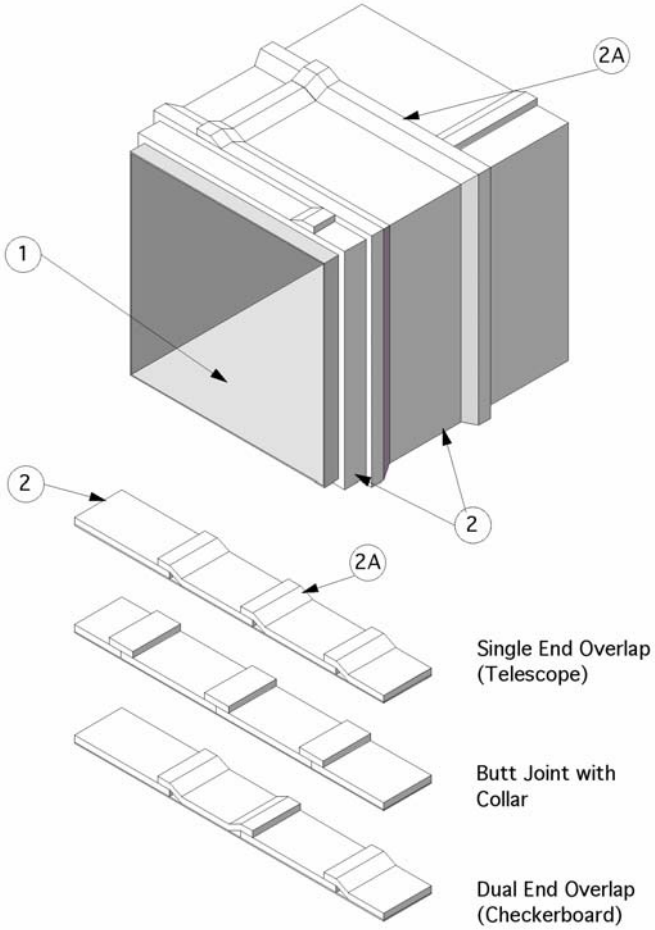
Design No. CFD 510 F
CHEMICAL FUME EXHAUST DUCTS
UL 1978 Second Edition (June 25, 2002)
Section 14 – Pass
Section 15 – Pass



1. CHEMICAL FUME EXHAUST DUCT**: A continuously welded, liquid-tight L-shaped duct system with horizontal and vertical shafts constructed of 16 GA sheet steel or 18 GA stainless steel with outside dimensions of max. 52-in. high x 52-in. wide and a maximum cross-section area of 2704 in^2. When required, equip the duct with a clean-out access door. Construct the duct using sections affixed to each other with seams. Reinforce the duct to IMC or NFPA 96 requirements designed to carry the weight of the duct assembly covered with insulation under a fire load equivalent to UL 1978 exposure and the ASTM E 119 time-temperature curve. Duct to be rigidly supported in accordance with IMC or NFPA 96 requirements and as specified in Item 6.

2. INSULATION: Use nom. 1-1/2-in. thick, 6-pcf (FyreWrap® EZ 1.5), 1-1/2-in. thick, 8-pcf (FyreWrap® 1.5), or nom. 2 in. 8pcf (FyreWrap® MAX 2.0) blanket made of soluble amorphous wool fibers or calcium magnesium silica fibers. Use blanket that is fully encapsulated or single faced with foil-scrim-metallized polyester facing. The blanket is installed in min. 24-in. wide sections. Pre-welded or cup head pins (3) and/or min. 1/2-in. wide nom. 0.020-in. thick carbon steel

bands or min. 1/2-in. wide nom. 0.015-in. thick stainless steel bands are applied (4) to maintain the blanket up against the duct to reduce sagging and to assist in the installation of vertical sections. Wrap the steel duct with one layer of duct wrap (facing exposed) with 3-in. min. overlaps at all joints. Install insulation with a nom. thickness of 3 in. at the overlap for FyreWrap® EZ 1.5 or FyreWrap® 1.5 application, or a nom. thickness of 4 in. at the overlap for FyreWrap® MAX 2.0 application. The wrap system may be installed with zero clearance to combustible construction at the overlaps and in the field between the overlaps. Make the transverse overlaps of adjacent blankets (2A) using one of the following three methods as depicted in the drawings:

* 3-in. overlap telescoping method where each adjacent blanket has one edge exposed and one edge covered by the next blanket,
* 3-in. overlap checkerboard pattern where both edges of each alternating blanket are covered by each adjacent blanket whose edges are exposed, or
* butt splice with collar method where the blankets are butted together and a 6-in. wide collar of blanket is centered over the butt splice overlapping each adjacent blanket 3-in.

For vertical runs, the insulation can be applied to the duct in a continuous length applied parallel with the length of the duct as opposed to wrapping around the duct. All overlaps are to be maintained at a min. 3 in. and are to occur a min. of 6 in. from any corner of the duct. Pins (3) spaced a maximum 8 in. o.c. are to be placed at the centerline of all vertically oriented overlaps.

Seal all exposed fiber with min. 4-in. wide, pressure-sensitive aluminum foil tape. Secure with stainless steel banding (4) or pins (3). Reference Product Section of this Directory for more details.

Listed Manufacturer:

Unifrax Corporation --

Applied Fireproofing

Insulation Blanket (Soluble Fiber)

FyreWrap® EZ 1.5 Duct Insulation

FyreWrap® 1.5 Duct Insulation

FyreWrap® MAX 2.0 Duct Insulation

3. IMPALING PINS: (*Not shown*) Weld min. 12 GA, min. 5-in. long, steel or stainless steel insulation pins to the duct. Locate pins to meet the following requirements: Place pins on all sides of the duct in rows (perpendicular to the length of the duct) spaced max. 10-1/2 in. o.c. Pins in each row are spaced a max. 6 in. from each edge and a max. 8 in. o.c. Locate pins max. 4 in. from the ends of the duct. All overlaps are a min. 3 in. for overlaps going around the duct and for overlaps following the length of the duct. Locate insulation (2) overlaps so they are centered on pins. Secure blanket to pins with 2-1/2 in. square galvanized steel speed clips. Turn down or cut off insulation pins that extend beyond the outer blanket wrap layer.
4. PINS AND BANDING: (*Optional Method, Not Shown*) – For ducts up to 24 in. x 48 in., weld min. 12 GA, min. 5-in. long, stainless steel insulation pins to the duct. Locate pins at all blanket overlaps and meet the following requirements. No pins are required on the sides. On bottom of duct, space pins in rows max. 10-1/2-in. apart and the pins in the rows are max. 12-in. O.C. Locate pins max. 12 in. from the edges of the duct. All overlaps are a min. 3 in. for overlaps going around the duct and for overlaps following the length of the duct. Locate pins in the middle of the overlap. Secure blanket to pins with 1-1/2 in. x 1-1/2 in. square, 1-1/2 in. diameter galvanized steel speed clips, or use cup head style pins. Turn down or cut off insulation pins that extend beyond the outer blanket wrap layer. Use min. 1/2-in. wide nom. 0.020-in. thick carbon steel bands or min. 1/2-in. wide nom. 0.015-in. thick stainless steel

bands. When needed, use filament tape as a temporary holding method for the insulation prior to banding to ease installation. Place bands max. 1.5 in. from each blanket edge and max. 10-1/2-in O.C. Tension the banding material to hold the insulation (2) in place without causing any cutting or damage to the insulation or duct.

For ducts having widths of 24 in. or less, place min. 1/2-in. wide nom. 0.020-in. thick carbon steel bands or min. 1/2-in. wide nom. 0.015-in. thick stainless steel bands over joints and within the field around the wrap. Locate bands 1-1/2 in. from each edge of the blanket, centered on the overlap, and on max. 10-1/2 in. centers. Pins are not required when this banding technique is used.

5. ACCESS DOOR (*Not shown*): Either a field fabricated or pre-fabricated grease duct access door may be used, provided the access door consists of the following:

   A. Field Fabricated Access Doors – **For door dimensions up to 24-in. x 18-in.:** After the duct is insulated, cut a max. 24-in. x 18-in. 16 GA metal plate to be used as the access door. Cut an opening in the insulation system 1-in. greater than the height and width of the access door. Then, cut an opening in the side of the duct 2-in. less in height and width than the access door. Weld four 6-in. x 1/4-in. all-thread rods to the duct, one at each corner of the duct opening. Cut a max. 24-in. x 18-in. 16 GA metal plate to be used as the access door. Drill holes in the door to match the rod pattern and seal the duct by overlapping the opening by 1-in. on all sides. Place a min. 1/2-in. thick ceramic fiber gasketing on the internal face of the door and place the door over the threaded rods. Weld four 5-in. long, 12 GA steel or stainless steel insulation pins to the access door corners. Apply two layers of insulation (2) over the access door. Cut the first layer 1-in. greater than the height and width of the access door and install it over the pins and covering the door with a friction fit. Cut the second layer 2-in. greater than the height and width of the access door and install it over the pins and covering the first layer so that a 1-in overlap exists. Secure blanket to pins with 2-1/2 in. square or round galvanized steel speed clips. Turn down or cut off insulation pins that extend beyond the outer blanket wrap layer. Secure the access door assembly by placing steel tubing over the threaded rod, then apply washers and wing nuts over the threaded rod.

   B. Pre-Fabricated Access Doors – **For door dimensions up to 24-in. x 18-in.:** After the duct is insulated, cut an opening in the insulation system 1-in. greater than the height and width of the access door. Then, cut an opening in the side of the duct 2-in. less in height and width than the Pre-Fabricated Access Door. Door shall be composed of three layers of steel, with a backing plate max. 16 GA steel affixed to the inner door which is a formed piece of steel with bolts welded to it. The shape of the inner door is affixed to the 16 GA flat backing plate that creates an air space. The last layer of the door assembly is the outer door that is another formed piece of steel that nests into the inner door with a ceramic gasket installed around the perimeter of the outer door. Door shall have conical springs located between the inner and outer doors positioned over the bolts. After the outer door assembly is placed over the bolts and conical springs, a fiber washer is set over each bolt, and a wing nut is then threaded onto each bolt. These springs are compressed when the wing nuts are placed on the bolts and tightened. When the springs are compressed the door assembly is locked to the duct walls. *NOTE: Pre-*

fabricated access doors may be used provided that the same number of layers of duct insulation are installed as specified in ITEM 5A. Install door in accordance with manufacturer's instructions.

6. SUPPORTS: (Not shown) After the installation of the insulation system is complete, add a typical trapeze support system. Center insulated duct on trapeze hangers so that min. 3-in space exists between insulated duct and rods. Support hanger systems do not need to be wrapped. Attach threaded rods through concrete ceiling and secure using appropriate size washers and nuts or secure threaded rods using appropriate size steel drop in expansion type masonry anchors. Space horizontal supports a max. 120-in. O.C., starting at the center of the vertical rise portion. Use min. 1/2-in. all-thread rod bolted to 2 x 2 x 1/4-in. steel angle to assemble the trapeze supports. The angle shall be min. 65 in. in length, except when supporting smaller ducts. Then shorter length angles are permitted as long as other requirements are met. Center the all-thread rod through 1/2 in. clearance holes drilled 2 in. from each end of the angle. Extend trapeze support at least 2-in. on each side of insulated duct and rods.

**The UL 1978 test, which is an internal fire test, evaluates the capability of the duct enclosure system to prevent the ignition of combustible construction adjacent to the duct enclosure in the event of an internal grease fire. This test does not, nor is it intended to, replicate a real world fire. Rather, the purpose of this test is to create a severe fire exposure situation, and to subject all similar devices to a standardized test in order to gage their performance. The performance criteria for the UL 1978 test is a maximum allowable temperature rise measured on the interior surface of a combustible construction placed on the duct in the manner specified in the test method.

With this application for a fume exhaust system, there is a potential presence of various types of chemicals. The presence of these various chemicals are not within the scope of the test protocols. Hence, this Design Listing will provide the ratings specified when installed in accordance with the Design Listing and tested in accordance with UL 1978. The various chemicals, to which the chemical fume exhaust system may be subjected to, should be considered by a chemical engineer to determine if the presence of various combinations may be a source of combustion, or if they may be a source for a fire exposure exceeding that of the UL 1978 test, or if they will react with the insulation, deteriorating the insulative characteristic.

