



FIREMASTER®

**Designers and Fire Authorities
FireMaster® Grease and Air Ventilation
Duct Systems Reference Manual**



FireMaster® Commercial Duct Systems



Thermal Ceramics, a global manufacturer of high temperature insulation products, has provided engineered solutions for heat containment problems for over 75 years and was the first to develop flexible duct fire resistive enclosures, FireMaster Duct Systems, for commercial kitchen grease and air ventilation ducts. Unlike imitation wraps on the market today, the company has the widest range of duct enclosure systems that are performance-tested beyond minimum laboratory listings or code requirements. This assures fire containment, from the most complex duct designs to typical everyday duct systems, without theorizing. FireMaster innovative duct systems are cost effective solutions, and because they withstand temperatures from 2000°F - 2300°F, they do not age during in-service operations, which could ultimately jeopardize the integrity of a fire resistive enclosure. Because these systems possess zero flame and smoke ratings on the blanket, and only a 5 flame spread and 10 smoke rating on the foil encapsulation, they do not add dangerous toxic emissions to fire conditions. With a vast number of field installations worldwide, FireMaster Duct

Systems have proven their worth, containing tough, real-world fires in over ten years of history in successful fire containment.

Through a dedicated staff of global experts in the fire protection industry, Thermal Ceramics continues to maintain worldwide leadership with breakthrough technology that creates reliable fire safe solutions. FireMaster Duct Systems utilize state of the art designs, which provide significant labor, weight and space savings with the additional benefit of acoustic protection, all in one product. FireMaster Duct Systems protect:

- Commercial Kitchen Grease Ducts
- Air Ventilation Ducts
- Chemical Exhaust Ducts
- Stair Pressurization Ducts
- Hazardous Exhaust Ducts
- Trash and linen chutes

Testimonials

"Having been involved in the building trades for over 30 years, both as a sheet metal worker and as a building code inspector, I have found the FireMaster grease duct and air duct wrap to be a versatile and effective alternative to gyp board shaft enclosures."

Phil Burkart, Structural/Mechanical Inspections Supervisor, City of Portland, OR

"The biggest advantage in FireMaster duct systems, in addition to the product's flexibility and lightweight nature, is time savings on installation. With FireMaster Duct Systems, the general contractor and owner can save a minimum 1 - 2 weeks when compared to drywall shafts even on jobs above ceiling grid lines."

Tommy Thoreson, Manager, Fire Stop Contracting, Superl, Inc., Fridley, MN

A Fire Story

Red Star Tavern and Road House, Portland, Oregon - An April 1998, grease duct fire at the Red Star Tavern and Road House, demonstrated the relative performance of a gypsum shaft enclosure and FireMaster Duct Wrap insulation methods on the same grease duct exhaust system. A horizontal duct segment above the kitchen and near the point of fire origin was wrapped with FireMaster Duct Wrap. This duct segment was installed with zero clearance to the duct. The FireMaster Duct Wrap effectively prevented fire in this area, and there was no escape of flame or fumes. However, the gypsum shaft enclosure around the vertical grease duct section failed, and spawned multiple fires that caused \$150,000 in damage to this 10-story hotel. Instead of protecting the structure, the gypsum enclosure with its air gap actually promoted the rapid spread of flames. When the building was rehabilitated, Portland building officials required that the entire duct be protected with foil encapsulated FireMaster Duct Wrap.



Red Star Tavern and Road House



Burned gypsum shaft

FireMaster Duct System also successfully contained a grease duct fire at McGuffey's Branson, MO, when the automatic fire suppression system failed to respond to the heat of the fire at stove level.

"The grease duct insulation did a good job of holding the fire in check until the suppression system could be manually activated. This incident demonstrated the value of using both active and passive fire protection components to protect commercial buildings."

Fire Chief Ernest Braswell, Branson, Missouri



McGuffey's

Typical Applications



Rigid Shaft Alternative



Zero Clearance to Combustibles Protection



2 Hr ASTM E119 & ASTM E814



Potential 2000°F Grease Duct Fire

The traditional method of enclosing grease ducts, as a fire resistive enclosure has been rigid drywall shafts. The historical justification was based on ASTM E119 wall tests that represent sustained room fires with one dimensional fire exposures, and not the unique 3-D transient and volatile grease duct fire dynamics that could potentially burn up to 2000°F. Drywall, with its temperature limitations of 125°F, could be exposed to temperatures in excess of 125°F during normal cooking operations, potentially resulting in a premature dehydration of the shaft's inner walls, compromising the integrity of the drywall protective enclosure.



Grease Duct drywall enclosure

FireMaster Duct Systems versus Drywall Board Shaft Enclosures

Even when built according to code, there are concerns for the performance of a drywall board enclosure under grease duct fire conditions. The concept of a two-hour rating for a drywall shaft enclosure is based on standard building conditions which does not take into account the unique fire behaviors that occur within grease and air ventilation ducts.

FireMaster Duct Systems

- 2000°F - 2300°F use temperature
- Passive protection remains reliable; does not age, shrink or become brittle over time or during high temperature exposures
- Reliable, dependable product longevity assures maximum performance against fire attack when needed
- Exhaustive testing to qualify for this specific end use
- High temperature insulation permits directly applied system to the duct
- Compact design saves space
- Lightweight, flexible allows swift installation
- Totally encapsulated blanket virtually impermeable to grease or water absorption
- Only duct support hardware required

Drywall Board Enclosure

- Not recommended for exposures > 125°F
- Grease ducts could operate at temperatures over drywall's temperature limit causing premature dehydration
- Potential deterioration, loss of fire resistive integrity with sustained high temperature exposures over recommended use limits
- No specific duct enclosure laboratory listing
- 3-6" air gap required between duct and drywall
- Consumes significant amount of space
- Labor intensive wall construction
- Potential for moisture deterioration and fungus attack
- Both duct and drywall enclosure support hardware systems required

Why Fully Encapsulated Duct FireMaster Is The Preferred Choice



The benefits of a totally encapsulated fire resistive wrap system goes beyond a less dusty and easier installation. Long after the laboratory tests, the totally encapsulated feature has a direct impact on the materials longevity and level of fire protection the wrap enclosure provides when a fire occurs. Other wraps on the market may substitute foil faced on one or both sides with edges of the fiber blanket exposed. These types of partially encapsulated wrap materials are vulnerable to wicking moisture, condensation or grease into the core fiber blanket that could cause degradation of the material ultimately violating the fire resistive properties of the wrap enclosure.

Should a water leak occur above a non-encapsulated blanket, the weight of accumulating moisture will weaken fibrous, partially encapsulated materials potentially causing sections to sag and eventually tear away. In air exhaust ducts, condensation that builds up on the outside of a cooling duct can also saturate partially encapsulated blankets, leading to similar damage. If a leak develops in a metal grease duct joint, cooking oils could bleed out and saturate foil faced insulation wrap systems. This contamination could render the insulation ineffective and would serve as a source of additional fuel in the event of a fire, thus compounding the problem.

The concern over the potential effect such absorption may have on the wrap has prompted Thermal Ceramics to limit their systems to fully encapsulated blankets only in all grease and air ventilation duct applications. The FireMaster fully encapsulated wrap systems have over a decade of proven performance installations as a viable and effective method in grease duct and air ventilation duct fire containment in both laboratory and real world fires.

Thermal Ceramics FireMaster Duct Systems have a long list of job references. A Fire Protection Marketing, Technical and Sales team is ready to assist you in your grease duct or air ventilation duct design, installation or inspection.

Because fire loss is a universal problem, there can be no excuse for using second best or imitations. So let the experts in heat containment with proven products help you solve your next fire related problem. For dependable fire protection with unmatched experience in flexible duct enclosures, contact your nearest Thermal Ceramics FireMaster Specialist.

FireMaster Duct Enclosure System Products

FireMaster duct passive fire protection systems are non-asbestos, inorganic fire-proof insulation materials that do not age or shrink excessively at elevated temperatures. These high temperature insulation materials are offered in two types; a body soluble, low biopersistent fiber technology and a ceramic fiber composition. The FireMaster body soluble fiber composition is designated by a "+" sign after the brand name.

Composition

Product

FireMaster + products
FireMaster

Chemistry

calcium-magnesium-silica amorphous wool (body soluble)
alumina-silica ceramic fiber

FastWrap+



MEA



- Single layer system
- Zero Clearance to combustibles at overlap or collar; 2" clearance between overlap or collar
- Lightweight, flexible compact design is easy to install & saves space
- Several approved installation techniques
- Protective encapsulation ensures fire performance is not compromised
- Design flexibility with extensive testing of complex duct designs
- 2000°F - 2300°F reliable fire proof material that does not age, shrink or become brittle under continuous high temperature cooking operations or with exposures to intermittent grease duct fires
- 1 & 2 Hr Shaft Alternative

Duct Wrap 2x2, Duct Wrap 2x2+



- 1 & 2 Hr Shaft Alternative
- Zero Clearance to combustibles
- Choice of installation methods
- Lightweight, flexible compact design is easy to install & saves space
- 2000°F - 2300°F reliable fire proof material that does not age, shrink or become brittle under continuous high temperature cooking operations or with exposures to intermittent grease duct fires
- Protective encapsulation ensures fire performance is not compromised

Duct Wrap, Duct Wrap+



MEA



- 1 & 2 Hr Shaft Alternative
- Zero Clearance to combustibles
- Extensive complex duct design solutions for designer flexibility
- Space Saver
- 2000°F - 2300°F reliable fire proof material that does not age, shrink or become brittle under continuous high temperature cooking operations or with exposures to intermittent grease duct fires
- Multiple installation choices
- Lightweight, flexible wrap installs quickly with simple tools
- Protective encapsulation ensures fire performance is not compromised

Proven Performance Testing

Test Standard	FastWrap+	Duct Wrap+	Duct Wrap	Duct Wrap 2x2	Duct Wrap2x2+
UL 1978	√	√	√	√	√
UL 2221 (proposed)				√	√
AC 101				√	√
ISO 6944	√	√	√	√	√
ASTM E 814	√	√	√	√	√
ASTM E 119	√	√	√	√	√
ASTM E 136	√	√	√	√	√
ASTM C 411	√	√	√	√	√
ASTM E 84	√	√	√	√	√
ASTM C 518-98	√	√	√	√	√

Listings

Listing	FastWrap+	Duct Wrap+	Duct Wrap	Duct Wrap 2x2+	Duct Wrap 2x2
UL		YYET / HNLJ R14229 CAJ-7014 CAJ-7021 CAJ-7012 CAJ-7019 V1, V2, V3, V4 W-L-7041	YYET / HNLJ R14229 CAJ-7014 CAJ-7021 CAJ-7012 CAJ-7019 V1, V2, V3, V4 W-L-7041		
Omega	GD 513, GD 514 VAD 516 FS 548, FS 549			GD 509 FS 548	GD 509 FS 548
Canada ULC			FRD-4, 440E9 FRD-3, FRD 5 Guide No. 40 U21 ISO 6944		
Brazil NBR Europe		14528, ISO 6944 BS 476 Part 24: 1978/ ISO 6944:1985	BS 476 Part 24: ISO 6944: 1986 UL 1978		
Asia		BS 476 Part 24: ISO 6944:1986, UL 1978	BS 476 Part 24: ISO 6944:1986, UL 1978		

Code Compliance

Building Code Compliance	FastWrap+	Duct Wrap+	Duct Wrap	Duct Wrap 2x2+	Duct Wrap 2x2
SBCCI	9424D	9424D	9424D		
BOCA	21.51	21.51	21.51		
ICBO				ER 4975	ER 4975
CA State Fire Marshal	2440:1361:103	2440-1361:100 4485-1361:101	2440-1361:100 4485-1361:101	2440:1361:104	2440:1361:104
NY MEA	422-00-M 421-00-M	417-92-M 417-92-M Vol II	417-92-M 417-92-M Vol II		
NFPA 96 1998 Edition	√	√	√	√	√
IMC 506.3.11	√	√	√	√	√



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Thermal Ceramics

FIREMASTER[®]

**FireMaster[®]
Duct Systems
Data Sheets**

Product Data and Installation Guide



IMC
NFPA 96
MEA



1. Product Description

Thermal Ceramics FireMaster® FastWrap+ is a one-layer foil-encapsulated, non-combustible high temperature, low biopersistence, flexible fireproofing wrap specifically tested to provide a 1 or 2 hour fire rated enclosure for horizontal and vertical commercial kitchen grease and air ventilation ducts. The core blanket chemistry is alkaline-earth silicate wool free of binders and lubricants. Thermal Ceramics FireMaster FastWrap+ is classified by Omega Point Laboratories Listing and Follow-up Service Program to ensure uniform thickness and density specifications, thus providing consistency in end physical properties for required fire ratings. Thermal Ceramics FireMaster FastWrap+ is a proven performance alternative through extensive testing to 1 or 2-hour fire-resistance rated shaft enclosures. With its excellent insulating capability of withstanding fire condition temperatures up to 2000°F (1093°C), it protects combustible constructions at zero clearance at the overlap or collar and a reduced clearance of 2" between overlaps or collars for commercial kitchen grease ducts in tight congested areas. When the duct penetrates fire rated walls and floors, Fire Barrier 2000+, 1000 N/S or 1003 S/L Silicone Sealant used in combination with Thermal Ceramics FireMaster FastWrap+ provides an alternate means of protection to rigid shafts by maintaining the integrity of the 1 or 2 hour fire rated wall and floor assembly.

Product Features

- One-layer system with 3 optional installation techniques
- Low biopersistent insulation blanket
- Shaft alternative
- Zero clearance to combustibles protection at the overlap or collar and reduced clearance of 2" between overlaps or collars
- Lightweight, compact design saves space
- Lightweight Flexible system requires minimum labor and resists cracking
- Problem solver for tight, congested areas
- Passive fire proof material does not lose fire fighting capabilities with age
- Totally foil encapsulated system protects against material degradation, potential fire hazards and allows easy installation.
- Product markings on foil ensure proper material identification for easy inspections
- Wide variety through-penetration systems

2. Applications

- 1 or 2 Hour Commercial Kitchen Grease Duct Enclosure
- 1 or 2 Hour Air Ventilation Duct Enclosure

3. Physical Characteristics

FireMaster Product	Unit	Size	Units	
			Ctn.	Wt./Ctn.
FastWrap+	Roll	2" x 24" x 20' (51mm x 610mm x 6m)	1	53 lbs. (24 kg)
FastWrap+	Roll	2" x 48" x 20' (51mm x 1.2m x 6m)	1	100 lbs. (45 kg)
FastWrap+ Collar	Roll	1 ½" x 6" x 20' (38.1mm x 152mm x 6m)	4	46 lbs. (20.9 kg)
Color		White blanket with silver foil encapsulation		

4. Specifications

This specification guide covers the application of Thermal Ceramics FireMaster FastWrap+ and Fire Barrier 2000+, 1000 N/S or 1003 S/L Silicone Sealant.

Application	Fire Resistive Rating	Fire Specification	Enclosure System	Through-Penetration System
Grease Ducts	1 or 2 hours	1 layer FastWrap+, 3" (75mm) perimeter and longitudinal overlap	GD513F, GD514F	OPL FS548F
Air Ducts	1 or 2 hours	1 layer FastWrap+, 3" (75mm) perimeter and longitudinal overlap	VAD516F	OPL FS549F

5. Performance

A. Thermal Ceramics FireMaster FastWrap+

Flammability (ASTM # 84/UL 723)

Foil: Flame spread	5
Smoke developed	10
Blanket: Flame spread	0
Smoke developed	0
Thermal Resistance	
R value per ASTM C 518	
4.15 per inch at 70°F (21°C)	

B. Fire Stop Sealant

3M™ Fire Barrier Sealant 2000+	1000 N/S	1003 S/L
Color	Light Gray	Light Gray
Working Time (min.)	10 - 20	5 - 10
Cure Time at 77°F (25°C), 50% R.H.	14 - 21 days	14 - 21 days
Flow, Sag, or Slump	Nil	Self
Elongation at Break	600%	600%

C. Listings

Agency	Reference Standard/File Number
Omega Point Laboratories, Inc	Listing # 11660-3 GD513F GD514F VAD516F FS548F FS549F
NFPA	Complies with NFPA 96, 1998 Edition
International Mechanical Code	Section 506 Commercial Kitchen Grease Ducts and Exhaust Equipment, Section 507 Commercial Kitchen Hoods
BOCA	Research Report 21.51
SBCCI	Research Report 9424D
MEA	421-00-M, 422-00-M
California State FireMarshall	2440-1361:103

6. Installation

A qualified contractor in accordance with manufacturer's instructions and referenced standards shall install the FireMaster FastWrap+ system. See figures 1 - 5 for complete drawing details.

Materials and Equipment:

FireMaster FastWrap+ blanket, 2" (51mm) thick, 24" (600mm), or 48" (1.2m) wide, 8-pcf (128-kg/m³) density, 20' (6m) long rolls. Optional 6" wide x 20' long (150mm x 6m) FireMaster FastWrap+ Collars when using the butt joint and collar installation method.

- 20' (6m) standard length, 48" (1220 mm) wide blanket helps to minimize waste
- Aluminum foil tape
- Minimum 3/4" (19.0 mm) wide filament tape
- Carbon steel or stainless steel banding material, minimum 1/2" (12.5mm) wide, minimum 0.015" (0.38mm) thick, with steel banding clips
- Hand banding tensioner and crimping tool
- Minimum 12 gage copper-coated steel insulation pins; galvanized steel speed clips, minimum 1 1/2" (38mm) x 1 1/2" (38mm) square or 1 1/2" dia. (38mm), or equivalent sized cuphead pins; capacitor discharge stud gun
- Access door hardware: four galvanized steel threaded rods, 1/4" diameter (6.35 mm) by 4 1/2" to 5" long (114 to 127mm) with 1/4" (6.35mm) wing nuts and 1/4" (6.35mm) washers; 4" (102mm) long steel tubing to fit threaded rods
- Fire Barrier 2000+, 1000 N/S or 1003 S/L silicone sealant

Storage:

The FireMaster FastWrap+ and Fire Barrier Silicone Sealant must be stored in a dry warehouse environment on pallets. Pallets should not be stacked.

Preparatory Work:

FireMaster FastWrap+ is installed with common tools, such as knives, banders and capacitor discharge guns for applying insulation pins. In order to install the duct fire stop system, the surfaces of all openings and penetrating items need to be clean, dry, frost free, and free of dust.

Installation techniques for Thermal Ceramics FireMaster FastWrap+ (Figure 1):

- **3" (75mm) Overlap Wrap Telescope** - Each blanket overlaps one adjacent blanket, and each blanket has one edge exposed and one edge covered by the next blanket as shown in Figure 1. The visible edges of the longitudinal overlaps all point in the same direction.
- **Overlap Checkerboard Pattern** - Blankets with both edges exposed alternate with blankets with covered edges, as shown in Figure 1. The visible edges of the longitudinal overlaps alternate their directions and appear on every other blanket.
- **Butt Joint & Collar System** - Adjacent blankets are butted tightly together and a 6" (152mm) wide collar of FireMaster FastWrap+ is centered over the joint, overlapping each blanket by 3" (75mm) as shown in Figure 1.
- **2 & 3 Sided Enclosure System** - When space does not allow for full wrap enclosure on all four sides of the duct, the FireMaster FastWrap+ may be installed on 2 or 3 sides of the duct and mechanically attached to a concrete or CMU assembly on the unexposed side of the duct.

General:

To minimize waste, FireMaster material should be rolled out tautly before measuring. Cut edges of the blanket shall be taped with aluminum foil tape to prevent exposed edges of the insulation from wicking moisture from condensation or grease from a compromised leaking duct joint into the material and causing degradation of the fire barrier. The FireMaster FastWrap+ material may be installed with either a mechanical banding system or insulation pins and clips (see Mechanical Attachment Methods below and figures 1 and 2). When using the banding technique, caution shall be taken to ensure that the bands are not fitted too snug as which could result in cutting into the blanket. To prevent blanket sag on ducts with dimensions greater than or equal to 24" (600mm), insulation pins, long enough to extend through the layers of blanket insulation, are welded to the duct in columns spaced 12" (305mm) apart, between 6" and 12" (152 and 305mm) from each edge and 10 1/2" (267mm) on center along the bottom horizontal and outside vertical duct runs as shown in Figure 2. Insulation pins that extend beyond the blanket wrap shall be tuned down to eliminate sharp points. Support hanger systems do not need to be wrapped provided that the steel hanger rods are at least a minimum of 3/8" (9.5 mm) diameter and the steel angle is a minimum of 1 1/2" x 1 1/2" x 1/8" (38mm x 38mm x 3.2mm). Horizontal trapeze support systems may be incorporated into the wrap enclosure.

A. Overlap Wrap Telescope Installation

FireMaster FastWrap+ commercial kitchen grease or air ventilation duct 1 or 2 hour enclosure includes a one-layer wrap construction applied directly to all surfaces of the duct (figure 1). The FireMaster FastWrap+ blanket is wrapped one layer 2" (50mm) thick around the perimeter of the duct with a length cut to provide enough excess to overlap itself not less than 3" (75mm). Adjacent blankets are placed to overlap the previous blanket not less than 3" (75mm). The overlap made by adjacent blankets forms the "longitudinal" overlap. The overlap a blanket makes with itself is called the "perimeter" overlap. The wrap layer is held temporarily in place with filament tape 1½" (38mm) from each blanket edge and in the center of the blanket until the mechanical banding or pinning and clip attachment method is secured.

B. Checkerboard Wrap Installation

FireMaster FastWrap+ is cut to completely wrap around the perimeter of the duct with enough excess to provide an overlap of not less than 3" (75 mm) (figure 1). The blankets with both edges exposed alternate with blankets with covered edges as shown in figure 1. The visible edges of the longitudinal overlaps alternate their directions and appear on every other blanket. A 3" (75mm) longitudinal overlap is installed onto the previous adjacent wrap forming a "checkerboard" construction. The wrap layer is held temporarily in place with filament tape 1½" (38mm) from each blanket edge and in the center of the blanket until the mechanical banding or pinning and clip attachment method is secured.

C. Butt Joint / Collar Installation

FireMaster FastWrap+ is installed in a single layer directly to the duct with a tight butt joint construction (figure 1). The FireMaster FastWrap+ material is held in place with filament glass tape 1½" (38 mm) from each blanket edge and in the center of the blanket temporarily until the mechanical banding or pinning and clip attachment method is secured. A 6" (152mm) wide FireMaster FastWrap+ Collar is centered over the joints overlapping on each side of the blanket joint 3" (75mm).

D. 2 & 3 Sided Wrap System

When space does not allow for a complete wrap applied to the duct on all four sides, the FireMaster FastWrap+ can be installed in a single layer on the 2 or 3 sides of the unexposed duct and mechanically attached to a concrete or CMU assembly. The FireMaster FastWrap+ is installed on the duct as described in one of the three installation methods described above with the starting edge of the blanket attached to the concrete or CMU assembly and then wrapped around the duct until the other end can be affixed to the other concrete or CMU assembly, thus encapsulating the duct with insulation around all accessible sides. The blanket is to flange out onto the concrete or CMU assembly. It should be secured to the adjoining assembly with min ¾" (4.7mm) diameter, 4" (100mm) long concrete anchors, footed to a minimum 1½" (38mm) wide x ¾" (4.7mm) thick steel strip/strap with pre-drilled holes spaced a maximum 10" (254mm) on center. The FireMaster FastWrap+ insulation wrap is secured to the duct with banding (see Mechanical Attachment Methods for Insulation Wrap section below or figure 1). The ends of the banding are to loop into the steel strips/straps that foot the blanket to the concrete floor or wall, and are tightened down. The trapeze support system may be incorporated within the wrap system.

Mechanical Attachment Methods for Insulation Wrap

1. Banding - ½" (12.7mm) wide carbon steel or stainless steel banding, 0.015" (0.376mm) thick, is placed around the entire perimeter of the insulated duct with maximum 10½" (267mm) spacing centers and 1½" (38 mm) from each blanket edge or 1" (25mm) from each collar edge when using the butt joint and collar method. When banding, filament tape can be used to temporarily hold the blanket in place until the banding is applied. The banding is placed around the material

and tightened so as to firmly hold the FireMaster FastWrap+ in place against the duct, but not cause any cutting or damage to the blanket.

2. Pinning - Min. 12 gage, 5" long (125mm) copper coated steel insulation pins are welded to the duct at all blanket overlap locations (see fig 1) spaced in rows max. 10½" (267mm) on center and maximum 8" (200mm) apart. An insulation pin is located in the middle of the perimeter overlap and center spaced between the pins. Pins are locked into place with 1½" (38mm) diameter square or round, galvanized steel, speed clips or cup head pins. Pins that extend beyond outer blanket wrap layer shall be turned down to eliminate sharp edges or the excess length cut off.

NOTE: Support hanger systems do not need to be wrapped and can be incorporated into the wrap enclosure provided that the hanger rods are at least a minimum of ¾" (9.53mm) diameter and spaced a maximum of 48" (120cm) on center along the length of the duct. Minimum 2" (50mm) x 2" (50mm) x ¼" (6.35mm) steel angle or unistrut equivalent or SMACNA equivalent support system.

Through-Penetration Firestop System

When the duct penetrates a concrete or drywall fire rated wall, ceiling, or floor, an approved fire stop system must be employed. (Figure 4 and 5). FireMaster FastWrap+ approved through penetration fire stop systems are listed in Section 4, Specifications.

To fire stop the through penetration void area, cut strips of FireMaster FastWrap+ 4½" (106mm) wide and as long as the opening and install at a minimum 50% compression. Install the strips so that they are recessed ¼" (6.35mm) from the top surface of the wall or floor. Install a minimum ¼" (6.35mm) depth of Fire Barrier 2000+, 1000 N/S or 1003 S/L Silicone Sealant into the opening to the recess around the top surface of the floor or wall through-penetration opening.

Grease Duct Access Door Installation (See Figure 3)

Four galvanized steel threaded rods, ¼" diameter (6.35mm) by 4½" to 5" long (114 to 125mm) are welded to the duct at the corners of the door opening. Four 5" (125mm) long 12 gage insulation pins are welded to the door panel for installation of the blanket. Two layers of FireMaster FastWrap+ are installed on the door. The first layer is cut and placed on the pins and over the access opening with a ½" (13mm) overlap. When the door is installed, this first layer is compressed and fitted against the wrap surrounding the door opening to form a tight butt joint. The second layer is centered over the first piece so that a minimum 1" (25mm) overlap exists around the perimeter. It is essential that this layer fit tightly against the wrap surrounding the access door opening with no through openings. The second layer is impaled over the pins and both layers are locked in place with speed clips. Pins that extend beyond the outer layer of FireMaster FastWrap+ shall be turned down to avoid sharp points on the door.

The insulated door panel and the steel tubes are placed over the threaded rods and held in place with washers and wing nuts. The details are shown in Figure 3.

7. Maintenance

No maintenance is required when installed in accordance with Thermal Ceramics installation instructions. Once installed, if any section of the FireMaster FastWrap+ is damaged, the following procedures will apply:

- The damaged section should be removed by cutting the steel banding or removing the clips holding it in place
- A new section of the same dimension should be cut from a roll of FireMaster FastWrap+, either 24" (610mm) or 48" (1220mm) wide. Cut edges of the blanket shall be taped to prevent exposed edges of the insulation from wicking moisture or grease into the material and degradation of the fire barrier.
- The new section should be placed per Thermal Ceramics manufacturer's Installation Instructions ensuring the same overlap that existed previously
- The steel banding should be placed around the material and tensioned so as to sufficiently hold the FireMaster FastWrap+ in place without cutting the blanket
- If the blanket has not been damaged but the foil has ripped, seal the opening with aluminum foil tape

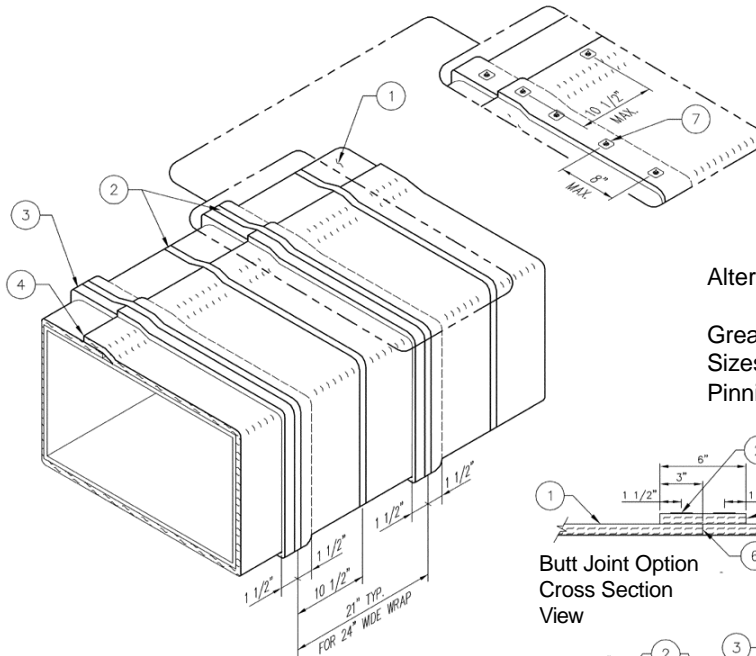
8. Limitations

- FireMaster FastWrap+ shall be installed in accordance with Thermal Ceramics -Installation Instructions
- Multiple steel ducts in a single FireMaster FastWrap+ enclosure system are not permitted for commercial kitchen grease ducts. Multiple steel ducts in a single enclosure are permitted for air ventilation ducts
- Grease Duct Sizes > 24"x48" (600mm x 1200mm) insulation is attached using steel pins
- Air Ducts: when maximum duct size dimensions are greater than 84"x21" (2100mm x 525mm) in cross section, reinforce the duct with steel angles sufficient to support the total weight of the duct assembly and the FireMaster FastWrap+ enclosure.
- Minimum 3/8" (9mm) diameter all thread steel rods do not have to be insulated
- Horizontal support members may be incorporated into the enclosure wrap
- The integrity of FireMaster FastWrap+ system is limited to the quality of the installation

*For personal protective equipment recommendations see the MSDS.

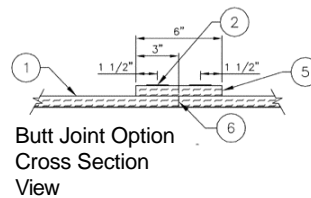
FireMaster is manufactured by and is a registered trademark of Thermal Ceramics.

Thermal Ceramics FireMaster FastWrap+ Commercial Kitchen Grease Duct or Air Ventilation Duct System 1 or 2 Hour Shaft Alternative Zero Clearance to Combustibles (Overlap Wrap Technique)

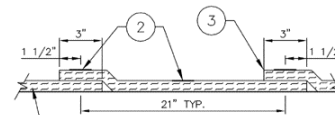


Alternate Pinning Technique

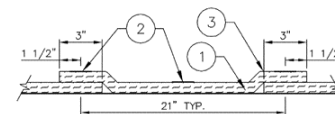
Grease Ducts Only:
Sizes > 24" x 48" in Cross Section
Pinning Technique Required.



Butt Joint Option
Cross Section
View



Overlap Wrap Option
Cross Section View

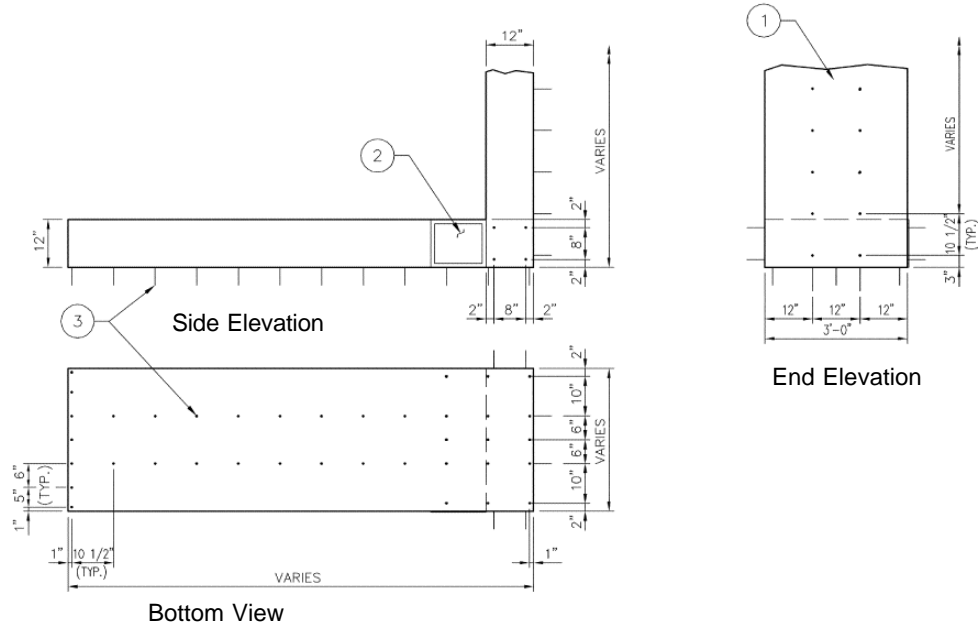


Checkerboard Wrap Option
Cross Section View

FireMaster FastWrap+	Figure 1	Drawing# RB0100507
1	One layer FireMaster FastWrap+	
2	Steel banding 1/2" wide minimum	
3	3" minimum longitudinal overlap	
4	3" minimum perimeter overlap	
5	6" wide FastWrap+ collar (for Butt Joint option)	
6	Firmly butted joint (for Butt Joint option)	
7	10 or 12 gauge copper coated steel insulation pin with 1 1/2" x 1 1/2" or 1 1/2" diameter galvanized speed clips (for alternate pinning)	

Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

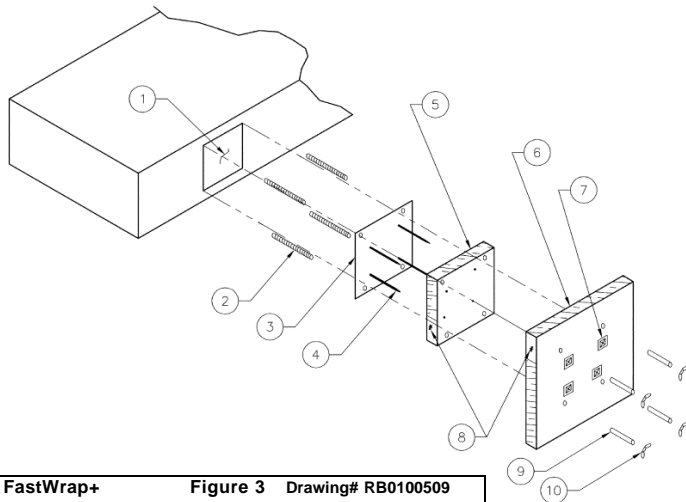
**Thermal Ceramics
FireMaster Duct System
Typical Insulation Pin Layout
For Duct Spans $\geq 24"$ Wide To Prevent Blanket Sag**



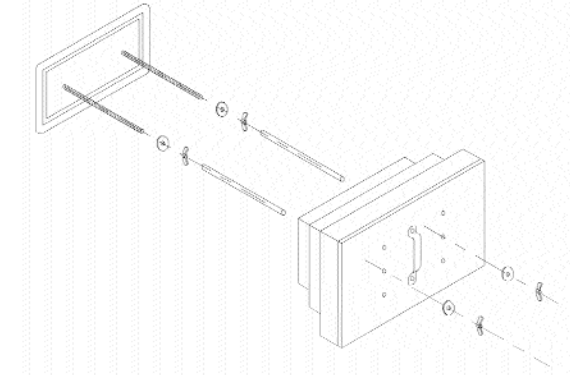
FireMaster FastWrap+		Figure 2	Drawing# RB0109301
1	Vertical section		
2	Access door		
3	10 or 12 gauge copper coated steel insulation pins		

Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

**Thermal Ceramics
FireMaster FastWrap+
Commercial Kitchen Grease Duct
Access Door System**



Prefabricated Access Door System available from Thermal Ceramics FireMaster distributors



FireMaster FastWrap+		Figure 3	Drawing# RB0100509
1	Door hole		
2	1/4" diameter all thread rods		
3	Access cover - 16 gauge		
4	Insulation pins - welded		
5	1 layer FireMaster FastWrap+		
6	1 layer FireMaster FastWrap+ 1" overlap		
7	Speed Clips		
8	Aluminum tape at edges		
9	Spool pieces for threaded rods		
10	1/4" diameter wing nuts		

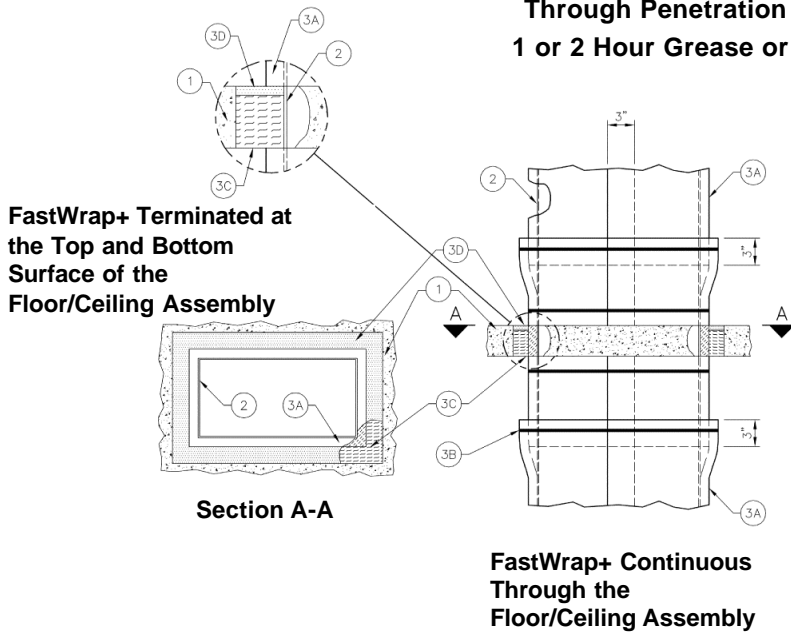
Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

Thermal Ceramics

FireMaster FastWrap+

Through Penetration System

1 or 2 Hour Grease or Air Duct



FireMaster FastWrap+	Figure 4	Drawing# RB0100508
1	Floor/ceiling	
2	Duct	
3	One layer FireMaster FastWrap+	
3B	Banding or pinning	
3C	FireMaster FastWrap+ (packing material)	
3D	Fire Barrier 2000+, 1000 N/S or 1003 S/L silicone sealants	

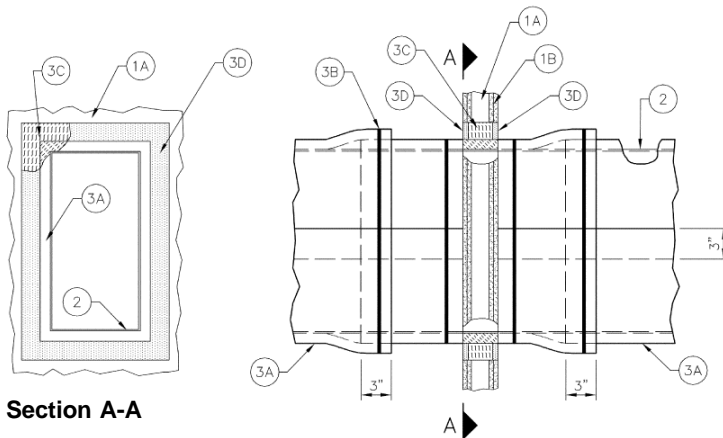
Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

Thermal Ceramics

FireMaster FastWrap+

Through Penetration System

Gypsum Wall 1 or 2 Hour Air Ventilation Duct



FireMaster FastWrap+	Figure 5	Drawing# RB0100516
1A	Wall	
1B	Gypsum wallboard	
2	Duct	
3A	One layer FireMaster FastWrap+	
3B	Banding or pinning	
3C	FireMaster FastWrap+ (packing material)	
3D	Fire Barrier 2000+ or 1000 N/S silicone sealant	

Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

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Product Data & Installation Guide



NFPA 96
MEA
IMC

1. Product Description

Thermal Ceramics FireMaster® Duct Wrap and FireMaster Duct Wrap+ products are foil-encapsulated, non-combustible, high temperature, inorganic flexible fireproofing wrap materials specifically tested to provide a 1 or 2 hour fire rated enclosure for commercial kitchen grease and air ventilation ducts. The difference between the two wrap systems is the core material basic chemistries. FireMaster Duct Wrap is a high temperature ceramic fiber insulating blanket composed primarily of alumina and silica. FireMaster Duct Wrap+ is a body soluble, low biopersistence, alkaline-earth silicate wool. Both chemistries are free of binders and lubricants. FireMaster Duct Wrap and Duct Wrap+ products are classified by Underwriters Laboratories Listing and Follow-up Service Program to ensure uniform thickness and density specifications, thus providing consistency in end physical properties for required fire ratings based on the number of wraps applied. FireMaster Duct Wrap and Duct Wrap+ systems are proven performance alternatives through extensive testing to 1 or 2-hour fire-resistance rated shaft enclosures for commercial kitchen grease and air ventilation duct systems. With its excellent insulating capability of withstanding fire temperatures from 2000°F to 2300°F (1093°C to 1260°C), it protects combustible constructions at zero clearance throughout the entire cocoon wrap enclosure for commercial kitchen grease ducts in tight congested areas. When the commercial kitchen grease or air ventilation duct penetrates fire rated walls and floors, Fire Barrier 2000+, 1000 N/S or 1003 S/L Silicone Sealant used in combination with FireMaster Duct Wrap and Duct Wrap+ provides an alternate means of protection to rigid shafts by maintaining the integrity of the 1 or 2 hour floor or wall assembly.

Product Features

- Completely inorganic
- Low biopersistence with FireMaster Duct Wrap+
- Alternate to rigid shaft enclosures
- Zero clearance to combustibles protection
- Wide range of proven performance testing for complex duct jobs
- Wide variety of through-penetration systems
- Compact wrap design saves space
- Lightweight flexible system requires minimum labor and resists cracking
- Problem solver for tight, congested areas
- Totally foil encapsulated system protects against material degradation and potential fire hazards
- Passive fire proof material does not lose fire fighting capabilities with age
- Product markings on foil ensure proper material identification for easy inspections



2. Applications

- 1 or 2 Hour Commercial Kitchen Grease Ducts
- 1 or 2 Hour Air Ventilation Ducts

3. Physical Characteristics

FireMaster Product	Unit	Size	Units Ctn.	Wt./Ctn.
Duct Wrap or Duct Wrap+	Roll	1 1/2" x 24" x 25' (37.5mm x 60cm x 7.5m)	1	43 lbs. (19.5kg)
Duct Wrap or Duct Wrap+	Roll	1 1/2" x 48" x 25' (37.5mm x 120cm x 7.5m)	1	86 lbs. (39kg)
Color		White filler blanket with silver foil encapsulation		

4. Specifications

This specification guide covers the application of FireMaster Duct Wrap, FireMaster Duct Wrap+ and Fire Barrier 2000+, 1000 N/S, or 1003 S/L Silicone Sealants.

Application	Fire Resistive Rating	Enclosure System	Through-Penetration System
Grease Ducts	1 or 2 hours	2 layers FireMaster Duct Wrap or FireMaster Duct Wrap+ UL YYET 3" (75mm) perimeter and longitudinal overlap	UL C-AJ 7014 UL C-AJ 7021 ULC-FRD-4
Air Ventilation Duct Systems	1 hour	1 layer FireMaster Duct Wrap or FireMaster Duct Wrap+, V-1, V-3, 3" (75mm) perimeter and longitudinal overlap or optional butt joint plus collar wrap method	UL C-AJ 7012 UL C-AJ 7019 UL W-L-7041 ULC-FRD-3
Air Ventilation Duct Systems	2 hours	2 layers FireMaster Duct Wrap or FireMaster Duct Wrap+ UL V-2, V-4, 3" (75mm) perimeter and longitudinal overlap or optional butt joint plus collar wrap method	UL C-AJ 7014 UL C-AJ 7021 UL W-L-7041 ULC-FRD-3

5. Performance

A. FireMaster Duct Wrap & FireMaster Duct Wrap+

Flammability (ASTM # 84/UL 723)

Foil:	Flame spread	5
	Smoke developed	5
Blanket:	Flame spread	0
	Smoke developed	0

Thermal Resistance

R value per ASTM C 518
4.15 per inch at 70°F (21°C)

B. Fire Stop Sealant

3M™ Fire Barrier Sealant2000+	1000 N/S	1003 S/L
Color	Light Gray	Light Gray
Working Time (min.)	10 - 20	5 - 10
Cure Time at 77°F (25°C), 50% R.H.	14 - 21 days	14 - 21 days
Flow, Sag, or Slump	Nil	Self Leveling
Elongation at Break	600%	600%

6. Listings

Agency	Reference Standard/ File Number
Underwriters Laboratories Inc.	Grease Duct Enclosures (YYET): R14229; Fire Resistance Ventilation Duct Assemblies (HNLJ): V-1, V-2, V-3, V-4 Batts and Blankets (BKNV): R8418; Through-Penetration Firestop Systems (XHEZ): C-AJ-7012, C-AJ-7019, C-AJ-7014, C-AJ 7021, W-L-7041
SBCCI	Research Report 9424D
BOCA	Research Report 21.51
NFPA	Complies with NFPA 96, 1998 Edition
California State Fire Marshall	Listing Nos. 2440-1361:100 4485-1361:101
New York City	MEA # 417-92-M (grease ducts) 417-92-M Vol II (air ventilation ducts)
North Carolina Mechanical Code	Sections 308.4.7, 308.4.10 Volume III
International Mechanical Code	Section 506 Commercial Kitchen Grease Ducts and Exhaust Equipment, Section 507 Commercial Kitchen Hoods

7. Installation

The FireMaster Duct Wrap and Duct Wrap+ systems shall be installed by a qualified contractor in accordance with the manufacturer's instructions and the referenced standards.

Materials and Equipment

- FireMaster Duct Wrap and Duct Wrap+ blanket, 1½" (38mm) thick, 24" (610mm) or 48" (120cm) wide, 6 pcf density, 25' (7.5m) long rolls, 48" (120cm) wide blanket helps to minimize waste
- Aluminum foil tape
- Minimum ¾" (19mm) wide filament tape
- Carbon steel or stainless steel banding material, minimum ½" (12.5mm) wide, minimum 0.015" (0.38mm) thick, with steel banding clips
- Hand banding tensioner and crimping tool
- Minimum 12 gage copper-coated steel insulation pins, 4" to 5" long (102 - 127mm); galvanized steel speed clips, minimum 1 ½" (38mm) x 1 ½" (38mm) square or 1 ½" dia. (38mm), or equivalent sized cup-head pins; capacitor discharge stud gun

- Access door hardware: four galvanized steel threaded rods, ¼" diameter (6.35mm) by 4 ½" to 5" long (114 to 127mm) with ¼" (6.35 mm) wing nuts and ¼" (6.35mm) washers; 4" (102mm) long steel tubing to fit threaded rods
- Fire Barrier 2000+, 1000 N/S or 1003 S/L silicone sealant

Storage:

The FireMaster Duct Wrap, Duct Wrap+, and Fire Barrier Silicone Sealant must be stored in a dry warehouse environment on pallets. Pallets should not be stacked.

Preparatory Work:

FireMaster Duct Wrap and Duct Wrap+ are installed with common tools, such as knives, banders and capacitor discharge guns for applying insulation pins. In order to install the duct fire stop system, the surfaces of all openings and penetrating items need to be clean, dry, frost free, and free of dust.

Installation techniques for Thermal Ceramics FireMaster Duct Wrap and Duct Wrap+ (Figure 1):

- 3" (75mm) Overlap Wrap Telescope - Each blanket overlaps one adjacent blanket a minimum of 3" (75mm), and each blanket has one edge exposed and one edge covered by the next blanket as shown in Figure 1. The visible edges of the longitudinal overlaps all point in the same direction.
- Butt Joint & Collar System - The adjacent blankets of both interior and exterior layers are firmly butted together with the exterior joints located 12" (30cm) away from the interior joints. An 8" (20cm) wide collar made from FireMaster Duct Wrap or Duct Wrap+ is centered over each exterior joint, overlapping each blanket by 4" (101mm) as shown in Figure 1. The collar overlaps itself with a 3" (75mm) perimeter overlap.
- 2 & 3 Sided Wrap System - When space does not allow for a full wrap enclosure on all four sides of the duct, the FireMaster Duct Wrap or Duct Wrap+ may be installed on 2 or 3 sides of the duct and mechanically attached to a concrete or CMU assembly on the unexposed side of the duct.

General:

Applies to all FireMaster Duct Wrap & FireMaster Duct Wrap+ Installation Methods

To minimize waste, FireMaster material should be rolled out tautly before measuring. Cut edges of the blanket shall be taped with aluminum foil tape to prevent exposed edges of the insulation from wicking moisture from condensation or grease from a compromised leaking duct joint into the material and causing degradation of the fire barrier. The FireMaster material may be installed with either a mechanical banding system or insulation pins and clips (see Mechanical Attachment Methods below and figures 1 and 2). When using the banding technique, caution shall be taken to ensure that the bands are not fitted too snug as which could result in cutting into the blanket. To prevent blanket sag on ducts with dimensions greater than or equal to 24" (600mm), insulation pins, long enough to extend through the layers of blanket insulation, are welded to the duct in columns spaced 12" (305mm) apart, between 6" and 12" (152 and 305mm) from each edge and 10½" (267mm) on center along the bottom horizontal and outside vertical duct runs as shown in Figure 3. Insulation pins that extend beyond the blanket wrap shall be tuned down to eliminate sharp points.

Support hanger systems do not need to be wrapped provided that the steel hanger rods are at least a minimum of ⅜" (9.5 mm) diameter and the steel angle is a minimum of 1½" x 1½" x ⅛" (38mm x 38mm x 3.2mm). Horizontal trapeze support system may be incorporated into the wrap enclosure.

A. Overlap Wrap Telescope Installation

FireMaster Duct Wrap and Duct Wrap+ commercial kitchen grease duct and air ventilation duct 2 hour enclosure includes a two-layer wrap construction for 1 or 2 hour grease ducts and 2 hour air ventilation ducts, or a one-layer wrap for 1 hour air ventilation ducts applied directly to all surfaces of the duct (see figure 1 and 2). The first or interior layer of FireMaster Duct Wrap or Duct Wrap+ blanket is wrapped around the perimeter of the duct and is cut to a length with enough excess to overlap itself not less than 3" (75mm). Adjacent blankets are placed to overlap the previous blanket not less than 3" (75mm). The overlap made by adjacent blankets forms the "longitudinal" overlap. The overlap a blanket makes with itself is called the "perimeter" overlap. The first layer is held in place with filament tape 1 1/2" (38mm) from each blanket edge and in the center of the blanket. The second layer is wrapped around the perimeter of the first layer with the longitudinal overlaps of the exterior layer spaced 10 1/2" (26cm) away from those of the interior layer and held in place with filament tape 1 1/2" (38mm) from each blanket edge and in the center of the blanket until banding is in place or the pinning attachment is fully secured.

B. Butt Joint / Collar Installation

FireMaster Duct Wrap or Duct Wrap+ is installed in two layers with a tight butt joint construction. The first layer of FireMaster Duct Wrap or Duct Wrap+ is applied directly to the duct with each adjacent blanket tightly butted to the next. The blankets of the first layer are held in place with filament glass tape 1 1/2" (38 mm) from each blanket edge and in the center of the blanket. The second layer of FireMaster Duct Wrap or Duct Wrap+ is wrapped around the perimeter of the first layer with a tight butt joint construction with the joints of the exterior wrap located 12" (305mm) away from the butted joints of the interior layer blankets. The second layer of FireMaster Duct Wrap or Duct Wrap+ is held in place with filament tape as a temporary hold until the mechanical attachment system is installed. An 8" (203mm) wide FireMaster Duct Wrap or Duct Wrap+ Collar is centered over the joints of the exterior layer and wrapped around the perimeter of the duct and cut to a length so that it overlaps itself not less than 3" (75mm). The collar is held in place with filament tape placed 1 1/2" (38mm) from each edge of the collar until the mechanical banding or pinning and clip attachment method is fully secured.

C. 2 & 3 Sided Wrap System

When space does not allow for a complete wrap applied to the duct on all four sides, the FireMaster Duct Wrap or Duct Wrap+ can be installed on 2 or 3 sides of the exposed duct in one of the installation methods described above and mechanically attached to a concrete or CMU assembly, thus enclosing the duct on all accessible sides. The FireMaster Duct Wrap or Duct Wrap+ is installed on the duct as described in the two installation methods above with the starting edge of the blanket attached to the concrete or CMU assembly and then wrapped around the duct until the other end can be affixed to the other concrete or CMU assembly, thus encapsulating the duct with insulation around all accessible sides. The blanket is to flange out onto the concrete or CMU assembly. It shall be secured to the adjoining assembly with min 3/16" (5mm) diameter, 4" (100mm) long concrete anchors, footed to a minimum 1 1/2" (38mm) wide x 3/16" (5mm) thick steel strip/strap with pre-drilled holes spaced a maximum 10" (25cm) on center. The FireMaster Duct Wrap or Duct Wrap+ insulation wrap is secured to the duct with banding. The ends of the banding are to loop into the steel strips/straps that foot the blanket to the concrete floor or wall, and tightened down.

Mechanical Attachment Methods for Insulation Wrap:

1. Banding - 1/2" (12.7mm) wide carbon steel or stainless steel banding, 0.015" (0.38mm) thick, is placed around the entire perimeter of the insulated duct with maximum 10 1/2" (267mm) spacing centers and 1 1/2" (38mm) from each blanket edge or 1 1/2" (38mm) from each collar edge when using the butt joint and collar method. When banding, filament tape can be used to temporarily hold the blanket in

place until the banding is applied. The banding is placed around the material and tightened so as to firmly hold the FireMaster Duct Wrap or Duct Wrap+ in place against the duct, but not cause any cutting or damage to the blanket.

2. Pinning - To prevent blanket sag on duct spans 24" (610mm) or larger, min. 12 gage, 5" long (127mm) copper coated steel insulation pins are welded to the duct in columns spaced 12" (305mm) apart, 6" - 12" (152 -305mm) from each edge and on 10 1/2" (267mm) centers along bottom horizontal and outside vertical runs (see fig 3). Pins are also required 1" (25mm) from the end of a duct and 1" (25mm) from any edge near a 90° bend, spaced on 6" (152mm) centers. Pins are locked into place with 1 1/2" (38mm) diameter round or square, galvanized steel, speed clips or cup head pins. Pins that extend beyond outer blanket wrap layer shall be turned down to eliminate sharp edges or the excess length cut off.

Grease Duct Access Door Installation (See Figure #4)

Four galvanized steel threaded rods, 1/4" diameter (6.35mm) by 4 1/2" to 5" long (114 to 127mm) are welded to the duct at the corners of the door opening. 4" (100mm) long steel tubes fit over the threaded rods and protect the blanket material when the door is fastened. Four 5" (125mm) long 12 gage insulation pins are welded to the door panel for installation of the blanket. Three layers of FireMaster Duct Wrap or Duct Wrap+ are impaled over the 12 gage insulation pins on the door panel. The first layer is cut and impaled on the door panel insulation pins with no less than 1" (25mm) overlap. When the door is installed, this first layer is compressed and fitted against the wrap surrounding the door opening to form a tight butt joint. The second layer is cut to overlap the first layer by no less than 1" (25mm), and the third layer is cut to overlap the second by no less than 1" (25mm). It is essential that these layers fit tightly against the wrap surrounding the access door opening with no through openings. The three layers are impaled over the pins and are locked in place with speed clips. Pins that extend beyond the outer layer of FireMaster wrap shall be turned down to avoid sharp points on the door.

The insulated door panel and steel tubes are placed over the threaded rods and held in place with washers and wing nuts. The details are shown in Figure 4.

Through-Penetration Firestop System

When the duct penetrates a concrete or dry-wall fire rated wall, ceiling, or floor, an approved fire stop system must be employed. The through penetration systems listed under Specifications in Paragraph 4 above, and shown in Figures 5 through 8, are approved for FireMaster Duct Wrap and Duct Wrap+.

To fire stop the through penetration void area of the wrapped duct, fill the annular space between the wrapped duct and periphery of the opening with 4 1/4" (107mm) thickness of scrap FireMaster Duct Wrap or Duct Wrap+, firmly packed into the opening and recessed 1/4" (6.25mm) below the top of the opening. Apply 1/4" (6.25mm) minimum Fire Barrier 2000+, 1000 N/S or 1003 S/L Silicone Sealant over the packing material within the annulus, flush with top surface of floor or both surfaces of wall.

Alternatively, when there is no room in the remaining annular space to wrap the duct with 1 or 2 layers of the FireMaster Duct Wrap or FireMaster Duct Wrap+ material, the FireMaster enclosure may terminate above and below the floor/ceiling or wall assembly as shown in figure 5 - 7 by mechanically attaching the FireMaster to the termination point above and below the termination area with bands or pins.

8. Maintenance

No maintenance is required when installed in accordance with the manufacturer's installation instructions. Once installed, if any section of the FireMaster Duct Wrap or FireMaster Duct Wrap+ is damaged, the following procedures will apply:

- The damaged section should be removed by cutting the steel bands and removing the anchor clips holding it in place
- A new section of the same dimension should be cut from a roll of Duct Wrap or FireMaster Duct Wrap+, either 24" (610mm) or 48" (120cm) wide. Cut edges of the blanket shall be taped to prevent exposed edges of the insulation from wicking moisture or grease into the material and degradation of the fire barrier
- The new section should be placed per manufacturer's installation instructions ensuring the same overlap and installation method that existed previously
- The steel banding should be placed around the material and tensioned so as to firmly hold the FireMaster Duct Wrap or Duct Wrap+ in place without cutting into the blanket causing violation of the fire barrier

9. Limitations

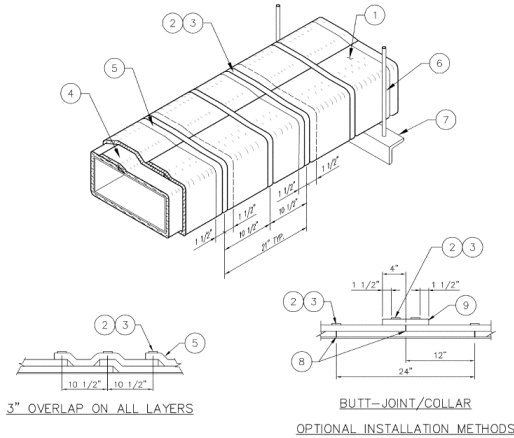
- FireMaster Duct Wrap and FireMaster Duct Wrap+ shall be installed in accordance with Thermal Ceramics manufacturer's installation instructions
- Multiple steel ducts in a single Duct Wrap or Duct Wrap+ enclosure are not permitted
- Minimum $\frac{3}{8}$ " (10mm) diameter all thread steel rods and minimum $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{1}{8}$ " (38 x 38 x 3.2mm) steel support angle do not have to be wrapped
- The size of the steel duct shall not be limited
- The use of transitional duct sizes shall not be limited
- The use of transition to gypsum wallboard shaft shall not be limited
- The integrity of FireMaster Duct Wrap and Duct Wrap+ systems is limited to the quality of the installation

*For personal protective equipment recommendations see the MSDS.

FireMaster is manufactured by and is a registered trademark of Thermal Ceramics.

Thermal Ceramics FireMaster Duct Wrap or Duct Wrap+ Commercial Kitchen Grease Duct System

1 or 2 Hour Shaft Alternative Zero Clearance to Combustibles (Overlap Wrap Technique)



FireMaster Duct Wrap or Duct Wrap+ Figure 1 Drawing# RB0100501	
1	Two layers FireMaster Duct Wrap or Duct Wrap+
2	Filament tape
3	Banding
4	3" minimum perimeter overlap
5	3" minimum longitudinal overlap
6	$\frac{3}{8}$ " minimum diameter hanger rod
7	$1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{1}{8}$ " angle
8	Firmly butted joint
9	8" wide Duct Wrap or Duct Wrap+ collar

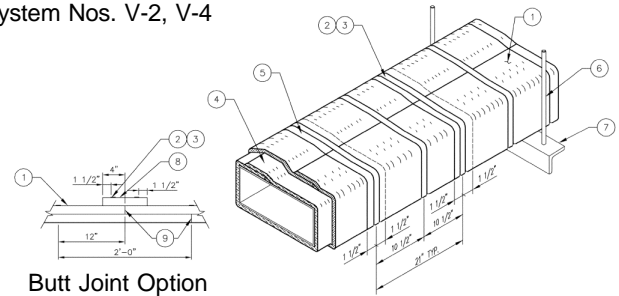
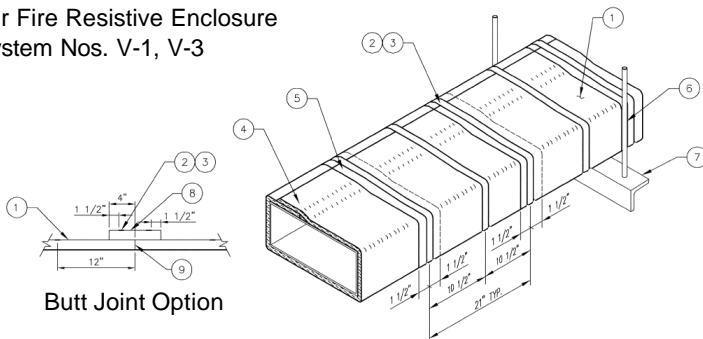
Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

Thermal Ceramics

FireMaster Duct Wrap or Duct Wrap+ Air Ventilation Duct System (Overlap Wrap Technique)

1 Hour Fire Resistive Enclosure
UL System Nos. V-1, V-3

2 Hour Fire Resistive Enclosure
UL System Nos. V-2, V-4

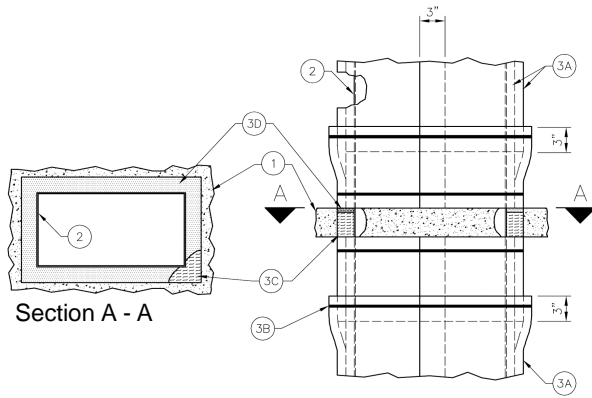


FireMaster Duct Wrap or Duct Wrap+ Figure 2 Drawing# RB0100503	
1	One layer FireMaster Duct Wrap or Duct Wrap+
2	Filament tape
3	Banding
4	3" minimum perimeter overlap
5	3" minimum longitudinal overlap
6	$\frac{3}{8}$ " minimum diameter hanger rod
7	$1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{1}{8}$ " angle
8	8" wide FireMaster Duct Wrap or Duct Wrap+ collar (for Butt Joint option)
9	Firmly butted joint (for Butt Joint option)

FireMaster Duct Wrap or Duct Wrap+ Figure 2A Drawing# RB0100503	
1	Two layers FireMaster Duct Wrap or Duct Wrap+
2	Filament tape
3	Banding
4	3" minimum perimeter overlap
5	3" minimum longitudinal overlap
6	$\frac{3}{8}$ " minimum diameter hanger rod
7	$1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $\frac{1}{8}$ " angle
8	8" wide FireMaster Duct Wrap or Duct Wrap+ collar (for Butt Joint option)
9	Firmly butted joint (for Butt Joint option)

Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

Thermal Ceramics
FireMaster Duct Wrap or Duct Wrap+
Through Penetration System 2 Hour Air Duct
UL System No. C-AJ-7021

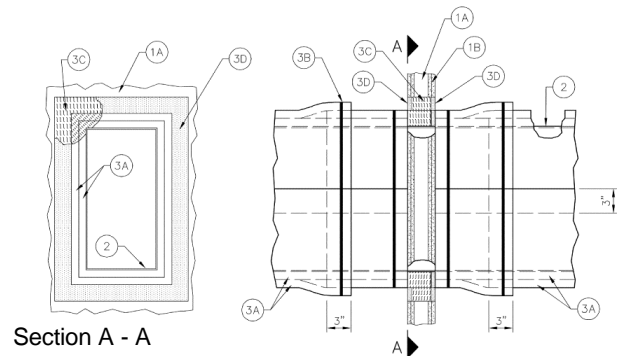


FireMaster Duct Wrap or Duct Wrap+ Figure 7 Drawing# RB0100506

1	Floor or wall
2	Duct
3A	Two layers FireMaster Duct Wrap or Duct Wrap+
3B	Banding
3C	FireMaster Duct Wrap or Duct Wrap+ (packing material)
3D	Fire Barrier 2000+, 1000 N/S or 1003 S/L silicone sealants

Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

Thermal Ceramics
FireMaster Duct Wrap or Duct Wrap+
Through Penetration System
Gypsum Wall 1 or 2 Hour
Grease or Air Ventilation Duct
UL System No. W-L-7041



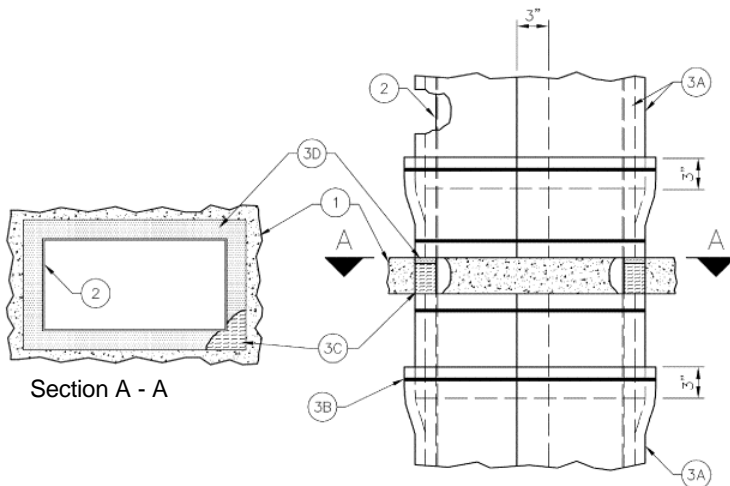
Section A - A

FireMaster Duct WRap or Duct Wrap+ Figure 8 Drawing# RB0100517

1A	Wall
1B	Gypsum wallboard
2	Duct
3A	Two layers FireMaster Duct Wrap or Duct Wrap+
3B	Banding or pinning
3C	FireMaster Duct Wrap or Duct Wrap+ (packing material)
3D	FB 2000+ caulk

Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

Thermal Ceramics
FireMaster Duct Wrap or Duct Wrap+
Through Penetration System
1 or 2 Hour Grease Duct UL System No. C-AJ-7014



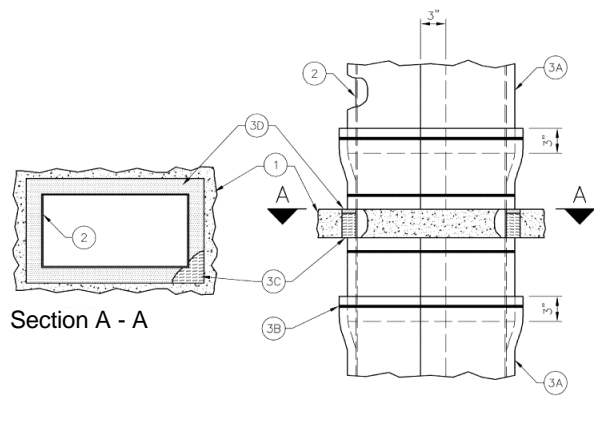
Section A - A

FireMaster Duct Wrap or Duct Wrap+ Figure 5 Drawing# RB0100504

1	Floor or wall
2	Duct
3A	Two layers FireMaster Duct Wrap or Duct Wrap+
3B	Banding
3C	FireMaster Duct Wrap or Duct Wrap+ (packing material)
3D	Fire Barrier 2000+, 1000 N/S or 1003 S/L silicone sealants

Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

Thermal Ceramics
FireMaster Duct Wrap or Duct Wrap+
Through Penetration System
1 Hour Air Duct UL System No. C-AJ-7019



Section A - A

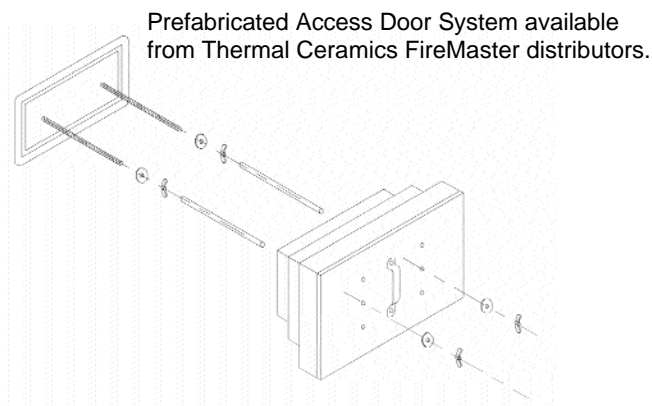
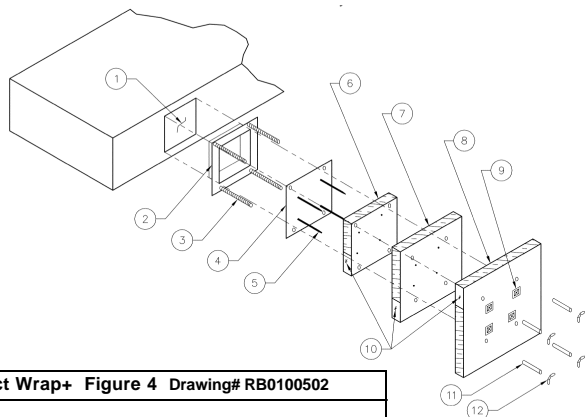
FireMaster Duct Wrap or Duct Wrap+ Figure 6 Drawing# RB0100505

1	Floor or wall
2	Duct
3A	One layer FireMaster Duct Wrap or Duct Wrap+
3B	Banding
3C	FireMaster Duct Wrap or Duct Wrap+ (packing material)
3D	Fire Barrier 2000+, 1000 N/S or 1003 S/L silicone sealants

Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

Thermal Ceramics

FireMaster Duct Wrap or Duct Wrap+ Commercial Kitchen Grease Duct Access Door System



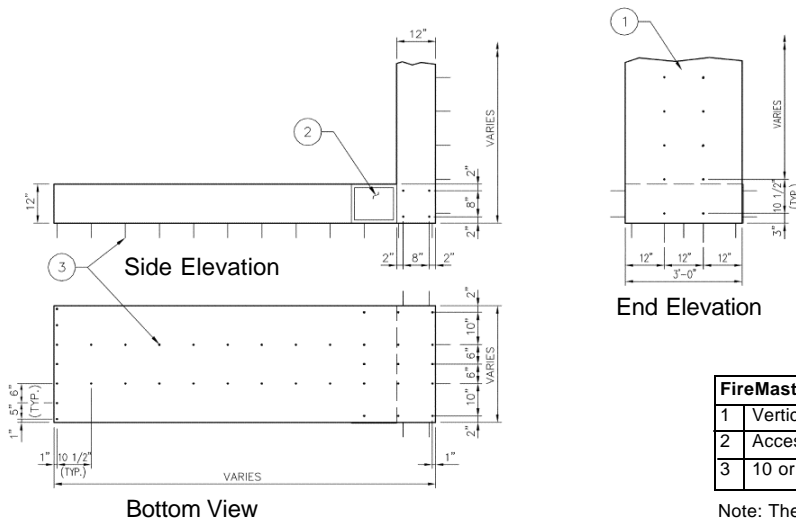
FireMaster Duct Wrap or Duct Wrap+ Figure 4 Drawing# RB0100502

1	Door hole
2	Access frame welded to duct
3	1/4" diameter threaded rods
4	Access cover - 16 gauge
5	Insulation pins - welded
6	One layer FireMaster Duct Wrap or Duct Wrap+
7	One layer FireMaster Duct Wrap or Duct Wrap+ 1" overlap
8	One layer FireMaster Duct Wrap or Duct Wrap+ 1" overlap
9	Speed clips
10	Aluminum tape at edges
11	Spool pieces for threaded rods
12	1/4" diameter wing nuts

Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

Thermal Ceramics FireMaster Duct System

Typical Insulation Pin Layout For Duct Spans $\geq 24"$ Wide To Prevent Blanket Sag



FireMaster Duct Wrap or Duct Wrap+ Figure 3 Drawing# RB0109301

1	Vertical section
2	Access door
3	10 or 12 gauge copper coated steel insulation pins

Note: The integrity of FireMaster Duct Systems is limited to the quality of the installation.

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Product Data & Installation Guide



NFPA 96
IMC

1. Product Description

Thermal Ceramics FireMaster® Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ are foil-encapsulated, non-combustible, inorganic, flexible fireproofing wraps specifically tested and designed to provide a 1 or 2 hour fire rated enclosure for commercial kitchen grease ducts in compliance with ICBO grease duct test standard. FireMaster Duct Wrap 2X2 or Duct Wrap 2x2+ is in compliance with the:

- Uniform Mechanical Code
- International Mechanical Code
- Uniform Building Code

for zero clearance to combustibles and shaft alternative. The difference between the two wrap systems is the core material basic chemistries. FireMaster Duct Wrap 2x2 is a high temperature ceramic fiber insulating blanket composed of primarily alumina and silica and FireMaster Duct Wrap 2x2+ is a low biopersistence alkaline-earth silicate wool. Thermal Ceramics FireMaster Duct Wrap 2x2 and Duct Wrap 2x2+ materials are classified by Omega Point Laboratories Listing and Follow-up Service Program to ensure uniform thickness and density specifications, thus providing required fire ratings as tested.. Thermal Ceramics FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ are proven performance alternatives through extensive testing to 1 and 2-hour fire-resistance rated shaft enclosures. With its excellent insulating capability of withstanding fire temperatures up to 2000°F to 2300°F (1093°C to 1260°C), it protects combustible constructions at zero clearance for commercial kitchen grease ducts in tight congested areas. When the duct penetrates fire rated walls and floors, Fire Barrier 2000+ ,1000 N/S, or 1003 S/L Silicone Sealant used in combination with Thermal Ceramics FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ provides an alternate means of protection to rigid shafts by maintaining the integrity of the 1 or 2 hour floor or wall assembly .

Product Features

- Completely inorganic
- Low biopersistent insulation with Duct Wrap 2x2+
- Shaft alternative to rigid board systems
- Zero clearance to combustibles protection
- Lightweight, compact design saves space
- Flexible system requires minimum labor and resists cracking
- Problem solver for tight, congested areas
- Totally foil encapsulated system for protection against material degradation, potential fire hazards and allows easy installation.
- Passive fire proof material does not lose fire fighting capabilities with age
- Product markings on foil ensure proper material identification for easy inspections
- Wide variety of through-penetration systems



2. Applications

- 1 or 2 Hour Commercial Kitchen Grease Duct Enclosure

3. Physical Characteristics

FireMaster Product	Unit Size	Units Ctn.	Wt./Ctn.
Duct Wrap 2x2 or Duct Wrap 2x2+	Roll 2" x 24" x 20' (50mm x 610mm x 6m)	1	50 lbs. (23 kg)
Duct Wrap 2x2 or Duct Wrap 2x2+	Roll 2" x 48" x 20' (50 mm x 1219 mm x 6m)	1	100 lbs. (45 kg)
Duct Wrap 2x2 or Duct Wrap 2x2+ Collar	Roll 2" x 8" x 20' (50 mm x 203 mm x 6m)	3	50 lbs. (23 kg)
Color	White filler blanket with silver foil encapsulation		

4. Specifications

This specification guide covers the application of FireMaster Duct Wrap 2x2, FireMaster Duct Wrap 2x2+, and Fire Barrier 2000+, 1000 N/S or 1003 S/L Silicone Sealant.

Application	Fire Resistive Rating	Enclosure System
Grease Ducts	1 or 2 hours	2 layers FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+, 3" (75mm) perimeter and longitudinal overlap

5. Performance

A. FireMaster Duct Wrap 2x2 and Duct Wrap 2x2+

Flammability (ASTM # 84/UL 723)

Foil:	Flame spread	5
	Smoke developed	5
Blanket:	Flame spread	0
	Smoke developed	0

Thermal Resistance

R value per ASTM C 518
4.15 per inch at 70°F (21°C)

B. Fire Stop Sealant

3M™ Fire Barrier Sealant 2000+	1000 N/S	1003 S/L
Color	Light Gray	Light Gray
Working Time (min.)	10 - 20	5 - 10
Cure Time at 77°F (25°C), 50% R.H.	14 - 21 days	14 - 21 days
Flow, Sag, or Slump	Nil	Self Leveling
Elongation at Break	600%	600%

6. Listings

Agency	Reference Standard/ File Number
Omega Point Laboratories, Inc (OPL)	11660-2, 11660-4
ICBO	Report ER-4975
NFPA	Complies with NFPA 96, 1998 Edition
International Mechanical Code	Section 506 Commercial Kitchen Grease Ducts and Exhaust Equipment, Section 507 Commercial Kitchen Hoods
California State Fire Marshall	2440-1361:104

7. Installation

The FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ systems shall be installed by a qualified contractor in accordance with manufacturer's instructions and referenced standards. See Figures 1 to 4 for complete details.

Materials and Equipment

- FireMaster Duct Wrap 2x2 and Duct Wrap 2x2+ blanket, 2" (51mm) thick, 24" (610mm) or 48" (1220mm) wide, 8 pcf (128 kg/m³) density, 20' (6.1m) long rolls. 48" (120cm) wide blanket helps to minimize waste
- Aluminum foil tape
- Minimum 3/4" (19mm) wide filament tape
- Carbon steel or stainless steel banding material, minimum 1/2" (12.7mm) wide, minimum 0.015" (0.38mm) thick, with steel banding clips
- Hand banding tensioner and crimping tool
- Minimum 12 gage copper-coated steel insulation pins; galvanized steel speed clips, minimum 1 1/2" (38mm) x 1 1/2" (38mm) square or 1 1/2" dia. (38mm), or equivalent sized cuphead pins; capacitor discharge stud gun
- Access door hardware: four galvanized steel threaded rods, 1/4" diameter (6.35mm) by 4 1/2" to 5" long (114 to 127mm) with 1/4" (6.35 mm) wing nuts and 1/4" (6.35mm) washers; 4" (102mm) long steel tubing to fit threaded rods
- Fire Barrier 2000+, 1000 N/S, or 1003 S/L silicone sealant

Storage:

The FireMaster Duct Wrap 2x2, FireMaster Duct Wrap 2x2+, and Fire Barrier Silicone Sealant must be stored in a dry warehouse environment on pallets. Pallets should not be stacked.

Preparatory Work:

FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ are

installed with common tools, such as knives, banders and capacitor discharge guns for applying insulation pins. In order to install the duct fire stop system, the surfaces of all openings and penetrating items need to be clean, dry, frost free, and free of dust.

Installation techniques for Thermal Ceramics FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ (Figure 1):

- **3" (75mm) Overlap Wrap Telescope** - Each blanket overlaps one adjacent blanket, and each blanket has one edge exposed and one edge covered by the next blanket as shown in Figure 1. The visible edges of the longitudinal overlap all point in the same direction.
- **Butt Joint Overlap Pattern** - The edges of each interior layer blanket are firmly butted against each other. The exterior layer blankets are installed over the interior layer so that the exterior blankets overlap each other with a 3" (75mm) overlap, and completely cover the butt joints of the interior blankets as shown in Figure 1.
- **Butt Joint & Collar System** - The adjacent blankets of both interior and exterior layers are firmly butted together with the exterior joints located 12" (305mm) away from the interior joints. An 8" (203mm) wide collar (6" (150mm) wide collar is pending) made from FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ is centered over each exterior joint, overlapping each blanket by 4" (102mm) as shown in Figure 1. The collar overlaps itself with a 3" (75mm) perimeter overlap.
- **2 & 3 Sided Wrap System** - When space does not allow for a full wrap enclosure on all four sides of the duct, the FireMaster Duct Wrap or FireMaster Duct Wrap+ may be installed on 2 or 3 sides of the duct and mechanically attached to a concrete or CMU assembly on the unexposed side of the duct.

General:

To minimize waste, FireMaster material should be rolled out tautly before measuring. Cut edges of the blanket shall be taped with aluminum foil tape to prevent exposed edges of the insulation from wicking moisture from condensation or grease from a compromised leaking duct joint into the material and causing degradation of the fire barrier. The FireMaster material may be installed with either a mechanical banding system or insulation pins and clips (see Mechanical Attachment Methods below and figures 1 and 2). When using the banding technique, caution shall be taken to ensure that the bands are not fitted too snug as which could result in cutting into the blanket. To prevent blanket sag on ducts with dimensions greater than or equal to 24" (600mm), insulation pins, long enough to extend through the layers of blanket insulation, are welded to the duct in columns spaced 12" (305mm) apart, between 6" and 12" (152 and 305mm) from each edge and 10 1/2" (267mm) on center along the bottom horizontal and outside vertical duct runs as shown in Figure 2. Insulation pins that extend beyond the blanket wrap shall be turned down to eliminate sharp points. Support hanger systems do not need to be wrapped provided that the hanger rods are at least a minimum of 3/8" (9.5mm) diameter and spaced a maximum of 48" (120cm) on center along the length of the duct, and the angle iron is a minimum of 1 1/2" x 1 1/2" x 1/8" (38mm x 38mm x 3.2mm). Horizontal trapeze support system may be incorporated into the wrap enclosure.

A. Overlap Wrap Telescope Installation

FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ commercial kitchen grease duct 1 or 2 hour enclosure includes a two-layer wrap construction applied directly to all surfaces of the duct (see figure 1). The first or interior layer of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ blanket is wrapped around the perimeter of the duct and is cut to a length with enough excess to overlap itself not less than 3" (75mm). Adjacent blankets are placed to overlap the

previous blanket not less than 3" (75mm). The overlap made by adjacent blankets forms the "longitudinal" overlap. The overlap a blanket makes with itself is called the "perimeter" overlap. The longitudinal overlaps of the exterior layer are to be spaced 10½" (26cm) away from those of the interior layer. The first layer is held in place with filament tape 1½" (38mm) from each blanket edge and in the center of the blanket. The second layer is wrapped around the perimeter of the first layer with the longitudinal overlaps of the exterior layer spaced 10½" (26cm) away from those of the interior layer and held in place with filament tape 1½" (38mm) from each blanket edge and in the center of the blanket until banding is in place or the pinning attachment is fully secured.

B. Butt Joint Overlap Wrap Installation

FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ is cut to completely wrap around the perimeter of the duct with enough excess to provide an overlap of not less than 3" (75mm). The joints of the adjacent blankets on the first (interior) layer are firmly butted against each other and held in place with filament tape 1½" (38mm) from each blanket edge and in the center of the blanket. The second layer of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ is wrapped around the perimeter of the first layer using the Overlap Wrap Telescope technique construction described in paragraph "A" above with a minimum 3" (75mm) overlap wrap. The second layer of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ is held into place with filament glass tape 1½" (38mm) from each blanket edge and in the center of the blanket as a temporary hold until the mechanical banding or pinning and clip attachment method is in place. (Figure 1)

C. Butt Joint / Collar Installation

FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ is installed in two layers with a tight butt joint construction and collar at the exterior layer joint. The butted joints of the exterior layer blankets are located 12" (305mm) away from the butted joints of the interior layer blankets, and the blankets are held in place with filament tape 1½" (38mm) from each edge of the blanket and in the center as a temporary hold until the mechanical attachment system is secured. A FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ Collar is centered over the joints of the exterior layer and wrapped around the perimeter of the duct and cut to a length so that it overlaps itself not less than 3" (75mm). The collar is held in place with filament tape placed 1½" (38mm) from each edge of the collar until the mechanical attachment is in place. Filament tape is used 1½" (38mm) from each blanket edge and in the center of the blanket as a temporary hold until the mechanical attachment is in place. (Figure 1)

D. 2 & 3 Sided Wrap Installation

When space does not allow for a complete wrap applied to the duct on all four sides, the FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ is approved for 2 or 3 sided installations with mechanical attachment to a concrete or CMU assembly. The FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ is installed on the 2 or 3 sides of the duct as described in one of the installation methods described above with the starting edge of the blanket attached to the concrete or CMU assembly and then wrapped around the duct until the other end can be affixed to the other concrete or CMU assembly, thus encapsulating the duct with insulation around all accessible sides. The blanket is to flange out onto the concrete or CMU assembly. It shall be secured to the adjoining assembly with min $\frac{3}{16}$ " (5mm) diameter, 4" (100mm) long concrete anchors, footed to a minimum 1½" (38mm) wide x $\frac{3}{16}$ " (5mm) thick steel strip/strap with pre-drilled holes spaced a maximum 10" (25cm) on center. The steel strip is to be placed around the entire perimeter of the duct in the exposure area. The FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ insulation wrap is secured to the duct with minimum ½" wide banding 10 ½" (267mm) centers. The ends of the banding are to loop into the steel strips/straps that foot the blanket to the concrete floor or wall, and tightened down. The trapeze support system may be incorporated within the wrap system.

Mechanical Attachment Methods for Insulation Wrap

1. Banding - ½" (12.7mm) wide carbon steel or stainless steel banding, 0.015" (0.38mm) thick, is placed around the entire perimeter of the insulated duct with maximum 10½" (267mm) spacing centers and 1½" (38mm) from each blanket edge or 1½" (38mm) from each collar edge when using the butt joint and collar method. When banding, filament tape can be used to temporarily hold the blanket in place until the banding is applied. The banding is placed around the material and tightened so as to firmly hold the FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ in place against the duct, but not cause any cutting or damage to the blanket. (Figure 1)

2. Pinning - For duct spans 24" (610mm) or larger, min. 12 gage, 5" long (127mm) copper coated steel insulation pins are welded to the duct in columns spaced 12" (305 mm) apart, 6" - 12" (152 -305mm) from each edge and on 10½" centers along bottom horizontal and outside vertical runs to prevent blanket sag (see fig 2). Pins are also required 1" (25mm) from the end of a duct and 1" (25mm) from any edge near a 90° bend, spaced on 6" (152mm) centers. Pins are locked into place with 1½" (37.5mm) diameter round or square, galvanized steel, speed clips or cup head pins. Pins that extend beyond outer blanket wrap layer shall be turned down to eliminate sharp edges or the excess length cut off.

Grease Duct Access Door Installation (See Figure 3)

Four galvanized steel threaded rods, ¼" diameter (6.35mm) by 4½" to 5" long (113 to 127mm) are welded to the duct at the corners of the door opening. Four 4" (100mm) long steel tubes fit over the threaded rods and protect the blanket material when the door is fastened. Four 5" (125mm) long 12 gage insulation pins are welded to the door panel for installation of the blanket. Three layers of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ are impaled over the 12 gage insulation pins on the 16 gauge door panel. The first layer is cut and impaled over the insulation pins with a minimum 1" (25mm) overlap. When the door is installed, this first layer is compressed and fitted against the wrap surrounding the door opening to form a tight butt joint. The second layer is cut to overlap the first layer by no less than 1" (25mm), and the third layer is cut to overlap the second by no less than 1" (25mm). It is essential that these layers fit tightly against the wrap surrounding the access door opening with no through openings. The three layers are impaled over the pins and are locked in place with speed clips. Pins that extend beyond the outer layer of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ shall be turned down to avoid sharp points on the door. The steel tubes are placed over the threaded rods. The insulated door panel is placed over the threaded rods covered by the steel tubes and held in place with washers and wing nuts. The details are shown in Figure 3.

Through-Penetration Fire Stop System

When the duct penetrates a fire rated wall, ceiling, or floor, an approved fire stop system must be employed. FireMaster Duct Wrap 2x2 and Duct Wrap 2x2+ approved fire stop systems are listed in Section 4, Specifications and in Figure 4.

One 10½" (267mm) wide strip and one 2¼" (57mm) wide strip of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ blanket are required. The narrower strip is placed on top of the wider strip, aligned with one edge. The wider strip is then folded over the narrower strip to create a three-layer, 6" (152mm) thick by 4¼" (108mm) wide strip. The blanket is then compressed to a minimum of 50 percent of the original thickness, and placed in the annular space, flush with the lower surface of the concrete slab and recessed a minimum of ¼" (6.4mm) from the upper surface. Install a minimum of ¼" (6.4mm) of Fire Barrier 2000+, 1000 N/S or 1003 S/L Silicone Sealant into the opening.

Alternatively, when there is no room in the remaining annular space to wrap the duct with FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ material, the FireMaster enclosure may terminate above and below the floor/ceiling or wall assembly as shown in figure 4 by mechanically attaching the FireMaster to the termination point above and below the termination area with bands or pins.

7. Maintenance

No maintenance is required when installed in accordance with the installation manual. Once installed, if any section of the FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ is damaged, the following procedures will apply:

- The damaged section shall be removed by cutting the steel banding or removing the clips holding it in place
- A new section of the same dimension shall be cut from a roll of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+, either 24" (610mm) or 48" (1219mm) wide
- The new section shall be placed per manufacturer's installation instructions and fitted ensuring the same overlap that existed previously

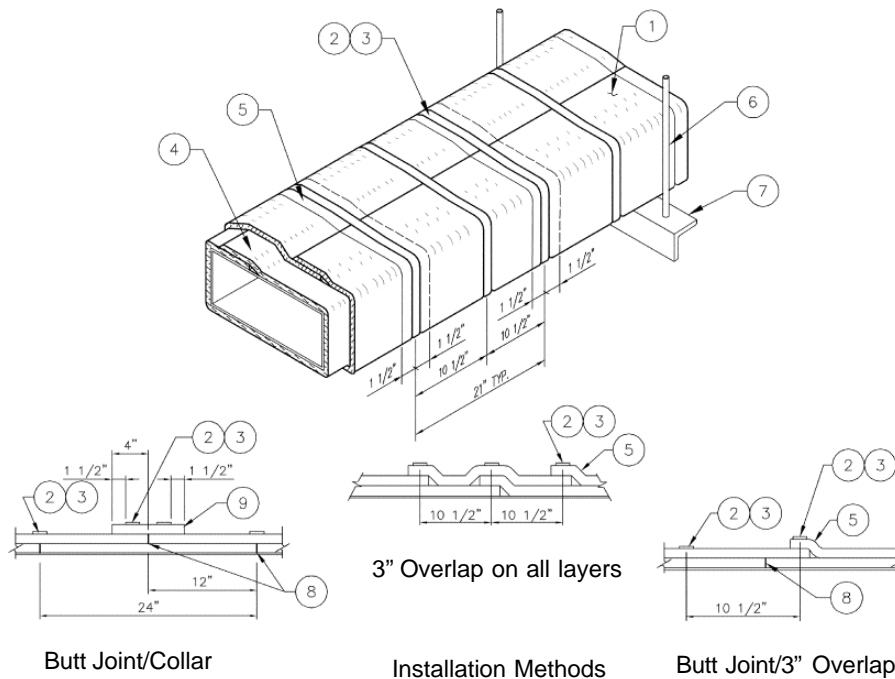
- The steel banding should be placed around the material and tensioned so as to firmly hold the FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ in place without cutting or damaging the blanket
- If the blanket has not been damaged but the foil has ripped, seal the opening with aluminum foil tape

8. Limitations

- Thermal Ceramics FireMaster Duct Wrap 2x2 and Duct Wrap 2x2+ shall be installed in accordance with the installation instructions
- Multiple steel ducts in a single enclosure are not permitted for commercial kitchen grease ducts
- Minimum 3/8" (9.3mm) diameter all thread steel rods do not have to be insulated
- The integrity of FireMaster Duct Wrap 2x2 and Duct Wrap 2x2+ systems is limited to the quality of the installation

FireMaster is manufactured by and is a registered trademark of Thermal Ceramics.

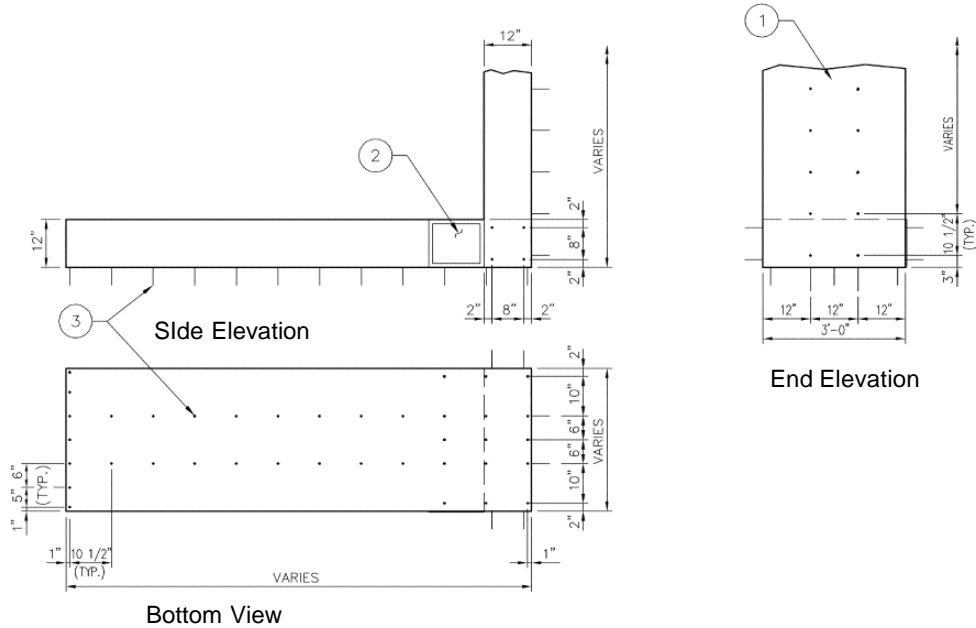
Thermal Ceramics FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ Commercial Kitchen Grease Duct System 1 or 2 Hour Shaft Alternative Zero Clearance to Combustible (Overlap Wrap Technique)



FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+	Figure 1	Drawing# RB0100511
1	Two layers FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+	
2	Filament tape	
3	Banding	
4	Minimum 3" perimeter overlap	
5	Minimum 3" longitudinal overlap	
6	Minimum 3/8" minimum diameter hanger rod	
7	1 1/2" x 1 1/2" x 1/8" angle	
8	Firmly Butted joint	
9	8" wide Duct Wrap 2x2 or 2x2+ collar	

Note: The integrity of FireMaster Duct System is limited to the quality of the installation.

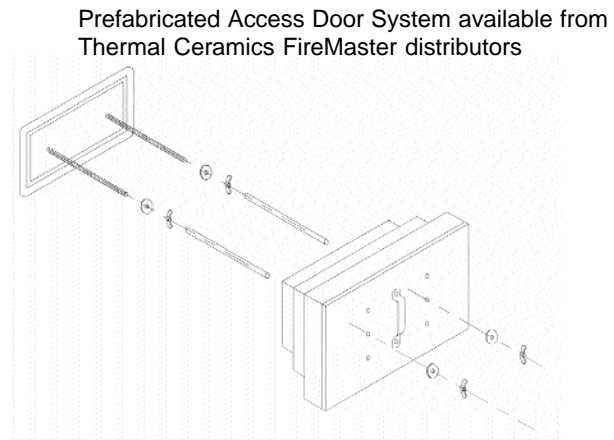
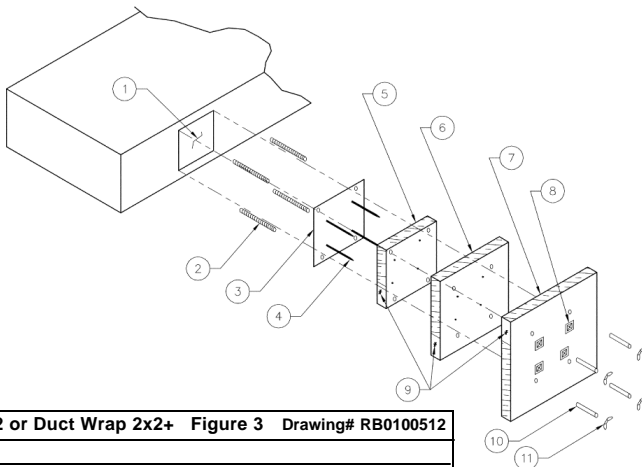
Thermal Ceramics
FireMaster Duct System
Typical Insulation Pin Layout
For Duct Spans > 24" Wide To Prevent Blanket Sag



FireMaster Duct Wrap 2x2 or Duct Wrap 2x2 +		Figure 2 Drawing# RB0109301
1	Vertical section	
2	Access door	
3	10 or 12 gauge copper coated steel insulation pins	

Note: The integrity of FireMaster Duct System is limited to the quality of the installation.

Thermal Ceramics
FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+
Access Door System Commercial Kitchen Grease Duct



FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ Figure 3 Drawing# RB0100512	
1	Door hole
2	1/4" diameter all threaded rods
3	Access cover - 16 gauge
4	Insulation pins - welded
5	One layer FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+
6	One layer FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ 1" overlap
7	One layer FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ 1" overlap
8	Speed clips
9	Aluminum tape at edges
10	Spool pieces for threaded rods
11	1/4" diameter wing nuts

Note: The integrity of FireMaster Duct System is limited to the quality of the installation.

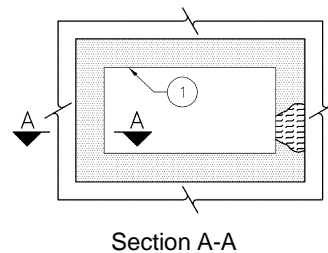
Thermal Ceramics

FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ Through Penetration System 1 or 2 Hour Grease Duct

Duct Wrap terminated at the top and bottom surface of the floor/ceiling assembly

	FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+	Figure 4A	Drawing# RB0100510
1	Duct		
2	Two layers FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ (2" thick each = 4" total thickness)		
3	Scrap pieces of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+		
4	Fire Barrier 2000+, 1000 N/S, or 1003 S/L silicone sealant		
5	Rated floor or Wall		

Note: The integrity of FireMaster Duct System is limited to the quality of the installation.



Section A-A

Floor View

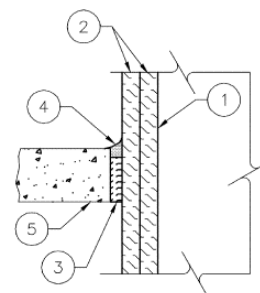
Thermal Ceramics

FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ Through Penetration System 1 or 2 Hour Grease Duct

Duct Wrap continuous through the floor/ceiling assembly

	FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+	Figure 4B	Drawing# RB0100510
1	Duct		
2	Two layers FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ (2" thick each = 4" total thickness)		
3	Scrap pieces of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+		
4	Fire Barrier 2000+, 1000 N/S, or 1003 S/L silicone sealant		
5	Rated floor or Wall		

Note: The integrity of FireMaster Duct System is limited to the quality of the installation.



Section A-A

Floor View

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Product Data and Installation Guide



1. Product Description

FireMaster® PlenumWrap and FireMaster PlenumWrap+ are foil-encapsulated, inorganic high temperature, flexible fireproofing wraps specifically tested for plastic pipe and cable protection from external flame-propagation and smoke generation in return air plenums or other spaces used for environmental air. The difference between the two wrap materials is the core material basic chemistries. FireMaster PlenumWrap and PlenumWrap+ are a high temperature insulating blankets with service temperatures ranging from 2000°F to 2300°F (1093°C to 1260°C). FireMaster PlenumWrap+ is a body soluble, low biopersistence, alkaline-earth silicate wool. Both chemistries are free of binders and lubricants. Thermal Ceramics FireMaster PlenumWrap and PlenumWrap+ are classified by Omega Point Laboratories Listing and Follow-up Service Program to ensure uniform thickness and density specifications, thus providing consistency in end physical properties for required fire ratings. FireMaster PlenumWrap and PlenumWrap+ have been tested to UL 910 test standard to provide protection from flame-propagation and smoke generated from electrical cables and plastic pipes installed in ducts (single or multiple), plenums and other spaces used for environmental air. The wrap enclosure is qualified for 1" (25mm) minimum diameter polyvinyl chloride (PVC), chlorinated polyvinyl chloride (CPVC), acrylonitrile polypropylene (PP) and polyvinylidene fluoride (PVDF). Copper cables insulated with any of the materials listed above may be protected.

Product Features

- Low biopersistent insulation blanket with PlenumWrap+
- Lightweight and flexible
- Contours easily
- Compact design for single and multiple pipes or cable bundles
- Foil encapsulation minimizes dusting in return air plenums
- Easy to install
- Unaffected by oil or water
- Passive fire proof material does not lose fire fighting capabilities with age
- Product markings on foil ensure proper material identification for easy inspections



2. Applications

- PVC Pipes
- CPVC Pipes
- PP Pipes
- PVDF Pipes
- ABS Pipes
- PB Pipes
- PE Pipes
- Electrical Cables

3. Physical Characteristics

FireMaster Product	Unit	Size	Units	
			Ctn.	Wt./Ctn.
PlenumWrap or PlenumWrap+	Roll	½" x 24" x 50' (13mm x 61cm x 15m)	1	33 lbs. (14 kg)
PlenumWrap or PlenumWrap+	Roll	½" x 48" x 25' (13mm x 120cm x 7m)	1	33 lbs. (14 kg)
Color		White blanket with silver foil encapsulation		

4. Specifications

This specification guide covers the application of Thermal Ceramics FireMaster PlenumWrap and FireMaster PlenumWrap+ and does not cover the construction requirements for plastic pipe.

Application	Fire Resistive Rating	Enclosure System	OPL Listing No.
Plastic pipes	UL 910	1 layer PlenumWrap or PlenumWrap+, 1" (25mm) longitudinal and 1" (25mm) perimeter overlap	11660-1 11660-5
Electric cables	UL 910	1 layer PlenumWrap or PlenumWrap+, 1" (25mm) perimeter and 1" (25mm) longitudinal overlap	11660-1 11660-5

5. Performance

FireMaster PlenumWrap and FireMaster PlenumWrap+

UL 910 test results covering PVC pipe:

- Optical Smoke Density Peak: 0.03
- Optical Smoke Density Avg.: 0.01
- Flame Propagation (Ft.): 2.6

ASTM E84

- Flame Spread 5
- Smoke Developed 5

C. Listings

Agency	Reference Standard/ File Number
Omega Point Laboratories, Inc	Listing # 11660-5 11660-1

6. Installation

The FireMaster PlenumWrap or PlenumWrap+ system shall be installed by a qualified contractor in accordance with the Thermal Ceramics manufacture's instructions. See figure 1.

Materials and Equipment:

- FireMaster Plenum Wrap or PlenumWrap+, ½" (12.7mm) min. thickness, 24" (60.9mm) wide by 50' (15m) long, and 48" (121.9cm) wide by 25' (7m) long
- Minimum ¾" (19.0 mm) wide filament tape.
- Aluminum foil tape for sealing cut edges of foil encapsulated blanket
- Banding material, minimum ½" (12.7 mm) wide, 0.015" (0.38mm) thick, carbon or stainless steel. Note: One strand of minimum 16 gauge carbon or stainless steel tie wire may be used as an alternative
- Hand tensioning tool and crimping tool

Storage:

FireMaster PlenumWrap or PlenumWrap+ must be stored in a dry warehouse environment. Pallets should not be stacked.

General:

FireMaster PlenumWrap and PlenumWrap+ are completely encapsulated in an aluminum foil scrim material protecting the environmental air space from exposed fiber. Aluminum foil tape is used to seal cut edges of the encapsulated blanket during installation. To minimize waste, FireMaster PlenumWrap or PlenumWrap+ material should be rolled out tautly before measuring. Filament tape is used to hold the wrap in place before mechanical attachment (see Mechanical Attachment Methods section for FireMaster PlenumWrap and PlenumWrap+).

Installation Method:

- Cut FireMaster PlenumWrap or PlenumWrap+ to a length sufficient to wrap completely around the perimeter of the pipe or cable, plus provide an overlap of not less than 1" (25mm).
- Secure the FireMaster PlenumWrap or PlenumWrap+ blanket in place by using minimum ¾" (19mm) wide filament tape as a temporary hold until banding or tie wire is in place. The tape shall be spaced ¼" (6.35mm) from the edge of the blanket and at the midpoint of the blanket (11 ¾" (29cm) on center). Additional tape may be added if needed.
- Cut the next adjacent wrap of FireMaster PlenumWrap or PlenumWrap+ to completely wrap around the perimeter of the pipe or cable with enough excess to overlap itself not less than 1" (25mm). A 1" (25mm) longitudinal overlap is required onto the previous adjacent wrap.
- Use filament tape as a temporary hold until the mechanical attachment is secured. See the Mechanical Attachment Methods for FireMaster PlenumWrap and PlenumWrap+ section and figure 1.

Mechanical Attachment Methods for PlenumWrap and PlenumWrap+

Banding - min. 1/2" (12.7mm) wide, 0.015" (0.38mm) thick carbon or stainless steel banding is placed around the entire perimeter of the insulated pipe or cable on maximum 11¾" (298mm) centers, and ¼" (6mm) from each blanket edge. As an alternative, 16 gauge carbon or stainless steel tie wire may be used in place of banding. Tighten the banding or tie wire to hold the wrap firmly in place without cutting or damaging the wrap. Bands or tie wires may be hand tightened.

7. Maintenance

No maintenance is required when installed in accordance with the installation instructions. Once installed, if any section of the FireMaster PlenumWrap or PlenumWrap+ is damaged, the following procedures will apply:

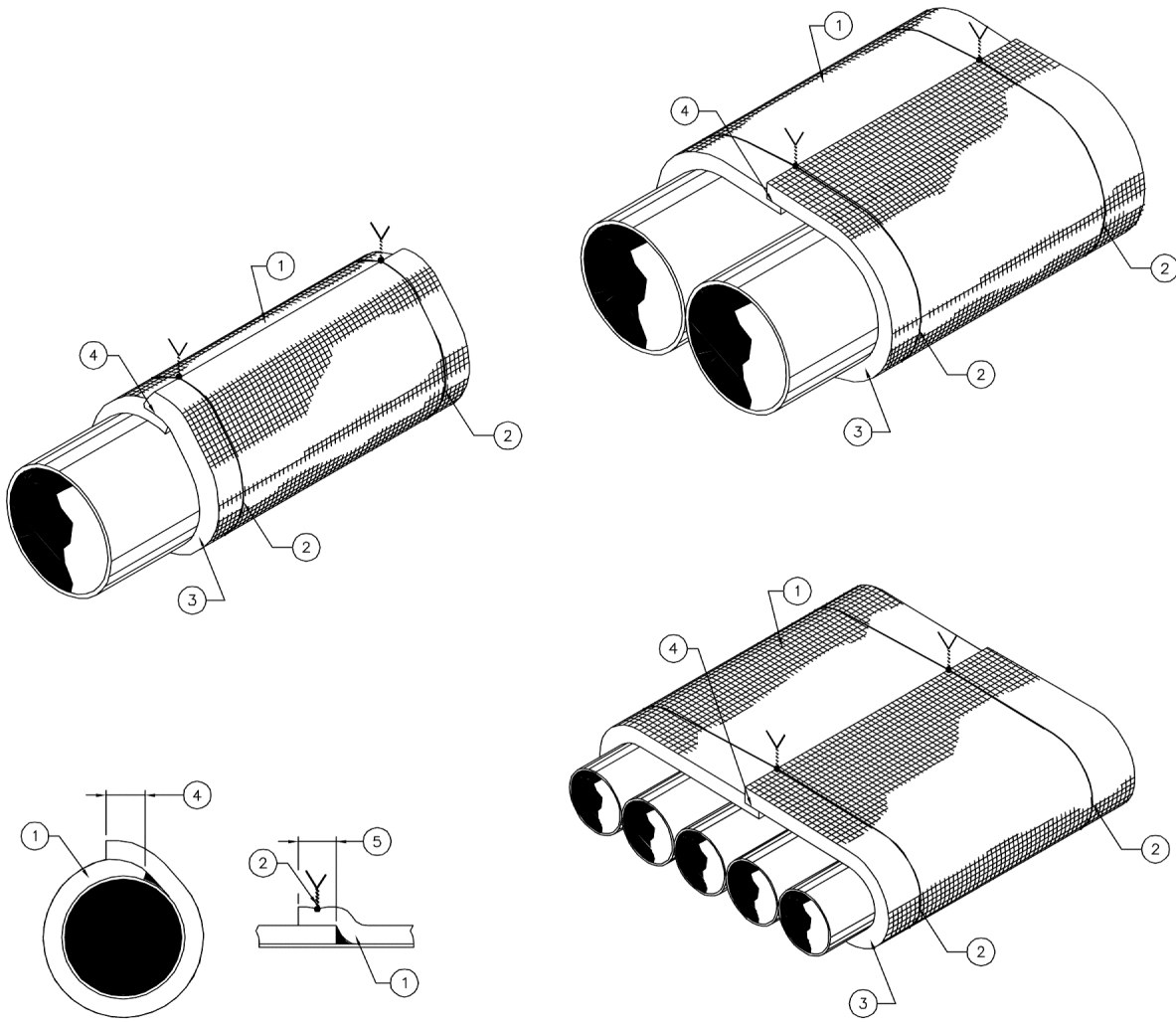
- The damaged section shall be removed by cutting the steel band or wire holding it in place
- A new section of the same dimension shall be cut from a roll of FireMaster PlenumWrap or PlenumWrap+, either 24" (60.9 cm) or 48" (121.9 cm) wide
- The new section shall be placed per Thermal Ceramics manufacture's Installation Instructions ensuring the same overlap that existed previously
- The steel banding shall be placed around the material and tensioned so as to firmly hold the FireMaster PlenumWrap or PlenumWrap+ in place without cutting or damaging the blanket
- If the blanket has not been damaged but the foil has ripped, seal the opening with aluminum foil tape

*For personal protective equipment recommendations see the MSDS.

FireMaster is manufactured by and is a registered trademark of Thermal Ceramics.

Thermal Ceramics

FireMaster PlenumWrap and PlenumWrap+ Plastic pipe and Electric Cable System



FireMaster PlenumWrap and PlenumWrap+Figure 1 Drawing# RB0100513	
1	One layer ½" minimum thick FireMaster PlenumWrap and PlenumWrap+
2	Tie wire or banding
3	Aluminum foil tape to seal cut edges
4	1" minimum perimeter overlap
5	1" minimum longitudinal overlap

Note: The integrity of the FireMaster Duct Systems is limited to the quality of the installation.

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Thermal Ceramics

FIREMASTER[®]

**FireMaster[®]
15080 Duct Systems
Specifications**



Thermal Ceramics

FIREMASTER®

Fire Protection Systems For Specification Purposes

Thermal Ceramics FireMaster FastWrap®+, 2000°F rated, non-mineral wool, passive low biopersistent, body soluble fiber, single layer, 2" thick, totally encapsulated on all sides with aluminum foil to provide a grease, water and condensation vapor protection barrier. All exposed edges should be sealed to prevent grease and moisture wicking. FireMaster FastWrap+ to provide 2 Hours protection for commercial kitchen grease, 1 or 2 Hours air ventilation, and chemical exhaust ducts in lieu of a shaft per Omega Point Laboratories Listings GD 545F, GD 546F, (Grease Ducts), VAD 541F, (Air Ducts), FS 582F, FS 583F, (Fire Stop), SBCCI 9424D, or BOCA 21.51. Thermal Ceramics FireMaster FastWrap+ to be applied directly to the duct as tested per manufacturer's (Thermal Ceramics) instructions by a qualified installer and can be installed at zero clearance to combustibles. Approved equals should demonstrate satisfactory use in similar service for not less than 5 years.

Field fabricated access doors are protected using two layers of FastWrap+ by impaling the blanket over welded pins to a steel plate matching that of the duct and fitting the layers tightly against the wrap surrounding the access door opening. The first layer is placed over the access opening with a ½" overlap step design. The second layer is centered over the first piece so that a minimum 1" overlap exist around the perimeter. The second layer is impaled over the pins and both layers are locked in place with speed clips. Alternatively, a prefabricated access door protected with the same FireMaster Duct System construction, supplied by an authorized FireMaster Distributor, may be utilized.

FireMaster is a registered trademark of Thermal Ceramics and manufactured by Thermal Ceramics.



Thermal Ceramics

FIREMASTER[®]

Fire Protection Systems For Specification Purposes

Thermal Ceramics FireMaster Duct Wrap, 2300°F rated, non-mineral wool, passive ceramic fiber, 1½" thick, two layers or FireMaster Duct Wrap+, 2000°F rated, passive low biopersistent, body soluble fiber, 1½" thick, two layers, either system totally encapsulated on all sides with aluminum foil to provide a grease, water and condensation vapor protection barrier. All exposed edges should also be sealed to prevent grease and moisture wicking. FireMaster Duct Wrap or FireMaster Duct Wrap+ to provide 2 Hours protection for commercial kitchen grease, 1 or 2 Hours air ventilation, and chemical exhaust ducts in lieu of a shaft per UL YYET R14229 (Grease Duct), HNLJ, V1, V2, V3, V4 (Air Ducts), CAJ 7014, 7021, 7012, 7019 (Fire Stop), SBCCI 9424D or BOCA 21.51. Thermal Ceramics FireMaster Duct Wrap or FireMaster Duct Wrap+ to be applied directly to the duct as tested per manufacturer's (Thermal Ceramics) instructions by a qualified installer and can be installed at zero clearance to combustibles through the length of the assembly. Approved equals should demonstrate satisfactory use in similar service for not less than 5 years.

Field fabricated access doors are protected using three layers of Duct Wrap or Duct Wrap+ by fitting the layers tightly against the wrap surrounding the access door opening with a 1" overlap step design resulting in a 3" total perimeter door overlap design. The three layers are impaled over pins welded to a steel plate matching that of the duct and are locked in place with speed clips. Alternatively, a prefabricated access door protected with the same FireMaster Duct System construction, supplied by an authorized FireMaster Distributor, may be utilized.

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Thermal Ceramics

FIREMASTER®

Fire Protection Systems For Specification Purposes

Thermal Ceramics FireMaster® Duct Wrap 2x2, 2300°F rated, passive ceramic fiber, 2" thick, two layers or FireMaster Duct Wrap 2x2+, 2000°F rated, passive low biopersistent, body soluble fiber, 2" thick, two layers, either system totally encapsulated on all sides with aluminum foil to provide a grease, water and condensation vapor protection barrier. FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ to provide 2 Hours protection for commercial kitchen grease ducts in compliance with ICBO Uniform Mechanical Code in lieu of a shaft per Omega Point Laboratories GD 509 (Grease Duct), FS 548 (Fire Stop), or ICBO Report 4975. Thermal Ceramics FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ to be applied directly to the duct as tested per manufacturer's instructions by a qualified installer and can be installed at zero clearance to combustibles.

Field fabricated access doors are protected using three layers of Duct Wrap 2x2 or Duct Wrap 2x2+ by fitting the layers tightly against the wrap surrounding the access door opening with a 1" overlap step resulting in a 3" total perimeter door overlap design. The three layers are impaled over pins welded to a steel plate matching that of the duct and are locked in place with speed clips. Alternatively, a prefabricated access door protected with the same FireMaster Duct System construction, supplied by an authorized FireMaster Distributor, may be utilized.

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**FireMaster Commercial Kitchen Grease and Air Ventilation
Duct System**

Part 1 General

1.01 Summary

- A. Work of this section includes labor, material, and equipment to provide a 2-hour fire-resistive enclosure as a shaft alternative for commercial kitchen grease and air duct systems.
- B. Related Sections:
 - 1. Section 15080 Mechanical
 - 2. Section 07840 Firestopping

1.02 References

- A. Test standards and laboratory listings for evaluating and rating performance of fire resistive shaft alternative enclosures and zero clearance to combustibles for flexible duct wrap systems.
 - 1. ASTM E 84, Surface Burning Characteristics: Omega Point Laboratories Applied Fireproofing Listing No. 11660-3.
 - 2. UL 1978, Standard for Grease Ducts: Omega Point Laboratories Applied Fireproofing Listing No. 11660-3, Design Nos. GD 545 F and GD 546 F.
 - 3. ASTM E 814, Through-Penetration 2 - Hour Firestop Test, hose stream evaluation: Omega Point Laboratories Applied Fireproofing Listing No. 11660-3, Design Nos. FS 581 F, FS 82 F, and FS 583 F.
 - 4. ASTM E 119 Standard Method of Fire Tests of Building Construction, 2-Hour Wall Panel Test, 2-Hour External Total Engulfment Test, hose stream evaluation: Omega Point Laboratories Applied Fireproofing Listing No. 11660-3, Design Nos. GD 545 F, GD 546 F, FS 581 F, FS 582 F, and FS 583 F.
 - 5. ASTM C 518 Aging Test, Steady State Heat Flux Measurements and Thermal Transmission Properties.
 - 6. ASTM E 162, Surface Flammability of Materials.
 - 7. ASTM E 136, Combustion Characteristics of Building Materials in a Vertical Tube Furnace.
 - 8. ISO 6944-1985, Method of Determining Fire Resistance of Ventilation Ducts: Omega Point Laboratories Design No. VAD 541 F, and FS 583 F.
- B. Evaluation Research Report: Codes
 - 1. Complies with the International Mechanical Code (IMC), Section 506.6 Commercial Kitchen Grease Ducts and Exhaust Equipment, Section 507 Commercial Kitchen Hoods.
 - 2. BOCA Evaluation Services, Inc. Report No. 21-51.
 - 3. Southern Building Code Congress, International (SBCCI), Report No. 9424D.
 - 4. NFPA 96, 1998 Edition, Ventilation Control & Fire Protection of Commercial Cooking Operations.
 - 5. California State Fire Marshal, File Nos. 2440-1361:103.
 - 6. New York City Department of Buildings, MEA 422-00-M (grease ducts) and MEA 421-00-M (air ventilation ducts).
 - 7. California State Fire Marshal: 2440-1361:103.
- C. Health studies for evaluating and rating the performance of low biopersistence insulation blankets.
 - 1. RCC Maximum Tolerated Dose Inhalation Study - Performed in accordance with: OECD Guidelines and US EPA Regulations.
 - 2. RCC Intertracheal Inhalation Study - Performed in accordance with the protocol of the European Commission (ECB/TM 26 Rev.7, 1998).
 - 3. WHO Fiber Half Life Solubility Study- Performed in accordance with Appendix V Nr.71 Abs. 1, Satz 2 Kriterium 2 of the German Gefahrstoffverordnung (Rev.12, June 1998).

- 4. Long Fiber Fraction Half Life Solubility Study - Performed in accordance with Guideline 97/69/EC dated 5 December 1997 Appendix Q.

1.03 System Description

- A. Thermal Ceramics FireMaster FastWrap + is a single layer, 2" thick, non-mineral wool, lightweight, flexible, noncombustible 2000°F inorganic fireproofing wrap material completely encapsulated in aluminum foil scrim to protect against the absorption of grease or water. All exposed edges should be sealed to prevent grease and moisture wicking. FireMaster FastWrap+ is directly applied to commercial kitchen grease duct and air ventilation duct systems with steel banding and/or insulation pins in a continuous wrap one layer thick. FireMaster FastWrap+ is a 1 and 2 hour rated alternative to rigid shaft enclosures, to be applied directly to the duct as tested per manufacturer's (Thermal Ceramics) instructions by a qualified installer, providing zero clearance to combustibles at the overlaps. Approved equals should demonstrate satisfactory use in similar service for not less than 5 years.
- B. Performance Requirements:
 - 1. Two hour rated fire resistive enclosure assembly, ASTM E 119: Large Scale Wall Panel Test and Total Engulfment Test.
 - 2. Zero clearance to combustible, UL1978 Standard for Grease Ducts.
 - 3. Class I interior finish materials, ASTM E 83.
 - 4. Through-penetration protection systems for commercial kitchen grease and air ventilation ducts, ASTM E 814/UL 1479.
 - 5. Non-Combustibility, ASTM E 136.
 - 6. ISO-6944-1985, Method of Determination of the Fire Resistance of Ventilation Ducts.

1.04 Submittals

- A. Submit test reports substantiating performance requirements and code compliance along with manufacturer's installation instructions.

1.05 Delivery, Storage, and Handling

- A. Deliver materials in original sealed containers or unopened packages, clearly labeled with manufacturer's name, product identification, and lot numbers.
- B. Store materials out of weather and in an enclosed shelter.

Part 2 Products

2.01 Manufacturer

- A. Fire resistive FireMaster FastWrap+ materials; manufactured by Thermal Ceramics, Augusta, Georgia 30903, Thermal Ceramics Burlington, Ontario Canada, and Thermal Ceramics, Caribbean.

2.02 Materials

- A. Fire resistive duct wrap
 - 1. Thermal Ceramics FireMaster FastWrap + is a single layer, 2" thick, non-mineral wool, lightweight, foil encapsulated, noncombustible inorganic flexible fireproofing wrap material specifically tested to provide a 1 or 2 hour fire rated enclosure for commercial kitchen grease and air ventilation ducts, to be applied directly to the duct as tested per manufacturer's (Thermal Ceramics) instructions by a qualified installer and can be installed at zero clearance to combustibles through the length of assembly. Approved equals should demonstrate satisfactory use in similar service for not less than 5 years. All exposed edges must be sealed to prevent grease and moisture wicking. FireMaster FastWrap+ is composed of a low biopersistence alkaline earth silicate fiber (AES

wool) that does not require a NIOSH respirator (see MSDS available from thermalceramics.com website).

2. Thermal Ceramics FireMaster FastWrap+, 2" (50 mm) thick, 24" (610mm) or 48" (1219 mm) wide x 240" (6 m) long rolls, foil encapsulated with logo identification. FireMaster Duct Wrap Collar, 6" (203 mm) wide for air duct butt joint optional wrap method.

B. Tapes

1. High performance filament tape: minimum ¾" (19 mm) wide.
2. Aluminum foil tape: minimum 3" (7,6 cm) wide to seal cut blanket edges.

C. Banding Material

1. Carbon steel banding or stainless ½" (12.7 mm) wide x 0.015" (0.38 mm) thick, with steel banding clips.

D. Insulation Pins/Washers

1. Pins: 10 gauge, 4 to 5 inches long, copper coated steel; washers: 1½" (38,1 mm) x 1½" (38,1 mm) or 1½" (38,1 mm) diameter, galvanized steel speed clips or cup head pins.

E. Through-Penetration Fire Stop Materials

1. Packing Material: Scrap pieces, FireMaster FastWrap+.
2. 3M Fire Barrier 2000+, 3M Fire Barrier 1000N/S, or 3M Fire Barrier 1003S/L silicone sealant.

F. Grease Duct Access Door

1. Access cover, minimum 16 gauge steel.
2. Insulation pins, minimum 12 gauge copper coated steel, 5" long.
3. Speed clips, minimum 1½" (38.1 mm) x 1½" (38.1 mm) square or 1½" (38,1 mm) diameter round galvanized steel.
4. Threaded rods: 5" long (12.7 cm) long, ¼" (6.35 mm) diameter galvanized steel with ¼" (6.35 mm) wing nuts.
5. Four-inch long steel tubing to fit threaded rods.

G. Hardware

1. Threaded rods: 4" (10,2 cm) to 5" (12.7 cm) long, ¼" (6.35 mm) diameter galvanized steel with ¼" (6,35 mm) wing nuts and ¼" (6,35 mm) metal washers.
2. Four-inch long, steel, hollow tubing to fit threaded rods.
3. ¼" (6,35 mm) wing nuts.

Part 3 Execution

3.01 Preparation

- A. Remove dirt and dust, and clean surfaces of openings and items penetrating rated floors and rated walls.

3.02 Installation

- A. Grease Ducts: Install FireMaster FastWrap+ system in accordance with manufacturer's instructions and referenced standards. One layer is installed for 1 or 2 hour commercial kitchen grease duct applications (see Figure 1). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.
- B. Air Ducts: Install one layer of FireMaster FastWrap + for 1 or 2-hour air ventilation duct enclosures in accordance with manufacturer's instructions (see Figure 1). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.
- C. General Installation Instructions: FireMaster FastWrap+ blankets are cut to a length that will fit around the duct and overlap itself no less than 3". Cut edges of the blanket shall be taped with aluminum foil duct wrap tape to prevent exposed edges of the insulation from wicking of condensation moisture in air ventilation ducts or grease from a leaking grease duct joint. Adjacent blankets overlap each other a minimum of 3 inches, or they can be fitted together with a tight butt joint and covered with a 6" wide collar. During installation the blankets are temporarily

held in place with filament tape until the wrap is mechanically attached with steel bands (see Figure 1) or insulation pins. For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.

Banding - Carbon steel or stainless steel banding is used to hold the blanket enclosure in place. Banding is a minimum ½" (12.7 mm) wide, and is placed around the entire perimeter of the duct on maximum 10 ½" (267 mm) centers and 1 ½" (38 mm) from each blanket or collar edge.

Pinning - To prevent blanket sag on duct spans 24" (610 mm) or larger, minimum 12 gauge copper coated steel insulation pins are welded to the duct along bottom horizontal and outside vertical runs in columns spaced 12" (305 mm) apart, 6" to 12" (152 -305 mm) from each edge, and on 10½" (267 mm) centers. Pins are also required 1" (25 mm) from the end of a duct and 1" from any edge near a 90° bend spaced 6" (152 mm) apart. Pins are locked in place with 1½" (38 mm) diameter or 11/3" square galvanized steel speed clips or cup head pins (see Figure 3). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. Pins shall be turned down or the excess cut off to eliminate sharp edges.

1. Overlap Wrap Technique: Each FireMaster FastWrap+ blanket is applied directly to the duct and is wrapped around the perimeter of the duct so that it overlaps itself a minimum of 3" (75 mm), and also overlaps the adjacent blanket a minimum of 3" (75 mm). The visible edges of the overlaps all point in the same directions (see Figure 1). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. The wrap is mechanically attached to the duct with steel banding as described above.
2. Checkerboard Wrap Technique: Blankets with both edges exposed alternate with blankets with covered edges. The visible edges of the minimum 3" overlaps alternate their directions and appear on every other blanket (see Figure 1). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. The wrap is mechanically attached to the duct with steel banding as described above.
3. Butt Joint with Collar Technique: FireMaster FastWrap+ is applied directly to the duct with each adjacent blanket butted tightly against the next. These are held in place with filament tape placed around the perimeter of the duct 1 ½" (38 mm) from the edge of each blanket and in the middle of each blanket. A 6" (152 mm) wide FireMaster FastWrap+ collar is centered over the joints and wrapped around the perimeter of the duct and cut to a length so that it overlaps itself not less than 3" (75 mm). It is held in place with filament tape placed 1½" (38 mm) from each edge of the collar until banding is in place (see Figure 1). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.
4. Two & Three Side Wrap System: When space does not allow for a complete wrap to be applied to the duct on all four sides, the FireMaster FastWrap + can be installed on 2 or 3 sides of the exposed duct in one of the installation methods described above, and mechanically attached to the concrete or CMU assembly thus enclosing the duct on all accessible sides.
5. Grease Duct Access Door Installation: Locate the field fabricated access doors at horizontal cleanouts as required by local codes. Protect with 2 layers of

FireMaster FastWrap+, each layer overlapping the other by 1" (25 mm) on all sides and in accordance with manufacturer's instructions (see Figure 3). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.

Alternatively, a prefabricated access door protected with the same FireMaster Duct System construction, supplied by an authorized FireMaster Distributor, may be utilized.

6. Through- Penetration Firestop System: When the duct penetrates a concrete or dry wall fire rated floor, ceiling, or wall, an approved firestop system must be employed. To fire stop the through penetration void area of the wrapped duct, fill the annular space between the wrapped duct and the periphery of the opening with 4¼" (107 mm) width of scrap FireMaster FastWrap+ firmly packed into the opening and recessed ¼" (6.25 mm) below the top of the opening. Apply a minimum ¼" of 3M Fire Barrier 2000+, 1000 N/S, or 1003 S/L silicone sealant over the packing material within the annular space, flush with the top surface of the floor or both surfaces of wall (see Figures 4 and 5). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. Alternatively, when there is no room in the remaining annular space to wrap the duct with FireMaster FastWrap+ material, the FireMaster enclosure may be terminated above and below the floor/ceiling or wall assembly by mechanically attaching the FireMaster to the duct at the termination point, above and below the termination area, with bands or pins. The annular space around the bare duct is filled with firmly packed FireMaster FastWrap+ and sealed with a minimum of ¼" Fire Barrier silicone sealant as described above (see Figure 4). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.

3.03 Repair Procedure

- A. Repair damaged FireMaster FastWrap+ in accordance with manufacturer's instructions.
- B. Remove damaged section by cutting the bands and removing the anchor clips holding it in place. Apply a new section of the same dimension ensuring the same overlap and installation method that existed previously. Cut edges and tears in the foil must be taped with aluminum tape to prevent the insulation from wicking moisture or grease which would degrade the fire barrier and create a fire hazard.
- C. The steel banding should be placed around the material and tightened so as to firmly hold the FireMaster FastWrap+ in place without cutting into the blanket causing violation of the fire barrier.

FireMaster is a registered trademark of and is manufactured by Thermal Ceramics.

15080 Architectural Specifications
FireMaster® Duct Wrap
FireMaster Duct Wrap+

FireMaster Commercial Kitchen Grease and Air Ventilation Duct System

Part 1 General

1.01 Summary

A. Work of this section includes labor, material, and equipment to provide a 2-hour fire-resistive enclosure as a shaft alternative and a method for providing zero clearance to combustible materials for commercial kitchen grease and air ventilation duct systems.

B. Related Sections:

1. Section 15080 Mechanical
2. Section 07840 Firestopping

1.02 References

A. Test standards and laboratory listings for evaluating and rating performance of fire resistive shaft alternative enclosures and zero clearance to combustibles for flexible duct wrap systems.

1. ASTM E 84, Surface Burning Characteristics: Building Materials, UL File R8418.
2. UL 1978, Standard for Grease Ducts, clearance to Combustibles: UL Heating, cooling, Ventilating and Cooking Equipment, Grease Duct Enclosures, YYET, File R14229.
3. ASTM E 814, Through-Penetration 2 Hour Firestop Tests, hose stream evaluation: UL Fire Resistance - Volume 2, File R14229, CAJ7012, CAJ7014, CAJ7019, CAJ7021, and W-L-7041.
4. ISO 6944-1985, 2-Hour Large Ventilation Duct Fire Resistive Enclosure Test: UL Fire Resistance - Volume 2, Ventilation Duct Assemblies, HNLJ File R14229, Assemblies V1, V2, V3, and V4.
5. ASTM E 119 Standard Method of Fire Tests of Building Construction, 2-Hour Wall Panel Test, 2 Hour External Total Engulfment Test, hose stream evaluation.
6. ASTM C 518 Aging Test, Steady State Heat Flux Measurements and Thermal Transmission Properties.
7. ASTM E 162, Surface Flammability of Materials.
8. ASTM E 136, Combustion Characteristics of Building Materials in a Vertical Tube Furnace.
9. Additional testing:
 - a. Center Support Rod Penetrating Wrap
 - b. Hanger Support Rod Interruption
 - c. Operation of Fire Damper assemblies in a wrapped air ventilation duct
 - d. Large to small transition duct sizes and various metal duct thickness
 - e. Transition to dry wall shaft
 - f. Gypsum wall penetration firestop
 - g. Through penetration firestops with continuously wrapped duct
 - h. Through penetration firestops with wrap terminating above and below firestop

B. Evaluation Research Report: Codes

1. Complies with International Mechanical Code

(IMC), Section 506.3.11, 2000 Edition

2. BOCA Evaluation Services, Inc. Report No. 21-51
 3. Southern Building Code Congress International (SBCCI), Report No. 9424D
 4. NFPA 96, 1998 Edition, Ventilation Control & Fire Protection of Commercial Cooking Operations
 5. California State Fire Marshal, File Nos. 2440-1361:100, 4485-1361:101
 6. New York City Department of Buildings, MEA 417-92-M (Grease Ducts) and MEA 417-92-M Vol.II (Air Ventilation Ducts)
 7. North Carolina Mechanical Code, Section 506 Commercial Kitchen Grease Ducts and Exhaust Equipment, Section 507 Commercial Kitchen Hoods
- C. Health studies for evaluating and rating the performance of low biopersistence insulation blankets (FireMaster Duct Wrap+)
1. RCC Maximum Tolerated Dose Inhalation 2 Year Animal Study - Performed in accordance with: OECD Guidelines and US EPA Regulations.
 2. RCC Intertracheal Inhalation Study-Performed in accordance with the protocol of the European Commission (ECB/TM 26 Rev.7, 1998).
 3. WHO Fiber Half Life Solubility Study - Performed in accordance with Appendix V Nr.7.1 Abs. 1, Satz 2 Kriterium 2 of the German Gefahrstoffverordnung (Rev. 12, June 1998).
 4. Long Fiber Fraction Half Life Solubility Study - Performed in accordance with Guideline 97/69/EC dated 5 December 1997 Appendix Q.

1.03 System Description

A. Thermal Ceramics FireMaster Duct Wrap and FireMaster Duct Wrap+ are two layers, 1 ½" thick, non-mineral wool, 2000°F - 2300°F rated, lightweight, flexible, non-combustible inorganic fireproofing wrap materials completely encapsulated (both layers should be encapsulated) in aluminum foil scrim to protect against the absorption of grease or water. All exposed edges must be sealed to prevent grease and moisture wicking. FireMaster Duct Wrap or FireMaster Duct Wrap+ is directly applied to commercial kitchen grease duct and air ventilation duct systems with steel banding and/or insulation pins in a continuous wrap to allow a zero clearance to combustible construction. FireMaster Duct Wrap and FireMaster Duct Wrap+ are 1 and 2 hour rated alternatives to rigid shaft enclosures, to be applied directly to the duct as tested per manufacturer's (Thermal Ceramics) instructions by a qualified installer and can be installed at zero clearance to combustibles through the length of assembly. Approved equals should demonstrate satisfactory use in similar service for not less than 5 years.

B. Performance Requirements:

1. Two hour rated fire resistive enclosure assembly, ASTM E 119: Large Scale Wall Panel Test and Total Engulfment Test.
2. Zero clearance to combustible, UL1978 Standard for Grease Ducts.
3. Class I interior finish materials, ASTM E 83.

4. Through-penetration protection systems for commercial kitchen grease and air ventilation ducts, ASTM E 814/UL 1479.
5. Non-Combustibility, ASTM E 136.
6. ISO-6944-1985, Fire Resistance Tests -Ventilation Ducts.

1.04 Submittals

- A. Submit test reports substantiating performance requirements and code compliance along with manufacturer's installation instructions.

1.05 Delivery, Storage, and Handling

- A. Deliver materials in original sealed containers or unopened packages, clearly labeled with manufacturer's name, product identification, and lot numbers.
- B. Store materials out of weather and in an enclosed shelter.

Part 2 Products

2.01 Manufacturer

- A. Fire resistive FireMaster Duct Wrap materials; manufactured by Thermal Ceramics, Augusta, Georgia 30903, Thermal Ceramics Burlington, Ontario, Canada, and Thermal Ceramics, Caribbean.

2.02 Materials

- A. Fire Resistive Duct Wrap
 1. Thermal Ceramics FireMaster Duct Wrap and FireMaster Duct Wrap+ are two layers, 1½" thick non-mineral wool, 2000°F -2300°F rated, light weight, foil encapsulated (both layers should be encapsulated), non-combustible inorganic flexible fireproofing wrap materials specifically tested to provide a 1 or 2 hour fire rated enclosure for commercial kitchen grease and air ventilation ducts, to be applied directly to the duct as tested per manufacturer's (Thermal Ceramics) instructions by a qualified installer and can be installed at zero clearance to combustibles through the length of assembly. Approved equals should demonstrate satisfactory use in similar service for not less than 5 years. All exposed edges must be sealed to prevent grease and moisture wicking. FireMaster Duct Wrap is composed of a high temperature alumino-silicate ceramic fiber, and FireMaster Duct Wrap+ is composed of a low biopersistence alkaline earth silicate fiber (AES wool) that does not require a NIOSH respirator (see MSDS available from Thermal Ceramics website).
 2. Thermal Ceramics FireMaster Duct Wrap and FireMaster Duct Wrap+ are 1½" (38,1 mm) thick, 6 pcf density, 24" (60,9 cm) or 48" (121,9 cm) wide x 300" (762 cm) long rolls, foil encapsulated with logo identification. FireMaster Duct Wrap Collar, 8" (20,3 cm) wide for air duct butt joint optional wrap method.
- B. Tapes
 1. High performance filament tape: minimum ¾" (19,0 mm) wide.
 2. Aluminum foil tape: minimum 3" (7.6 cm) wide to seal cut blanket edges.

C. Banding Material

1. Carbon steel banding or stainless steel banding material, minimum ½" (12.7 mm) wide x 0.015" (.381 mm) thick with steel banding clips.

D. Insulation Pins/Washers

1. Pins: 12 gauge, 4 to 5 inches long, copper coated steel; washers: 1½" (38.1 mm) x 1½" (38.1 mm) or 1½" (38.1 mm) diameter, galvanized steel speed clips or cup head pins.

E. Through-Penetration Fire Stop Materials

1. Packing Material: Scrap pieces, FireMaster Duct Wrap or FireMaster Duct Wrap+.
2. 3M FB2000+ Silicone sealant, 3M Fire Barrier 1000N/S, or 3M Fire Barrier 1003S/L Silicone

Sealant.

F. Grease Duct Access Door

1. Steel angle opening frame welded to duct.
2. Access cover, minimum 16 gauge steel.
3. Insulation pins, minimum 12 gauge copper coated steel, 5" long.
4. Speed clips, minimum 1½" (38.1 mm) x 1½" (38.1 mm) square or 1½" (38.1 mm) diameter round galvanized steel.
5. Threaded rods: 5" long (12.7 cm) long, ¼" (6.35 mm) diameter galvanized steel with ¼" (6.35 mm) wing nuts.
6. Four-inch long steel tubing to fit threaded rods.

Part 3 Execution

3.01 Preparation

- A. Remove dirt and dust, and clean surfaces of openings and items penetrating rated floors and rated walls.

3.02 Installation

- A. Grease Ducts: Install FireMaster Duct Wrap or FireMaster Duct Wrap+ system in accordance with manufacturer's instructions and referenced standards. Two layers are installed for 1 or 2 hour commercial kitchen grease duct applications (See Figure 1). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.
- B. Air Ducts: Install 1 layer of FireMaster Duct Wrap or FireMaster Duct Wrap+ for 1 hour air ventilation duct enclosures. Install 2 layers of FireMaster Duct Wrap or FireMaster Duct Wrap+ in accordance with manufacturer's instructions for 2 hour air ventilation duct enclosures (see Figures 2 & 2A). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.
- C. General Installation Instructions: FireMaster Duct Wrap and FireMaster Duct Wrap+ blankets are cut to a length that will fit around the duct and overlap itself no less than 3". Cut edges of the blanket shall be taped with aluminum foil duct wrap tape to prevent exposed edges of the insulation from wicking of condensation moisture in air ventilation ducts or grease from a leaking grease duct joints. Adjacent blankets overlap each other a minimum of 3", or alternatively, they can be fitted together with a tight butt joint and covered with an 8" wide collar. During installation the blankets are temporarily held in place with filament tape until the

wrap is mechanically attached with steel bands (see Figure 1) or insulation pins. For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.

Banding - Carbon steel or stainless steel banding is used to hold the outer layer of the blanket enclosure in place. Banding is a minimum ½" (12.7 mm) wide, and is placed around the entire perimeter of the duct on maximum 10 ½" (267 mm) centers and 1 ½" (38 mm) from each blanket or collar edge.

Pinning - To prevent blanket sag on duct spans 24" (6109 mm) or larger, minimum 12 gauge copper coated steel insulation pins are welded to the duct along bottom horizontal and outside vertical runs in columns spaced 12" (305 mm) apart, 6" to 12" (152-305 mm) from each edge, and on 10 ½" (267 mm) centers. Pins are also required 1" (25 mm) from the end of a duct and 1" from any edge near a 90° bend spaced 6" (152 mm) apart. Pins are locked in place with 1 ½" (38 mm) diameter or 1 ½" square galvanized steels peed clips or cup head pins (see Figure 3). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. Pins shall be turned down or the excess cut off to eliminate sharp edges.

1. **Overlap Wrap Technique:** Each FireMaster Duct Wrap or Duct Wrap+ blanket is applied directly to the duct and is wrapped around the perimeter of the duct so that it overlaps itself a minimum of 3" (75 mm), and also overlaps the adjacent blanket a minimum of 3" (75 mm). (See Figures 1, 2, 2A). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. The outer layer is mechanically attached to the duct with steel banding as described above.
2. **Butt Joint with Collar Technique:** The first layer of FireMaster Duct Wrap or Duct Wrap+ is applied directly to the duct with each adjacent blanket butted tightly against the next. This layer is held in place with filament tape placed around the perimeter of the duct 1½" (38 mm) from the edge of each blanket and in the middle of each blanket. The second layer of FireMaster Duct Wrap or FireMaster Duct Wrap+ is wrapped around the perimeter of the first layer with a tight butt joint construction with the butted joints of the second layer located 12" (305 mm) away from the butted joints of the first layer. Filament tape is used to hold this layer in place. An 8" (203 mm) wide FireMaster Duct Wrap or Duct Wrap+ collar is centered over the joints of the outer layer and wrapped around the perimeter of the duct and cut to a length so that it overlaps itself not less than 3" (75 mm). It is held in place with filament tape placed 1½" (38 mm) from each edge of the collar until banding is in place (see Figures 1, 2, 2A). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.
3. **2 & 3 Sided Wrap System:** When space does not allow for a complete wrap applied to the duct on all four sides, the FireMaster Duct Wrap or Duct

Wrap+ can be installed on 2 or 3 sides of the exposed duct in one of the installation methods described above, and mechanically attached to the concrete or CMU assembly thus enclosing the duct on all accessible sides.

4. **Grease Duct Access Door Installation:** Locate the field fabricated access doors at horizontal cleanouts as required by local codes. Protect with 3 layers of FireMaster Duct Wrap or Duct Wrap+, each layer overlapping previous by 1" (2,54 cm) on all sides and in accordance with manufacturer's instructions (see Figure 4). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. Alternatively, a prefabricated access door protected with the same FireMaster Duct Systems construction, supplied by an authorized FireMaster Distributor, may be utilized.
5. **Through-Penetration Firestop System:** When the duct penetrates a concrete or dry-wall fire rated floor, ceiling, or wall, an approved firestop system must be employed. To fire stop the through penetration void area of the wrapped duct, fill the annular space between the wrapped duct and the periphery of the opening with ¼" (107 mm) thickness of scrap FireMaster Duct Wrap or Duct Wrap+, firmly packed into the opening and recessed ¼" (6.25 mm) below the top of the opening. Apply a minimum ¼" of 3M Fire Barrier 2000+, 1000 N/S, or 1003 S/L silicone sealant over the packing material within the annular space, flush with the top surface of the floor or both surfaces of wall. Alternatively, when there is no room in the remaining annular space to wrap the duct with FireMaster Duct Wrap or Duct Wrap+ material, the FireMaster enclosure may be terminated above and below the floor/ceiling or wall assembly, as shown in Figures 5 to 7, by mechanically attaching the FireMaster to the duct at the termination point above and below the termination area with bands or pins.

3.03 Repair Procedure

- A. Repair damaged FireMaster Duct Wrap or FireMaster Duct Wrap+ in accordance with manufacturer's instructions.
- B. Remove damaged section by cutting bands and removing the anchor clips holding it in place. Apply a new section of same dimension ensuring same overlap and installation method that existed previously. Cut edges and tears in the foil must be taped with aluminum tape to prevent the insulation from wicking moisture or grease which would degrade the fire barrier and create a fire hazard.
- C. The steel banding should be placed around the material and tightened so as to firmly hold the FireMaster Duct Wrap or FireMaster Duct Wrap+ in place without cutting into the blanket causing violation of the fire barrier.

FireMaster is a registered trademark of and is manufactured by Thermal Ceramics.

FireMaster Commercial Kitchen Grease Duct System

Part 1 General

1.01 Summary

Work of this section includes labor, material, and equipment to provide a 2-hour fire-resistive enclosure as a shaft alternative and a method for providing zero clearance to combustible materials for commercial kitchen grease and air ventilation duct systems.

B. Related Sections:

1. Section 15080 Mechanical
2. Section 07840-Firestopping

1.02 References

Test standards and laboratory listings for evaluating and rating performance of fire resistive shaft alternative enclosures and zero clearance to combustibles for flexible duct wrap systems.

1. ASTM E 84, Surface Burning Characteristics: Omega Point Laboratories Applied Fireproofing Listing Nos. 11660-2, 11660-4.
 2. AC 101, Acceptance Criteria for Grease Duct Enclosures, internal grease duct fire test section 5.4, fire engulfment test section 5.5, hose stream test, UBC Standard section 7.108: Omega Point Laboratories Applied Fireproofing Listing Nos. 11660-2, 11660-4 Design No. GD 509 F.
 3. ASTM E 814, Through-Penetration, 2-Hour Firestop Test, hose stream evaluation: Omega Point Laboratories Applied Fireproofing Listing Nos. 11660-2, 11660-4; Design No. GD 509 F.
 4. ASTM E 119 Standard Method of Fire Tests of Building Construction, 2 Hour Wall Panel Test, 2 Hour External Total Engulfment Test, hose stream evaluation.
 5. ASTM C 518 Aging Test, Steady State Heat Flux Measurements and Thermal Transmission Properties.
 6. ASTM E 162, Surface Flammability of Materials.
 7. ASTM E 136, Combustion Characteristics of Building Materials in a Vertical Tube Furnace.
 8. ISO 6944-1985, Method of Determining Fire Resistance of Ventilation Ducts.
- B. Evaluation Research Report: Codes Complies with International Mechanical Code (IMC), Section 506.3.11; Commercial Kitchen Grease Ducts and Exhaust Equipment, Section 507; Commercial Kitchen Hoods CBO Evaluation Services Report ER-4975; NFPA 96, 1998 Edition, Ventilation Control & Fire Protection of Commercial Cooking Operations; California State Fire Marshal, File Nos. 2440-1361:100 and 4485-1361:101; New York City Department of Buildings, MEA 417-092-M (grease ducts) and MEA 417-92-M Vol. II (air ventilation ducts); North Carolina Mechanical Code, Section 506 Commercial Kitchen Grease Ducts and Exhaust Equipment, Section 507 Commercial Kitchen Hoods; California State Fire Marshall: 2440-1361: 104
- C. Health Studies for Evaluating and rating the performance of low biopersistence insulation blankets (FireMaster Duct Wrap+) RCC Maximum Tolerated Dose Inhalation 2 Year Animal Study - Performed in accordance with: OECD Guidelines and US EPA Regulations.
RCC Intertracheal Inhalation Study - Performed in accordance with the protocol of the European Commission (ECB/TM 26 Rev.7, 1998).
WHO Fiber Half Life Solubility Study - Performed in accordance with Appendix V Nr.7.1 Abs. 1, Satz 2 Kriterium 2 of the German Gefahrstoffverordnung (Rev. 12, June 1998).

1.03 System Description

- A. Thermal Ceramics FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ are lightweight, flexible, non-combustible high temperature inorganic fireproofing wrap materials completely encapsulated in aluminum foil scrim to protect against the absorption of grease or water. FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ is directly applied to commercial kitchen grease duct and air ventilation duct systems with steel banding and/or insulation pins in a continuous wrap to allow a zero clearance to combustible construction. FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ are 1 and 2 hour rated alternatives to rigid shaft enclosures.

Performance Requirements:

1. Two hour rated fire resistive enclosure assembly, ASTM E 119: Large Scale Wall Panel Test and Total Engulfment Test.
2. Zero clearance to combustible, ICBO AC101 Acceptance Criteria for Grease Duct Enclosures.
3. Class I interior finish materials, ASTM E 83.
4. Through-penetration protection systems for commercial kitchen grease and air ventilation ducts, ASTM E814/UL1479.
5. Non-Combustibility, ASTM E 136.
6. ISO-6944-1985, Method for Determination of the Fire Resistance of Ventilation Ducts.

1.04 Submittals

- A. Submit test reports substantiating performance requirements and code compliance along with manufacturer's installation instructions.

1.05 Delivery, Storage, and Handling

- A. Deliver materials in original sealed containers or unopened packages, clearly labeled with manufacturer's name, product identification, and lot numbers.
- B. Store materials out of weather and in an enclosed shelter.

Part 2 Products

2.01 Manufacturer

- A. Fire resistive FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ materials; manufactured by Thermal Ceramics, Augusta, Georgia 30903, Thermal Ceramics, Burlington, Ontario Canada, and Thermal Ceramics, Caribbean.

2.02 Materials

- A. Fire resistive duct wrap Thermal Ceramics FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ are totally foil encapsulated, non-combustible, high temperature inorganic flexible fireproofing wrap materials specifically tested to provide a 1 or 2 hour fire rated enclosure for commercial kitchen grease and air ventilation ducts. FireMaster Duct Wrap 2x2 and Duct Wrap 2x2+ may be installed at zero clearance to combustible construction. FireMaster Duct Wrap 2x2 is composed of a high temperature, alumino silicate ceramic fiber, and FireMaster Duct Wrap 2x2+ is composed of a low biopersistence alkaline earth silicate fiber (AES wool) that does not require a NIOSH respirator (see MSDS available from thermalceramics.com website). Thermal Ceramics FireMaster Duct Wrap 2x2 and FireMaster Duct Wrap 2x2+ are 2" (50 mm) thick, 24" (610mm) or 48" (1219mm) wide x 240" (6m) long rolls, foil encapsulated with logo identification. FireMaster Duct Wrap Collar 6" (203 mm) wide for air duct butt joint optional wrap method.

B. Tapes

1. High performance filament tape: minimum ¾" (19mm) wide.
2. Aluminum foil tape: minimum 3"(7.6 cm) wide to seal cut blanket edges.

Banding Material

1. Carbon steel banding or stainless steel banding material, minimum ½" (12.7mm) wide x 0.015" (0.38mm) thick, with steel banding clips.

Insulation Pins/Washers

1. Pins: 10 gauge, 4 to 5 inches long, copper coated steel; washers: 1½" (38,1 mm) x 1½" (38,1 mm) or 1½" (38,1 mm) diameter, galvanized steel speed clips or cup head pins.

Through-Penetration Fire Stop Materials

1. Packing Material: Scrap pieces, FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+.
2. 3M Fire Barrier 2000+, 3M Fire Barrier 1000N/S, or 3M Fire Barrier 1003S/L silicone sealant.

Grease Duct Access Door

1. Access cover, minimum 16 gauges.
2. Insulation pins, minimum 12-gauge copper coated steel, 5" long.
3. Speed clips, minimum 1½" (38.1 mm) x 1½" (38.1 mm) square or 1½" (38.1 mm) diameter round galvanized steel.
4. Threaded rods: 5" long (12.7 cm) long, ½" (6.35 mm) diameter galvanized steel with ¼" (6.35 mm) wing nuts.
5. Four-inch long steel tubing to fit threaded rods.

Part 3 Execution

3.01 Preparation

- A. Remove dirt and dust, and clean surfaces of openings and items penetrating rated floors and rated walls.

3.02 Installation

Install FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ system in accordance with manufacturer's instructions and referenced standards. Two layers are installed for 1 or 2 hour commercial kitchen grease duct applications (see Figure 1). For additional complex duct design installation recommendations, see the Thermal Ceramics complete installation guide.

Install 1 layer of FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ for 1 hour air ventilation duct enclosures. Install 2 layers of FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ in accordance with manufacturer's instructions for 2 hour air ventilation duct enclosures (see Figure 1). For additional complex duct design installation recommendations, see the Thermal Ceramics complete installation guide. An alternative offering increased optimization for air ventilation ducts is to use FireMaster Duct Wrap or FireMaster Duct Wrap+, ½" thick fire protection enclosure. One layer of FireMaster Duct Wrap or FireMaster Duct Wrap+ provides one-hour protection for air ventilation ducts, and two layers provide two hours of protection.

General Installation Instructions:

FireMaster 2x2 and FireMaster Duct Wrap 2x2+ blankets are cut to a length that will fit around the duct and overlap itself no less than 3". Cut edges of the blanket shall be taped with aluminum foil tape to prevent exposed edges of the insulation from wicking of condensation moisture in air ventilation ducts or grease from a leaking grease duct joint. Adjacent blankets overlap each other a minimum of 3", or they can be fitted together with a tight butt joint and covered with a 6" wide collar. Alternatively, a butt joint can be used on the first layer with a 3" overlap on the second layer (see Figure 1). For additional complex duct design installation recommendations

see the Thermal Ceramics complete installation guide. During installation the blankets are temporarily held in place with filament tape until the wrap is mechanically attached with steel bands (see Figure 1) or insulation pins.

Banding - Carbon steel or stainless steel banding is used to hold the outer layer of the blanket enclosure in place. Banding is minimum ½" (12.7 mm) wide, and is placed around the entire perimeter of the duct on maximum 10½" (267 mm) centers and 1½" (38 mm) from each blanket or collar edge.

Pinning - To prevent blanket sag on duct spans 24" (610 mm) or larger, minimum 12-gauge copper coated steel insulation pins are welded to the duct along bottom horizontal and outside vertical runs in columns spaced 12" (305 mm) apart, 6" to 12" (152-305 mm) from each edge, and on 10½" (267 mm) centers. Pins are also required 1" (25 mm) from the end of a duct and 1" from any edge near a 90° bend spaced 6" (152 mm) apart. Pins are locked in place with 1½" (38 mm) diameter or 1½" square galvanized steel speed clips or cup head pins (see Figure 3). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. Pins shall be turned down or the excess cut off to eliminate sharp edges.

Overlap Wrap Technique - Each FireMaster Duct Wrap 2x2 and Duct Wrap 2x2+ blanket is applied directly to the duct and is wrapped around the perimeter of the duct so that it overlaps itself a minimum of 3" (75 mm), and also overlaps the adjacent blanket a minimum of 3" (75 mm) (See Figure 1). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. The outer layer is mechanically attached to the duct with steel banding as described above.

Butt Joint with Collar Technique - The first layer of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ is applied directly to the duct with each adjacent blanket butted tightly against the next. This layer is held in place with filament tape placed around the perimeter of the duct 1½" (38 mm) from the edge of each blanket and in the middle of each blanket. The second layer of FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ is wrapped around the perimeter of the duct and cut to a length so that it overlaps itself not less than 3". The joints of the adjacent blankets are firmly butted together, with the butted joints of the second layer located 12" (305 mm) away from the butted joints of the first layer. Filament tape is used to hold this layer in place as described above. A 6" (152 mm) wide FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ collar is centered over the joints of the outer layer and wrapped around the perimeter of the duct and cut to a length so that it overlaps itself not less than 3" (75 mm). It is held in place with filament tape placed 1½" (38 mm) from each edge of the collar until banding is in place (see Figure 1). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.

Butt Joint with 3" Overlap Technique - The joints of the adjacent FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ blankets on the first layer are firmly butted against each other and held in place with filament tape as described above in the Butt Joint Technique. The second layer is wrapped around first layer using the Overlap Wrap Technique as described above with a minimum of 3" (75 mm) overlap. It is held in place with filament tape placed 1½" (38 mm) from each edge and on 10½" centers until banding is in place (see Figure 1). For additional complex duct design installation recommendations see the Thermal Ceramics installation guide.

Grease Duct Access Door Installation:

Locate the field fabricated access doors and protect with 3 layers of FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ (see Figure 3). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. Alternatively, a prefabricated access door protected with the same FireMaster Duct System construction, supplied by an authorized FireMaster Distributor, may be utilized.

Through-Penetration Firestop System:

When the duct penetrates a concrete or dry wall fire rated floor, ceiling, or wall an approved firestop system must be employed. To fire stop the through penetration void area of the wrapped duct, fill the annular space between the wrapped duct and the periphery of the opening with 4¼" (107 mm) width of scrap FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+, firmly packed into the opening and recessed ¼" (6.25 mm) below the top of the opening. Apply a minimum ¼" of 3M Fire Barrier 2000+, 1000 N/S, or 1003 S/L silicone sealant over the packing material within the annular space, flush with the top surface of the floor or both surfaces of wall (see Figure 4B). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide. Alternatively, when there is no room in the remaining annular space to wrap the duct with FireMaster Duct Wrap 2x2 or Duct Wrap 2x2+ material, the FireMaster enclosure may be terminated above and below the floor/ceiling or wall assembly by mechanically attaching the FireMaster to the duct at the termination point above and below the termination area with bands or pins. The annular space around the bare duct is filled with firmly packed FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ and sealed with a minimum of ¼" Fire Barrier silicone sealant as described above (see Figure 4A). For additional complex duct design installation recommendations see the Thermal Ceramics complete installation guide.

3.03 Repair Procedure

Repair damaged FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ in accordance with manufacturer's instructions. Remove damaged section by cutting the bands and removing the anchor clips holding it in place. Apply a new section of the same dimension ensuring the same overlap and installation method that existed previously. Cut edges and tears in the foil must be taped with aluminum tape to prevent the insulation from wicking moisture or grease, which would degrade the fire barrier and create a fire hazard. The steel banding should be placed around the material and tightened so as to firmly hold the FireMaster Duct Wrap 2x2 or FireMaster Duct Wrap 2x2+ in place without cutting into the blanket causing violation of the fire barrier.

FireMaster is a registered trademark of and is manufactured by Thermal Ceramics.



Thermal Ceramics

FIREMASTER®

FireMaster® Duct Systems Reference List

Duct Chemical

University of Alabama	Tuscaloosa, AL
University of San Diego	San Diego, CA
Schwitzer Lab	Indianapolis, IN
Bryan Lab-Duke University	Durham, NC
Albertus Magnus	Providence, RI
Boeing	Seattle, WA

Duct Grease

Galley, Andrews Air Force Base	Guam
Old Country Buffet	Salinas, CA
McDonald's	Sitka, AK
Inmate Reception Center	San Diego, CA
Birmingham Civic Center	Birmingham, AL
Madera Women's Prison	Madera, CA
Del Champs	Hoover, AL
Soledad Prison	Soledad, CA
Birmingham Turf Club	Birmingham, AL
Delmar	San Diego, CA
McDonald's	Birmingham, AL
Methodist Hospital	Sacramento, CA
Via Linda High School	Scottsdale, AZ
Monte Carlo Hotel	Monte Carlo, CA
AT&T	Mesa, AZ
Disneyland	Anaheim, CA
Mario's Restaurant	Tempe, AZ
Fullerton Hospital	Fullerton, CA
Glendale Schools	Glendale, AZ
Long Beach Memorial	Long Beach, CA
McDonald's	Mesa, AZ
Luckys	N. California, CA
K-Mart	Tucson, AZ
California Pizza	San Mateo, CA
McDonald's	Tempe, AZ
Steak Escape	Cerritos, CA
McDonald's	Phoenix, AZ
Wienerschnitzel	Rancho Cucamonga, CA
Octel	Milpitas, CA
McDonald's	Rancho Cucamonga, CA
Anaheim Stadium	Southern CA
UCLA	Torrance, CA
Getty Center	Southern CA
IHOP	San Francisco, CA
Neiman Marcus	Southern CA
Planet Hollywood	San Francisco, CA
UCLA Exchange	Southern CA
Grace Maternity Hospital	Halifax Nova Scotia, CN
Gap	San Bruno, CA
Broadmoor Golf Club	Colorado Springs, CO
Hana Winery	Healdsburg, CA
Boston Chicken	Broomfield, CO
Claudes Bar & Grill	Santa Cruz, CA
Bennetts Bar-B-Q	Englewood, CO
Round Table Pizza	Sacramento, CA
Fort Lupton Middle School	Ft. Lupton, CO
Culinary Institute	Napa, CA
Grisante's	Greenwood Villi, CO
Tony Romas	Concord, CA

St. Vicent dePaul	Denver, CO
Studio City Home	Studio City, CA
Herrington Elementary	Denver, CO
James Logan High School	Union City, CA
Chic-Fil-A	Aurora, CO
Little Joes	San Francisco, CA
Castle Pines Country Club	Castle Pines, CO
Taco Bell	Walnut Creek, CA
Lutheran Hospital	Wheatridge, CO
Miyako Hotel	San Francisco, CA
On the Border Café	Denver, CO
Rocky & Natasita's	Sonoma, CA
MBNA Telemarket Building	Wilmington, DE
Roys	Spanish Bay, CA
Quale West Country Club	Naples, FL
U.C. Irvine	Irvine, CA
Boco Woods Country Club	Boca Raton, FL
Woolae Oak	Beverly Hills, CA
Ft. Wilderness Hotel	Orlando, FL
TGIF	Oakland, CA
Publix Grocery Store	Lakeland, FL
Spotlight 29	Palm Springs, CA
Ritz Carlton Hotel	Manalapan, FL
Oxnard High School	Oxnard, CA
Sheraton Hotel	Miami, FL
Walt Disney Swan Hotel	Lake Buena Vista, FL
Allstar Hotel Disney	Orlando, FL
Disney Dolphin Hotel	Lake Buena Vista, FL
Grey Oaks Country Club	Naples, FL
Ruby Tuesday's	Clearwater, FL
Mesquite Charles	Springfield, MO
Rye Elementary School	Bradenton, FL
Springfield School	Springfield, MO

Duct Grease

Orange City Convention Center	Orlando, FL
Amigo's Restaurant	St. Joseph, MO
Marina Bay Resort	Ft. Lauderdale, FL
Bartle Hall Convention	Kansas City, MO
Coleman Federal Prison	Coleman, FL
TGI Friday's	Springfield, MO
Omni Rosen Hotel	Orlando, FL
Grecian Steak House	Springfield, MO
Medical College of Georgia	Augusta, GA
Ashbury Church	Springfield, MO
Marietta Sporting Club	Tucker, GA
Dillions Superstore	Springfield, MO
Atlanta International Airport	Atlanta, GA
St. Louis Stadium	St. Louis, MO
Morrison's Fresh Ck	Marietta, GA
Lone Star Steak Salon	Branson, MO
Ihilani Hotel	Honolulu, HI
Arby's	Raytown, MO
Ilikai Hotel	Waikiki, HI
McDonald's	Belgrade, MT
Ritz Carlton	Maui, HI
McDonald's	Dillon, MT
Sheraton Moana Surf	Honolulu, HI
McDonald's	Glaslow, MT
Hapuna Prince	S. Kohala Coast, HI
McDonald's	Kalispell, MT
L'Italiano's Restaurant	Honolulu, HI
Prisms Restaurant	Charlotte, NC
Kaholo Mandrian	Honolulu, HI
Hardee's	Stanley, NC
Hale Koa Hotel	Waikiki, HI
Murdoch Center	Butner, NC



Thermal Ceramics



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FIREMASTER®

Pizza Hut Iikai Hotel
 Old Spaghetti Factory
 Hale Koa Hotel
 City Fair
 Forniao Restaurant
 The Mill Restaurant
 Principal Building
 Hardee's
 Red Lobster
 Hardee's
 Dunkin Donuts
 Hardee's
 University of Illinois
 McDonald's
 Lone Star Steak Salon
 Wendy's
 Prudential I Tower
 Duke University Cafeteria
 Circle Center Mall
 Nations Bank Tower
 Indiana Medical Center
 Hardee's
 Olive Garden Restaurant
 Denny's
 St. Benedictine
 Denny's
 Lutheran Hospital
 Denny's
 McDonald's
 Hardee's
 Tiffany's Bakery
 Duke Power
 Tool Shed Restaurant
 Denny's
 Macaroni Grill
 Days Hotel
 Boston Chicken
 Duke-R.D. Thomas Building
 Sterling House Health CTN
 Olive Garden
 Greyhound Dog Track
 Camden Aquarium
 Arby's
 Robert Wood Johnson
 Old Country Buffet
 McDonald's
 Main Street Deli
 Intel FAB 11
 Boeing Mil Airplane
 Sandia National Labs
 Koch Industries
 Tratorias
 Kentucky Fried Chicken
 Smoke Ranch Junction
 Westinghouse-Tech Bldg.
 Lamb of God Lutheran
 National Security Ag.
 Bombadear
 National Security Ag.
 Bomerang
 Pargo's Restaurant
 Wendy's

Waikiki, HI
 Charlotte, NC
 Waikiki, HI
 Charlotte, NC
 Honolulu, HI
 Charlotte, NC
 Des Moines, IA
 Laurel Park, NC
 Coeur d'Alene, ID
 Huntersville, NC
 Lisle, IL
 Morrisville, NC
 Champaign, IL
 New Hanover City, NC
 Springfield, IL
 New Hanover City, NC
 Chicago, IL
 Durham, NC
 Indianapolis, IN
 Charlotte, NC
 Fort Wayne, IN
 Old Fort, NC
 Fort Wayne, IN
 Mooresville, NC
 Ferdinand, IN
 Morganton, NC
 Ft. Wayne, IN
 Black Mountain, NC
 Indianapolis, IN
 Morganton, NC
 Topeka, KS
 Charlotte, NC
 Olathe, KS
 Greensboro, NC
 Overland Park, KS
 Charlotte, NC
 Overland Park, KS
 Durham, NC
 Lenexa, KS
 E. Hanover, NJ
 Sedgwick County, KS
 Camden, NJ
 Topeka, KS
 New Brunswick, NJ
 Topeka, KS
 South Plainfield, NJ
 Lawrence, KS
 Rio Rancho, NM
 Sedgwick County, KS
 Albuquerque, NM
 Wichita, KS
 Las Vegas, NV
 Grayson, KY
 Las Vegas, NV
 Baltimore, MD
 Las Vegas, NV
 Baltimore, MD
 Las Vegas, NV
 Baltimore, MD
 Las Vegas, NV
 Frederick, MD
 Las Vegas, NV

Ruby Tuesdays
 Macaroni Grill
 One Detroit Center
 McDonald's
 Kentucky Fried Chicken
 Grand Gourmet at MGM
 Little Caesar's
 Family Fun Center

Southfield, MI
 Las Vegas, NV
 Detroit, MI
 Las Vegas, NV
 Battle Creek, MI
 Las Vegas, NV
 Detroit, MI
 Las Vegas, NV

Duct Grease

Wayne County Correctional
 Family Fun Center
 Detroit Athletic Club
 Ruby's at Bowling Center
 Wendy's
 Hyatt at Lake Tahoe
 Mall of America
 Project C Hotel Casino
 Raintree Forest Restaurant
 Kokomo's Mirage Hotel
 McDonald's
 Union Plaza
 China Town Plaza
 Hyatt at Lake Tahoe
 Denny's
 Garlic House
 Pizza Hut
 Sam's Town
 Outback Steak House
 HIP
 4 Queens Hotel and Casino
 Morgan Stanley
 Horseshoe Hotel
 George Eastman House
 Circus Circus
 Red Lobster
 Buffalo Bills
 Red Lobster
 Boulder Station
 Federal Reserve Building
 Casino Royale
 Eastview Mall
 Planet Hollywood
 Endwell Hospital
 Spats
 Carousel Mall
 Verdi Café
 Nationwide
 Turtle Stop Stores
 Juvenile Detention Center
 Caesars Palace
 Wyndham Hotel
 Tropicana Hotel
 McDonald's
 Las Vegas Hilton
 McDonald's
 Silver Legacy
 Grady's Restaurant
 Hot Dog on a Stick
 Macaroni Grill
 Rio Hotel & Casino
 Portland International Airport
 Grand Slam Hotel
 US Bank Tower
 Nugget Hotel & Casino
 Spirit Mountain Casino
 Boulevard Mall Restaurant
 Geriatric Center
 Sands Hotel & Casino
 Joseph Stokes Recreation

Detroit, MI
 Las Vegas, NV
 Detroit, MI
 Reno, NV
 Maple Grove, MN
 Reno, NV
 St. Paul, MN
 Reno, NV
 St. Paul, MN
 Las Vegas, NV
 Springfield, MO
 Las Vegas, NV
 Las Vegas, NV
 Reno, NV
 Las Vegas, NV
 Las Vegas, NV
 Las Vegas, NV
 Las Vegas, NV
 White Plains, NY
 Las Vegas, NV
 New York City, NY
 Las Vegas, NV
 Rochester, NY
 Las Vegas, NV
 Niagara Falls, NY
 Stateline, NV
 Niagara Falls, NY
 Las Vegas, NV
 Buffalo, NY
 Las Vegas, NV
 Rochester, NY
 Las Vegas, NV
 Johnson City, NY
 Incline Village, NV
 Syracuse, NY
 Las Vegas, NV
 Columbus, OH
 Las Vegas, NV
 Cincinnati, OH
 Las Vegas, NV
 Cleveland, OH
 Las Vegas, NV
 Yukon, OK
 Las Vegas, NV
 Yukon, OK
 Reno, NV
 Oklahoma City, OK
 Reno, NV
 Oklahoma City, OK
 Las Vegas, NV
 Portland, OR
 Las Vegas, NV
 Portland, OR
 Las Vegas, NV
 Polk County, OR
 Las Vegas, NV
 Allentown, PA
 Las Vegas, NV
 Philadelphia, PA



Thermal Ceramics

FIREMASTER®

Fog City Diner
 Marriott Hotel
 Rio Hotel & Casino
 Boston Chicken
 Continental Hotel
 VA Hospital
 Caesars Palace
 Burger King
 Chevy's Restaurant
 Richland Mall
 Hamburger Hamlet Restaurant
 TGI Friday's Restaurant
 Bally's
 Chase Restaurant
 MGM Grand Theme Park
 Pontiac Elementary
 Luxor Hotel
 Nashville Stadium
 Kenny Roger Roaster
 Hard Rock Café
 Whiskey Pete Hotel
 E.O. Woods
 Reno Hilton
 Black Eyed Pea
 Eddorado Hotel
 Bay Area Hospital
 Burger King/Circus Circus
 Alamodome
 Boston Chicken
 Wendy's
 Stratosphere Tower
 Ryan Steak House
 Blue Diamond Boomtown
 Del Norte Hotel
 Kentucky Fried Chicken
 Dulles International Airport
 Kentucky Fried Chicken
 Underwriter's Labs
 Burger King
 McDonald's
 PriMadonna
 McDonald's

Las Vegas, NV
 Philadelphia, PA
 Las Vegas, NV
 Philadelphia, PA
 Las Vegas, NV
 Philadelphia, PA
 Las Tahoe, NV
 Columbia, SC
 Las Vegas, NV
 Columbia, SC
 Las Vegas, NV
 Columbia, SC
 Las Vegas, NV
 Columbia, SC
 Las Vegas, NV
 Nashville, TN
 Las Vegas, NV
 Nashville, TN
 Clark County, NV
 Ft. Worth, TX
 Reno, NV
 Garland, TX
 Reno, NV
 Corpus Christi, TX
 Las Vegas, NV
 San Antonio, TX
 Las Vegas, NV
 Austin, TX
 Las Vegas, NV
 Austin, TX
 Las Vegas, NV
 El Paso, TX
 Las Vegas, NV
 Chantilly, VA
 Reno, NV
 Camas, WA
 Reno, NV
 Seattle, WA
 Stateline, NV
 Yelm, WA

Duct HVAC

L.B. Memorial Hospital
 U.S Court of Appeals
 Lam Research
 USDC Science Building
 K-Mart
 San Francisco Library
 Calloway Golf Manufacturing
 The Avenue Store
 Orange Cty. Convention Ctr.
 V.A. Hospital
 Honolulu Medical Convention Ctr.
 Hospital HVAC Duct
 Bank One Center
 Rows Wharf
 Signature Inn
 Monroe Public School
 First Union Bank
 AT&T Building II
 Merck Pharmacy
 Grand Slam Hotel
 Nevada State Library
 Luxor Hotel
 Blue Diamond Boomtown
 Gershwin Theater
 Watchtower Magazine
 Buffalo University
 Nordstroms
 Nordstroms-Westchester
 Hewlett Packard
 Providence College
 Charlotte Knights
 Brook Army Hospital
 George Washington University
 Winchester Medical Center
 Boeing

Long Beach, CA
 San Francisco, CA
 Berkeley, CA
 San Diego, CA
 Turlock, CA
 San Francisco, CA
 Carlsbad, CA
 Jacksonville, FL
 Orlando, FL
 Dekalb County, GA
 Honolulu, HI
 Des Moines, IA
 Indianapolis, IN
 Boston, MA
 Auburn Hills, MI
 Monroe, MI
 Charlotte, NC
 Murray Hill, NJ
 Rahway, NJ
 Las Vegas, NV
 Carson City, NV
 Las Vegas, NV
 Las Vegas, NV
 Manhattan, NY
 Patterson, NY
 Buffalo, NY
 White Plains, NY
 White Plains, NY
 Corvallis, OR
 Providence, RI
 Fort Mills, SC
 Fort Sam Houston, TX
 Loudon County, VA
 Winchester, VA
 Seattle, WA

Duct Grease

Embassy Suites Hotel
 Embassy Suites Hotel
 St. Peters Hospital
 St. Peters Hospital
 Top Foods Grocery
 Top Foods Grocery
 Panda Bear Restaurant
 Panda Bear Restaurant
 McDonald's
 McDonald's
 Multicare Center
 Multicare Center
 Boeing Longacres
 Boeing Longacres
 McDonald's
 McDonald's
 Bellevue, WA
 Bellevue, WA
 Olympia, WA
 Olympia, WA
 Poyallup, WA
 Poyallup, WA
 Bellevue, WA
 Bellevue, WA
 Spokane, WA
 Spokane, WA
 Tacoma, WA
 Tacoma, WA
 Renton, WA
 Renton, WA
 South Charleston, WV
 South Charleston, WV



Thermal Ceramics

FIREMASTER®

September 5, 2001

FireMaster® is a registered trademark of Thermal Ceramics, manufactured by Thermal Ceramics worldwide. Thermal Ceramics has extensively tested FireMaster Duct Systems for over 10 years with Underwriters Laboratories and Omega Point Laboratories to qualify a number of listings for commercial kitchen grease exhaust ducts and air ventilation ducts protection. This battery of performance testing has gained recognition of BOCA, SBCCI, ICBO, IMC, NFPA 96, California State Fire Marshal, MEA and many individual local jurisdictions. These products were distributed by Thermal Ceramics from 1991 to 1994 and have been distributed by 3M Company since late 1994. Thermal Ceramics is happy to announce that we are again distributing these products through our own network of authorized distributors. Current specifications may designate the name "3M FireMaster". These specifications should be changed to "Thermal Ceramics FireMaster" to reflect the manufacturer of the product, and owner of the registered name, and listings.

Thermal Ceramics FireMaster Grease & Air Duct Systems Code Compliance

Building Code Compliance	FastWrap+	Duct Wrap+	Duct Wrap	Duct Wrap 2x2+	Duct Wrap 2x2
SBCCI	9424D	9424D	9424D		
BOCA	21.51	21.51	21.51		
ICBO				ER 4975	ER 4975
CA State Fire Marshal	2440:1361:103	2440-1361:100 4485-1361:101	2440-1361:100 4485-1361:101	2440:1361:104	2440:1361:104
NY MEA	422-00-M 421-00-M	417-92-M 417-92-M Vol II	417-92-M 417-92-M Vol II		
NFPA 96 1998 Edition	√	√	√	√	√
IMC 506.3.11	√	√	√	√	√

Thermal Ceramics offers a wide range of FireMaster Duct System including the following products:

- FireMaster FastWrap®+
- FireMaster Duct Wrap 2x2
- FireMaster Duct Wrap 2x2+
- FireMaster Duct Wrap
- FireMaster Duct Wrap+
- FireMaster PlenumWrap®+
- FireMaster PlenumWrap

For more information regarding FireMaster Duct Systems or your nearest authorized FireMaster distributor, please do not hesitate to contact Thermal Ceramics at 706-796-4200, firemaster@thermalceramics.com, or visit our website at www.thermalceramics.com.

Regards,
Vicki Floyd
Sr. Market Manager, Fire Protection



Thermal Ceramics

FIREMASTER®

Duct Fire Protection Systems Health & Safety Aspects

Thermal Ceramics manufactures a complete line of high temperature fibrous insulation products for fire protection applications that have been extensively tested approved by UL, Omega Point Laboratories, LPC Laboratories, NFPA, International Mechanical Code, SBCCI, BOCA, ICBO, California State Fire Marshal, MEA New York, and many major local jurisdictions. These products are marketed under the trade names FireMaster® and FireMaster+. The difference between the two is in their chemistries. FireMaster products are alumino-silicate, refractory ceramic fibers (RCF). FireMaster+ products are composed of alkaline-earth silicate (AES) wools (Superwool®) that duplicate the same physical and thermal properties of FireMaster products with a more body soluble fibrous structure (i.e., low biopersistence). Selection of the preferred product depends both on the technical specifications and on possible interest in the material's capacity to persist in the body.

Both FireMaster and FireMaster+ products come fully encapsulated in an aluminum foil scrim bag to provide a moisture and grease barrier and to preserve the integrity of the fibrous material. Both FireMaster RCF and FireMaster+ Superwool products have provided many years of outstanding fire protection worldwide. They have been used in a wide variety of industrial, commercial, and original equipment manufacturing applications with over a decade of proven performance for successful fire containment.

Thermal Ceramics' FireMaster+ products have shown no adverse health effects and are the only AES materials that have undergone a lifetime, animal toxicology study. FireMaster+ products are exonerated (1) from any carcinogenic classification in the countries of the European Union under Directive 97/69/EC and have not been classified by the International Agency for Research on Cancer (IARC). Respiratory protection is not necessary when using FireMaster+ products, only a matter of personal choice.

In addition to the health benefits of FireMaster products, life safety is ensured with dependable and reliable performance. Unlike lower temperature fibrous products, such as mineral wool that shrinks and becomes brittle at 1300°F, FireMaster is rated at 2300°F, and 2000°F for FireMaster+ products. This means assured fire protection that is unchanged in the most hostile fire conditions, such as grease or air ventilation duct fire containment.

(1) Fraunhofer Institute for Inhalation Toxicology (Hannover, Germany); AEA Technology, Harwell Oxon/Zeneca Central Toxicology Laboratory (Alderly Edge, UK) and Sciences International Inc. (Alexandria, VA)

FireMaster is a registered trademark of Thermal Ceramics and manufactured by Thermal Ceramics.
To view the most updated MSDS please refer to www.thermalceramics.com



Thermal Ceramics

FIREMASTER®

Thermal Ceramics offers a line of UL-classified products that are dedicated to the fire protection market and are manufactured/supplied by Thermal Ceramics under the trade name FireMaster®. These high temperature insulation materials are offered in two types; a body soluble, low biopersistent fiber technology and a ceramic fiber composition. The FireMaster body soluble fiber composition is designated by a (+) sign after the brand name and does not require respirator protection during installation. These high performance materials have a service range from 2000°F to 2300°F which provides outstanding performance required to meet industry's need for high quality, reliable fire protection materials that are cost-effective.

In order to ensure conformance and certification capability to national testing laboratory standards and approval agencies, FireMaster products meet strict manufacturing tolerances and quality control inspections for product consistency. These procedures ensure that the high performance properties of FireMaster products are maintained for this critical life safety market.

To distinguish it from industrial grade materials for the fire protection market, product packaging for the FireMaster line is identified with the OPL Label, FireMaster logo and product information.

You may encounter specifications that refer to our industrial grade Kaowoolâ product designation; however, Thermal Ceramics recommends that only FireMaster products with the OPL label be used for all life safety applications.

PERFORMANCE COMPARISON CHART FIREMASTER VS. OTHER BUILDING MATERIALS

	FIREMASTER+	FIREMASTER	FIBERGLASS	MINERAL WOOL	CAL SIL	DRYWALL
Design Use Limit (°F)	2000	2300	1000	1200	1800	212
Melting Point (°F)	2327	3200	1300	2000+	2700	NA
Flame Spread	0	0	25	15	0	15
Smoke Developed	0	0	50	0	0	0
Fuel Contributed	0	0	NA	5	0	15
R value/inch	4.15	4.15	3.77	3.67	2.80	0.90
Acoustics NRC/inch	0.85	0.85	0.70	0.60	NA	NA
Density (pcf)	6-8	6-8	1.0	4.0	14.5	48.0
Form Supplied	Roll	Roll	Roll	Batt	Board	Board



Thermal Ceramics

FIREMASTER[®]

**FireMaster[®]
FastWrap[®]+
Installation Drawings**



Thermal Ceramics

FIREMASTER[®]

**FireMaster[®]
Duct Wrap, Duct Wrap+
Installation Drawings**



Thermal Ceramics

FIREMASTER[®]

**FireMaster[®]
Duct Wrap 2x2, Duct Wrap 2x2+
Installation Drawings**



Thermal Ceramics

FIREMASTER[®]

**FireMaster[®]
PlenumWrap[®], PlenumWrap+
Installation Drawings**