

# Development Services

## From Concept to Construction

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### APPEAL SUMMARY

**Status:** Decision Rendered - Held over from ID 22211 for additional information

<b>Appeal ID:</b> 23297	<b>Project Address:</b> 555 SE MLK Jr Blvd
<b>Hearing Date:</b> 1/8/20	<b>Appellant Name:</b> Daniel Hannah
<b>Case No.:</b> M-001	<b>Appellant Phone:</b> 5036799879
<b>Appeal Type:</b> Mechanical	<b>Plans Examiner/Inspector:</b> Kent Hegsted, Ali Soheili
<b>Project Type:</b> commercial	<b>Stories:</b> 6 <b>Occupancy:</b> Commercial Office <b>Construction Type:</b> Commercial
<b>Building/Business Name:</b> District Office	<b>Fire Sprinklers:</b> Yes - Entire Building
<b>Appeal Involves:</b> Reconsideration of appeal	<b>LUR or Permit Application No.:</b> 17-208768-REV-03-MT
<b>Plan Submitted Option:</b> pdf [File 1] [File 2] [File 3] [File 4] [File 5]	<b>Proposed use:</b> Office Space

### APPEAL INFORMATION SHEET

#### Appeal item 1

<b>Code Section</b>	OMSC 607.5.5. Exception 1.1.
<b>Requires</b>	Fire Dampers are not required at penetrations of shafts where: 1.1.:Steel exhaust subducts extend at least 22 inches vertically in exhaust shafts provided that there is continuous airflow upward to the outdoors
<b>Proposed Design</b>	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.  All other portions of the fire subduct 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.
<b>Reason for alternative</b>	Due to limited ceiling space there is not adequate room to build a two hour rated duct enclosure in the horizontal offset.  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)  Response to Checksheet Note 5 and additional information for appeal 22211 on Hold:  The fire subduct system does meet the requirements as designed. We added another section detail D / M-110 to make it more clear. Subducts do extend at least 22 inches up before attaching to exhausts duct riser.

5a:Added the calculations and pressure drops on new detail showing adequate duct sizing.

5b:Specifications require minimum 26 gauge sheetmetal ducts. Note was added to new detail showing that also.

5c:Appeal information has been submitted and similar appeals for this condition have been approved in the past. Appeal #20138 and #18939.

Detail of method of duct penetration of rated shaft with firewrap has been added to the drawing M-110 and is stamped by an Oregon registered engineer. The one registered Fire Protection engineer was not going to be available in a timely manner to look at this.

Information of the 2 hour duct wrap assembly has been submitted earlier.

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## APPEAL DECISION

**1a. Use of grease duct wrap as 2 hour protection of horizontal duct run: Granted provided duct wrap installation is per manufacturers specifications.**

**1b. Omission of fire damper at 6th floor through penetration of 2 hour shaft with engineering analysis: Granted as proposed.**

**Appellant may contact John Butler (503 823-7339) with questions.**

The Administrative Appeal Board finds with the conditions noted, that the information submitted by the appellant demonstrates that the approved modifications or alternate methods are consistent with the intent of the code; do not lessen health, safety, accessibility, life, fire safety or structural requirements; and that special conditions unique to this project make strict application of those code sections impractical.

Pursuant to City Code Chapter 24.10, you may appeal this decision to the Building Code Board of Appeal within 90 calendar days of the date this decision is published. For information on the appeals process, go to [www.portlandoregon.gov/bds/appealsinfo](http://www.portlandoregon.gov/bds/appealsinfo), call (503) 823-7300 or come in to the Development Services Center.



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## Letter

Date:	December 31, 2019
To:	Caliber Plumbing & Mechanical 6036 N Cutter Circle, Suite 360 Portland, OR 97217 Sent via Email
Attention:	Daniel Hannah Project Manager/Estimator
From:	David Gessert, P. E. Fire Protection Engineer
Subject/Project:	Eastside Office 555 SE Martin Luther King Blvd Appeal – Exhaust Duct Fire Resistance
Job No.:	2019-57



Total Pages: 3 plus 8 pages of attachments, 11 pages total

### Introduction/Executive Summary

On the Eastside Office project, 555 SE MLK, a horizontal exhaust duct exits the rated shaft, 90s up, and discharges above the roof line. Two-hours of fire resistance is provided for this duct by ceramic insulation that is designed and installed in accordance with a nationally published standard.

### Fire Resistance Analysis of Duct

Refer to drawing M-110, Eastside Office, HVAC Roof Plan and Design No. 3MU/DI 120-01, Ventilation Duct Protection.

The detail in the upper left-hand portion of the drawing shows the 2-hour fire resistance protection for the 12x16 duct from the gypsum shaft assembly and terminating above the roof line. This 2-hour fire resistance protection is achieved using 3M Fire Barrier Duct Wrap, 3M Fire Barrier Sealant, and related accessories. Design and installation of the 2-hour fire resistance material is to be in accordance with Design No. 3MU/DI 120-01, Ventilation Duct Protection.

3M Fire Barrier Duct Wrap 615+ is a ceramic insulation product that is routinely used for wrapping of commercial kitchen grease ducts as well as ventilation ducts. Per the data sheet and a phone conversation with a factory representative the ceramic insulation is covered by a

fiberglass-reinforced aluminized polyester scrim. See the appendix for more information on ceramic insulation.

Where an unwrapped duct passes through rated construction the annular space is sealed with unfaced ceramic insulation and fire caulk. Then the duct wrap is butted against the annular seal and rated construction. See Design No. 3MU/DI 120-01, Ventilation Duct Protection.

### Conclusion

Two-hours of fire resistance is provided by ceramic insulation for the duct from the rated shaft to the exterior of the building. Design and insulation shall be in accordance with Design No. 3MU/DI 120-01, Ventilation Duct Protection.

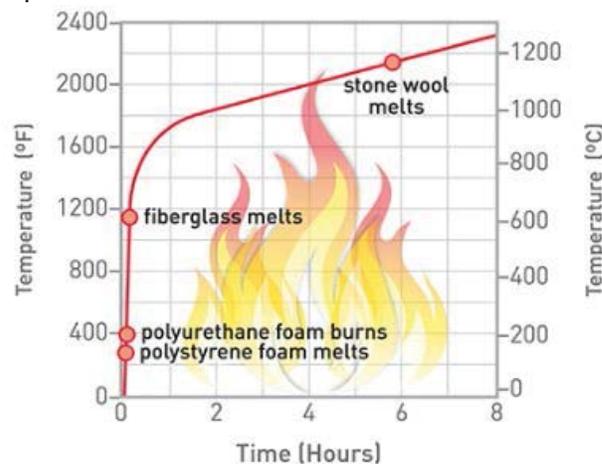
### Appendix – Ceramic Insulation

When compared to other types of insulation ceramic insulation had a much higher melting point.

#### Melting Temperatures of Selected Insulation

Insulation Type	Melting Temperature °F
Polystyrene	270
Fiberglass	1100
Rock Wool	2100
Ceramic	2300 working temp, 3200 melting temp

At two hours the ASTM E119 test furnace reaches a temperature of approximately 1900 °F. See the following graph.



**ASTM E119 Time Temperature Curve**

Letter to Daniel Hannah  
December 31, 2019  
Page 3 of 3

## **References**

Design No. 3MU/DI 120-01, Ventilation Duct Protection, November 25, 2014, 3M Company, Maplewood, Minnesota

Drawing M-110, Eastside Office, HVAC Roof Plan, Revision No. 3, 4-16-2019, System Design Consultants, Portland, Oregon

*Oregon Mechanical Specialty Code*, 2014 Edition, International Code Council, Country Club Hills, Illinois

End of Report

## **Attachments**

Design No. 3MU/DI 120-01, Ventilation Duct Protection, November 25, 2014, 3M Company, Maplewood, Minnesota

Drawing M-110, Eastside Office, HVAC Roof Plan, Revision No. 3, 4-16-2019, System Design Consultants, Portland, Oregon



**Design No. 3MU/DI 120-01**

November 25, 2014

**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 hr

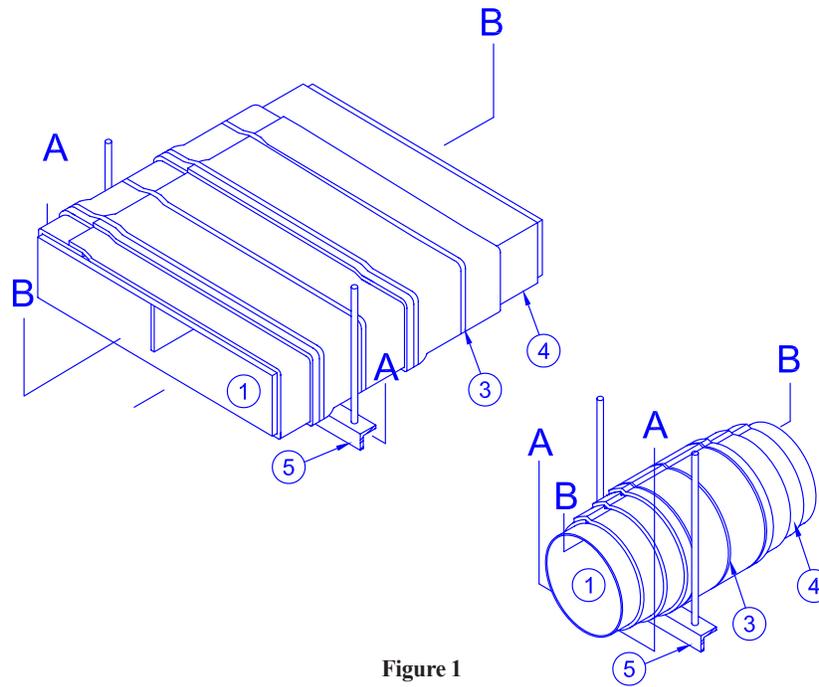
Insulation – 2 hr

Integrity – 2 hr

**ASTM E 814**

F-Rating – 2 hr

T-Rating – 2 hr

**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.

Ventilation Duct for Items 7 References	Shape	Min Gauge	Max Dimension	Max Diameter	Max 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.

**Design No. 3MU/DI 120-01 continued**

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. 2.5 in. x 2.5 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 the pins a max. of 3 in. apart.
  - III. After insulation (Item 4B) is installed, place min. 2.5 in. x 2.5 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. 2.5 in. x 2.5 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. 2.5 in. x 2.5 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.

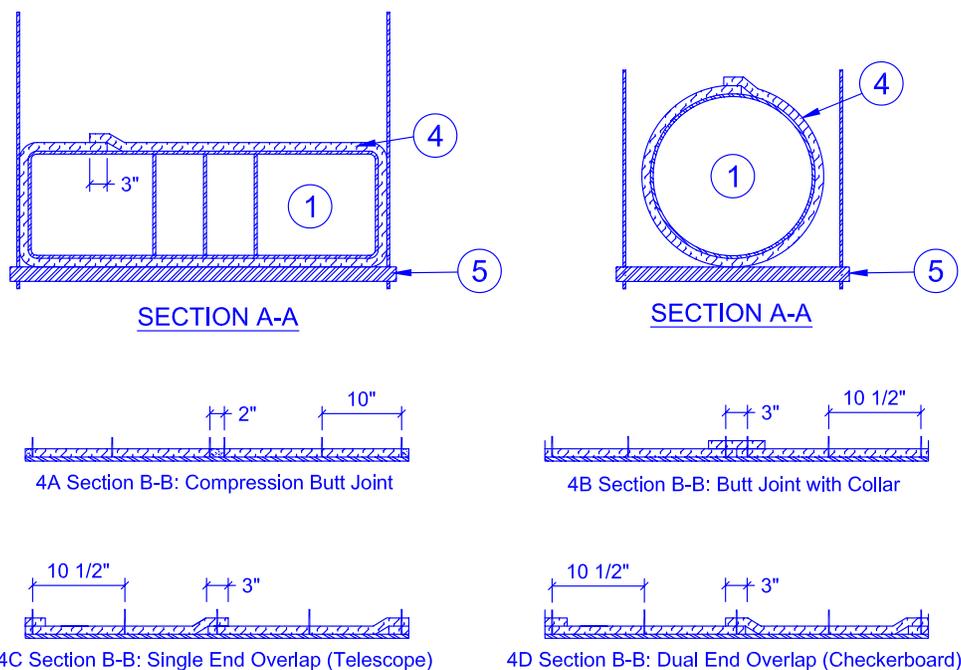


Figure 2

## Design No. 3MU/DI 120-01 *continued*

Flexible Wraps

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).

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”, **U** 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.

Duct Wrap

Ventilation Duct

DI

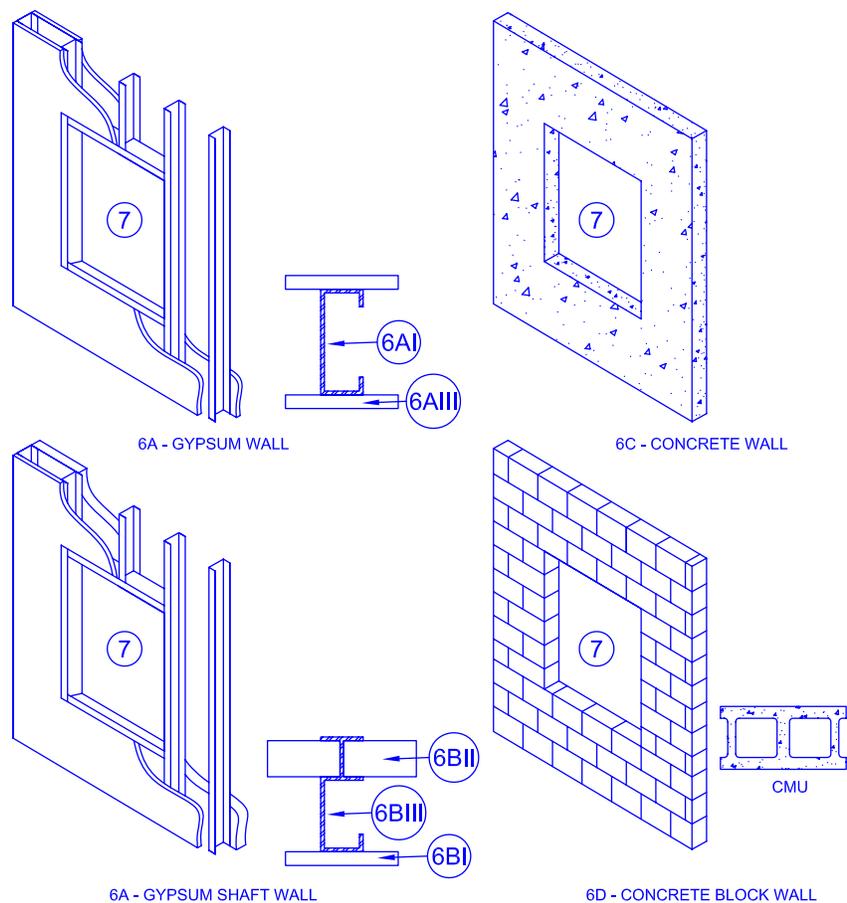


Figure 3

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:

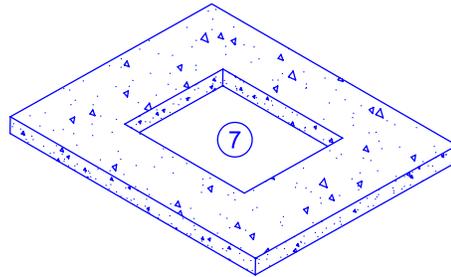
- I. Steel Studs – Min. 25 GA galvanized steel studs measuring 3-5/8 in. wide with 1-1/4 in. legs spaced max. 24 in. oc. Attach studs with min. #6 x 3/8 in. steel stud framing screws to floor and ceiling tracks.
- II. Tracks – Channel U-shaped floor and ceiling runners measuring 1/2 in. deep by 3-5/8 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.

**Design No. 3MU/DI 120-01 *continued***

- 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/m<sup>3</sup>) 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/m<sup>3</sup>) concrete, which may also be used as a shaft wall assembly.

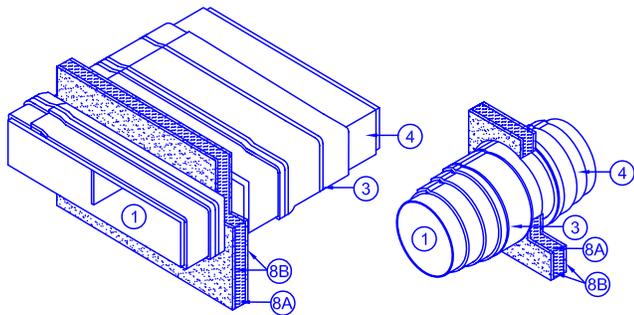


6E - CONCRETE FLOOR

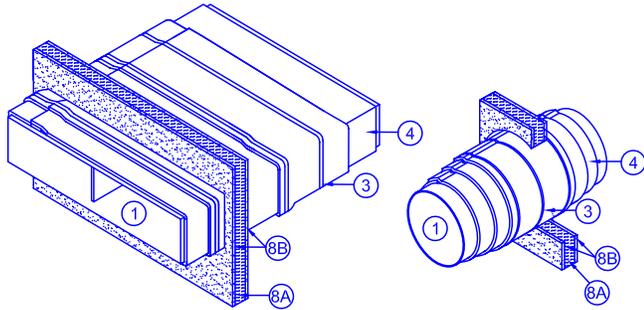
**Figure 4**

- 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/m<sup>3</sup>) 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 with in accord with the following:
- A. For gypsum wall assemblies (Item 6A) and shaft wall assemblies (Item 6B), frame the opening with steel studs (Item 6A1) and tracks (Item 6A11).

Table 2 Opening Information				
Ventilation Duct Requirements Refer to Table 1	Maximum		Annular space	
	Cross Sectional Area (inches <sup>2</sup> )	Dimension (inches)	Min (inches)	Max (inches)
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

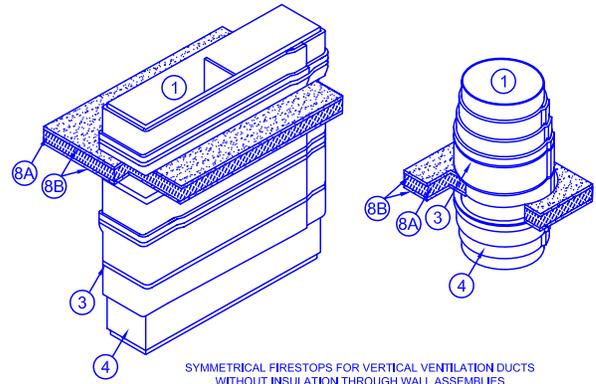


SYMMETRICAL FIRESTOPS FOR HORIZONTAL VENTILATION DUCTS WITHOUT INSULATION THROUGH WALL ASSEMBLIES

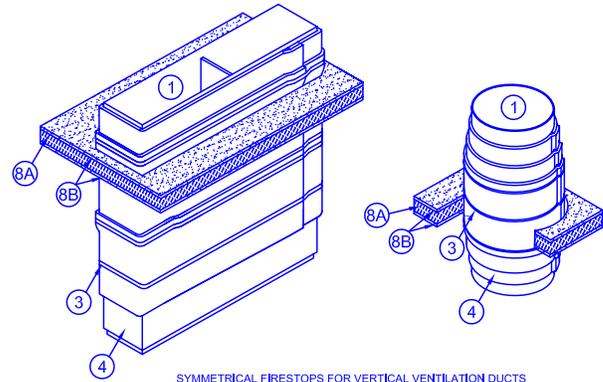


SYMMETRICAL FIRESTOPS FOR HORIZONTAL VENTILATION DUCTS WITH INSULATION THROUGH WALL ASSEMBLIES

Figure 5

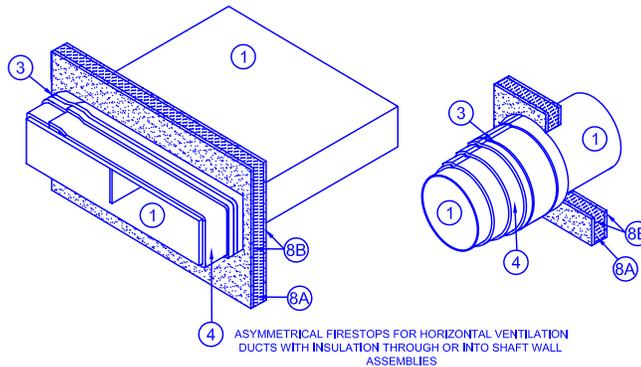


SYMMETRICAL FIRESTOPS FOR VERTICAL VENTILATION DUCTS WITHOUT INSULATION THROUGH WALL ASSEMBLIES



SYMMETRICAL FIRESTOPS FOR VERTICAL VENTILATION DUCTS WITH INSULATION THROUGH WALL ASSEMBLIES

Figure 7



ASYMMETRICAL FIRESTOPS FOR HORIZONTAL VENTILATION DUCTS WITH INSULATION THROUGH OR INTO SHAFT WALL ASSEMBLIES

Figure 6

**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

## Design No. 3MU/DI 120-01 *continued*

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 annular 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 (2) 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.

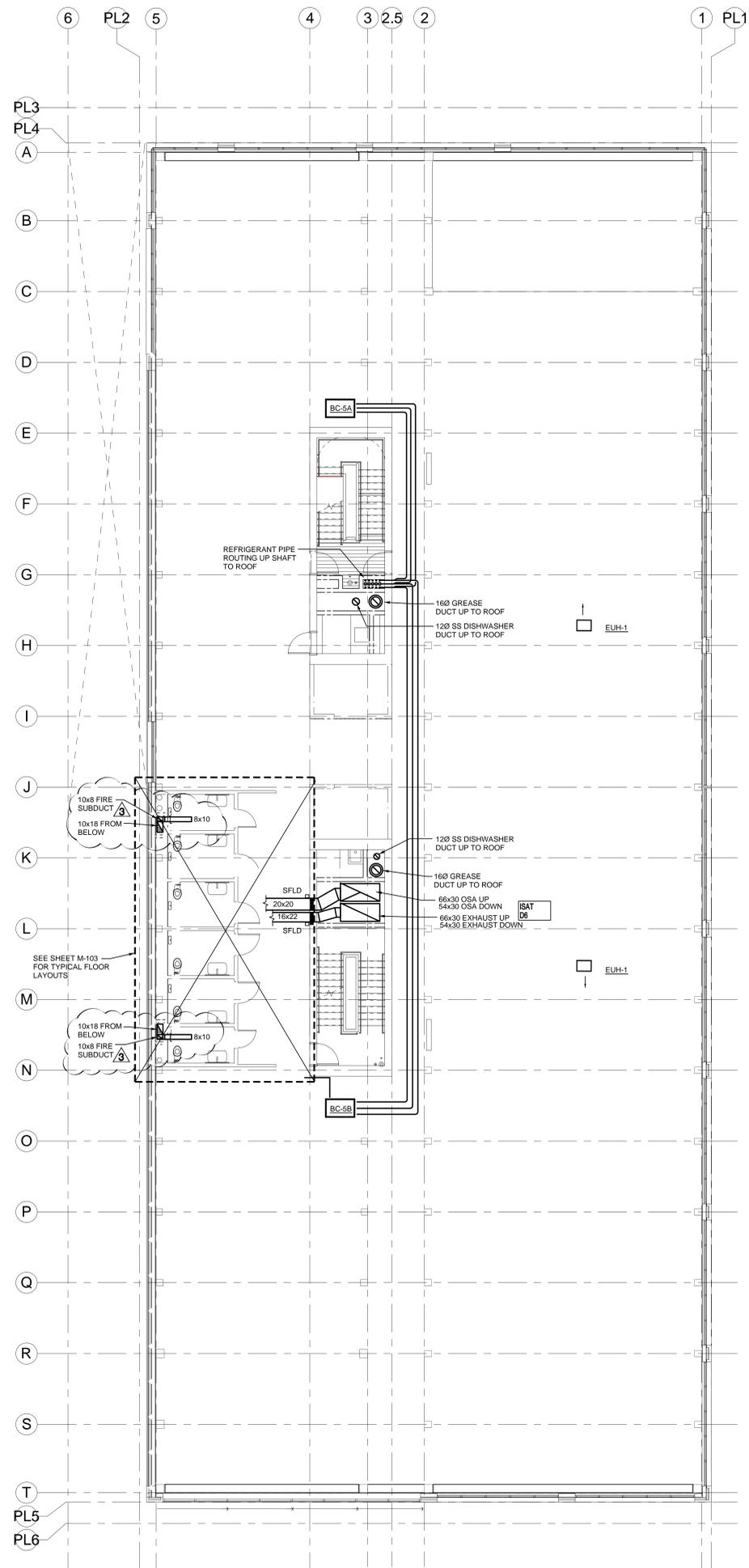
This material was extracted and drawn by 3M Fire Protection Products from the 2015 Product Directory, © Intertek

Flexible Wraps

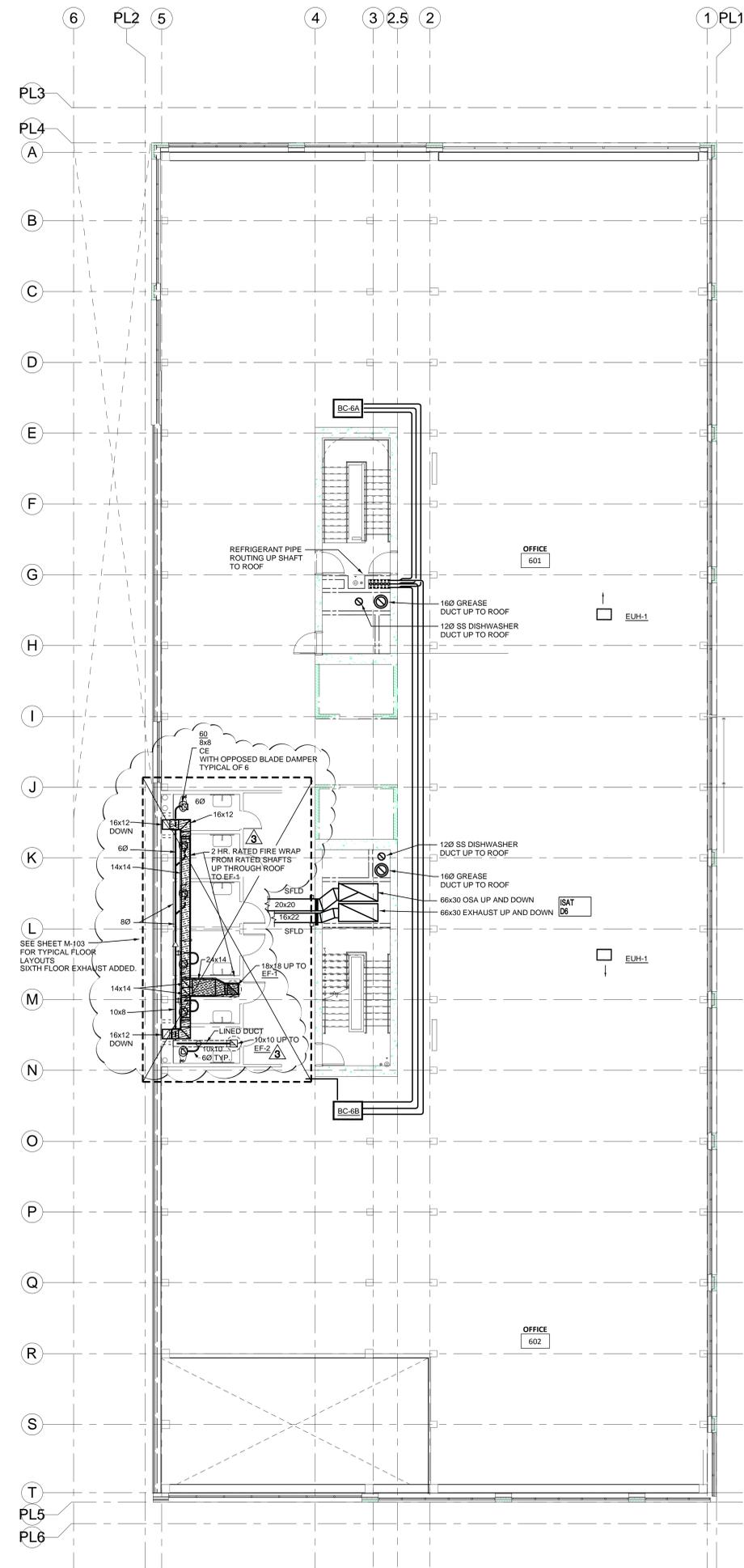
Duct Wrap

Ventilation Duct

DI



1 Level 5 HVAC Plan  
M-104 1/8" = 1'-0"



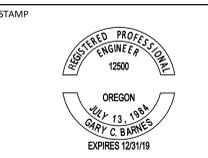
2 Level 6 HVAC Plan  
M-104 1/8" = 1'-0"

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

ARCHITECTS

CONSULTANT

**SYSTEM DESIGN CONSULTANTS INC.**  
333 SE SECOND AVE. SUITE 100  
PORTLAND, OREGON 97214  
503-248-0227 FAX 248-0240  
CONTACT: BRUCE WILSON



REVISION NO.	DATE
ASI 8	9-23-2011
PERMIT REVISIONS	
REF. PIPING REVISIONS	2-08-2011
FOR CONSTRUCTION	3-22-2011
FIRE SUBDUCT REVISIONS	4-16-2011

KEY PLAN - (NTS)

TRUE NORTH PLAN NORTH

**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 M-104



**MECHANICAL CHECKSHEET**

**Mechanical Permit**

Application # : **17-208768-REV-03-MT**

Review Date: **November 6, 2019**

Recheck 01: **November 13, 2019**

Recheck 02: **November 25, 2019**

**Recheck 03: December 17, 2019**

<b>To:</b>	APPLICANT	DANIEL HANNAH CALIBER PLUMBING AND MECHANICAL 6036 N CUTTER CIRCLE, STE 360 PORTLAND, OR 97225	Work:	503 206-7591
			Home:	503 -
			e-Mail:	dan@calibermechanical.com

<b>From:</b>	Commercial Plans Examiner	Kent Hegsted	Phone:	503-823-7725
			Fax:	503-823-7692

<b>cc:</b>	OWNER	PMC BUILDING LLC 75 SE YAMHILL ST #201 PORTLAND, OR 97214		

**PROJECT INFORMATION**

Street Address: 555 SE M L KING BLVD

Description of Work: REV-03 - Remove fire dampers. Add subducting and fire wrap.

Based on the plans and specifications submitted, the following items appear to be missing or not in conformance with the Oregon Mechanical Specialty Code and / or other city, state, or federal requirements.

Grayscale items with reduced font are satisfied.

Items in black remain open and are further explained by recheck comments in red.

Item #	Location on plans	Code Section	Clarification / Correction Required
1.	M-100PA	2014 OMSC 106.3.1	There is a HP-PA shown in the garage under this revision. These units are for outdoor installation. If installed in the garage, provide provisions to remove the heat when the unit is in operation. 11/13/19: Your respond indicating opening in the garage. The opening shall be near the HP unit. Mechanical plan does not show any opening near the HP unit. 11/25/19 Recheck 02: Resolved. HP-PA relocated near ramp at garage entry.
2.	General	2014 OMSC 106.3.1	Floor plans are showing future FC's which require future HP's and assumed to be in the garage. See comment 1 which will apply when future HP's are installed.
3.	Floor Plans	2014 OMSC Chapter 5	Provide grease duct or wrap detail for the two grease ducts on plans. 11/13/19: Your comment refers to the grease duct material. The intention of this comment to indicate the shaft, its rating and if there is any listed duct wrap. 11/25/19 Recheck 02: Not resolved. Please provide details and listing for the grease duct. <b>12/17/19 Recheck 03: Resolved, thank you.</b>
4.	M102		There is not enough heating for the freeze protection. Provide one additional EUH-1 near

**MECHANICAL CHECKSHEET**

Application # 17-208768-REV-03-MT

Review Date: November 13, 2019

			<p>grids 4 &amp; C, and grids 4 &amp; R.                      11/13/19: Your comment is indicating heating BTU/HR requirement. The comment is not about that requirement. There is not enough circulation for these fans. When the distribution is too far from the envelop, by the time the air reaches the envelop, due to the distance it is not warm enough to protect the envelop from freezing.                      11/25/19 Recheck 02: Resolved. Two additional EUH-1 units added.</p>
5.	M-110	<p>2014 OMSC                      106.3.1                      607.5.5                      Exception                      1.1 &amp; 2</p>	<p>Job description is indicating removing fire dampers and sub-ducts. Details in M-110 does not match the description, clarify.                      11/13/19: Your comment indicating sheet M-110 showing the sub-duct system. The details shown, is connecting ducts to a duct riser and do not meet the requirement of sub-duct system. Refer to OSSC chapter 6 and chapter 9 for requirement of sub-duct system.  <b>11/25/19 Recheck 02: Not resolved.</b>                      As noted on 11/6/19 and 11/13/19 The details shown do not meet the requirements of a subduct system. See 607.5.5 Exception 1.1 &amp; 2.</p> <ul style="list-style-type: none"> <li>a) Please provide calculations for duct sizing. Show that the cross-sectional area of the main duct is large enough so that the subduct does not excessively restrict the airflow from below.</li> <li>b) Specify a minimum thickness of 26 gage for the subducts.</li> <li>c) The 2-hour rated shaft rating that these ducts exhaust through must be maintained. 2 hour rated horizontal assemblies are required where they connect with EF-1. Fire wrap is not an approved alternative.</li> <li>d) EF-1 must be powered continuously. Identify the source for standby power and clearly identify on the plans that the fan must run continuously.</li> </ul> <p><b>12/17/19 Recheck 03: Not resolved.</b>  <b>Appeal ID 22211 is on Hold for additional information. Please contact John Butler 503-823-7339 with questions.</b></p>
6.	M-110	<p>2014 OMSC                      Chapter 5</p>	<p>Future exhaust fan discharge shall be at least 10' from the skylight openings.</p>
7.			
8.			
9.			
10.			

## MECHANICAL CHECKSHEET

Application # 17-208768-REV-03-MT

Review Date: November 13, 2019

### INSTRUCTIONS

To respond to this checksheet, come to the Bureau of Development Services located at 1900 SW Fourth Ave. The Development Service Center (1st floor) and Permitting Services (2nd floor) are open Monday through Friday from 8:00 a.m. to 3:00 p.m. (close at noon on Thursday). Please update all sets of submitted drawings by either replacing the original sheets with new sheets, or editing the originally submitted sheets. You can review "How to Update Your Plans in Response to a Checksheet" at <http://www.portlandoregon.gov/bds/article/93028>. Visit the BDS website for more helpful information and a current listing of services available in the Development Services Center.

Please complete the attached Checksheet Response Form and include it with your re-submittal.

If you have specific questions concerning this Checksheet, please call me at the phone number listed above. To check the status of your project, go to <http://www.portlandonline.com/bds/index.cfm?c=34194>. Or, you may request the status to be faxed to you by calling 503-823-7000 and selecting option 4.

You may receive separate Checksheets from other City agencies that will require separate responses.

**NEW RECHECK FEE:** Please note that for plans submitted on or after July 1, 2010 plan review fees for Life Safety, Structural, Site Development and Planning and Zoning will cover the initial review and up to two checksheets and the reviews of the applicant's responses to those checksheets. All additional checksheets and reviews of applicant responses will be charged \$155 per checksheet.

Appeals: Pursuant to City Code Chapters 24.10, 25.07, 26.03, 27.02, and 28.03, you may appeal any code provision cited in this Checksheet to the BDS Administrative Board of Appeal within 180 calendar days of the review date. For information on the appeals process and costs, including forms, appeal fee, payment methods and fee waivers, go to [www.portlandoregon.gov/bds/appeals](http://www.portlandoregon.gov/bds/appeals), call (503) 823-7300 or come in to the Development Services Center. Permit application expiration will not be extended pending resolution of any administrative appeal.




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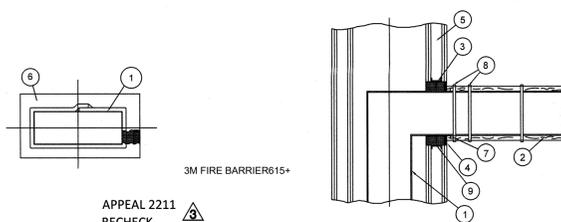
*(for office use only)*



REVISION NO.	DATE
1	9-21-2011
2	2-08-2011
3	3-22-2011
4	4-16-2011



**3M FIRE BARRIER DUCT WRAP 615+ 1.5 Duct Insulation - Single layer  
 1 and 2 Hour Rated Air Distribution System (ADS Duct)  
 Shaft Wall Termination Suggested Installation**



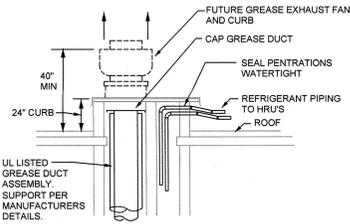
APPEAL 2211  
 RECHECK

NOTES:

- BAND SPACING MAY VARY DEPENDING ON ACTUAL INSULATION LAYOUT. BAND SPACING MAY HAVE A MAXIMUM SPACING OF 10". TWO BANDS SHOULD BE USED AT THE POINT OF WRAP TERMINATION.
- FOR DUCTS OVER 24" WIDTH, 12 GA. STEEL INSULATION WELD PINS AND WASHER (OR CUPHEAD STYLE PINS) SHOULD BE LOCATED ON THE BOTTOM OF THE DUCT IN ROW 12" APART, 10" ON CENTER.
- OPENING IN SHAFT TO BE FRAMED ALL FOUR SIDES WITH STANDARD STEEL FRAMING STUDS.

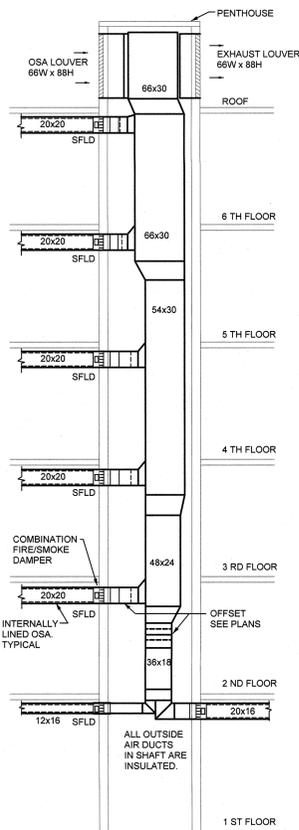
LEGEND:

- AIR DUCT, MIN. 24 GAUGE, 400 IN AREA
- 3M FIRE BARRIER DUCT WRAP 615+ 1.5 DUCT INSULATION, ONE LAYER
- UNFACED 3M FIRE BARRIER 615+ 1.5 (COMPRESSED 33%), RECESSED 1/2" ON EACH SIDE
- FIRESTOP SEALANT, 3/4" DEPTH, OVERLAPPING ON GYPSUM BOARD AND DUCT MIN. 1" 3M™ Fire Barrier™ Sealant
- GYPSUM SHAFT ASSEMBLY, 2 HR. RATED
- ANNULAR SPACE, 1" TO 1 1/2"
- DUCT REINFORCEMENT, 1"x1"x1/2" STEEL ANGLE ON ALL FOUR SIDES OF DUCT WITHIN 3" OF WALL
- 1/2" WIDE STEEL BANDS AND CLIPS
- STANDARD STEEL FRAMING STUDS

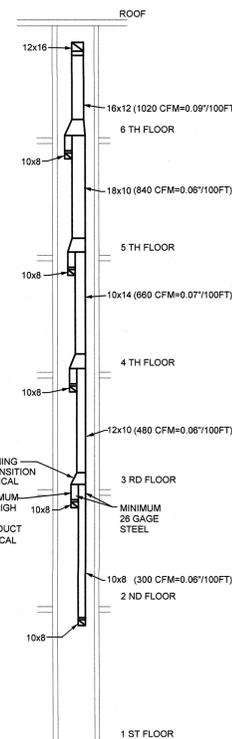


**DETAIL AT SHAFT TOP**  
 M-110 NO SCALE

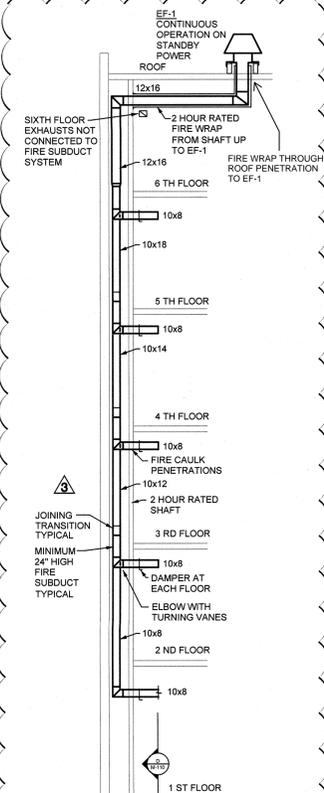
26 GAUGE, 1296 IN AREA



**SHAFT SECTION**  
 M-110 NO SCALE



APPEAL 2211  
 RECHECK  
**FIRE SUBDUCT SECTION**  
 M-110 NO SCALE



APPEAL 2211  
 RECHECK  
**EXHAUSTS SHAFT SECTION**  
 M-110 NO SCALE

