Thermal Ceramics, Inc.
Design No. TC/BI 120-03
Fire Resistant Ventilation Air Duct
FireMaster® FastWrap® XLS Duct Insulation

	ASTM E2816	ASTM E814	
Duct	**Rating**	**F-Rating**	**T-Rating**
Condition C (Horizontal)	120 minutes	120 minutes	120 minutes
Condition D (Vertical)	120 minutes	120 minutes	120 minutes

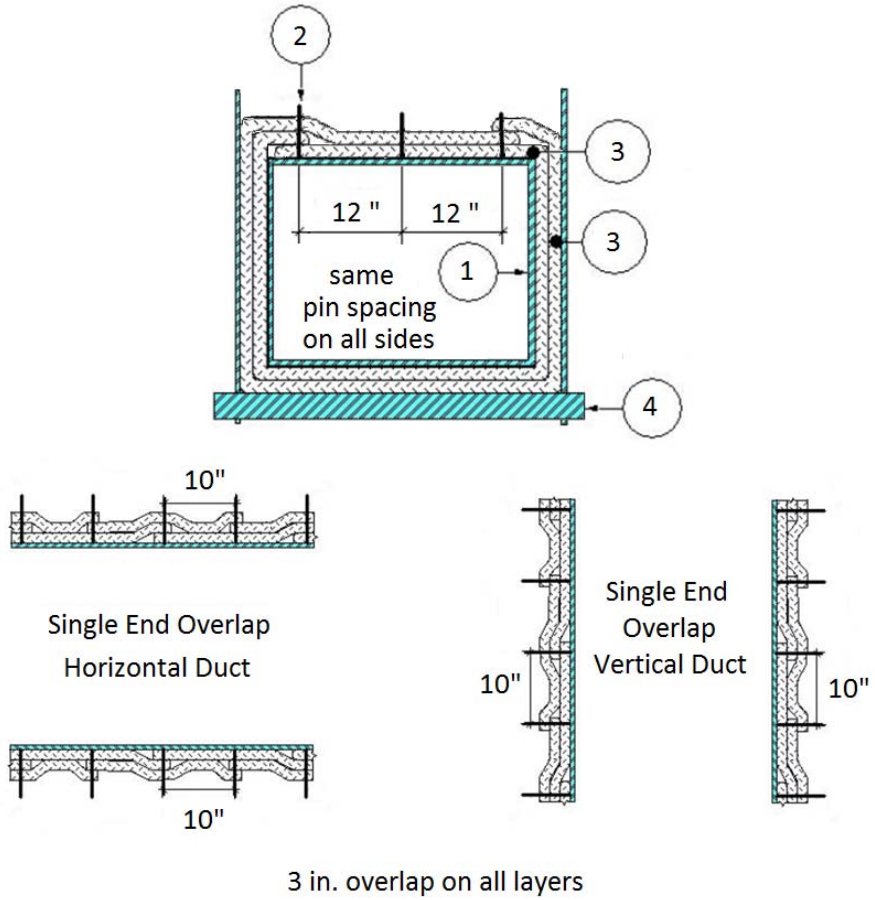

Figure 1. Cross-Sections, Condition C and Condition D

1. **VENTILATION AIR DUCT:** Use a duct constructed to SMACNA HVAC Duct Construction Standard, min. 2 in.H_2O-pressure class, rectangular duct, with a max. cross-sectional area of 600.25 in.^{2} with no single dimension exceeding 49 in. Apply silicone sealant to joints and seams.

2. **PINS:** Refer to Figure 1. Use min. 12 GA steel impaling pins to secure the duct insulation (Item 3). Select pin length as required to penetrate all layers of duct insulation (Item 3) and penetration firestop insulation collars (Item 7C) by a min. of 1 in. without compression. Weld the pins to the ventilation air duct (Item 1). Space pins longitudinally at max. 10 in. on center (oc) and centered on duct insulation (Item 3) overlaps or collars. Locate pins transversely max. 12 in. oc on all sides of the ventilation air duct (Item 1) with a row of pins centered on the duct insulation (Item 3) overlap. Secure insulation on pins with 2-1/2 × 2-1/2 in. × 12 GA, galvanized steel clip washers.

3. **DUCT INSULATION: Intertek-Certified, Thermal Ceramics Inc., FireMaster® FastWrap® XLS Duct Insulation.**

   Apply two (2) layers of nominal 1-1/2 in. thick, nominal 4.4 pcf density duct insulation over the entire surface of the ventilation air duct (Item 1). Apply with transverse and longitudinal joints overlapping a min. of 3 in. Offset the first and second layer overlap joints. Duct insulation is installed with 1 in. compression at wall and floor/ceiling penetrations. As an option, notch the duct insulation corners where multiple overlaps align in order to maintain maximum of three layers of duct insulation. Finish and seal exposed ends of insulation and tape all overlap joints with finish/seal tape (Item 8).

4. **SUPPORTS:** Support the horizontal portion of the insulated ventilation air duct (Item 1) using an un-insulated “trapeze” system composed of min. 3 × 3 × 1/4 in. steel angle as the cross-member, and two (2), min. 3/8 in. all-thread, steel rods connected using nuts and washers. Alternatively, use min. 1-1/2 × 1-1/2 × 3/16 in. steel angle as the cross-member for max. 21-1/4 in. × 6 in. ventilation air ducts (Item 1). The horizontal supports shall be spaced a max. of 14 in. from the face of the supporting wall construction (Item 5), and a max. of 60 in. oc between supports. Reduce the spacing if needed to not exceed a maximum combined load of the ventilation air duct (Item 1) and duct insulation (Item 3) of 200 lb per horizontal support. Connect the all-thread steel rods to the underside of the floor/ceiling (Item 5D) assembly using an attachment method designed to carry the system weight under a fire exposure condition equivalent to the exposure corresponding to the listed 2 hr fire rating. Place one (1) all-thread steel rod at each end of the trapeze cross-member. Center ventilation air duct (Item 1) covered by duct insulation (Item 3) on trapeze cross-member. Space all-thread steel rods a min. of 1 in. and max. 6 in. from surface of the insulated ventilation air duct. Extend trapeze cross-member at least 2 in. past each all-thread rod. Where ventilation air duct (Item 1) penetrates a fire rated floor/ceiling assembly (Item 5D), install a riser support frame prior to installing duct insulation (Item 3). Use a supporting steel frame designed and constructed to meet the requirements of the International Mechanical Code.

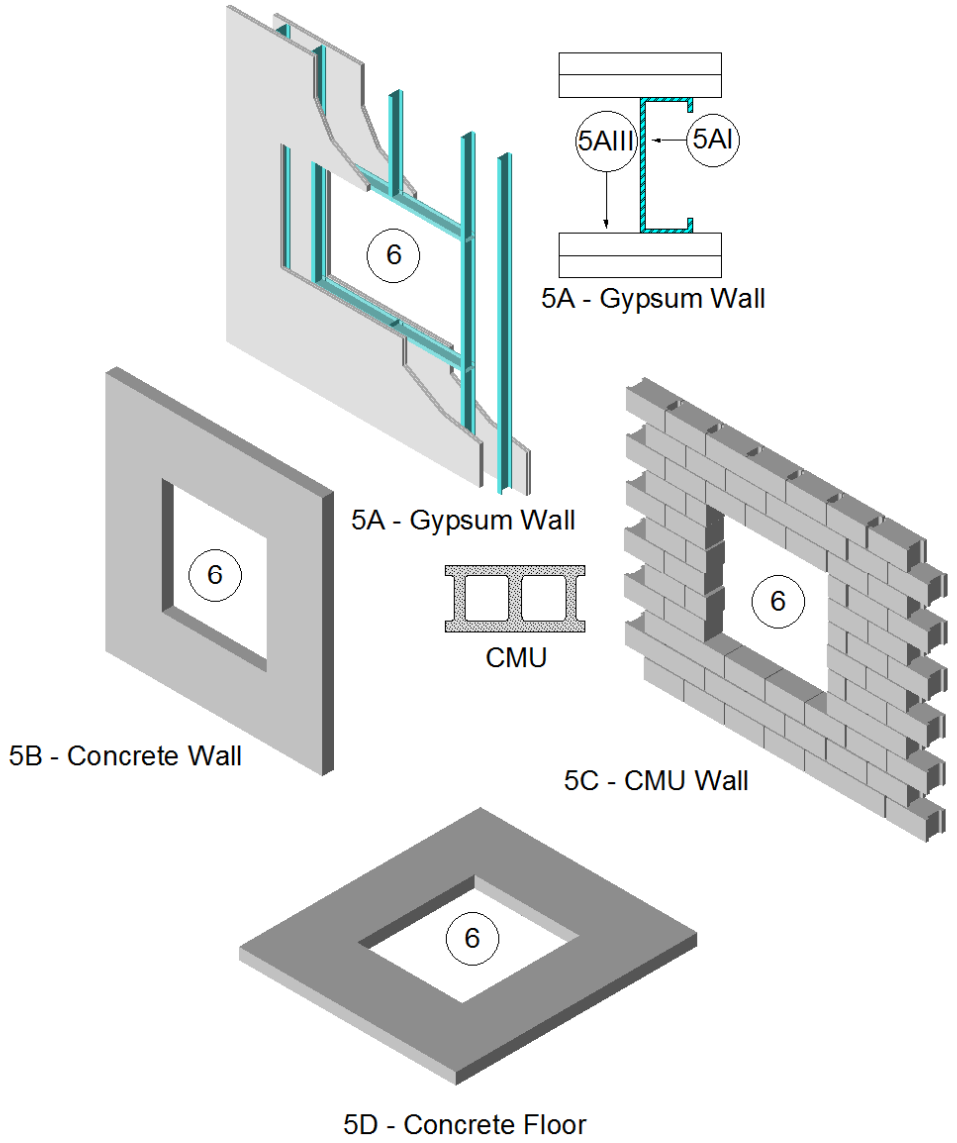

Figure 2. Supporting Construction

5. **SUPPORTING CONSTRUCTION:** Refer to Figure 2. Use one of the following wall or floor/ceiling assemblies:

   A. GYPSUM WALL ASSEMBLY: Use a symmetrical 2 hour rated gypsum wall assembly constructed in accordance with the corresponding fire resistance rated design listing and consisting of the following minimum requirements:

   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.

ii. Tracks – Channel U-shaped floor and ceiling runners measuring 1/2 in. deep by 3-5/8 in. wide.

iii. Gypsum Board – Cover studs and runners with two layers of 5/8 in. thick, Type X, gypsum board on each face. Apply vinyl or casein 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. Minimum wall assembly thickness is 6 in. measured from face layer of gypsum board to opposite face layer of gypsum board.

B. CONCRETE WALL ASSEMBLY: Use a symmetrical, min. 2 hr rated, solid concrete wall assembly made from reinforced lightweight or normal weight (100-150 pcf) concrete constructed of solid concrete with a minimum concrete thickness measured from exposed face to exposed face using one of the following:

i. Lightweight concrete at 4.6 in.

ii. Sand-lightweight concrete at 4.6 in.

iii. Carbonate, aggregate concrete at 4.6 in.

iv. Siliceous aggregate concrete at 5.0 in.

C. MASONRY WALL ASSEMBLY: Use a symmetrical, min. 2 hour rated, nominal 8 × 8 × 16 in. concrete masonry unit (CMU) wall, or wall assembly made from lightweight or normal weight concrete (100-150-pcf).

D. CONCRETE FLOOR/CEILING ASSEMBLY: Use a symmetrical, min. 2 hour rated solid concrete floor/ceiling assembly made from reinforced lightweight or normal weight concrete (100-150-pcf) with a minimum thickness measured from exposed face to exposed face using one of the following:

i. Lightweight concrete at 4.6 in.

ii. Sand-lightweight concrete at 4.6 in.

iii. Carbonate aggregate concrete at 4.6 in.

iv. Siliceous aggregate concrete at 5.0 in.

6. OPENING: Create an opening in the supporting construction (Item 5). The opening shall be framed out using min. 25 GA steel studs when using gypsum wall construction and shall have a solid perimeter face for masonry wall construction. The opening shall be sized to house the ventilation air duct (Item 1) without duct insulation (Item 3). Position the ventilation air duct (Item 1) concentrically in the opening such that there is a 2-1/2 in. annular space on all sides.

7. PENETRATION FIRESTOP: Install firestop between the supporting construction (Item 5) and the insulated ventilation air duct (Item 1). Use a firestop system with the following minimum requirements:

A. Packing Material: Intertek-Certified, Thermal Ceramics Inc., FireMaster® FastWrap® XLS Duct Insulation.

Fill the entire annular space with certified duct insulation without the encapsulation (foil scrim). Cut nominal 1-1/2 in. thick core insulation into strips min. 4 in. wide. Pack a minimum of three layers of core insulation into the annular space such that the width is compressed to fit in the 2-1/2 in. annular

space dimension. Install additional layers of packing material for supporting construction greater than 4-1/2 in. thick as required to fill the space.

B. STEEL FLASHING: Use min. 18 GA steel flashing bent at a 90-degree angle with a 1-in. and a 4-1/2 in. leg. Butt the 1 in. leg of the flashing to the ventilation air duct (Item 1) with min. 1/4 in. bead of 100% silicone sealant between the flashing and the ventilation air duct. Secure the 1 in. leg of the flashing to the ventilation air duct (Item 1) with #10, 1 in., self-tapping screws. Locate screws 1 in. from either end of the flashing and space remaining fasteners max. 8 in. oc. Butt the 4-1/2 in. leg of the flashing to supporting construction with two, min. 1/4 in. beads of 100% silicone sealant between the flashing and the supporting construction. Attach the 4-1/2 in. leg to the supporting construction using 1/4 in. by 1-1/4 in. long, Tapcon concrete anchors for concrete floor/ceiling, or #10 self-tapping screws for steel stud framed walls, spaced 1 in. from the ends and max. 8 in. oc in between. Use steel flashing on both sides for wall assemblies (Figure 3), and on the top and bottom sides for floor/ceiling assemblies (Figure 4).

C. FIRESTOP COLLAR: Intertek-Certified, Thermal Ceramics Inc., FireMaster® FastWrap® XLS Duct Insulation.

Install two (2) 6 in. wide duct insulation strips to form collars at the penetration on both sides of the supporting construction (Item 5). Secure the collars with a row of pins (Item 2) centered on the collars. Space pins (Item 2) max. 12 in. around the perimeter of the ventilation air duct (Item 1). Use a compressed butt joint installation method for collar ends and finish the compressed butt joint with finish/seal tape (Item 8). Tape the outer collar to the 18 GA steel flashing (Item 7B) along the entire perimeter with aluminum or aluminum foil/scrim finish/seal tape (Item 8).

8. FINISH/SEAL TAPE: Finish and seal exposed ends of insulation with tape that complies with one of the following requirements:

- Tape certified to UL181A or UL181B
- Aluminum or aluminum foil/scrim tape certified to ASTM E84 or UL 723 with a Flame Spread Index of 25 or less, and a Smoke Developed Index of 50 or less.

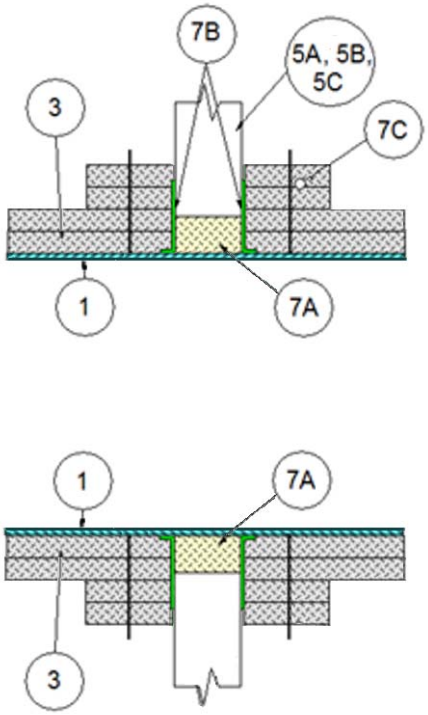

Figure 3. Penetration Assembly, Duct Through Wall

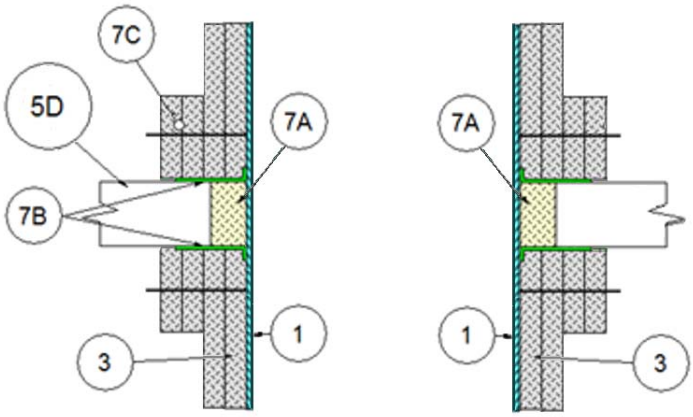

Figure 4. Penetration Assembly, Duct Through Floor/Ceiling

Consult the listing report on the Directory of Building Products (https://bpdirectory.intertek.com) for the edition of the standard(s) evaluated.