
Design Number UNI/DI 180-01
FIRE RESISTANT DUCT
(HORIZONTAL VENTILATION DUCT A)
Unifrax I LLC
FyreWrap® Elite® 1.5 Duct Insulation
ISO 6944 (1985) Duct A
Fire Resistance Rating – 3 hours
Stability – 3 hours
Insulation – 3 hours
Integrity – 3 hours

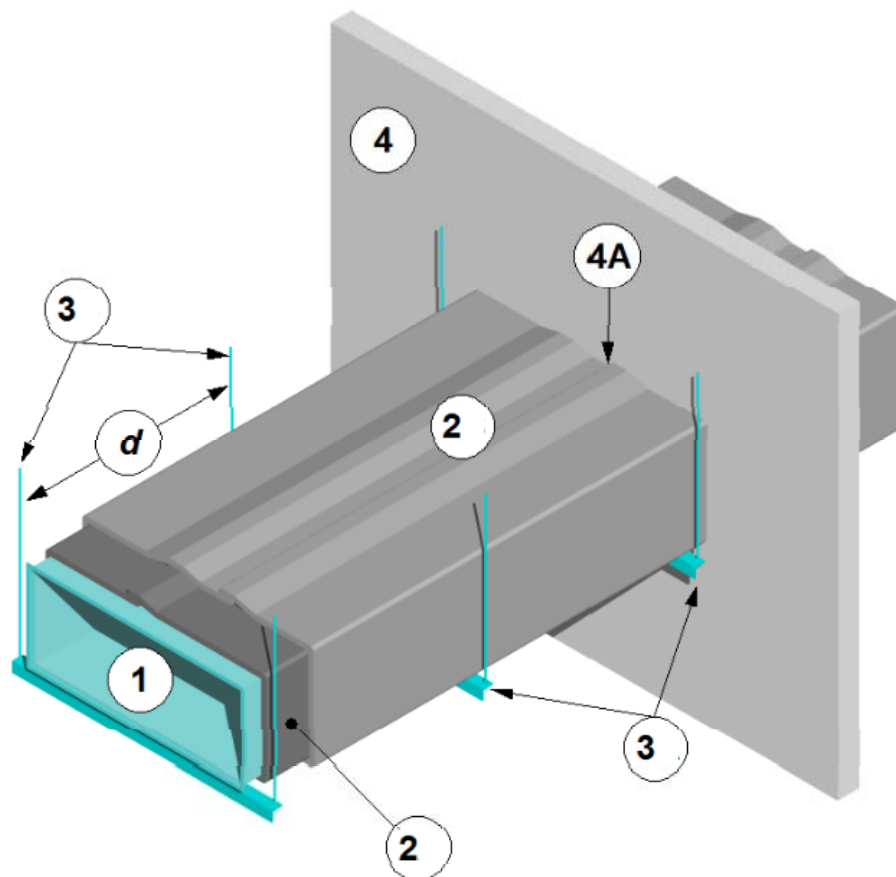


Figure 1 – Horizontal Ventilation Duct

1. VENTILATION DUCT: Install a horizontally oriented, continuous, air-tight, duct system constructed per SMACNA HVAC Duct Construction Standards, Metal and Flexible, Third Edition – 2005 or DW/144,

Specification for Sheet Metal Ductwork, Low, Medium and High Pressure/Velocity Air Systems, 1998 and the requirements for Rectangular Ducts (Item 1A) or Circular Ducts (Item 1B). Position the duct assembly

concentrically or eccentrically in the wall assembly's (Item 4) opening. Annular space range min. 12.7 mm (0.5 in.) to max. 76 mm (3 in.). When required, equip the ventilation duct with transition fittings, e.g. elbows, tees, reducers, etcetera.

A. Rectangular Ducts

- i. Max. cross sectional area: 0.84 m² (1296 in.²).
- ii. Max. width: 1372 mm (54 in.)
- iii. Sheet Steel: Use min. 0.71mm (22 GA) galvanized-sheet steel; increase steel GA as needed to meet min. SMACNA or DW/144 requirements for the pressure class and size.
- iv. Duct Reinforcement: Use min. reinforcement requirements for 500Pa (2 in. water GA) under pressure; increase as needed to meet min. SMACNA or DW/144 requirements for higher pressure class. Use max. spacing of 1250mm (49 in.) between joint reinforcements and/or intermediate reinforcements. For transverse joint reinforcements other than bolted companion angles (rolled steel angle-flanged joints), use a min. of one (1) intermediate reinforcement spaced max. 3 in. from the joint.

B. Circular Ducts

- i. Max. cross sectional area: 0.84 m² (1296 in.²).
- ii. Max. Diameter: 1032 mm (40.62 in.)
- iii. Sheet Steel: Use min. 0.71mm (22 GA) galvanized-sheet steel; increase steel GA as needed to meet min. SMACNA or DW/144 requirements for the pressure class and size.
- iv. Duct Reinforcement: Use bolted companion angles (rolled steel angle-flanged joints) for transverse joint reinforcements and intermediate reinforcement angles. Use max. spacing of 1250 mm (49 in.) between joint reinforcements and/or intermediate reinforcements.

C. Alternative constructions may be designed by a registered design professional to withstand the weight of the system including the Insulation when exposed to the time-temperature curve as defined by ISO 6944.

2. CERTIFIED MANUFACTURER: Unifrax I LLC

CERTIFIED PRODUCT: Duct Insulation

CERTIFIED MODEL: FyreWrap® Elite® 1.5 Duct Insulation

INSULATION: Use only the certified product cited and bearing Intertek's label. Install two layers of foil-encapsulated, nom. 96 kg/m³ (6-pcf) density, nom. 38 mm (1-1/2 in.) thick, min. 610 mm (24 in.) wide blanket made of soluble amorphous wool fibers or calcium magnesium silica fibers. Seal all cut edges with min. 76 mm (3 in.) wide pressure sensitive aluminum foil tape. Total nominal thickness at each longitudinal joint will be 114 mm (4.5 in.) once the ventilation duct (Item 1) is fully insulated. Refer to the manufacturer's instructions for details regarding the insulation's installation. Refer to Figure 2 for installation of duct insulation joints.

A. Pins: Prior to insulating the ventilation duct (Item 1) weld or pop rivet min. 2.8 mm (12 GA), 178 in. long, copper coated steel insulation pins to the bottom of the ventilation duct. Match pin pattern with the corresponding insulation installation method. Once installation of both layers is complete, install nom. 50 mm (2 in.) steel speed clips over all pins. If required bend or cut pins after installing speed clips

B. Longitudinal Joints:

- i. Install the first insulation layer with min. 76 mm (3 in.) overlap longitudinal joints on the top of the duct.
- ii. Install the second insulation layer with min. 76 mm (3 in.) overlap longitudinal joints offset a min. of 267 mm (10-1/2 in.) offset from the first layer of insulation joints (Item 2A).
- iii. Refer to Figure 2. Install the longitudinal overlaps of adjacent blankets using one of the following three methods:

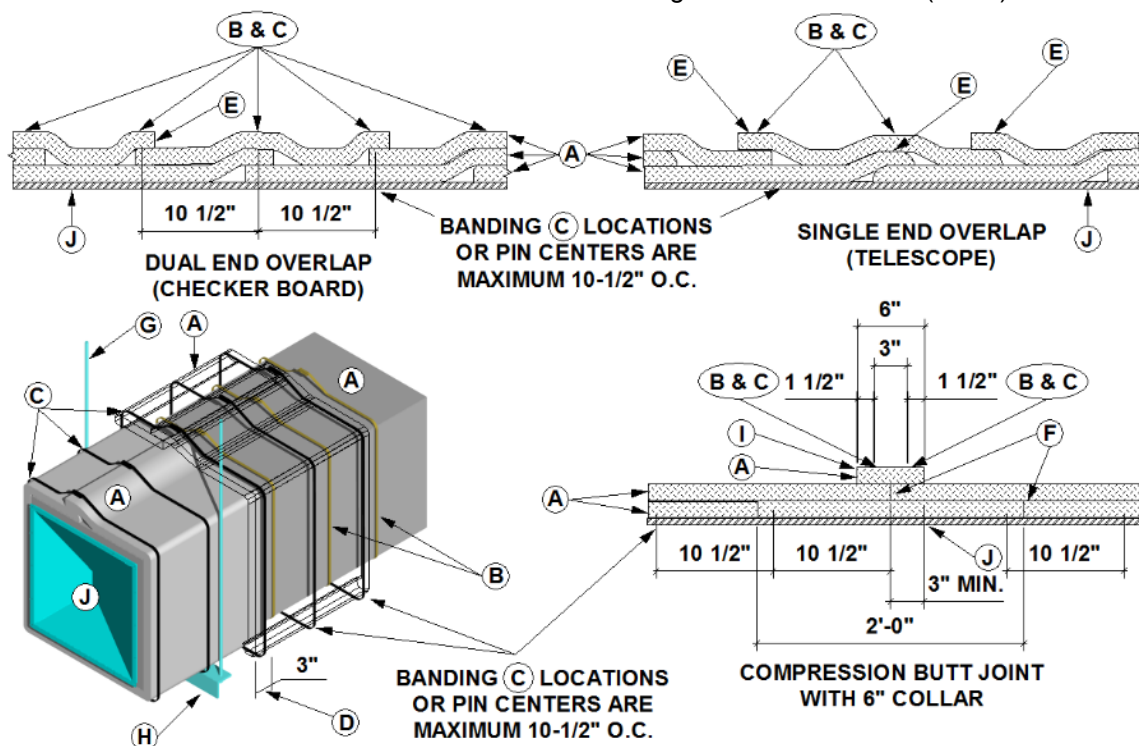
C. Transverse Joints

- i. Single End Overlap (Telescope): Each adjacent blanket has one edge

- overlapped 76 mm (3 in.) by the next blanket,
- ii. Dual End Overlap (Checkerboard): Both edges of each alternating blanket are covered 76 mm (3 in.) by each adjacent blanket whose edges are exposed, or
 - iii. Butt Joint with Collar: All blankets are compressed min. 25.4 mm (1 in.) and butted together. Place and center a 152 mm (6 in.) wide collar of blanket over the butt joint and

overlapping each adjacent blanket 76 mm (3 in.).

- D. Banding: Secure insulation (Item 2) to the ventilation duct (Item 1) using nom. 12.7 mm (1/2 in.) wide steel bands. Use min. three bands on each blanket. Place a band approximately 38 mm (1.5 in.) from each edge of the blanket with an additional steel band centered between each blanket edge or max. 267 mm (10.5 in.) on center (oc) for blankets greater than 610 mm (24 in.) wide.



Drawing Legend:

- A – Insulation (Item 2) – FyreWrap® Elite® 1.5
- B – Filament Tape (Temporary Hold)
- C – Carbon or Stainless Steel Straps (Permanent Hold)
- D – 3 in. Min. Longitudinal Overlap
- E – 3 in. Min. Transverse Overlap
- F – 1 in. Compression Butt Joint
- G – All-Thread Steel Rod
- H – Steel Angle
- I – 6 in. Wide Collar – FyreWrap® Elite® 1.5
- J – Ventilation Duct (Item 1)
- E. *Use 1 in. = 25.4 mm to convert to metric

Figure 2 – Insulation Installation Methods

- 3. SUPPORTS: Support the horizontal ventilation duct (Item 1) using an un-

insulated “Trapeze” Suspension System composed of the following items spaced

max. 1372 mm (54 in.) oc. Center ventilation duct (Item 1) with duct insulation (Item 2) on steel angle (Item 3A). Extend steel angle (Item 3A) at least 51 mm (2 in.) past each all-thread, steel rod (Item 3B). Refer to Figure 3. At any branch install a support within 305 mm (12 in.) of the main duct and a support centered on any branch turn:

A. Steel Angle:

- i. Rectangular Duct Supports: Use steel angle (Item 3A) as the trapeze cross-member. Steel angle shall be of size and composition as specified in Table 1. Steel angle shall have holes positioned at a min. of 25.4 mm (1 in.) to max. 76 mm (3 in.) from the outer surface of the insulated ventilation duct. Holes shall be cut to a diameter corresponding steel rod (Item 3B).
- ii. Circular Duct Supports: Use steel angle rings equivalent to the size of the steel angles described in Table 1.

a. Steel angle rings shall be designed to be supported by two steel rods (item 3B).

- B. Steel Rod: Install two, all-thread, steel rods through holes in the steel angles (Item 3A) connected using washers (Item 3C) and nuts (Item 3D). Refer to Table 1 for steel rod size. Connect the all-thread steel rods (Item 3B) to the bottom of the floor/ceiling assembly (Item 4) using attachment methods designed to carry the weight of the ventilation duct (Item 1) with its insulation (Item 2) under a fire load equivalent to that of the ISO 6944 exposure and time-temperature curve for the rated period.
- C. Alternative support systems may be designed by a registered design professional to withstand the weight of the system including the Insulation when exposed to the time-temperature curve as defined by ISO 6944.

TABLE 1 – “Trapeze” Suspension System

Min. Hanger Diameter (Item 3B)	Max. Duct Perimeter (Item 1)	Min. Cross Member (Item 3A)	Max. Support Distance (<i>d</i>) Refer to figure 1
13 mm (1/2 in.)	1219 mm (48 in.)	Metric equivalent to/or use 1-1/2 x 1-1/2 x 1/8 RSA	1372 mm (54 in.)
16 mm (5/8 in.)	2438 mm (96 in.)	Metric equivalent to/or use 2 x 2 x 1/4 RSA	1372 mm (54 in.)
19 mm (3/4 in.)	3962 mm (156 in.)	Metric equivalent to/or use 3 x 3 x 3/8 in. RSA	1372 mm (54 in.)

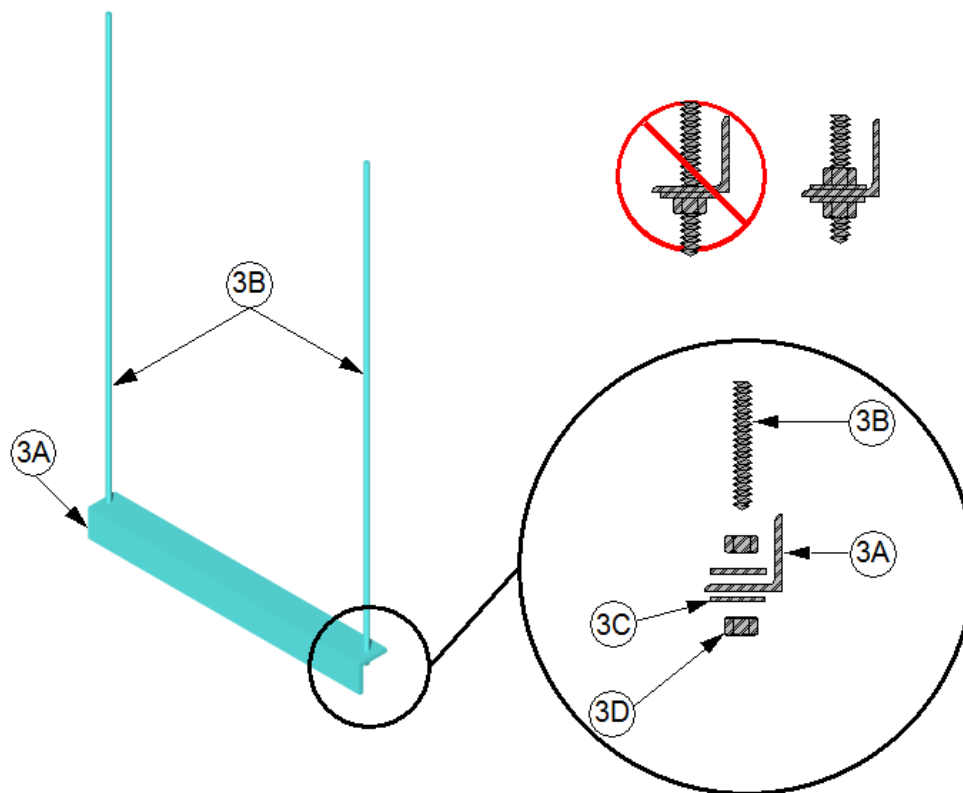


Figure 3 – Item 3 – Details of ‘Trapeze’ Suspension System

4. WALL ASSEMBLY: Use min. 3 hour rated wall assembly constructed of nom. 203 mm (8 in.) solid CMU, or min. 145 mm (5.7 in.) thick normal weight or min. 112 mm (4.4 in.) thick lightweight (100 to 150 pcf) reinforced concrete; or, use any *Listed* 3 hour gypsum wall assembly, min. 152 mm (6 in.) thick, with min. 0.8 mm (22 GA), 92 mm (3-5/8 in.) deep, steel C-studs covered with gypsum board on both sides.

- A. Create an opening in the wall assembly (item 4) compatible with the horizontal penetrating item dimensions and an annular space between 12.7 mm (0.5 in.) and 76 mm (3 in.); max opening 736.5 mm (29 in.) x 1498.5 mm (59 in.) for max. ventilation duct (Item 1) dimensions and annular space.

5. FIRESTOP SYSTEM: Protect the annular space when the ventilation duct (Item 1) passes through a fire-resistance rated wall assembly (Item 4). Install additional perimeter steel reinforcement (min. 25.4 mm (1 in.) x 25.4 mm (1 in.) x 3 mm (1/8 in.)

RSA) required 76 mm (3 in.) from both sides of the wall assembly, and secured 305 mm (12 in.) oc with 51 mm (2 in.) x 6.5 mm (1/4 in.) hex head bolts, nuts, and washers. Alternatively the additional reinforcement may be attached to the ventilation duct (Item 1) using 4mm (0.157 in.) diameter steel pop rivets and/or M4 x .07, 12.7 mm long (#8, 0.5 in. long) self-drilling Phillips truss head screws spaced 152 mm (6 in.) oc. Position and install nuts and washers on the inside of the ventilation duct (Item 1). Ensure that the packing material (Item 3Bi) is installed prior to fully tightening the fasteners of the perimeter steel reinforcement. Use one of the following firestop system's methods:

- A. ASTM E814 Firestop System: Not Shown – Use and follow details of Intertek Design Number UNI/PF 180-01 for details.
- B. ISO 6944 Firestop System: Not Shown – Use and follow details of the penetration firestop specification section

23 00 00 Heating, Ventilation, and Air-Conditioning (HVAC)
23 07 00 HVAC Insulation
23 07 13 Duct Insulation

UNI/DI 180-1
Page 6 of 6

of Intertek Design Number UNI/BI 120-06 for details.

Design Number UNI/DI 180-02
FIRE RESISTANT DUCT
(VERTICAL VENTILATION DUCT)
Unifrax I LLC
FyreWrap® Elite® 1.5 Duct Insulation
ISO 6944 (1985) Duct A
Fire Resistance Rating – 3 hours
Stability – 3 hours
Insulation – 3 hours
Integrity – 3 hours

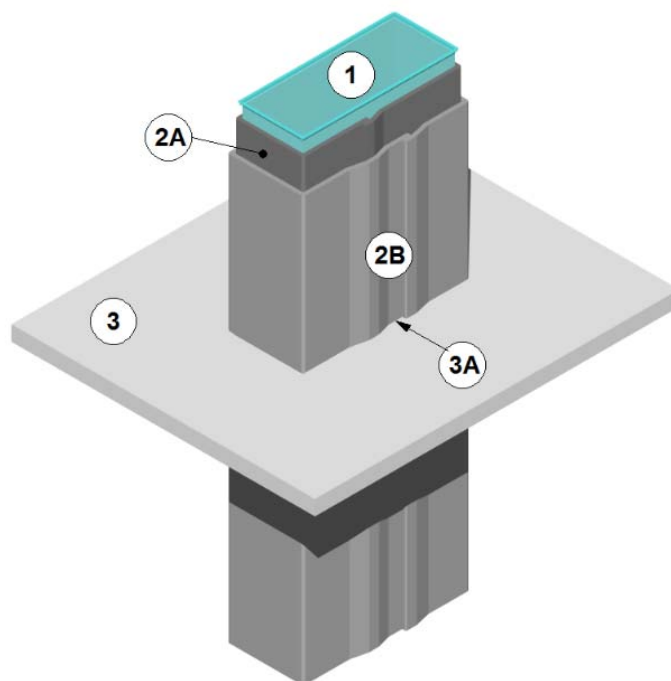


Figure 1 – Vertical Ventilation Duct

1. VENTILATION DUCT: Install a vertically oriented, continuous, air-tight, duct system constructed per SMACNA HVAC Duct Construction Standards, Metal and Flexible, Third Edition – 2005 or DW/144, Specification for Sheet Metal Ductwork, Low, Medium and High Pressure/Velocity Air Systems, 1998 and the requirements for Rectangular Ducts (Item 1A) or Circular Ducts (Item 1B). Position the duct assembly concentrically or eccentrically in the floor assembly's (Item 4) opening. Annular space range min. 12.7 mm (0.5 in.) to max. 76 mm (3 in.). When required, equip the ventilation duct with transition fittings, e.g. elbows, tees, reducers, etcetera.
- A. Rectangular Ducts
 - i. Max. cross sectional area: 0.84 m² (1296 in.²).
 - ii. Max. width: 1372 mm (54 in.)
 - iii. Sheet Steel: Use min. 0.71mm (22 GA) galvanized-sheet steel; increase steel GA as needed to meet min. SMACNA or DW/144 requirements for the pressure class and size.
 - iv. Duct Reinforcement: Use min. reinforcement requirements for 500Pa (2 in. water GA) under pressure; increase as needed to meet min. SMACNA or DW/144 requirements for higher pressure

class. Use max. spacing of 1250mm (49 in.) between joint reinforcements and/or intermediate reinforcements. For transverse joint reinforcements other than bolted companion angles (rolled steel angle-flanged joints), use a min. of one (1) intermediate reinforcement spaced max. 3 in. from the joint.

B. Circular Ducts

- i. Max. cross sectional area: 0.84 m² (1296 in.²).
- ii. Max. Diameter: 1032 mm (40.62 in.)
- iii. Sheet Steel: Use min. 0.71mm (22 GA) galvanized-sheet steel; increase steel GA as needed to meet min. SMACNA or DW/144 requirements for the pressure class and size.
- iv. Duct Reinforcement: Use bolted companion angles (rolled steel angle-flanged joints) for transverse joint reinforcements and intermediate reinforcement angles. Use max. spacing of 1250 mm (49 in.) between joint reinforcements and/or intermediate reinforcements.

C. Alternative constructions may be designed by a registered design professional to withstand the weight of the system including the Insulation when exposed to the time-temperature curve as defined by ISO 6944.

2. CERTIFIED MANUFACTURER: Unifrax I LLC

CERTIFIED PRODUCT: Duct Insulation

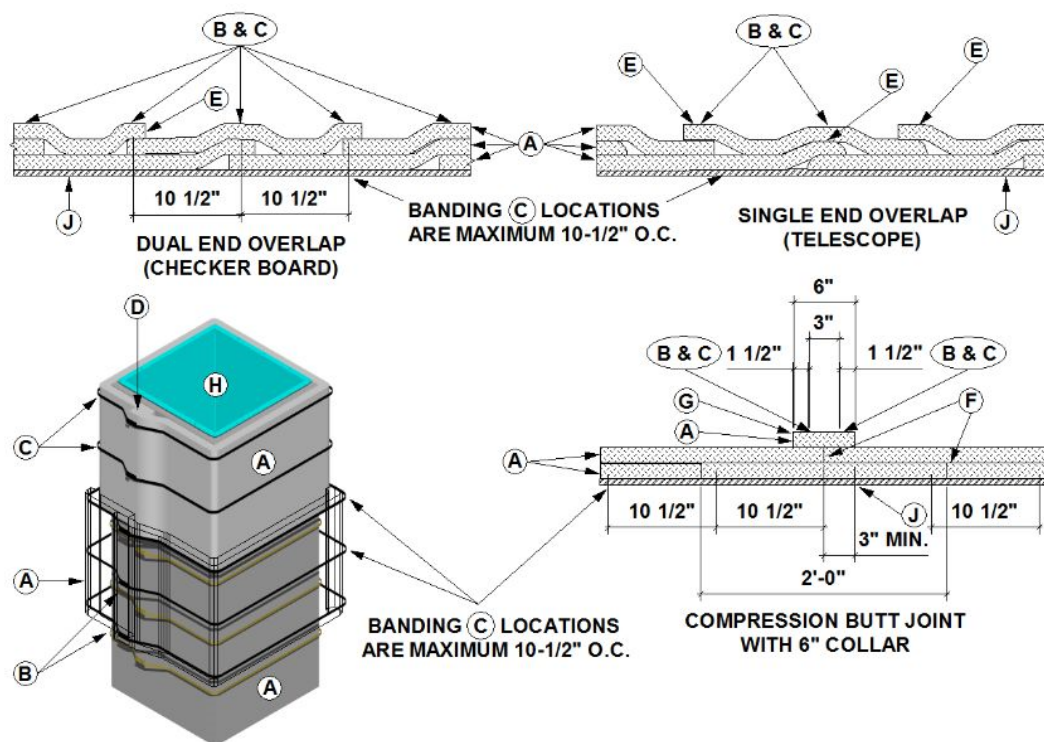
CERTIFIED MODEL: FyreWrap® Elite® 1.5 Duct Insulation

INSULATION: Use only the certified product cited and bearing Intertek's label. Install two layers of foil-encapsulated, nom. 96 kg/m³ (6-pcf) density, nom. 38 mm (1-1/2 in.) thick, min 610 mm (24 in.) wide blanket. Use the same application method for both insulation layers. Refer to the manufacturer's instructions for details regarding the insulation's installation. Stagger the first insulation layer (Item 2A) and

second insulation layer (Item 2B) joints a min. of 267 mm (10-1/2 in.) Seal all cut edges with min. 76 mm (3 in.) wide pressure sensitive aluminum foil tape. Wrap the ventilation duct (Item 1) with two layers of insulation (Item 2) with 76 mm (3 in.) min. overlaps at all joints and min. nom. thickness of 76 mm (3 in.) at the transverse overlaps of completed wrapped ventilation duct (Item 1). Use the same insulation method for both layers. Refer to Figure 2. Install the longitudinal overlaps of adjacent blankets using one of the following three methods:

- Single End Overlap (Telescope): Each adjacent blanket has one edge overlapped 76 mm (3 in.) by the next blanket,
- Dual End Overlap (Checkerboard): Both edges of each alternating blanket are covered 76 mm (3 in.) by each adjacent blanket whose edges are exposed, or
- Butt Joint with Collar: All blankets are compressed min. 25.4 mm (1 in.) and butted together. Place and center a 152 mm (6 in.) wide collar of blanket over the butt joint and overlapping each adjacent blanket 76 mm (3 in.).

Use min. 12 GA, 165 mm (6-1/2 in.) long, steel insulation pins with nominal 50 mm (2 in.) x 50 mm (2 in.) self adhering plate. Pins shall be welded or riveted to the two opposing, largest, sides of the ventilation air duct (Item 1) with 4 mm (5/32 in.) diameter pop rivets. Two pins shall be spaced nominally 230 mm (9 in.) from edge of duct. Pins shall be spaced nominal 350 mm (13-3/4 in.) from all duct joints and 550 mm (21-1/2 in.) longitudinally in the field of the duct. Secure insulation (Item 2) to the ventilation duct (Item 1) using nom. 1/2 in. wide steel bands. Use min. three bands on each blanket. Place a band approximately 38 mm from each edge of the blanket with an additional steel band a max. 584 mm (23 in.) between each blanket edge. Use nom. 50 mm (2 in.) diameter steel speed clips over insulation pins to secure insulation to ventilation duct.



Drawing Legend:

- A – Insulation (Item 2) – FyreWrap® Elite® 1.5
- B – Filament Tape (Temporary Hold)
- C – Carbon or Stainless Steel Straps (Permanent Hold)
- D – 3 in. Minimum Longitudinal Overlap
- E – 3 in. Minimum Transverse Overlap
- F – 1 in. Compression Butt Joint
- G – 6 in. Wide Collar – FyreWrap® Elite® 1.5
- H – Ventilation Duct (Item 1)

*Use 1 in. = 25.4 mm to convert to metric

Figure 2 – Insulation Installation Methods

3. SUPPORTS: Not Shown – Support the vertical ventilation duct (Item 1) using one of the following:
 - A. Rectangular Duct: Use min. 25.4 mm (1 in.) x 25.4 mm (1 in.) x 3 mm (1/8 in.) RSA (steel angles) forming an “H-shape” attached to the vertical ventilation duct (Item 1) around its perimeter at each floor/ceiling assembly (Item 4). Use min. 9.5 mm (3/8 in.) dia. bolts, washers and nuts to attach the steel angles to the ventilation duct (Item 1). Space fasteners max. 203 mm (8 in.) on center (oc). Two parallel steel angles shall extend beyond the annular space of the opening and bear upon the surface of the floor/ceiling assembly (Item 4).
 - B. Circular Ducts: Use min. 25.4 mm (1 in.) x 25.4 mm (1 in.) x 3 mm (1/8 in.) RSA (steel angles) pieces forming a continuous ring around the vertical ventilation duct (Item 1) perimeter at each floor/ceiling assembly (Item 4). Use min. 9.5 mm (3/8 in.) dia. bolts, washers and nuts to attach the steel angles to the ventilation duct (Item 1). Space fasteners max. 203 mm (8 in.) oc. Two parallel portions of the steel angle ring shall extend beyond the annular space of the opening and bear

upon the surface of the floor/ceiling assembly (Item 4).

4. FLOOR/CEILING ASSEMBLY: Use min. 145 mm (5.7 in.) thick normal weight or min. 112 mm (4.4 in.) thick lightweight (1600 to 2400 kg/m³ (100 to 150 pcf)) reinforced concrete.
 - A. Create an opening in the floor/ceiling assembly compatible with the ventilation duct (Item 1) dimensions and an annular space between 12.7 mm (0.5 in.) and 76 mm (3 in.). Max. opening 736.5 mm (29 in.) x 1498.5 mm (59 in.) for max. ventilation duct (Item 1) dimensions and annular space.
5. FIRESTOP SYSTEM: Protect the annular space when the ventilation duct (Item 1) passes through a fire-resistance rated floor/ceiling assembly. Install additional perimeter steel reinforcement ((min. 25.4 mm (1 in.) x 25.4 mm (1 in.) x 3 mm (1/8 in.) min. 76 mm (3 in.) from both sides of the floor/ceiling assembly, and

secured to ventilation duct (Item 1) 305 mm (12 in.) oc with 51 mm (2 in.) x 6.5mm (1/4 in.) hex head bolts, nuts, and washers, positioned with nuts and washers installed from the inside of the duct after the fill, void, or cavity material has cured. Alternatively the additional reinforcement may be attached to the ventilation duct (Item 1) using 4mm (0.157 in.) diameter steel pop rivets and/or M4 x .07, 12.7 mm long (#8, 0.5 in. long) self-drilling Phillips truss head screws spaced 152 mm (6 in.) oc. Use one of the following firestop system's methods:

- A. ASTM E814 Firestop System: Not Shown – Use and follow details of Intertek Design Number UNI/PF 180-02 for details.
- B. ISO 6944 Firestop System: Not Shown – Use and follow details of the penetration firestop specification section of Intertek Design Number UNI/BI 180-02 for details.