with Section 506.3.3 of the IMC, or Sections 510.1.6 and 510.5.1 of the 2012 IAPMO UMC (2009 IAPMO UMC Sections 510.1.7 and 510.5.1), as applicable, and Section 4.2.3 of this report. Maximum duct size is 48 inches by 24 inches (1219 mm by 610 mm).

3.1.4 Sealants: 3M Fire Barrier 1000 N/S Silicone Sealant (Non-Slump) and 3M Fire Barrier 1003 S/L Silicone Sealant (Self-Leveling) are ready-to-use, one-component silicone elastomers used in through-penetration fire-stop assemblies described in Section 4.2.4. The sealants are packaged in cartridges and have a shelf life of 12 months from date of packaging when stored in a clean, dry area with temperatures between 40°F and 90°F (4.4°C and 32.2°C).

3.1.5 3M Fire Barrier Grease Duct Access Door and DuctMate ULtimate Door: The rectangular prefabricated access doors are UL listed Hood and Duct Accessories. The access doors are provided in three sizes: 12 inches by 8 inches (305 mm by 203 mm), 14 inches by 10 inches (356 mm by 254 mm) and 22 inches by 22 inches (559 mm by 559 mm). The access door assembly consists of the 3M access door, four 1/4-inch-diameter (6.4 mm) threaded

extension rods, three layers of the 615+ blanket, a No. 16 gage cover plate, and wing nuts and washers.

4.0 INSTALLATION

4.1 General:

The Duct Wrap 615+ wrap materials are installed with zero clearance from the ducts, and may be installed with zero clearance from the insulating material to combustible construction. Grease ducts protected with Duct Wrap 615+ are permitted to penetrate nonfire-resistance-rated wall, floor-ceiling and roof-ceiling assemblies, provided the duct is protected from the point of penetration in accordance with this report. The systems are also permitted to penetrate fire-resistance-rated assemblies when the through-penetration is protected in accordance with Section 4.2.4 of this report. The systems comply with the requirements of Section 602.2.1 of the IMC, and Section 602.2 of the UMC for installation in plenums.

4.2 Two-hour Fire-resistance-rated Enclosure Assembly:

4.2.1 Enclosure Assembly: The duct must be installed in accordance with Section 506.3.8 of the IMC or Sections 510.1, 510.4 or 510.5 of the UMC, as applicable. Ducts must have a maximum 48-inch-by-24-inch (610 mm by 1219 mm) cross-sectional opening. A total of two layers of blanket material is installed around the grease duct, using one of the four overlap techniques illustrated in Figure 1. Adjacent blankets on the inside layer are installed with either tight butt-joints between blankets or 3-inch (76 mm) perimeter and longitudinal overlaps. Edge joints of the second layer must be offset 10¹/₂ inches (267 mm) from those of the first layer. The second layer of blanket material must have minimum 3-inch (76 mm) perimeter and longitudinal overlaps. Before the insulation is applied on ducts of 24 inches and larger, 7-inch-long (178 mm), No. 12 gage, copper-coated, mild steel impaling pins must be welded to the duct on the underside of horizontal assemblies and vertical assemblies spaced as illustrated in Figure 1B. Galvanized, mild steel speed washers must be placed over each impaling pin to secure the blanket. Steel banding straps must be placed circumferentially, 1¹/₂ inches (38 mm) from the edge of the blanket and at 10¹/₂ inches (267 mm) on center. Material must not be installed that has been abused or damaged, e.g., stepped on, unintentionally cut or ripped. The tension in the banding straps must be sufficient to firmly retain the blanket materials, but not to unduly compress the blanket, and must not be so great as to cause any cutting or damage or compression to the blanket material. Seven-inch-long (178 mm), No. 12 gage, copper-coated, mild steel impaling pins, welded to the duct as shown in Figure 1B, can be used as an alternative to steel banding straps on any size duct.

4.2.2 Grease Duct Access Doors:

4.2.2.1 General: Grease duct access doors must comply with Section 506.3.8 of the IMC, and Section 510.3 of the UMC, as applicable.

4.2.2.2 Prefabricated Access Doors: The 3M Fire Barrier Grease Duct Access Door Assembly or Ductmate ULTimate Doors are installed as illustrated in Figure 3. Three layers of the 615+ blanket must be installed over the access door such that each layer overlaps the preceding layer by 1 inch (25 mm) on all four sides. Edges of the outer layer of insulation blanket must be sealed with aluminum foil tape. A No. 16 gage steel plate the same size as the outer layer of insulation blanket must be secured over the outer layer of insulation.

4.2.2.3 Field-fabricated Access Doors: The access doors must be protected with three layers of 3M Fire Barrier Duct Wrap 615+ blanket material as illustrated in Figures 2 and 3. The first layer of blanket is cut the same size as the door, and the subsequent layers must overlap the previous layer by 1 inch (25.4 mm). Access door labels must be applied to all access doors.

4.2.3 Duct Support: Horizontal duct assemblies with maximum cross-sectional openings of 24 inches by 24 inches (610 mm by 610 mm) must be supported with minimum ³/₈-inch-diameter (9.5 mm), all-thread steel rod and 2-inch-by-2-inch-by-¹/₈-inch (51 mm by 51 mm by 3.2 mm) steel angle, spaced a maximum of 60 inches (1524 mm) on center. A minimum clearance of 0 inch and a maximum clearance of 6 inches (152 mm) is required between the vertical edge of the blanket material surrounding the duct and the steel rod.

Horizontal duct assemblies with maximum dimensions of 24 inches by 48 inches (610 mm by 1219 mm) must be supported with minimum ¹/₂-inch-diameter (12.7 mm), all-thread steel rod and 2-inch-by-2-inch-by-¹/₄-inch (51 mm by 51 mm by 6.4 mm) steel angle spaced a maximum of 60 inches (1524 mm) on center. A minimum clearance of 0 inch (0 mm) and a maximum clearance of 6 inches (152 mm) is required between the vertical edge of the blanket material surrounding the duct and the steel rod.

Vertical assemblies must be supported as shown in Figure 4. Vertical ducts must be supported at every floor line on the top of the slab.

4.2.4 Through-penetration Fire-stop Assemblies: See Table 1 and Figures 4 and 5 for descriptions of various through-penetration firestop assemblies that are used with the 3M Fire Barrier Duct Wrap 615+ system. The forming material placed in the annular space must be compressed to fill the space. The forming material must be recessed the appropriate depth (identified as Sealant Depth in Table 1) for application of the sealant. The sealant must be flush with the wall or floor surface. On floors, the sealant must be overlapped onto the floor approximately 1 inch (25.4 mm) and onto the insulated duct approximately ¹/₄ inch (6.4 mm).

5.0 CONDITIONS OF USE

The 3M Fire Barrier Duct Wrap 615+ grease duct enclosure assembly described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The enclosure systems must be constructed and installed in accordance with this report. In the event of a conflict between this report and the manufacturer's instructions, this report governs.
- 5.2 The blanket materials are manufactured for 3M in Coahuila, Mexico, under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with ASTM E2336 and the ICC-ES Acceptance Criteria for Field-applied Grease Duct Enclosure Assemblies (AC101.1), dated December 2012 (editorially revised November 2013).

7.0 IDENTIFICATION

The 3M Fire Barrier Duct Wrap 615+ blanket material must bear a label indicating the product name, the 3M Fire Protection Products name and address, clearances in accordance with the applicable code, and the evaluation report number (ESR-1255). The wording "Fire-resistive

Enclosure, Do Not Remove" must be printed on the blankets at maximum 24-inch (610 mm) intervals.

The 3M Fire Barrier Grease Duct Access Doors are identified by a label bearing the 3M Company name and address, and the product name.

The Ductmate Ultimate Doors are identified by a label bearing the Ductmate Industries, Inc.'s name and address, and the product name.

Sealants must be identified by the 3M company name and address, and the product name.

8.0 OTHER CODES:

In addition to the codes referenced in Section 1.0, the products described in this report were evaluated for compliance with the requirements of the following codes:

- 2006 *International Building Code*® (2006 IBC)
- 2006 *International Mechanical Code*® (2006 IMC)
- 2006 *IAPMO Uniform Mechanical Code* (2006 UMC)
- 2003 *International Building Code*® (2003 IBC)
- 2003 *International Mechanical Code*® (2003 IMC)
- 2003 *IAPMO Uniform Mechanical Code* (2003 UMC)

The products comply with the above-mentioned codes as described in Sections 2.0 through 7.0 of this report, except the applicable code sections are as follows for the report sections cited:

- Section 2.0:

- Grease duct enclosures:
 - 2006 and 2003 IMC Section 506.3.10
- Shaft enclosures:
 - 2006 and 2003 IBC Section 707.4
 - 2006 and 2003 UMC Section 510.7.1
- Section 3.2:
 - Joints and seams of grease ducts:
 - 2006 and 2003 IMC Section 506.3.2
 - 2006 and 2003 UMC Section 510.5.2
 - Duct supports:
 - 2006 and 2003 IMC Section 506.3.3
 - 2006 and 2003 UMC Sections 510.1.7 and 510.5.1
- Section 4.1:
 - 2006 and 2003 IMC Section 602.2.1
 - 2006 and 2003 UMC Section 602.2
- Section 4.2.2.1:
 - 2006 IMC Section 506.3.8
 - 2003 IMC Sections 506.3.9 and 506.3.11
 - 2006 and 2003 UMC Section 510.3

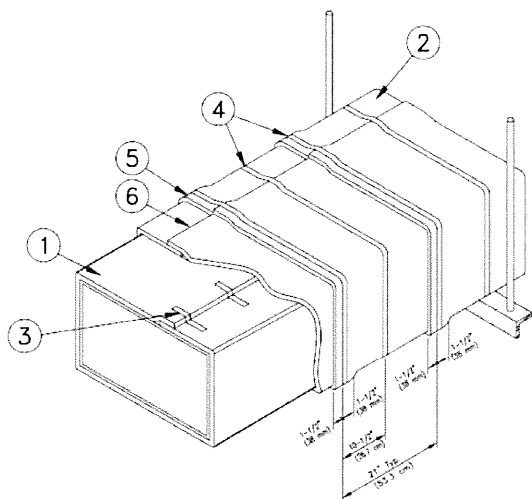
TABLE 1—THROUGH-PENETRATION FIRESTOP ASSEMBLIES¹

MAXIMUM DUCT SIZE (inches by inches)	WALL, FLOOR OR CEILING CONSTRUCTION	ANNULAR SPACE (inches)		PENETRATION FIRESTOP		FIRE-RESISTANCE RATING (hours)	
		Min.	Max.	Forming Materials	Sealant Depth (inches)	F-Rating	T-Rating
24 × 30, wrapped with 3M Duct Wrap through-penetration	No. 25 gage steel studs with one layer of 5/8-inch gypsum board on both sides	5/8	3 1/2	Unfaced 3M Duct Wrap or min. 4 pcf mineral wool compressed 25 percent	5/8, both sides	1	NA
24 × 30, wrapped with 3M Duct Wrap through-penetration	No 25 gage steel studs with two layers of 5/8-inch gypsum board on both sides	1	3 1/2	Unfaced 3M Duct Wrap or min. 4 pcf mineral wool compressed to fill the annular space	5/8, both sides	2	NA
24 × 30, wrapped with 3M Duct Wrap through-penetration	2-by-10 wood joists, with 5/8-inch gypsum board on the bottom side and 3/4-inch plywood on the top side	1	2 1/2	Unfaced 3M Duct Wrap or min. 4 pcf mineral wool compressed 25 percent	3/4, top surface	1	1
24 × 30, wrapped with 3M Duct Wrap through-penetration	4 1/2-inch reinforced concrete slab	1 1/4	2 1/2	Unfaced 3M Duct Wrap or min. 4 pcf mineral wool compressed to fill the annular space	7/16, top surface	2	2
24 × 30, bare duct through-penetration	4 1/2-inch reinforced concrete slab	1	2	Unfaced 3M Duct Wrap or min. 4 pcf mineral wool compressed 25 percent	3/8, top surface	2	2
24 × 48, wrapped with 3M Duct Wrap through-penetration	4 1/2-inch reinforced concrete slab	1	4 1/2	Unfaced 3M Duct Wrap or min. 4 pcf mineral wool compressed 56 percent	1/4, top surface	2	2

For SI: 1 inch = 25.4 mm.

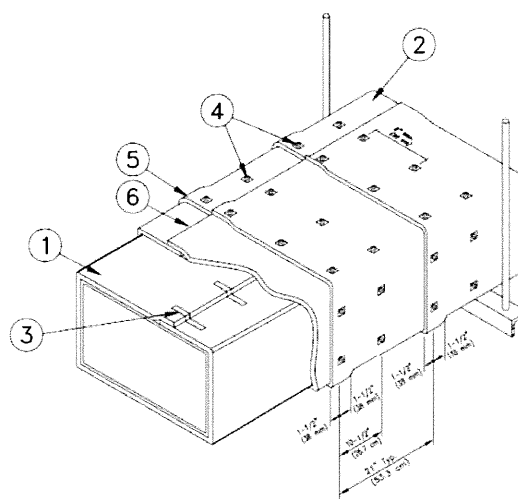
¹See Figure 4 and Figure 5 for an illustration of components.

FIGURE 1A
3M FIRE BARRIER DUCT WRAP 615+
COMMERCIAL KITCHEN GREASE DUCT SYSTEMS
1 OR 2 HOUR SHAFT ALTERNATIVE ZERO CLEARANCE TO COMBUSTIBLES
TELESCOPING TECHNIQUE W/BANDING ONLY
FOR DUCTS 24" (60.9 CM) OR LESS



- | | |
|----|--|
| 1. | First Layer 3M Fire Barrier Duct Wrap 615+ |
| 2. | Second Layer 3M Fire Barrier Duct Wrap 615+ |
| 3. | Filament Tape For Temporary Hold On 1st Layer Duct Wrap |
| 4. | Steel Banding 1/2 in. (13 mm) Wide Min. Typical 10-1 1/2" O.C. |
| 5. | 3 in. (76 mm) Min. Longitudinal Overlap |
| 6. | 3 in. (76 mm) Min. Perimeter Overlap |
- System integrity is limited by quality of installation.

FIGURE 1B
3M FIRE BARRIER DUCT WRAP 615+
COMMERCIAL KITCHEN GREASE DUCT SYSTEMS
1 OR 2 HOUR SHAFT ALTERNATIVE ZERO CLEARANCE TO COMBUSTIBLES
TELESCOPING TECHNIQUE W/WELD PINS ONLY



- | | |
|----|--|
| 1. | First Layer 3M Fire Barrier Duct Wrap 615+ |
| 2. | Second Layer 3M Fire Barrier Duct Wrap 615+ |
| 3. | Filament Tape For Temporary Hold On 1st Layer Duct Wrap |
| 4. | 1-1/2" Square (38mm) or 1-1/2" dia (38mm) galvanized speed clips |
| 5. | 3 in. (76 mm) Min. Longitudinal Overlap |
| 6. | 3 in. (76 mm) Min. Perimeter Overlap |
- System integrity is limited by quality of installation.

FIGURE 1C TELESCOPING OVERLAP WRAP OPTION
CROSS SECTIONAL VIEW

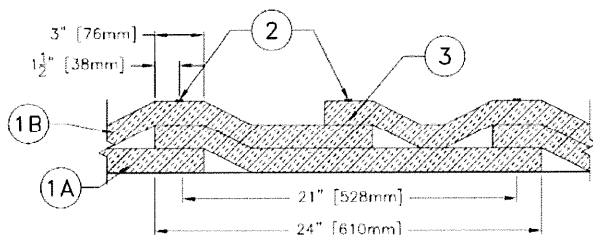


FIGURE 1D BUTT JOINT WITH COLLAR OPTION
CROSS SECTIONAL VIEW

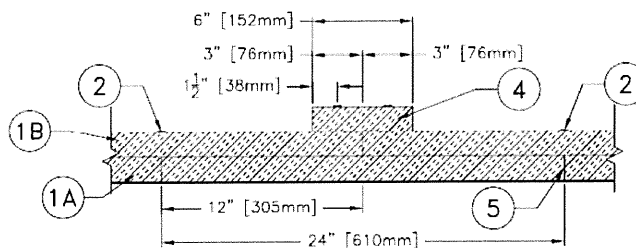


FIGURE 1E CHECKERBOARD OVERLAP OPTION
CROSS SECTIONAL VIEW

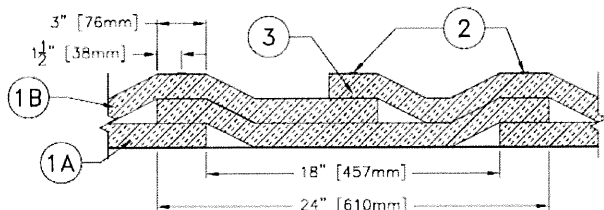
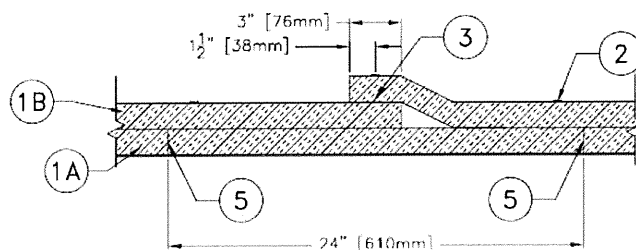
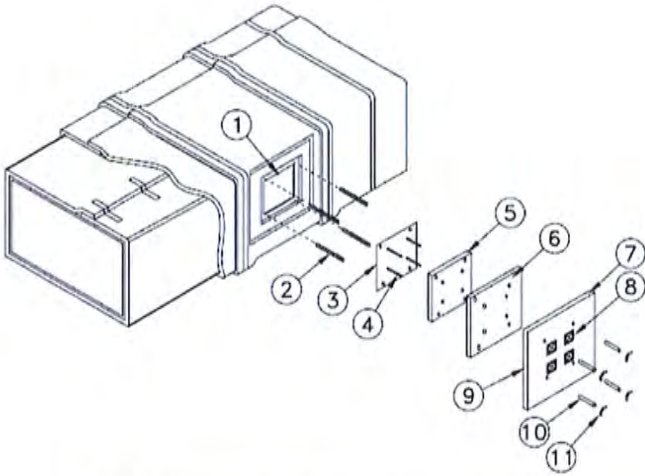


FIGURE 1F BUTT/OVERLAP OPTION
CROSS SECTIONAL VIEW



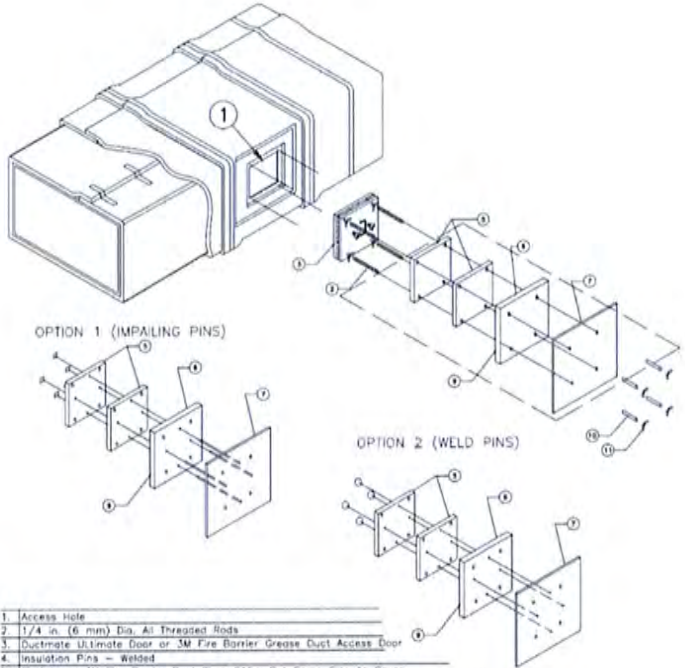
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|-----|---|
| 1A. | First Layer 3M Fire Barrier Duct Wrap 615+ |
| 1B. | Second Layer of 3M Fire Barrier Duct Wrap 615+ |
| 2. | Carbon or Stainless Steel Banding |
| 3. | 3 in. (76 mm) Min. Longitudinal Overlap |
| 4. | 6 in. (152 mm) Wide Collar Made from 3M Fire Barrier Duct Wrap 615+ |
| 5. | Firmly Butted Joint |
- System integrity is limited by quality of installation.

FIGURE 1—TYPICAL APPLICATION OF DUCT WRAP



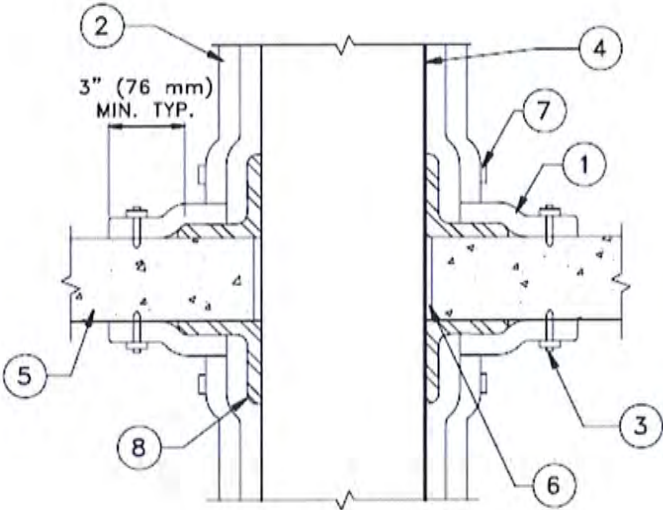
- | | |
|-----|---|
| 1. | Access Hole |
| 2. | 1/4 in. (6 mm) Dia. All Threaded Rods |
| 3. | Access Cover - 18 Gauge |
| 4. | Insulation Pins - Welded |
| 5. | First Layer 3M Fire Barrier Duct Wrap 615+ Cut Same Size As Cover |
| 6. | Second Layer 3M Fire Barrier Duct Wrap 615+ with 1 in. (25 mm) Overlap On All Sides |
| 7. | Third Layer 3M Fire Barrier Duct Wrap 615+ with 1 in. (25 mm) Overlap On All Sides |
| 8. | Speed Clips |
| 9. | Aluminum Tape Covering All Exposed Edges |
| 10. | Spool Pieces For Threaded Rods |
| 11. | 1/4 in. (6 mm) Diameter Wing Nuts |
- System integrity is limited by quality of installation.

FIGURE 2—3M FIRE BARRIER DUCT WRAP 615+ COMMERCIAL KITCHEN GREASE DUCT SYSTEMS, 1- OR 2-HOUR, ACCESS DOOR SYSTEM



- | | |
|-----|---|
| 1. | Access Hole |
| 2. | 1/4 in. (6 mm) Dia. All Threaded Rods |
| 3. | Ductmate Ultimate Door or 3M Fire Barrier Grease Duct Access Door |
| 4. | Insulation Pins - Welded |
| 5. | First Layer 3M Fire Barrier Duct Wrap 615+ Cut Same Size As Cover |
| 6. | Second Layer 3M Fire Barrier Duct Wrap 615+ with 1 in. (25 mm) Overlap On All Sides |
| 7. | Third Layer 3M Fire Barrier Duct Wrap 615+ with 1 in. (25 mm) Overlap On All Sides |
| 8. | Speed Clips |
| 9. | Aluminum Tape Covering All Exposed Edges |
| 10. | Spool Pieces For Threaded Rods |
| 11. | 1/4 in. (6 mm) Diameter Wing Nuts |
- System integrity is limited by quality of installation.

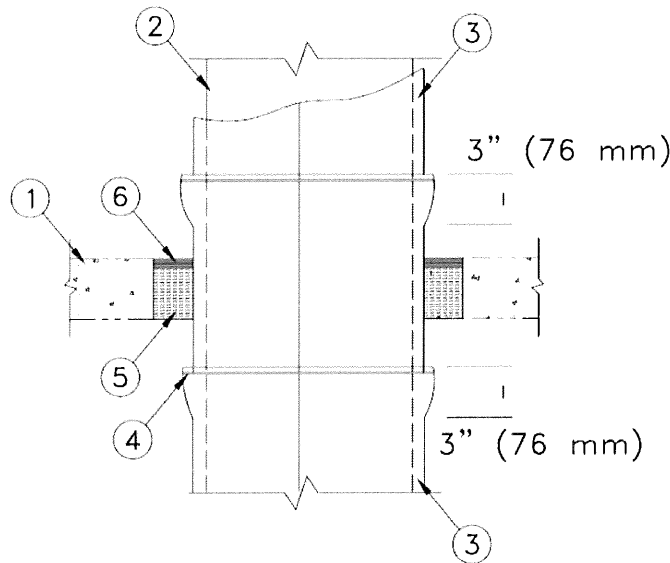
FIGURE 3—3M FIRE BARRIER OR DUCTMATE ULTIMATE GREASE ACCESS DOOR



- | | |
|----|---|
| 1. | First Layer 3M Fire Barrier Duct Wrap 615+ |
| 2. | Second Layer 3M Fire Barrier Duct Wrap 615+ |
| 3. | Mechanical Fasteners and Washers |
| 4. | Duct |
| 5. | Rated Floor/Ceiling |
| 6. | Firestopping System |
| 7. | Banding |
| 8. | Support Channel |
- System integrity is limited by quality of installation.

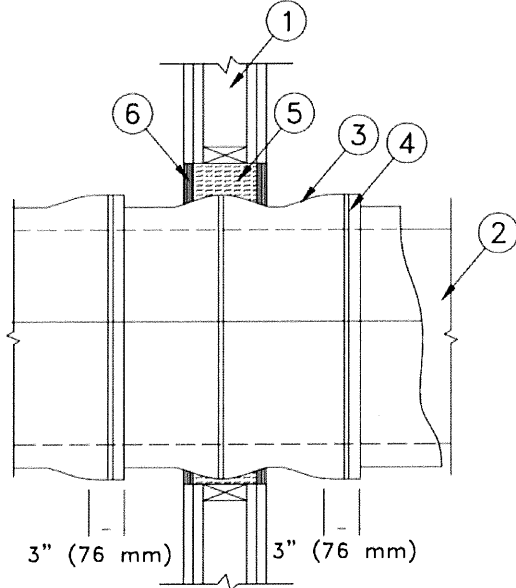
FIGURE 4—3M FIRE BARRIER DUCT WRAP 615+ COMMERCIAL KITCHEN GREASE DUCT SYSTEMS, 1- OR 2-HOUR, VERTICAL SUPPORT

FIGURE 5A
3M FIRE BARRIER DUCT WRAP 615+
COMMERCIAL KITCHEN GREASE DUCT SYSTEMS
1 OR 2 HOUR THROUGH PENETRATION SYSTEMS
4-1/2 INCH (11,4cm) CONCRETE FLOOR OR WALL



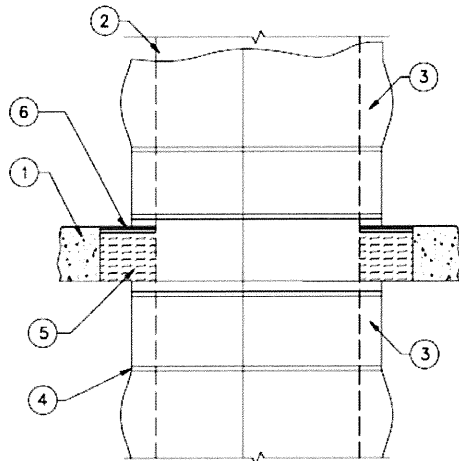
- | | |
|----|--|
| 1. | Floor/Ceiling or Wall Assembly |
| 2. | Duct |
| 3. | 2 Layers 3M Fire Barrier Duct Wrap 615+ |
| 4. | Banding or Pinning |
| 5. | Packing Material |
| 6. | 3M Fire Barrier 1000 NS or 1003 SL Silicone Sealant
(Note: 1003 SL for floors only)
For Wall Assembly Apply Sealant To Both Sides of Wall. |
- System integrity is limited by quality of installation.

FIGURE 5B
3M FIRE BARRIER DUCT WRAP 615+
COMMERCIAL KITCHEN GREASE DUCT SYSTEMS
1 OR 2 HOUR THROUGH PENETRATION SYSTEMS
FIRE-RATED GYPSUM WALLBOARD



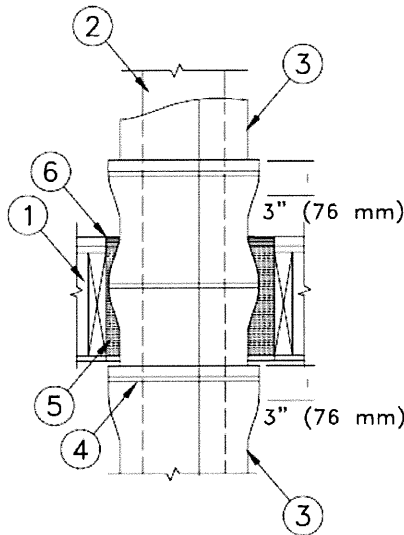
- | | |
|----|--|
| 1. | Gypsum Wallboard Assembly (1 layer for 1 hour, 2 layers for 2 hours) |
| 2. | Duct |
| 3. | 2 Layers 3M Fire Barrier Duct Wrap 615+ |
| 4. | Banding or Pinning |
| 5. | Packing Material |
| 6. | 3M Fire Barrier 1000 NS or 1003 SL Silicone Sealant |
- System integrity is limited by quality of installation.

FIGURE 5C
3M FIRE BARRIER DUCT WRAP 615+
COMMERCIAL KITCHEN GREASE DUCT SYSTEMS
1 OR 2 HOUR THROUGH PENETRATION SYSTEMS
4-1/2 INCH (11,4cm) CONCRETE FLOOR OR WALL



- | | |
|----|--|
| 1. | Floor/Ceiling or Wall Assembly |
| 2. | Duct |
| 3. | 2 Layers 3M Fire Barrier Duct Wrap 615+ |
| 4. | Banding or Pinning |
| 5. | Packing Material |
| 6. | 3M Fire Barrier 1000 NS or 1003 SL Silicone Sealant
(Note: 1003 SL for floors only)
For Wall Assembly Apply Sealant To Both Sides of Wall. |
- System integrity is limited by quality of installation.

FIGURE 5D
3M FIRE BARRIER DUCT WRAP 615+
COMMERCIAL KITCHEN GREASE DUCT SYSTEMS
1 HOUR THROUGH PENETRATION SYSTEMS
FIRE RATED WOOD/GYPSUM - FLOOR/CEILING ASSEMBLY



- | | |
|----|---|
| 1. | Fire Rated Floor/Ceiling Assembly |
| 2. | Duct |
| 3. | 2 Layers 3M Fire Barrier Duct Wrap 615+ |
| 4. | Banding or Pinning |
| 5. | Packing Material |
| 6. | 3M Fire Barrier 1000 NS or 1003 SL Silicone Sealant |
- System integrity is limited by quality of installation.

FIGURE 5—THROUGH-PENETRATION FIRE-STOPS

Design No. 3MU/DI 120-01
VENTILATION DUCT PROTECTION

3M Company

3M™ Fire Barrier™ Duct Wraps: 615 and 615+

3M™ Fire Barrier™ Sealants: Water-Tight 1000-NS Silicone, Water-Tight 1003-SL Silicone
(floors only), 2000+ Silicone, and CP 25 WB+

ISO 6944 (1985) Duct A

Stability – 2 Hour

Insulation – 2 Hour

Integrity – 2 Hour

ASTM E 814

F-Rating – 2 Hour

T-Rating – 2 Hour

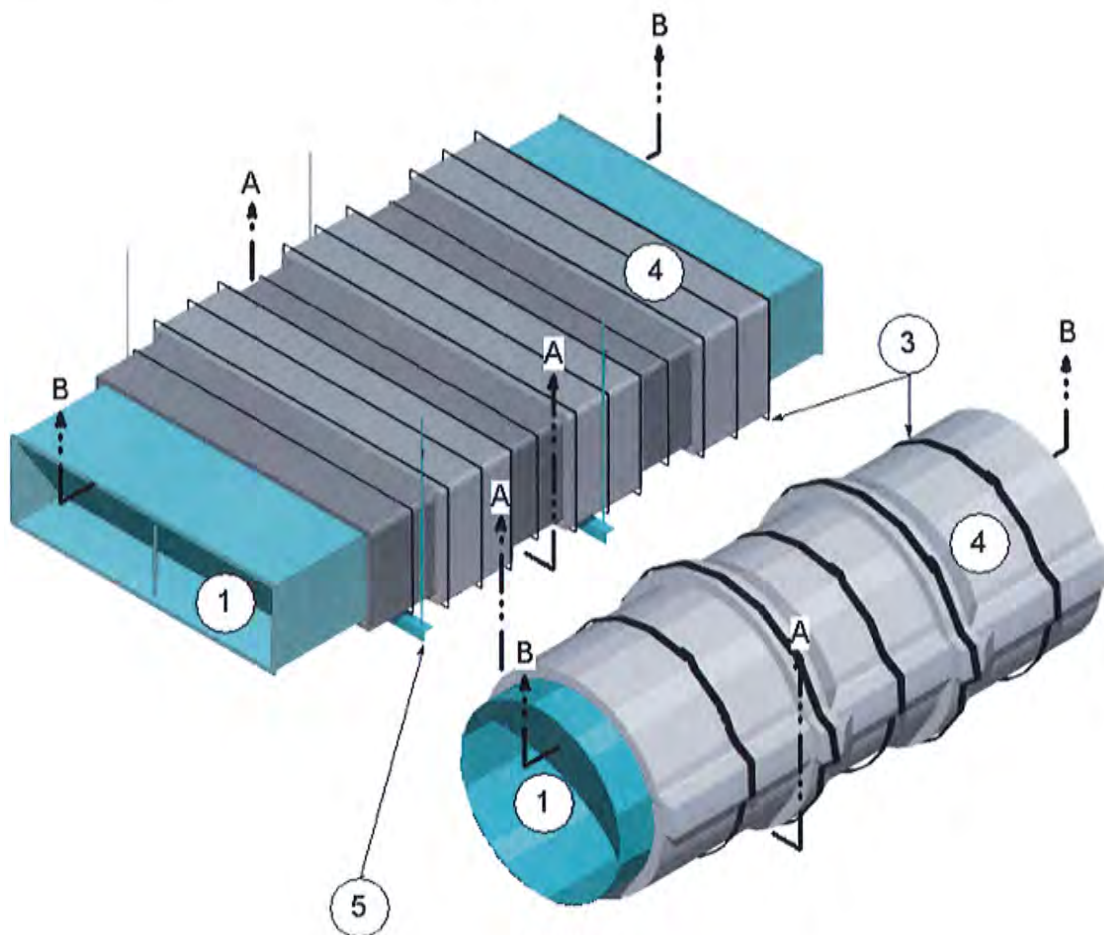


Figure 1

1. **VENTILATION DUCT:** Refer to Figure 1. Continuous, air-tight, rectangular or circular duct system with either horizontally or vertically oriented shafts constructed of sheet steel with a max.

area and a max. dimension as referenced in the Table 1. When required, equip the ventilation duct with transition fittings, e.g. elbows, tees, reducers, etcetera.

Table 1 – Ventilation Duct Requirements

Ventilation Duct for Item 7 References	Shape	Minimum Gauge	Maximum Dimension	Maximum Diameter	Maximum Area
R1	Rectangular	26	12	--	144
R2	Rectangular	24	40	--	400
R3	Rectangular	22	60	--	1440
R4	Rectangular	22	85	--	2040
C1	Circular	26	--	13	133
C2	Circular	24	--	21	346
C3	Circular	20	--	40	1257

A. Construct the ventilation duct using sections affixed to each other with seams or flanges.

B. Reinforce the ventilation duct to IMC, SMACNA* or NFPA 90A requirements designed to carry the weight of the ventilation duct assembly covered with insulation (Item 4) under a fire load equivalent to ASTM E 119 time-temperature curve.

*Exception: SMACNA 3rd Edition-2005, RT3 Drawband Joint or equivalent are not approved for use under this design listing with circular ventilation ducts.

C. Rigidly support the ventilation duct in accordance with IMC, SMACNA or NFPA 90A requirements designed to carry the weight of the ventilation duct assembly covered with insulation (Item 4) under a fire load equivalent to ASTM E 119 time-temperature curve or as specified in Item 5.

D. Protect the annular space around the ventilation duct passing through a fire rated wall assembly with an Intertek certified, compatible, 3M, penetration firestop system, refer to Section 8, having the same fire rating as the wall assembly.

2. **FASTENERS:** Refer to Figure 2. Weld min. 12 GA, 4-1/2 in. long, copper-coated

steel insulation pins or 12 GA insulated cup head pins to the ventilation duct (Item 1). Match fastener method with corresponding insulation (Item 4) method.

A. Compression Butt Joint: Refer to 4A Section View B-B. Locate pins at all blanket overlaps, on all sides of the ventilation duct (Item 1), and meet the following requirements.

I. Space pins max. 12 in. apart in rows across the width of ventilation duct (Item 1). Locate pins max. 6-3/4 in. from the edges of the rectangular ventilation duct (Item 1).

II. Space the rows of pins max. 9-1/2 in. apart along the length ventilation duct (Item 1). Where pieces of insulation (Item 4A) are to be butted together, space the pins a max. of 2 in. apart.

III. After insulation (Item 4A) is installed, place min. 2-1/2 in. x 2-1/2 in. square, galvanized steel, self-locking washer clips onto all insulation pins.

IV. After clips are installed, cut off or bend flush with insulation (Item 4) the pins that are too long.

B. Butt Joint with Collar: Refer to 4B Section View B-B. Locate pins at all

blanket overlaps, on all sides of the ventilation duct (Item 1), and meet the following requirements.

- I. Space pins max. 12 in. apart in rows around the circumference for circular ventilation ducts (Item 1) or on all sides for rectangular ventilation ducts (Item 1). For rectangular ventilation ducts (Item 1), locate pins max. 6-3/4 in. from the edges.
 - II. Space the rows of pins max. 9 in. apart along the length ventilation duct (Item 1). Where pieces of insulation (Item 4B) are to be butted together, space pins a max. of 3 in. apart.
 - III. After insulation (Item 4B) is installed, place min. 2-1/2 in. x 2-1/2 in. square, galvanized steel, self-locking washer clips onto all insulation pins.
 - IV. After clips are installed, cut off or bend flush with insulation (Item 4B) the pins that are too long.
- C. Single End Overlap (Telescope): Refer to 4C Section View B-B. Locate pins at all blanket overlaps, on all sides of the ventilation duct (Item 1), and meet the following requirements.
- I. Space pins max. 12 in. apart in rows across the width of ventilation duct (Item 1). Locate pins max. 6-3/4 in. from the edges of the rectangular ventilation duct (Item 1).
 - II. Space the rows of pins max. 10-1/2 in. apart along the length ventilation duct (Item 1). Where pieces of insulation (Item 4C) are to be butted together, space the pins a max. 1-1/2 in. apart.
 - III. After insulation (Item 4C) is installed, place min. 2-1/2 in. x 2-1/2 in. square, galvanized steel, self-locking washer clips onto all insulation pins.
- IV. After clips are installed, cut off or bend flush with insulation (Item 4C) the pins that are too long.
- D. Dual End Overlap (Checkerboard): Refer to 4D Section View B-B. Locate pins at all blanket overlaps, on all sides of the ventilation duct (Item 1), and meet the following requirements.
- I. Space pins max. 12 in. apart in rows across the width of ventilation duct (Item 1). Locate pins max. 6-3/4 in. from the edges of the rectangular ventilation duct (Item 1).
 - II. Space the rows of pins max. 10-1/2 in. apart along the length ventilation duct (Item 1). Where pieces of insulation (Item 4D) are to be butted together, space the pins a max. of 1-1/2 in. apart.
 - III. After insulation (Item 4D) is installed, place min. 2-1/2 in. x 2-1/2 in. square, galvanized steel, self-locking washer clips onto all insulation pins.
 - IV. After clips are installed, cut off or bend flush with insulation (Item 4D) the pins that are too long.
3. **BANDING:** Do not use banding for the installation of insulation method (Item 4A), Compression Butt Joint. Banding is an option to fastener methods (Items 2B, 2C and 2D) but not fastener method (Item 2A). After insulation (Item 4) is installed, apply min. 1/2 in. wide, 0.015 in. thick stainless steel bands or min. 1/2 in. wide, 0.020 in. thick carbon steel bands and secured with min. 1 in. long stainless or carbon steel crimp clamps to be used with corresponding banding type. When needed to ease installation, use filament tape as a temporary hold for the insulation (Item 4) prior to banding. Place banding a max. 1-1/2 in. from all insulation (Item 4) edges and a max. of 10-1/2 in. on center (oc). Tension the banding to hold the insulation (Item 4) in place without cutting or damaging the insulation (Item 4) or ventilation duct (Item 1).

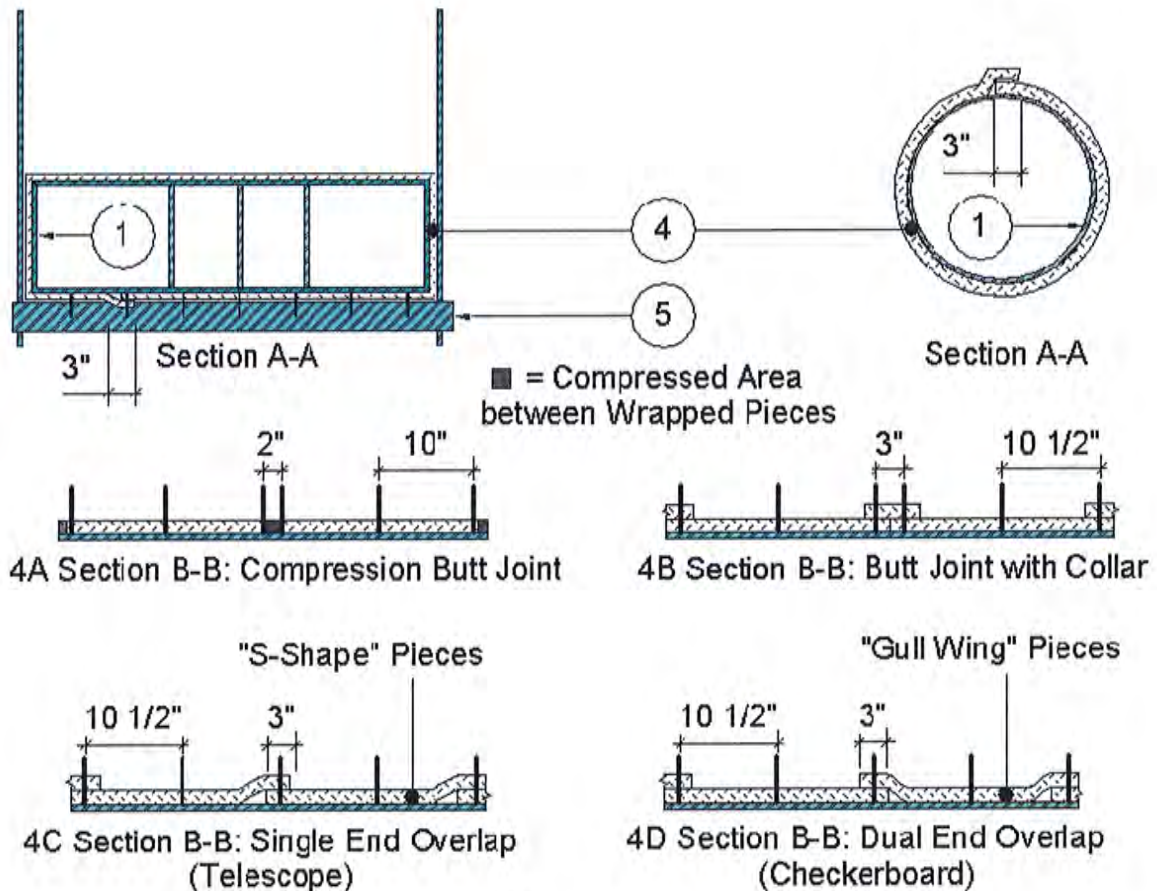


Figure 2

4. **CERTIFIED MANUFACTURER:** 3M Company

CERTIFIED PRODUCT: 3M™ Fire Barrier Duct Wrap

MODEL: 615 or 615+

INSULATION: Refer to Figure 2. Apply one layer of nominal 1-1/2 in. thick, 6 pcf blanket, made of fibers, encapsulated with foil scrim over the entire surface of the ventilation duct (Item 1) and a collar on each side of the penetration firestop (Item 1D). Apply the insulation in accord with one of the four methods (A, B, C, or D) that follow. Use blanket that is encapsulated with a polypropylene/foil scrim or an aluminized polyester/scrim/foil. Wrap one layer of insulation around the ventilation duct (Item 1) perimeter so that each terminating end of insulation


overlaps onto the starting end of insulation a min. of 3 in. at all transverse joints. Alternate the transverse overlap location so that no two consecutive adjacent overlaps align. Refer to Section View A-A for transverse overlap section view. Cover and seal all visually exposed ends and edges of insulation with nominal 4 in. wide pressure-sensitive aluminum foil tape.

- A. **Compression Butt Joint:** Refer to 4A Section View B-B. Wrap the ventilation duct (Item 1) with one layer of insulation installed with compression butt joints at all longitudinal joints. Compress each end of each piece of insulation together and butt to preceding edge of insulation. Each piece of installed insulation width is 2 in. less than insulation nominal width. (Example:

each piece of nominal 24 in. wide insulation when installed is 22 in. wide.) Install the insulation overlap in contact (pressed against) with the insulation being overlapped. Verify all insulation butt joints are a min. 1-1/2 in. in overall thickness at compression butt joints.

- B. Butt Joint with Collar: Refer to 4B Section View B-B. Wrap the ventilation duct (Item 1) with one layer of insulation installed with butt joints at all longitudinal joints. Butt each end of each piece of insulation together with preceding edge of insulation. Each piece of installed insulation width is its nominal width. (Example: each piece of nominal 24 in. wide insulation when installed is 24 in. wide.) Install the insulation overlap in contact (pressed against) with the insulation being overlapped. Place and center 6 in. wide collar of insulation over the butt joint. Overlap 6 in. wide collar onto each adjacent insulation 3 in. Verify all insulation butt joints with collars are a min. 3 in. in overall thickness.
- C. Single End Overlap (Telescope): Refer to 4C Section View B-B. Wrap the ventilation duct (Item 1) with one layer of insulation installed with 3 in. min. overlaps at all longitudinal joints. Overlap each adjacent insulation edge with the edge of the next piece of insulation. Install the insulation overlap in contact (pressed against) with the insulation being overlapped. Verify all insulation overlaps are nominally 3 in. in overall thickness.
- I. Starting at one end of the ventilation duct (Item 1), apply the first piece of insulation around the ventilation duct (Item 1) to overlap fasteners (Item 2C). Refer section view A-A.
- II. Position and overlap the leading edge of the second piece of insulation nominally 3 in. over the flush edge of the first piece of insulation. Place the opposite

edge of the second piece of insulation flush against the surface of the ventilation duct (Item 1). An "S-shaped" cross section of the insulation is created. Refer to 4C section view B-B.

- III. Apply all additional pieces of insulation as "S-shaped" cross section of the insulation in compliance with Item 4CII.
- D. Dual End Overlap (Checkerboard): Refer to 4D Section View B-B. Verify all insulation overlaps are a min. 3 in. in overall thickness. Do not align two consecutive insulation end overlaps. Overlap each full-width insulation edge with the edge of the "Gull Wing",  shaped insulation. Install the insulation overlap in contact (pressed against) with the insulation being overlapped. Verify all insulation overlaps are nominally 3 in. in overall thickness.
- I. Wrap the first piece of insulation around the ventilation duct (Item 1) so that the insulation is flush against the surface of the ventilation duct (Item 1). Position the starting end of the insulation to overlap pins (Item 2A) a min. of 1-1/2 in. while the edges of the insulation overlap the rows of pins (Item 2B) a min. of 1-1/2 in.
- II. Position the second piece of insulation nominally 18 in. from the edge of the first piece of insulation. Install the second piece in the same manner as the first.
- III. Cover the ventilation duct (Item 1) that is exposed between the edges of the first two pieces of insulation with another piece of insulation. Position the starting end of the insulation to overlap pins (Item 2A) a min. of 1-1/2 in. while the edges of the insulation overlap the adjacent edges of the two pieces installed insulation a min. of 1-1/2 in.

5. **SUPPORTS:** Support the insulated ventilation duct (Item 1) using a support system composed of min. 3/8 in. diameter steel, all-thread rods and min. 2 x 2 x 1/4 in. steel angle cross-member for rectangular ducts or a min. 2 x 2 x 1/4 in. steel angle ring cross-member for circular ducts. Connect all-thread steel rods (insulation (Item 4) not required) to the angle or angle ring cross-member using nuts and washers. Connect the all-thread steel rods to the bottom of the floor assembly using an attachment method designed to carry

the weight of the ventilation duct (Item 1) with insulation (Item 4) under a fire load equivalent to ASTM E119 time-temperature curve. Center ventilation duct (Item 1) with insulation (Item 4) on support cross-member. Space all-thread steel rods a max. distance of 6 in. from surface of the insulated ventilation duct or allowing all-thread steel rods to contact with the insulation (Item 4) at the min. distance. Extend support cross-member at least 2 in. past each all-thread steel rod. Space supports a max. 60 in. oc.

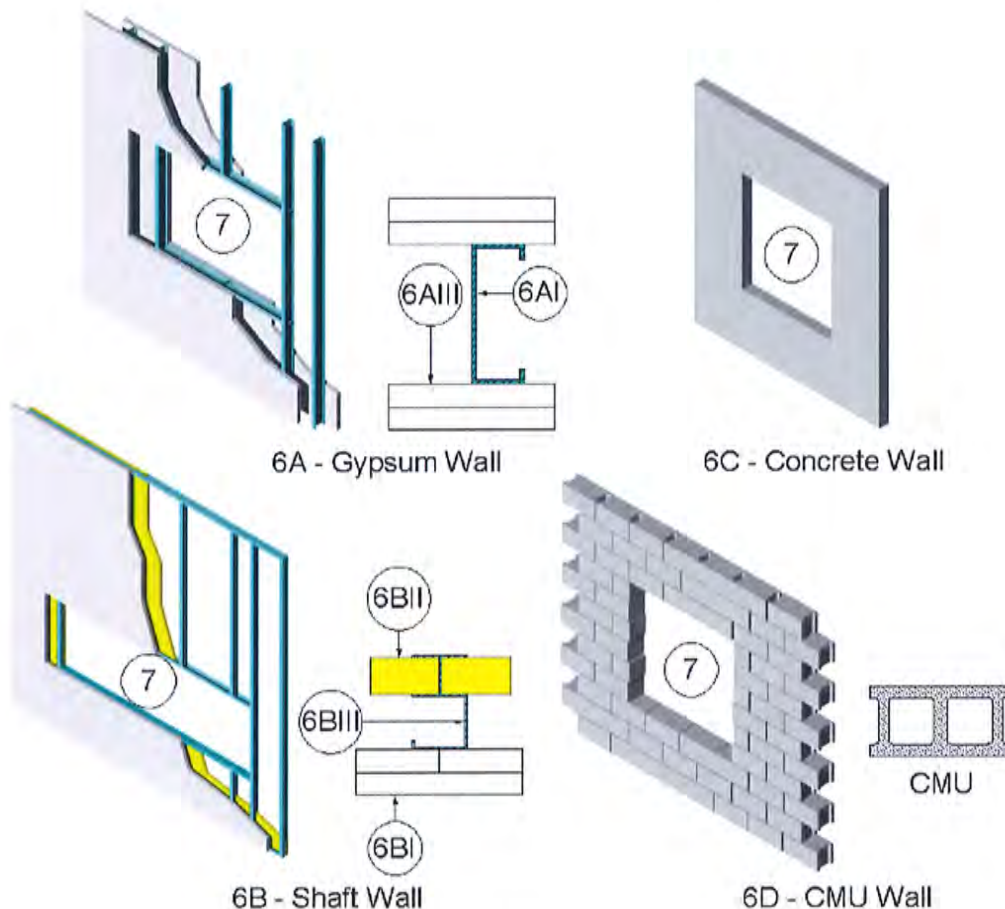


Figure 3

6. **SUPPORTING CONSTRUCTION:** Refer to Figures 3 and 4. Use one of the following wall or floor assemblies.

A. **GYPSUM WALL ASSEMBLY:**
Symmetrical two-hour rated gypsum wall assembly, which may also be used as a shaft wall assembly, constructed of the following:

- I. Steel Studs – Min. 25 GA galvanized steel studs measuring 3-5/8 in. wide with 1-1/4 in. legs spaced max. 24 in. oc. Attach studs with min. #6 x 3/8 in. steel stud framing screws to floor and ceiling tracks.
- II. Tracks – Channel U-shaped floor and ceiling runners measuring 1/2 in. deep by 3-5/8 in. wide, which are secured to floor and ceiling with 1 in. long fasteners suitable for the mounting to substrate and spaced max. 18 in. oc.
- III. Gypsum Board – Cover studs and runners with two layers of 5/8 in. thick, Type X gypsum board on each face. Fasten base layer of gypsum board to steel studs with #6 1-1/8 in. bugle head phillips drywall screws spaced max. 12 in. oc. Fasten face layer of gypsum board with #6, 1-5/8 in. long bugle phillips drywall screws spaced max. 8 in. oc. Apply vinyl or casein, dry or premixed joint compound to face layers of gypsum board in two coats to all exposed screw heads and gypsum board joints. Embed min. 2 in. wide paper, plastic or fiberglass tape in first layer of joint compound over joints in gypsum board. Min. wall assembly thickness of 6 in. measured from face layer of gypsum board to opposite face layer of gypsum board.

B. **SHAFT WALL ASSEMBLY:**
Asymmetrical two-hour rated gypsum shaft wall assembly constructed of the following:

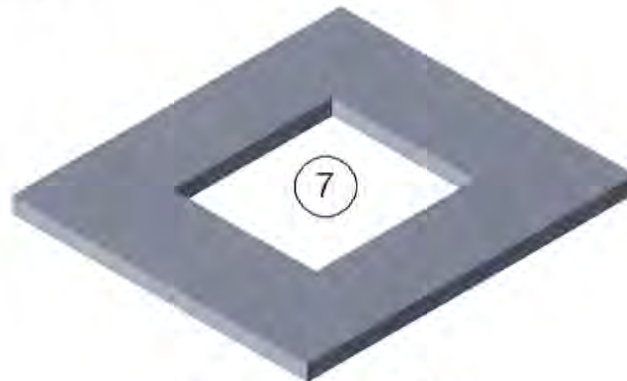
- I. Visual Gypsum Board – Cover studs and runners with two layers of min. 1/2 in. thick, Type X gypsum board on each face. Fasten base layer of gypsum board to steel studs with #6 1-1/8 in. bugle head phillips drywall screws spaced max. 12 in. oc. Fasten face layer of gypsum board with #6, 1-5/8 in. long bugle phillips drywall screws spaced max. 8 in. oc. Apply vinyl or casein, dry or premixed joint compound to face layers of gypsum board in two coats to all exposed screw heads and gypsum board joints. Embed min. 2 in. wide paper, plastic or fiberglass tape in first layer of joint compound over joints in gypsum board. Min. wall assembly thickness of 4-1/2 in. measured from face layer of gypsum board to opposite face layer of gypsum board.
- II. Interior Gypsum Board – Cut 1 in. thick Type X gypsum board 1 in. less than floor to ceiling height. Insert the longitudinal edges of the 1 in. thick Type X gypsum board into the C-T or C-H studs. Secure the transverse edge of the 1 in. thick Type X gypsum board to the long leg of J-runner using its tabs or min. 1-5/8 in. long Type S self-tapping bugle head steel screws spaced max. 12 in. oc.
- III. Steel Studs – Cut min. 25 GA galvanized steel C-T or C-H studs measuring min. 2-1/2 in. wide with min. 1-1/2 in. flanges 3/4 in. less than floor to ceiling height and spaced max. 24 in. oc in runners with T or H section abutting long leg of runner.
- IV. Runners – Use min. 2-1/2 in. wide J-runner compatible with studs and having unequal vertical legs: min. 1 in. short leg and min. 2 in. long leg. Position J-runners with short leg towards visual face of shaft wall. Attach to floor and ceiling using steel fasteners

located a max. of 2 in. from each end and a max. of 24 in. oc.

- C. **CONCRETE WALL ASSEMBLY:**
Symmetrical two-hour rated solid concrete wall assembly made from reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete, which may also be used as a shaft wall assembly. Constructed of solid concrete with a min. concrete thickness measured from exposed face to exposed face using one of the following:

- I. lightweight concrete is 3.6 in.;
- II. sand-lightweight concrete is 3.8 in.;
- III. carbonate aggregate concrete is 4.6 in.; and
- IV. siliceous aggregate concrete is 5.0 in.

- D. **MASONRY WALL ASSEMBLY:**
Symmetrical two-hour rated nominal 8 x 8 x 16 CMU wall assembly made from lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete, which may also be used as a shaft wall assembly.



6E - Concrete Floor

Figure 4

- E. **CONCRETE FLOOR ASSEMBLY:**
Symmetrical two-hour rated solid concrete floor assembly made from reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m³) concrete. Constructed of solid concrete with a min. concrete thickness measured from exposed face to exposed face using one of the following:

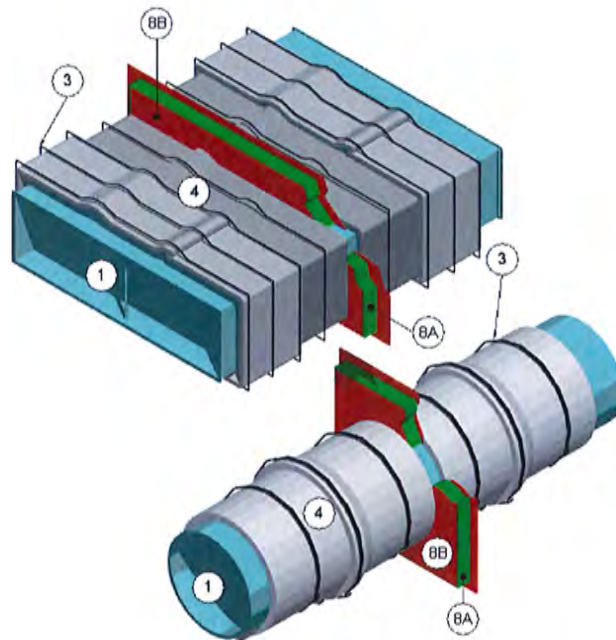
- I. lightweight concrete is 3.6 in.;
- II. sand-lightweight concrete is 3.8 in.;
- III. carbonate aggregate concrete is 4.6 in.; and
- IV. siliceous aggregate concrete is 5.0 in.

7. **OPENING:** – Refer to Figures 3 and 4.
Create an opening in the supporting construction (wall or floor assembly). Determine the opening shape and size to house the ventilation duct's (Item 1), whether with or without insulation (item 4) passing through the opening, shape and

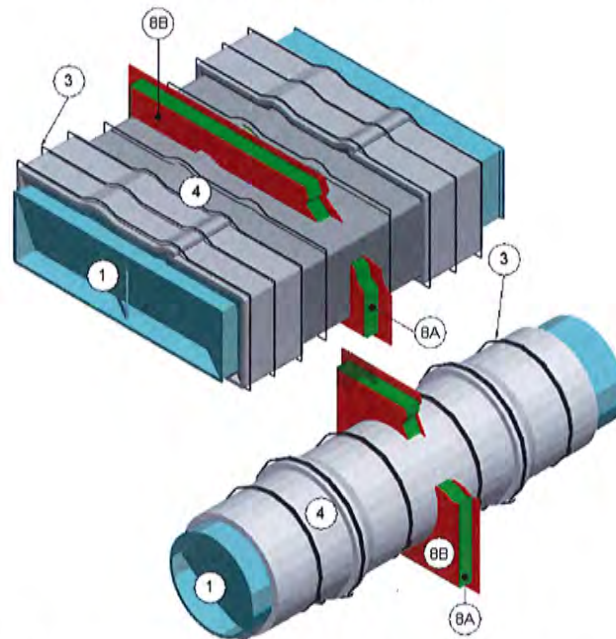
size. Position the penetrating item (Item 1) concentrically or eccentrically in the opening so that the annular space ranges from min. to max. as in Table 2. Make the opening in accordance with the following:

- A. For gypsum wall assemblies (Item 6A) and shaft wall assemblies (Item 6B), frame the opening with steel studs (Item 6AI) and tracks (Item 6AII).

Table 2 – Opening Information				
Ventilation Duct Requirements Refer to Table 1	Maximum		Annular Space	
	Cross Sectional Area (in ²)	Dimension (in.)	Minimum (in.)	Maximum (in.)
R1	506	22.5	1	3-1/2
R2	1035	50.5	1	3-1/2
R3	2432	70.5	1	3-1/2
R4	2492	89	1	3
C1	241	17.5	1	3-1/2
C2	511	25.5	1	3-1/2
C3	1555	44.5	1	3-1/2

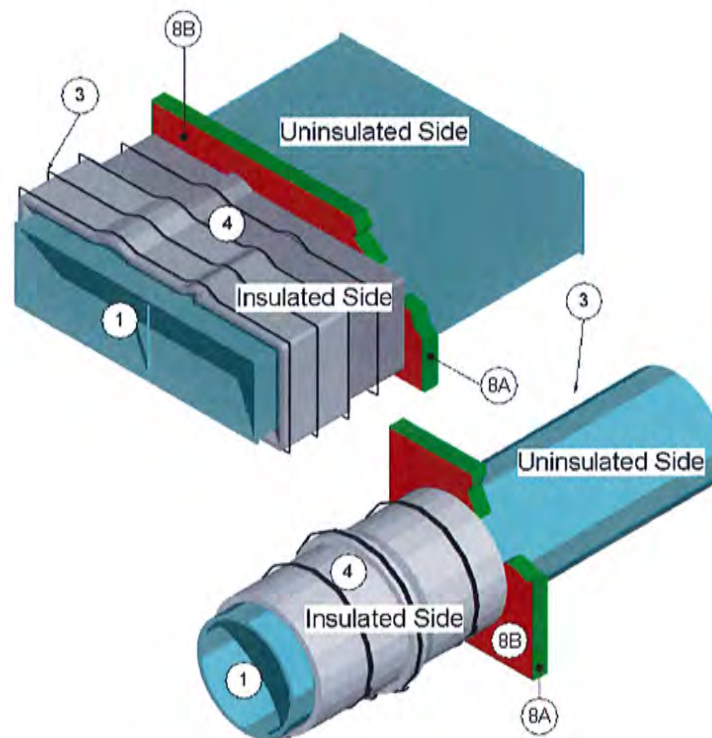


Symmetrical Firestops for Horizontal Ventilation Ducts
without Insulation Through Wall Assemblies



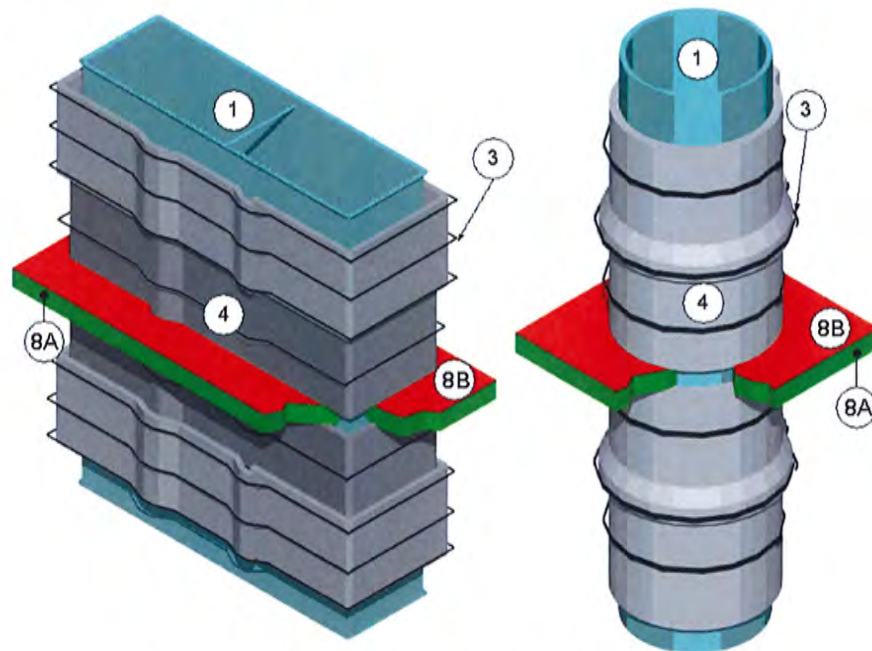
Symmetrical Firestops for Horizontal Ventilation Ducts
with Insulation Through Wall Assemblies

Figure 5

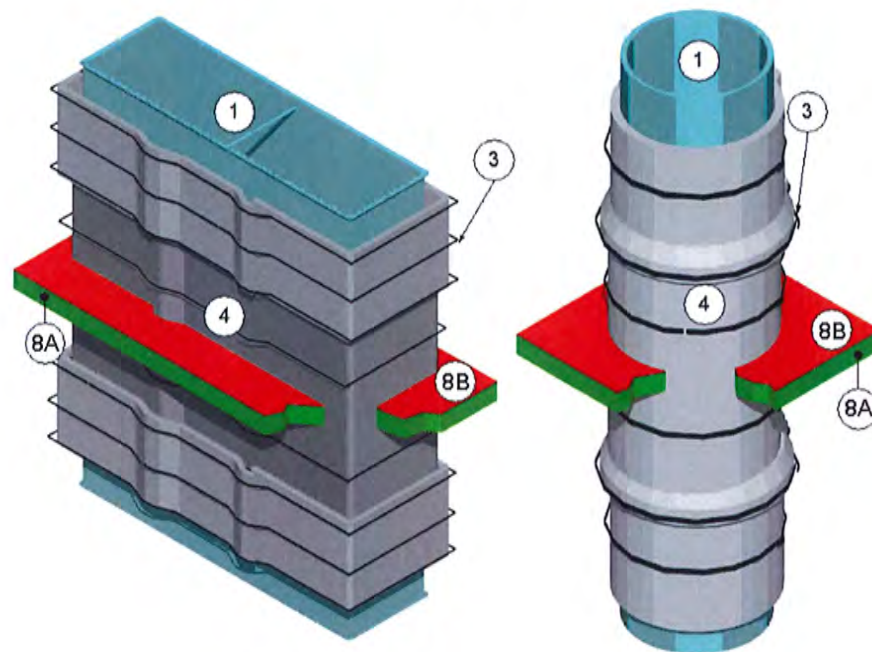


Asymmetrical Firestops for Horizontal Ventilation Ducts
without Insulation Through or Into Shaft Assemblies

Figure 6



Asymmetrical Firestops for Vertical Ventilation Ducts
without Insulation Through Floor Assemblies



Asymmetrical Firestops for Vertical Ventilation Ducts
with Insulation Through Floor Assemblies

Figure 7

Table 3 – Fire Ratings for ONLY Figure 6: Asymmetrical Firestops for Horizontal Ventilation Ducts without Insulation Through or Into Shaft Assemblies

All other Figures and Assemblage References are 2 Hour F-Rating & T-Rating		
Fire Exposure	F-Rating (Hours)	T-Rating (Hours)
"Uninsulated Side" Designation on Drawing	2	2
Insulated Side	2	0

8. PENETRATION FIRESTOP: Install firestop between the supporting construction (Item 6) and the ventilation duct (Item 1) or the ventilation duct (Item 1) protected with the insulation (Item 4). Use a symmetrical wall penetration firestop, an asymmetrical shaft penetration firestop, or an asymmetrical floor penetration firestop constructed of the following components:

A. CERTIFIED MANUFACTURER: 3M Company

CERTIFIED PRODUCT: 3M™ Fire Barrier Duct Wrap Insulation

MODEL: 615 or 615+

PACKING MATERIAL: Fill the entire annular space's width and a min. depth of 4 in. with min. 4 pcf density mineral wool or certified insulation without the encapsulation (foil scrim).

Cut the packing material into strips not less than one and one half (1-1/2) times the width of the annular space to be filled. Compress packing material nominally 33% and insert packing material into the annual space.

For wall assemblies, recess the surface of packing material nominally 5/8 in. from surfaces of both faces of the supporting construction (Item 6).

For floor and shaft wall assemblies, recess the surface of packing material nominally 5/8 in. from the visual surface of the supporting construction (Items 6).

B. CERTIFIED MANUFACTURER: 3M Company

CERTIFIED PRODUCT: 3M™ Fire Barrier™ Sealant

MODEL: Water-Tight 1000-NS Silicone, Water-Tight 1003-SL Silicone (floors only), 2000+ Silicone, or CP 25 WB+

FILL, VOID OR CAVITY MATERIAL: Install min. 5/8 in. depth of fill material into the recess over the entire surface of the packing material (Item 7A). Screed the fill material flush with the surface of the supporting construction (Item 6). Overlap a min. of 1/4 in., the fill material onto face of supporting construction (Item 6).

C. CERTIFIED MANUFACTURER: 3M Company

CERTIFIED PRODUCT: 3M™ Fire Barrier Duct Wrap Insulation

MODEL: 615 or 615+

D. COLLAR: Required for R4 ventilation ducts (Item 1) in Table 1. After the ventilation duct (Item 1) is covered with insulation (Item 4), install a collar, which is another layer of min. 24 in. wide, min. 6 pcf density, insulation (Item 4) over the insulated ventilation duct (Item 1) on each side of the supporting construction (Item 6). Match and use the same installation method as used to install the insulation (Item 4) applied to the ventilation duct (Item 1) creating two layers of insulation (Item 4) on the ventilation duct (Item 1) adjacent to the supporting construction (Item 6). Abut one perimeter edge of each collar to the exposed surface supporting construction (Item 6).

E. STEEL ANGLE: Required for R4 ventilation ducts (Item 1) in Table 1. Before the ventilation duct (Item 1) is covered with insulation (Item 4) and after the packing material (Item 7A) and fill material (Item 7B) are installed, install a nominal 16 GA 2 x 1-1/2 in. steel angle around the perimeter of the ventilation duct (Item 1) with notched

ends to create a continuous frame. Place the 1-1/2 in. leg of the steel angle flush against the surface of the supporting construction (Item 6). Attach the 2 in. leg of the steel angle to the ventilation duct (Item 1) using self-drilling, 12-24x2 hex head, screws with a #5 point, spaced a max. of 6 in. oc.