NSi

DECEMBER 2007

FireStop™

SYSTEM COMPONENTS

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TORK® POLARIS™ EASY-TWIST™ LIGHTING TORK®ALERT™

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Terms of Sale

Vendor Number: 662381

1. Prices are F.O.B. our plant.
2. Prices do not include any sales tax.
3. Freight charges will be prepaid on all orders $250.00 and over shipping within continental USA using standard shipping methods and service.
4. Minimum order – $100.00.
5. Claims for shortage, erroneous charges or price corrections shall be deemed waived unless made in writing, delivered to NSi within 30 days of invoice.
6. Terms of payment – 2% 10th prox. net 25th following.
7. Warranties – NSi guarantees all products to be free of defects in material and workmanship for a period of 90 days from date of sale. Any claims for defective material must be agreed to in writing by NSi. Defective material will be replaced on an F.O.B. – our factory basis. NSi disclaims the implied warranty of fitness for a particular application.

Other Products Available

NSi can provide many other products for special applications which are not listed in this catalog. If you require an item which you do not find listed, please contact us. We would be pleased to provide a quotation upon receipt of a drawing or a sample.

Guarantee

It is our goal to provide extraordinary products and service on a daily basis. If our products or service do not meet with your satisfaction, please let us know immediately and we promise to make every reasonable effort to remedy the situation.

FIRESTOP™ INTUMESCENT CAULK

NSi FireStop™ Intumescent Caulk is water-based, single component elastomeric sealant intended for use as a firestop system component. It forms an economical yet durable, flexible and watertight bond with most construction materials. It is applied independently for "caulk and walk" systems or over mineral wool or backer rod to seal the openings where building services such as pipes and cables penetrate fire rated assemblies. Will not crack or crumble as the physical properties remain stable over time. It tools easily and cleans up with water. May be applied by caulking gun or trowel. ASTM E 814 and UL 1479.

CATALOG NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FSIC-10	05540	FireStop Intumescent Caulk in 10.3 fl. oz. cartridges (304 ml)	12	25
FSIC-20	05541	FireStop Intumescent Caulk in 20 oz. foil packs (600 ml)	12	19
FSIC-45	05542	FireStop Intumescent Caulk in 4.5 US gallon pails (17L)	1	48

FIRESTOP™ SILICONE

NSi FireStop™ Silicone is a primerless, single component silicone sealant. The sealant cures to a durable, flexible silicone rubber when exposed to atmospheric moisture. It is designed for economical use in joint and service penetration firestop configurations and forms a watertight bond with most construction materials. In most cases, no primer is required.

NSi FireStop™ Silicone is designed to tool easily. It will not crack or crumble as its physical properties remain stable over time. It may be applied over a wide temperature range, 0°F to 120°F (-18°C to 50°C), allowing it to be applied in any season. It will remain flexible indefinitely between temperatures of -50°F and 300°F (-45°C and 149°C). May be applied by caulking gun or trowel. ASTM E 814 and UL 1479.

CATALOG NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FSS-10	05543	FireStop Silicone in 10.3 fl. oz. cartridges (304 ml)	12	25
FSS-20	05544	FireStop Silicone in 20 oz. foil packs (600 ml)	12	19
FSS-45	05545	FireStop Silicone in 4.5 US gallon pails (17L)	1	48

FIRESTOP™ SILICONE SL

NSi FireStop™ Silicone SL is a primerless, single component self-levelling silicone sealant. The sealant cures to a durable, flexible silicone rubber when exposed to atmospheric moisture. It is designed for economical use in joint and service penetration firestop configurations and forms a watertight bond with most construction materials. In most cases, no primer is required.

FireStop™ Silicone SL is designed to self-level. No tooling is required. It will not crack or crumble as its physical properties remain stable over time. It may be applied over a wide temperature range, 0°F to 120°F (-18°C to 50°C), allowing it to be applied in any season. It will remain flexible indefinitely between temperatures of -50°F and 300°F (-45°C and 149°C). May be applied by caulking gun or trowel. ASTM E 814 and UL 1479.

CATALOG NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FSSL-10	05546	FireStop Silicone SL in 10.3 fl. oz. cartridges (304 ml)	12	25
FSSL-20	05547	FireStop Silicone SL in 20 oz. foil packs (600 ml)	12	19
FSSL-45	05548	FireStop Silicone SL in 4.5 US gallon pails (17L)	1	48

FIRESTOP814™ RESIDENTIAL & COMMERCIAL FIRE STOP

NSi FireStop814™ Fire stopping caulk is a single component, non-combustible, non-intumescent material for residential and commercial applications. Colored red for easy inspection, FireStop814™ creates an effective barrier against flames, smoke, and toxic gasses and has superior adhesion and gunnability. FireStop814™ is for use in annular spaces around wires and pipes, in one- and two-hour fire rated assemblies. It restores the integrity of firestops in residential and commercial construction. Meets UL 1479/ ASTM-E814 standards.

CATALOG NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FS-814	05567	10.3oz Caulk Tube, Red, non-intumescent commercial fire stop	12	14

FIREBLOCK136™ RESIDENTIAL RATED FIRE BLOCK

NSi FireBlock136™ Fire-blocking caulk is a single component, non-combustible material for residential applications. Colored red for easy inspection, FireBlock136™ creates an effective barrier against flames, smoke, and toxic gasses and has superior adhesion and gunnability. FireBlock136™ is for use in annular spaces around wires, pipes, ducts, vents and other penetrating items at ceiling and floor openings; and room to room in wood and steel frame constructions. It restores the integrity of fireblocks in one and two family construction. Exceeds ASTM-E136 standards for fireblocking residential requirements prescribed by all major-model building codes, and also meets or exceeds requirements of UBC, BOCA, SBC, IRC, NYS and MA codes. Meets UL 1479/ ASTM-E136 standards.

CATALOG NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FS-136	05566	10.3oz Caulk Tube, Red; Non-combustible for residential applications	12	14

FIRE RATED PUTTY STICKS AND PUTTY PADS

NSi Fire Rated Putty is a moldable non-curing, one-component fire rated material for through penetration fire stop systems. In the event of a fire, Putty will expand when exposed to fire, forming an insulating char, which prevents the spread of flames, smoke, gas and water through penetration openings. Installation is easy as there are no additives, there is no mixing and no curing time is required. The putty is applied by hand and adheres to all common building surfaces. Putty can be installed in confined or occupied spaces since there are no volatile solvents or asbestos fillers.

NSi Putty systems are rated up to 3 hours in accordance with ASTM E 814, UL 1479 and ULC/CAN4-S115-M standards. NSi Fire Rated Putty is available in sticks or pads.

Moldable Putty Pads are available in two sizes, 6" x 7" x 1/8" or 7" x 7" x 1/8", and are classified as a wall opening protective material. Use them to protect metal electrical cabinets, outlet boxes and mechanical cabinets. STC Rating 49.

Putty Sticks are 1 1/2" in diameter x 10 inches long, and are classified as a fill, void or cavity material by UL. Use them to seal around cable, electrical conduit and metal pipe to prevent passage of smoke, flame and toxic gases. They will not dry out and can be reused as additional penetrating items are installed or removed.

CATALOG NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FSPS	05555	Putty sticks – 1 1/2" diameter x 10" long (18 cu. in.) – Red	12	13
FSPP-1	05556	Putty pads – 6" x 7" – Red	20	8
FSPP-2	05557	Putty pads – 7" x 7" – Red	20	9

FIRESTOP™ MORTAR

NSi FireStop Mortar™ is a single component non-combustible fiber reinforced, foamed cement mortar. It is intended to provide economical, non-combustible and tight-fitting firestops at openings and penetrations through fire-rated wall and floor assemblies. FireStop™ Mortar powder mixes easily to form a shaving cream-like, non-slumping paste. This feature permits easy installation with a minimum of damming.

When cured, FireStop™ Mortar is self-supporting and therefore may be used for large openings where other firestopping materials are impractical. It requires and contains no solvents and is comprised of materials of low toxicity. It mixes and trowels easily and tools are cleaned with water. Dust protection is recommended. The color is a distinctive charcoal (dark grey). ASTM E 814 and UL 1479. Coverage per bag is 850 cn in. or 0.49 cn ft.

CATALOG NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FSM	05549	FireStop Mortar in 15.5 lb. (7 kg) bags	1	15.5

FIRESTOP™ MINERAL WOOL

NSi FireStop™ Mineral Wool is a pre-formed, non-combustible mineral wool insulation. It is a semi-rigid combination of basaltic mineral wool and proprietary binders. The mineral wool is pre-cut into various widths and depths in 48 inch lengths for ease of handling and immediate installation. It is intended for use as a firestop system component and forming material in tested firestop systems and designs. It is friction fitted into openings, joints, gaps, spaces and voids in fire rated assemblies. It is usually used in conjunction with firestop sealant products such as Silicone, Silicone SL and Intumescent Caulk.

CATALOC NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FSMW	05550	FireStop Mineral Wool in 25 lb. bags	1	25

FIRESTOP™ PILLOWS

NSi FireStop Pillows™ are a single step firestop system component. They are intended for wall and/or floor openings through fire separations where temporary or permanent firestops are required. They are ideal where cable retrofitting is frequent and anticipated. These pillows allow for quick and clean single product installation. Pillows are self-supporting – no wire lath or mesh is required. They are to be packed tightly into the voids between penetrating items and the perimeter of the opening. During a fire, the intumescent component within each pillow dramatically expands to seal the opening from fire, thereby maintaining the integrity of the fire separation.

FireStop™ Pillows consist of an intumescent layer sandwiched between non-combustible insulation, all enclosed in a hermetically sealed polyethylene shell. No sealant or putty is required. Easy to install, easy to remove – a quick and clean single product installation. ASTM E 814 and UL 1479.

CATALOG NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FSP	05551	FireStop Pillows 2 in. x 4 in. x 8 in. (50 x 100 x 200 mm.)	25	7

FIRESTOP™ BOX GUARDS

NSi FireStop™ Box Guards are one component fire rated pads made of highly intumescent firestop material for use in electrical boxes. They are inserted in the box and adhere to the inside back wall. FireStop™ Box Guards are easy to install and very cost effective. When exposed to fire they expand, forming a char that will seal off the opening, prevent the spread of fire and limit the temperature rise on the unexposed surfaces. When used as directed, the horizontal separation between outlet boxes on opposite sides of the wall may be less than 24 inches, provided that the boxes are not back-to-back.

FireStop™ Box Guards are classified by UL under Wall Opening Protective Material as found in the Fire Resistance Directory. Available in two sizes to suit single and double boxes. STC Rating 55.

CATALOG NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FSBG-1	05558	Single box insert	50	3
FSBG-2	05559	Double box insert	50	7

FIRESTOP™ COVER GUARDS

NSi FireStop™ Cover Guards are one component fire rated gaskets made of highly intumescent firestop material for use in electrical boxes. They are mounted on the inside of the cover plate and installed at the same time as the cover plate. When exposed to fire they expand, forming a char that will seal off the opening, prevent the spread of fire and limit the temperature rise on the unexposed surfaces.

NSi FireStop™ Cover Guards are easy to install and very cost effective. Excellent for use when addressing the 24 inch rule. They are used when electrical boxes are installed in rated walls facing opposite directions and horizontally separated by less than 24 inches. They can also be used as a solution for standard electrical boxes when the 100 square inch rule is violated. Exceptional for safe, retrofit applications. Can be used for both metal and plastic cover plates.

FireStop™ Cover Guards are available as single switch, double switch, single receptacle, single décor and double décor. An economical alternative to putty pads. STC Rating 54.

CATALOG NO.	UPC CODE	DESCRIPTION	CTN. QTY.	LBS./CTN.
FSSRC	05560	Single receptacle cover guard	50	2
FSDRC	05561	Double receptacle cover guard	50	3
FSSSC	05562	Single switch	50	2
FSDSC	05563	Double switch	50	3
FSSDC	05564	Single décor	50	2
FSDDC	05565	Double décor	50	3

CONDUIT AND EMT

MAX. PEN. DIAMETER	RATING (HR.)	MAX. OPENING	FLOOR OR WALL SYSTEM	NSi FIRESTOP PRODUCT(S) REQUIRED	APPLICATION THICKNESS	SYSTEM NO.	PAGE NO.
6 in. conduit & EMT or smaller	3	0 in. to 2 in. annulus	Floor – concrete, Wall – concrete or concrete block	NSi FireStop Intumescent Caulk NSi FireStop Mineral Wool	Min. 1/4 in. thick within annulus flush with top of floor or both surfaces of wall Min. 4 in. thick packed into opening (wall both sides)	C-AJ-1509	10
6 in. conduit & EMT or smaller	2	0 in. to 2 1/4 in. annulus	Floor – concrete (2 1/2 in. min.), Wall – concrete, concrete block or precast units	NSi FireStop Intumescent Caulk NSi FireStop Mineral Wool	Min. 1/4 in. thick within annulus flush with top of floor or both surfaces of wall Min. 4 in. thick packed into opening (wall both sides)	C-AJ-1510	10
6 in. conduit & EMT or smaller	2	0 in. to 7/8 in. annulus	Floor – concrete (2 1/2 in. min.), Wall – concrete, concrete block or precast units	NSi FireStop Intumescent Caulk	Min. 1/2 in. thick within annulus flush with top of floor or both surfaces of wall	C-AJ-1511	11
4 in. conduit & 6 in. EMT or smaller	2	0 in. to 3 1/4 in. annulus	Floor – concrete, Wall – concrete, concrete block or precast units	NSi FireStop Silicone or Silicone SL NSi FireStop Mineral Wool	Min. 1/2 in. thick within annulus flush with top of floor or both surfaces of wall Min. 4 in. thick packed into opening (wall both sides)	C-AJ-1508	11
8 in. diameter or smaller	2	0 in. to 3 7/8 in. annulus	Floor – concrete	NSi FireStop Silicone SL NSi FireStop Mineral Wool	Min. 1/4 in. thick within annulus flush with top of floor Min. 4 in. thick packed into opening	C-AJ-1507	12
6 in. conduit & EMT or smaller	2	0 in. to 1/2 in. annulus	Wall – gypsum board	NSi FireStop Intumescent Caulk	Min. 1 1/4 in. thick within annulus flush with both surfaces of wall	W-L-1349	12
6 in. conduit & EMT or smaller	2	0 in. to 1 1/2 in. annulus	Wall – gypsum board	NSi FireStop Intumescent Caulk NSi FireStop Mineral Wool	Min. 5/8 in. thick within annulus flush with both surfaces of wall Min. 2 in. thick packed into opening on both sides of wall	W-L-1350	13
6 in. conduit & EMT or smaller	1	1/4 in. to 1/2 in. annulus	Wall – gypsum board	NSi FireStop Intumescent Caulk	Min. 5/8 in. thick within annulus flush with both surfaces of wall	W-L-1351	13
3 in. conduit & EMT or smaller	2	0 in. to 1 3/4 in. annulus	Wall – gypsum board	NSi FireStop Intumescent Caulk	Min. 1 1/4 in. thick within annulus flush with both surfaces of wall	W-L-1348	14
2 in. conduit & EMT or smaller	1 & 2	0 in. to 1 7/8 in. annulus	Wall – gypsum board	NSi FireStop Silicone	Min. 5/8 in. thick within annulus flush with both surfaces of wall	W-L-1347	14
4 in. conduit & EMT or smaller	1	1/4 in. annulus	Floor – lumber Ceiling – gypsum board	NSi FireStop Silicone	Min. 1 1/8 in. thick within annulus on top of floor Min. 1/2 in. thick within annulus on bottom surface of ceiling	F-C-1126	15
4 in. conduit & EMT or smaller	1	0 in. to 1/2 in. annulus	Floor – lumber Ceiling – gypsum board	NSi FireStop Intumescent Caulk	Min. 3/4 in. thick within annulus on top of floor Min. 5/8 in. thick within annulus on bottom surface of ceiling	F-C-1128	16
4 in. conduit & EMT or smaller	1	1/4 in. annulus	Floor – lumber Ceiling – gypsum board – in wall	NSi FireStop Silicone	Min. 1 1/8 in. thick within annulus on top of floor A generous bead within annulus flush with bottom surface of lower top plate	F-C-1127	16

NON-METALLIC CONDUIT

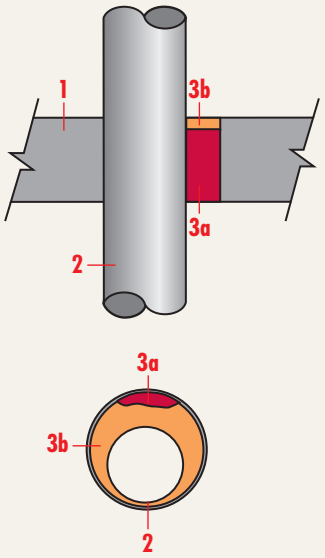
MAX. PEN. DIAMETER	RATING (HR.)	MAX. OPENING	FLOOR OR WALL SYSTEM	NSi FIRESTOP PRODUCT(S) REQUIRED	APPLICATION THICKNESS	SYSTEM NO.	PAGE NO.
2, PVC, CPVC & Rigid conduit & 1 1/2 in. EMT or smaller	2	3/4 in. to 1 3/8 in annulus	Floor – concrete, Wall – concrete or concrete block	NSi FireStop Silicone or Silicone SL NSi FireStop Mineral Wool	Min. 1 in. thick within annulus flush with top of floor or both surfaces of wall Min. 4 in. thick packed into opening (wall both sides)	C-AJ-2479	17
2, PVC, CPVC & Rigid conduit or smaller	2	1/2 in. to 1 1/8 in. annulus	Wall – gypsum board wood	NSi FireStop Silicone NSi FireStop Mineral Wool	Min. 3/4 in. thick within annulus flush with both surfaces of wall Min. 2 in. thick packed into opening on both sides of wall	W-L-2393	18
2, PVC, CPVC, ABS & Rigid conduit or smaller	1	1/4 in. nom. annulus	Floor – lumber Ceiling – gypsum board	NSi FireStop Intumescent Caulk	Min. 3/4 in. thick within annulus on top of floor Min. 5/8 in. thick within annulus on bottom surface of ceiling	F-C-2297	18

CABLES/LARGER OPENINGS

TYPE OF PENETRATION	RATING (HR.)	MAX. OPENING	FLOOR OR WALL SYSTEM	NSi FIRESTOP PRODUCT(S) REQUIRED	APPLICATION THICKNESS	SYSTEM NO.	PAGE NO.
Coaxial, fiber optic & 24 AWG	3	288 sq. in.	Floor – concrete, Wall – concrete or concrete block	NSi FireStop Pillows	Installed with 8 in. dimension projecting through floor or wall & centered within opening	C-AJ-4073	19
Coaxial, fiber optic, 24 AWG & data cable	3	288 sq. in.	Floor – concrete, Wall – concrete or concrete block	NSi FireStop Pillows	Installed with 8 in. dimension projecting through floor or wall & centered within opening	C-AJ-4074	19
500 MCM, 10, 12, 24 AWG & RG 11/U	1	1/8 in. nom. annulus	Floor – lumber, Ceiling – gypsum board – out of wall	NSi FireStop Silicone	Min. 1 1/8 in. thick within annulus on top of floor Min. 1/2 in. thick within annulus on bottom surface of ceiling	F-C-3081	20
500 MCM, 24, 12 AWG & RG 11/U	1	1/8 in. nom. annulus	Floor – lumber, Ceiling – gypsum board – in wall	NSi FireStop Silicone	Min. 1 1/8 in. thick within annulus flush with top of floor A generous bead within annulus flush with bottom surface of lower top plate	F-C-3083	20
Cables	1	0 in. to. 1/4 in annulus	Floor – lumber Ceiling – gypsum board	NSi FireStop Intumescent Caulk	Min. 1 1/4 in. thick within annulus on top of floor Min. 1/2 in. thick within annulus on bottom surface of ceiling	F-C-3084	21
500 MCM, 24, 12, 10 AWG or smaller, RG/U	2	1/4 in. nom. annulus	Wall – concrete or concrete block	NSi FireStop Silicone NSi FireStop Mineral Wool	Min. 3/4 in. thick within annulus flush with both surfaces of wall Min. 2 in. thick packed into opening on both sides of wall	W-J-3129	22
500 MCM, 24 AWG & RG 11/U	1 & 2	1/4 in. nom. annulus	Wall – gypsum board	NSi FireStop Silicone	2 hr. - min. 1 in. within annulus on both surfaces of wall 1 hr. - min. 1/2 in. within annulus on both surfaces of wall	W-L-3253	23
500 MCM, 24, 12, 10 AWG or smaller, RG/U	1 & 2	1/4 in. nom. annulus	Wall – gypsum board	NSi FireStop Silicone NSi FireStop Mineral Wool	Min. 3/4 in. thick within annulus flush with both surfaces of wall Min. 2 in. thick packed into opening on both sides of wall	W-L-3254	24

MULTIPLE PENETRATIONS

TYPE OF PENETRATION	RATING (HR.)	MAX. OPENING	FLOOR OR WALL SYSTEM	NSi FIRESTOP PRODUCT(S) REQUIRED	APPLICATION THICKNESS	SYSTEM NO.	PAGE NO.
3 in. conduit & EMT or smaller, cables & cable tray	3	2.2 sq. ft.	Floor – concrete, Wall – concrete, concrete block or precast units	NSi FireStop Silicone or Silicone SL NSi FireStop Mineral Wool	Min. 1/4 in. thick within annulus flush with top of floor or both surfaces of wall Min. 4 in. thick packed into opening (wall both sides)	C-AJ-8146	25
3 in. conduit & EMT or smaller, cables & cable tray	3	2.2 sq. ft.	Floor – concrete, Wall – concrete or concrete block	NSi FireStop Mortar	Min. 3 in. thick flush with top of floor & both surfaces of wall	C-AJ-8147	26
4 in. conduit & EMT or smaller, cables & cable tray	1 & 2	1.9 sq. ft.	Wall – gypsum board	NSi FireStop Mortar NSi FireStop Mineral Wool NSi FireStop Silicone	2 hr. - min. 4 1/2 in. flush with both surfaces of wall 1 hr. - min. 3 1/2 in. flush with both surfaces of wall	W-L-8053	27
2 in. conduit or smaller, cables & cable tray	3	24 sq. ft.	Floor – concrete, Wall – concrete	NSi FireStop Mortar	Fill opening to min. depth of 3 in.	AD/PHV 180-01	28



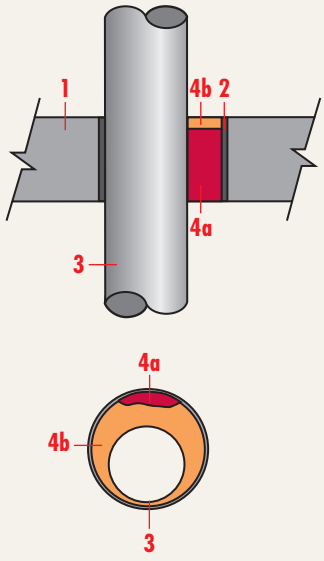
UL SYSTEM NO. C-AJ-1509

F Rating – 3 hr., T Rating – 0 hr.

1. **Floor or wall assembly** – Minimum 4 1/2 in. thick reinforced normal weight concrete. Wall may also be constructed of any UL Classified concrete blocks. Maximum diameter of opening is 8 in. See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrant** – One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. A maximum of one pipe, conduit or tubing to be installed within the opening. The space between the pipe, conduit or tubing and the periphery of opening shall be a minimum of 0 in. to a maximum of 2 in. The following types and sizes of metallic pipes, conduits or tubing may be used:
   a) Steel pipe – Nom. 24 in. diameter (or smaller) Schedule 10 (or heavier) steel pipe
   b) Conduit – Nom. 6 in. diameter (or smaller) electrical metallic tubing or steel conduit
   c) Copper tubing – Nom. 6 in. diameter (or smaller) Type L (or heavier) copper tubing
   d) Copper pipe – Nom. 6 in. diameter (or smaller) Regular (or heavier) copper pipe.

3. **Firestop System** – The firestop system shall consist of the following:
   a) Packing material – NSi FireStop Mineral Wool. Minimum 4 in. thickness of minimum 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material
   b) Fill, void or cavity material – NSi FireStop Intumescent Caulk. Minimum 1/4 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. At the point contact location between through penetrant and concrete, a minimum 1/4 in. diameter bead of fill material shall be applied at the concrete/through penetrant interface on the top surface of floor and on both surfaces of wall.



UL SYSTEM NO. C-AJ-1510

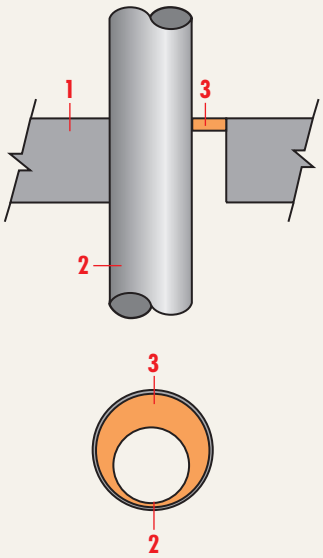
F Rating – 2 hr., T Rating – 0 hr.

1. **Floor or wall assembly** – Minimum 2 1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) structural concrete. Floor may also be constructed of any minimum 6 in. thick UL Classified hollow-core precast concrete units. Wall may also be constructed of any UL Classified concrete blocks. Maximum diameter of opening is 26 1/4 in. Maximum diameter of opening in floors constructed of hollow-core is 7 in. See Concrete Blocks (CAZT) or Precast Concrete Units (CFTV) category in the Fire Resistance Directory for names of manufacturers.

2. **Steel Sleeve** (optional) – Nom. 26 in. diameter (or smaller) Schedule 10 (or heavier) steel pipe cast or grouted into floor or wall assembly, flush with floor or wall surfaces.

3. **Through Penetrant** – One metallic pipe, conduit or tubing, rigidly supported on both sides of floor or wall assembly. The annular space between the pipe or conduit and the periphery of opening shall be a minimum of 0 in. (point contact) to a maximum of 2 1/4 in. The following types and sizes of metallic pipes, conduits or tubing may be used:
   a) Copper tubing – Nom. 6 in. diameter (or smaller) Type L (or heavier) copper tube
   b) Steel pipe – Nom. 24 in. diameter (or smaller) Schedule 10 (or heavier) steel pipe
   c) Conduit – Nom. 6 in. diameter (or smaller) steel electrical metallic tubing (EMT)
   d) Iron pipe – Nom. 24 in. diameter (or smaller) cast or ductile iron pipe.

4. **Firestop System** – The firestop system shall consist of the following:
   a) Packing material – NSi FireStop Mineral Wool. Minimum 4.5 pcf mineral wool batt insulation, tightly compressed and firmly packed into opening as a permanent form to a minimum depth of 2 1/4 in. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of sealant
   b) Fill, void or cavity material – NSi FireStop Intumescent Caulk. Minimum 1/4 in. thickness of caulk applied within the annulus, flush with top surface of floor or with both surfaces of wall. In floors constructed of hollow-core precast concrete units, fill material installed symmetrically on both sides of floor. Additional material installed to form a minimum 1/4 in. crown bead at the point contact location between the pipe and periphery of the opening. For vertical installations, sealant to be applied symmetrically on both sides of wall.



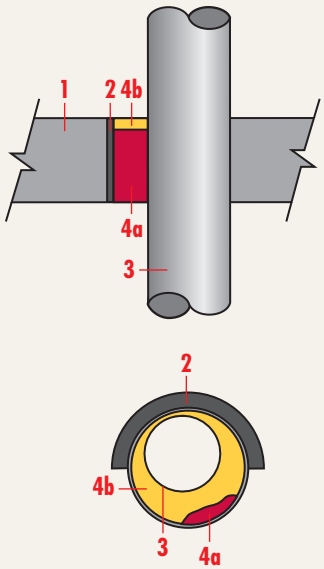
UL SYSTEM NO. C-AJ-1511

F Rating – 2 hr., T Rating – 0 hr.

1. **Floor or wall assembly** – Minimum 2 1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete floor. Floor may also be constructed of any minimum 6 in. thick UL Classified hollow-core precast concrete units. Wall may also be constructed of any UL Classified concrete blocks. Maximum diameter of opening is 24 7/8 in. Maximum diameter of opening in floors constructed of hollow-core is 7 in. See Concrete Blocks (CAZT) or Precast Concrete Units (CFTV) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrant** – One metallic pipe, conduit or tubing to be installed within the firestop system. Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The annular space between the pipe or conduit and the periphery of opening shall be a minimum of 0 in. (point contact) to a maximum of 7/8 in. The following types and sizes of metallic pipes, conduits or tubing may be used:
   a) Steel pipe – Nom. 24 in. diameter (or smaller) Schedule 10 (or heavier) steel pipe
   b) Iron pipe – Nom. 24 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 6 in. diameter (or smaller) steel electrical metallic tubing or steel conduit
   d) Copper pipe or tubing – Nom. 6 in. diameter (or smaller) Type L (or heavier) copper tubing.

3. **Fill, void or cavity material** – NSi FireStop Intumescent Caulk. Minimum 1/2 in. thickness of caulk applied within the annulus, flush with top surface of floor or with both surfaces of wall. In floors constructed of hollow-core precast concrete units, fill material installed symmetrically on both sides of floor. Additional material installed to form a minimum 1/4 in. crown bead at the point contact location between the pipe and periphery of the opening. For vertical installations, sealant to be applied symmetrically on both sides of wall.



UL SYSTEM NO. C-AJ-1508

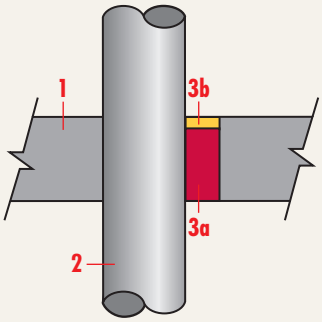
F Rating – 2 hr., T Rating – 0 hr.

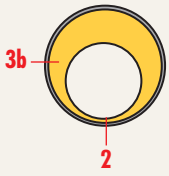
1. **Floor or wall assembly** – Minimum 4 1/2 in. thick reinforced normal weight (140-150 pcf) concrete floor or minimum 5 in. thick reinforced normal weight concrete wall. Floor may also be constructed of any minimum 6 in. thick UL Classified hollow-core precast concrete units. Wall may also be constructed of any UL Classified concrete blocks. Maximum diameter of opening is 20 in. If firestop system is installed within a hollow-core precast concrete unit, maximum diameter of opening shall be 7 in. See Concrete Blocks (CAZT) or Precast Concrete Units (CFTV) category in the Fire Resistance Directory for names of manufacturers.

2. **Metallic Sleeve** (optional) – Nom. 20 in. diameter (or smaller) Schedule 30 (or heavier) steel sleeve cast or grouted into floor or wall assembly, flush with floor or wall surfaces.

3. **Through Penetrant** – One metallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe or conduit and the periphery of opening shall be a minimum of 0 in. (point contact) to a maximum of 3 1/4 in. Pipe or conduit to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or conduits may be used:
   a) Steel pipe – Nom. 16 in. diameter (or smaller) Schedule 40 (or heavier) steel pipe
   b) Iron pipe – Nom. 16 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 4 in. diameter (or smaller) steel electrical metallic tubing or nom. 6 in. diameter steel conduit.

4. **Firestop System** – The firestop system shall consist of the following:
   a) Packing material – NSi FireStop Mineral Wool. Minimum 4 in. thickness of minimum 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material. When the floor is constructed of hollow-core precast concrete units, packing material shall be recessed from both surfaces of floor to accommodate the required thickness of fill material
   b) Fill, void or cavity material – Sealant – NSi FireStop Silicone SL (for floors only) and NSi FireStop Silicone (for floors, hollow-core pre-cast concrete units and walls). Minimum 1/2 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall. When the floor is constructed of hollow-core precast concrete units, fill material shall be installed symmetrically on both sides of floor, flush with floor surface. At the point contact location between through penetrant and concrete, a minimum 3/8 in. diameter bead of fill material shall be applied at the concrete/through penetrant interface on the top surface of floor and on both surfaces of wall.





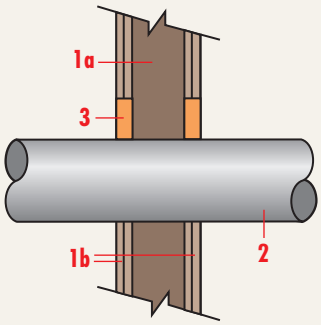
UL SYSTEM NO. C-AJ-1507

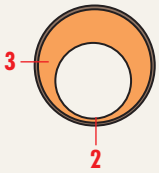
F Rating – 2 hr., T Rating – 0 hr.

1. **Floor or wall assembly** – Minimum 4 1/2 in. thick reinforced normal weight concrete. Floor may also be constructed of any minimum 6 in. thick UL Classified hollow-core precast concrete units. Wall may also be constructed of any UL Classified concrete blocks. Maximum diameter of opening is 12 1/2 in. If firestop system is installed within hollow-core concrete unit, maximum diameter of opening shall be 7 in. See Concrete Blocks (CAZT) or Precast Concrete Units (CFTV) category in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrant** – One metallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between pipes or conduits and the periphery of opening shall be a minimum of 0 in. (point contact) to a maximum of 3 7/8 in. Pipe or conduit to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes or conduits may be used:
   a) Steel pipe – Nom. 8 in. diameter (or smaller) Schedule 40 (or heavier) steel pipe
   b) Iron pipe – Nom. 8 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 4 in. diameter (or smaller) steel electrical metallic tubing or nom. 6 in. diameter steel conduit.

3. **Firestop System** – The firestop system shall consist of the following:
   Firestop Configuration A:
   a) Packing material – NSi FireStop Mineral Wool. Minimum 4 in. thickness of minimum 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from bottom surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material. When the floor is constructed of hollow-core precast concrete units, packing material shall be recessed from bottom surface of floor to accommodate the required thickness of fill material and installed flush with top surface of floor.
   b) Fill, void or cavity material – Sealant – NSi FireStop Silicone (floors, pre-cast concrete units and walls). Minimum 1/4 in. thickness of fill material applied within the annulus, flush with bottom surface of floor or with both surfaces of wall assembly. At the point contact location between through penetrant and concrete, a minimum 1/4 in. diameter bead of fill material shall be applied at the concrete/through penetrant interface on the bottom surface of floor and on both surfaces of wall.
   Firestop Configuration B:
   a) Packing material – NSi FireStop Mineral Wool. Minimum 4 in. thickness of minimum 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material. When the floor is constructed of hollow-core precast concrete units, packing material shall be recessed from both surfaces of floor to accommodate the required thickness of fill material.
   b) Fill, void or cavity material – Sealant – NSi FireStop Silicone SL (floors only) and NSi FireStop Silicone (floors, pre-cast concrete units and walls). Minimum 1/4 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall assembly. When the floor is constructed of hollow-core precast concrete units, fill material shall be installed flush with both surfaces of floor. At the point contact location between through penetrant and concrete, a minimum 1/4 in. diameter bead of caulk grade fill material shall be applied at the concrete/through penetrant interface on the top surface of floor and on both surfaces of wall and hollow-core precast concrete units.





UL SYSTEM NO. W-L-1349

F Rating – 2 hr., T Rating – 0 hr.

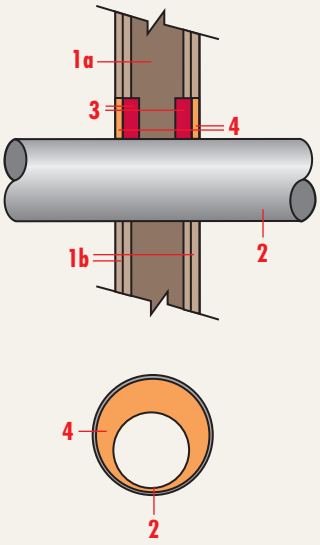
1. **Wall Assembly** – The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom. 2 x 4 in. lumber spaced 16 in. oc. Steel studs to be minimum 3 5/8 in. wide and spaced maximum 24 in. oc. When steel studs are used and the diameter of openings exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between vertical studs and screw-attached to the studs at each end. The framed opening in the wall shall be 4 to 6 in. wider and 4 to 6 in. higher than the diameter of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. clearance is present between the penetrating item and the framing on all four sides.
   b) Wallboard, Gypsum – 5/8 in. thick, 4 ft. wide with square or tapered edges. The gypsum wall board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Maximum diameter of opening is 6 5/8 in.

2. **Through Penetrant** – One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipes, conduits or tubing and the periphery of opening shall be a minimum of 0 in. (point contact) to a maximum of 1/2 in. Pipe, tubing or conduit to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, tubing or conduits may be used:
   a) Steel pipe – Nom. 24 in. diameter (or smaller) Schedule 5 (or heavier) steel pipe
   b) Iron pipe – Nom. 24 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 6 in. diameter (or smaller) steel electrical metallic tubing or steel conduit
   d) Copper Tubing – Nom. 6 in. diameter (or smaller) Type L (or heavier) copper tubing
   e) Copper Pipe – Nom. 6 in. diameter (or smaller) Regular (or heavier) copper pipe.

3. **Fill, void or cavity material** – Sealant – NSi FireStop Intumescent Caulk. Minimum 1 1/4 in. thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between through penetrant and gypsum wall board, a minimum 1/2 in. diameter bead of fill material shall be applied at the gypsum wallboard/through penetrant interface on both surfaces of wall.

UL SYSTEM NO. W-L-1350

F Rating – 2 hr., T Rating – 0 hr.



1. **Wall Assembly** – The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom. 2 x 4 in. lumber spaced 16 in. oc. Steel studs to be minimum 3 5/8 in. wide and spaced maximum 24 in. oc. When steel studs are used and the diameter of openings exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between vertical studs and screw-attached to the studs at each end. The framed opening in the wall shall be 4 to 6 in. wider and 4 to 6 in. higher than the diameter of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. clearance is present between the penetrating item and the framing on all four sides
   b) Wallboard, Gypsum – 5/8 in. thick, 4 ft. wide with square or tapered edges. The gypsum wall board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Maximum diameter of opening is 7 5/8 in.

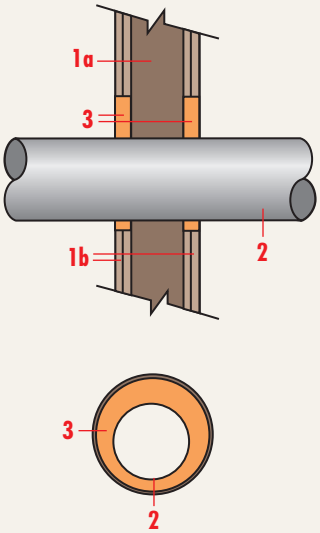
2. **Through Penetrant** – One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipes, conduits or tubing and the periphery of opening shall be a minimum of 0 in. (point contact) to a maximum of 1 1/2 in. Pipe, tubing or conduit to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, tubing or conduits may be used:
   a) Steel pipe – Nom. 24 in. diameter (or smaller) Schedule 5 (or heavier) steel pipe
   b) Iron pipe – Nom. 24 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 6 in. diameter (or smaller) steel electrical metallic tubing or steel conduit
   d) Copper Tubing – Nom. 6 in. diameter (or smaller) Type L (or heavier) copper tubing
   e) Copper Pipe – Nom. 6 in. diameter (or smaller) Regular (or heavier) copper pipe.

3. **Packing Material** – NSi FireStop Mineral Wool. Minimum 2 in. thickness of minimum 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from both surfaces of the wall by 5/8 in.

4. **Fill, void or cavity material** – Sealant – NSi FireStop Intumescent Caulk. Minimum 5/8 in. thickness of fill material applied within the annulus, flush with both surfaces of wall. Additional material to be installed such that a 1/4 in. crown bead is formed around the penetrating item.

UL SYSTEM NO. W-L-1351

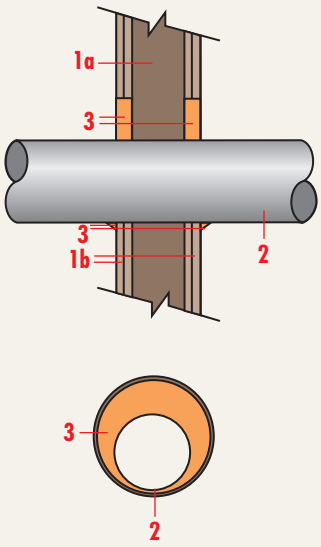
F Rating – 1 hr., T Rating – 0 hr.



1. **Wall Assembly** – The 1 hr. fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom. 2 x 4 in. lumber spaced 16 in. oc. Steel studs to be minimum 3 5/8 in. wide and spaced maximum 24 in. oc. When steel studs are used and the diameter of openings exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between vertical studs and screw-attached to the studs at each end. The framed opening in the wall shall be 4 to 6 in. wider and 4 to 6 in. higher than the diameter of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. clearance is present between the penetrating item and the framing on all four sides
   b) Wallboard, Gypsum – 5/8 in. thick, 4 ft. wide with square or tapered edges. The gypsum wall board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Maximum diameter of opening is 24 3/4 in. for steel stud walls. Maximum diameter opening is 14 1/2 in. for wood stud walls.

2. **Through Penetrant** – One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipes, conduits or tubing and the periphery of opening shall be a minimum of 1/4 in. to a maximum of 1/2 in. Pipe, tubing or conduit to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, tubing or conduits may be used:
   a) Steel pipe – Nom. 24 in. diameter (or smaller) Schedule 5 (or heavier) steel pipe
   b) Iron pipe – Nom. 24 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 6 in. diameter (or smaller) steel electrical metallic tubing or steel conduit
   d) Copper Tubing – Nom. 6 in. diameter (or smaller) Type L (or heavier) copper tubing
   e) Copper Pipe – Nom. 6 in. diameter (or smaller) Regular (or heavier) copper pipe.

3. **Fill, void or cavity material** – Sealant – NSi FireStop Intumescent Caulk. Minimum 5/8 in. thickness of fill material applied within the annulus, flush with both surfaces of wall.



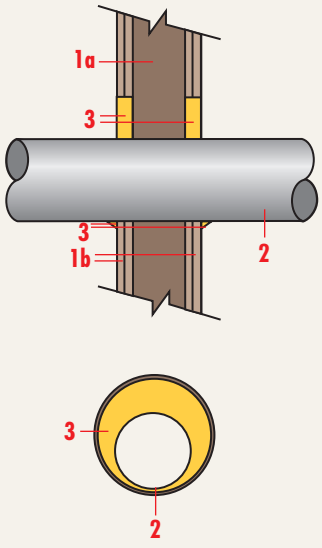
UL SYSTEM NO. W-L-1348

F Rating – 2 hr., T Rating – 0 hr.

1. **Wall Assembly** – The 2 hr. fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom. 2 x 4 in. lumber spaced 16 in. oc. with nom. 2 x 4 in. lumber end plates and cross braces. Steel studs to be minimum 3 5/8 in. wide and spaced maximum 24 in. oc. When steel studs are used and the diameter of openings exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between vertical studs and screw-attached to the studs at each end. The framed opening in the wall shall be 4 to 6 in. wider and 4 to 6 in. higher than the diameter of the penetrating item, such that when the penetrating item is installed in the opening, a 2 to 3 in. clearance is present between the penetrating item and the framing on all four sides
   b) Wallboard, Gypsum – 5/8 in. thick, 4 ft. wide with square or tapered edges. The gypsum wall board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Maximum diameter of opening is 5 in.

2. **Through Penetrant** – One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipes, conduits or tubing and the periphery of opening shall be a minimum of 0 in. (point contact) to a maximum of 1 3/4 in. Pipe, tubing or conduit to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, tubing or conduits may be used:
   a) Steel pipe – Nom. 3 in. diameter (or smaller) Schedule 5 (or heavier) steel pipe
   b) Conduit – Nom. 3 in. diameter (or smaller) steel electrical metallic tubing or galv. steel conduit
   c) Copper Tubing – Nom. 3 in. diameter (or smaller) Type L (or heavier) copper tubing
   d) Copper Pipe – Nom. 3 in. diameter (or smaller) Regular (or heavier) copper pipe.

3. **Fill, void or cavity material** – Sealant – NSi FireStop Intumescent Caulk. Minimum 1 1/4 in. thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between through penetrant and gypsum wall board, a minimum 3/8 in. diameter bead of fill material shall be applied at the gypsum wallboard/through penetrant interface on both surfaces of wall.



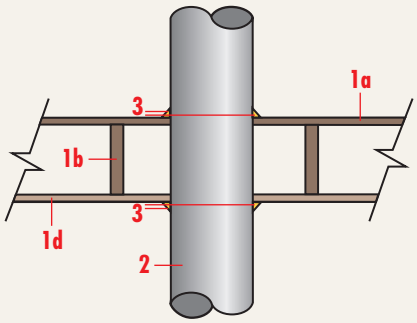
UL SYSTEM NO. W-L-1347

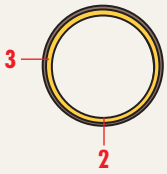
F Rating – 1 and 2 hr. (See Item 1b), T Rating – 0 hr.

1. **Wall Assembly** – The 1 or 2 hr. fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom. 2 x 4 in. lumber spaced 16 in. oc. with nom. 2 x 4 in. lumber end plates and cross braces. Steel studs to be minimum 3 5/8 in. wide and spaced maximum 24 in. oc.
   b) Wallboard, Gypsum – 5/8 in. thick, 4 ft. wide with square or tapered edges. The gypsum wall board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Maximum diameter of opening is 4 in. The hourly F rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Through Penetrant** – One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipes, conduits or tubing and the periphery of opening shall be a minimum of 0 in. (point contact) to a maximum of 1 7/8 in. Pipe, tubing or conduit to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, tubing or conduits may be used:
   a) Steel pipe – Nom. 2 in. diameter (or smaller) Schedule 10 (or heavier) steel pipe
   b) Iron pipe – Nom. 2 in. diameter (or smaller) cast or ductile iron pipe
   c) Copper Tubing – Nom. 2 in. diameter (or smaller) Type L (or heavier) copper tubing
   d) Copper Pipe – Nom. 2 in. diameter (or smaller) Regular (or heavier) copper pipe
   e) Conduit – Nom. 2 in. diameter (or smaller) steel electrical metallic tubing or galv. steel conduit.

3. **Fill, void or cavity material** – Sealant – NSi FireStop Silicone. Minimum 5/8 in. thickness of fill material applied within the annulus, flush with both surfaces of wall. At the point contact location between through penetrant and gypsum wallboard, a minimum 3/8 in. diameter bead of fill material shall be applied at the gypsum wallboard/through penetrant interface on both surfaces of wall.





UL SYSTEM NO. F-C-1126

F Rating – 1 hr.
T Ratings – 0, 3/4 and 1 hr. (See Item 2)

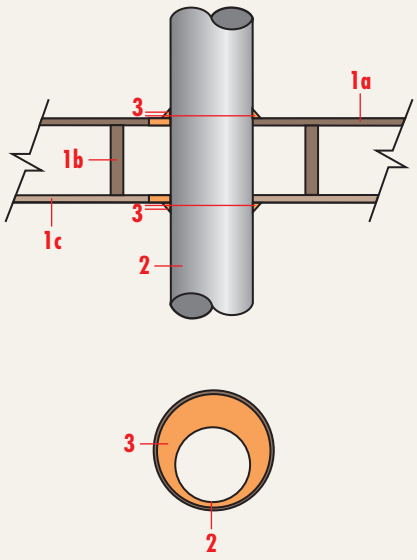
1. **Floor-Ceiling Assembly** – The fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the Design No. L512, L513 or L514 in the UL Fire Resistance Directory and shall include the following construction features:
   a) Flooring System – Lumber or minimum 1/2 in. plywood subfloor with lumber or minimum 3/4 in. plywood finish floor or Floor-Topping Mixture as specified in the individual floor-ceiling design. Maximum diameter of opening is 7 in.
   b) Wood Joists – Nom. 2 x 10 in. lumber joists spaced 16 in. oc. with nom. 1 x 3 in. lumber bridging and with ends firestopped
   c) Furring Channels (not shown) – Resilient galv. steel furring installed perpendicular to wood joists between wallboard and wood joists and spaced maximum 24 in. oc.
   d) Wallboard, Gypsum – Nom. 4 ft. wide x 1/2 or 5/8 in. thick as specified in the individual floor-ceiling design. Wallboard attached to wood joists and furring channels as specified in the individual floor-ceiling design. Maximum diameter of opening is 7 in.

2. **Through Penetrant** – One metallic pipe, conduit or tubing to be installed approximately midway between wood joists and centered within the firestop system. Diameter of openings hole-sawed through flooring system and through gypsum wallboard ceiling to be nom. 1/4 in. larger than the outside diameter of through penetrant. Pipe, tubing or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of metallic pipes, tubing or conduits may be used:
   a) Steel pipe – Nom. 6 in. diameter (or smaller) Schedule 40 (or heavier) steel pipe
   b) Iron pipe – Nom. 6 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 4 in. diameter (or smaller) electrical metallic tubing or steel conduit
   d) Copper Tubing – Nom. 4 in. diameter (or smaller) Type L (or heavier) copper tubing
   e) Copper Pipe – Nom. 4 in. diameter (or smaller) Regular (or heavier) copper pipe.

   The T-Rating of the Firestop system is dependent upon the type of penetrant and nom. diameter of penetrant used as tabulated below:

PENETRANT TYPE	MAXIMUM DIAMETER OF THROUGH PENETRANT (IN.)	T-RATING (HR.)
Steel pipe	4	1
Steel pipe	6	3/4
Iron pipe	6	0
Copper tubing	4	0
Copper pipe	4	0

3. **Fill, void or cavity material** – Sealant – NSi FireStop Silicone. On top of assembly, a minimum 1 1/8 in. thickness of fill material applied within the annulus on top surface of floor. On bottom of assembly, a minimum 1/2 in. thickness of fill material applied within annulus on bottom surface of ceiling. Additional fill material to be installed such that a minimum 1/2 in. thick crown is formed around the through penetrant on both sides of floor-ceiling assembly.



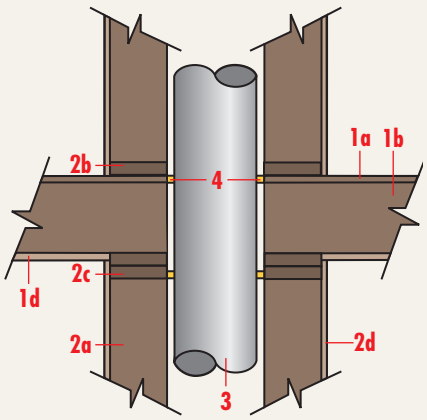
UL SYSTEM NO. F-C-1128

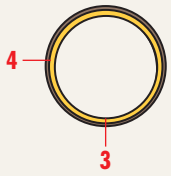
F Rating – 1 hr., T Rating – 0 hr.

1. **Floor-Ceiling Assembly** – The 1 hr. fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory and shall include the following construction features:
   a) Flooring System – Lumber or plywood subfloor with finish floor of lumber, plywood or Floor-Topping Mixture as specified in the individual floor-ceiling design. Maximum diameter of floor opening is 5 in.
   b) Wood Joists – Nom. 10 in. deep (or deeper) lumber, steel or combination lumber and steel joists, trusses or Structural Wood Members with bridging as required and with ends firestopped
   c) Wallboard, Gypsum – Nom. 4 ft. wide x 5/8 in. thick as specified in the individual floor-ceiling design. Wallboard nailed to wood joists.

2. **Through Penetrant** – One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe, conduit or tubing and the periphery of opening shall be a minimum of 0 in. (point contact) to a maximum of 1/2 in. Pipe, tubing or conduit to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, tubing or conduits may be used:
   a) Steel pipe – Nom. 4 in. diameter (or smaller) Schedule 10 (or heavier) steel pipe
   b) Iron pipe – Nom. 4 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 4 in. diameter (or smaller) steel electrical metallic tubing or steel conduit
   d) Copper Tubing – Nom. 4 in. diameter (or smaller) Type L (or heavier) copper tubing
   e) Copper Pipe – Nom. 4 in. diameter (or smaller) Regular (or heavier) copper pipe.

3. **Fill, void or cavity material** – NSi FireStop Intumescent Caulk. Minimum 3/4 in. thickness of fill material applied within the annulus on top surface of floor. Minimum 5/8 in. thickness of fill material applied within annulus on bottom surface of ceiling. Additional fill material to be installed such that a minimum 1/2 in. thick crown is formed around the through penetrant on top surface of floor-ceiling assembly.





UL SYSTEM NO. F-C-1127

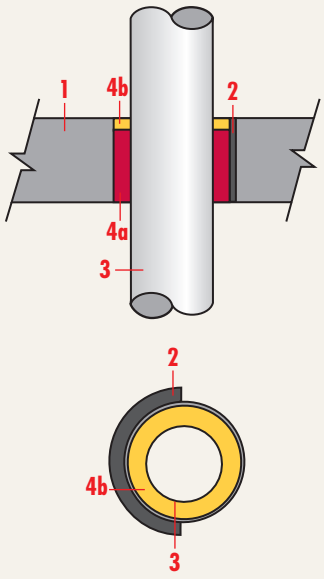
F Rating – 1 hr., T Rating – 1 hr.

1. **Floor-Ceiling Assembly** – The fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory and shall include the following construction features:
   a) Flooring System – Lumber or plywood subfloor with finish floor of lumber, plywood or Floor-Topping Mixture as specified in the individual floor-ceiling design. Maximum diameter of floor opening is 5 in.
   b) Joists – Nom. 10 in. deep (or deeper) lumber and steel joist, trusses or structural wood members with bridging as required and with ends firestopped
   c) Furring Channels (not shown) – Resilient galv. steel furring installed perpendicular to wood joists between wallboard and wood joists or furring channels as required in the individual floor-ceiling design
   d) Wallboard, Gypsum – Nom. 4 ft. wide x 1/2 or 5/8 in. thick as specified in the individual floor-ceiling design. Wallboard secured to wood joists spaced 24 in. oc. as specified in the individual floor-ceiling design. Maximum diameter of ceiling opening is 5 in.

2. **Chase Wall** – The fire-rated single or double wood stud/gypsum wallboard chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Nom. 2 x 6 in. or double nom. 2 x 4 in. lumber studs
   b) Sole Plate – Nom. 2 x 6 in. or parallel. 2 x 4 in. lumber plates, tightly butted
   c) Top Plate – The double top plate shall consist of two nom. 2 x 6 in. or two sets of parallel. 2 x 4 in. lumber plates, tightly butted. Maximum diameter of opening is 5 in.
   d) Wallboard, Gypsum – Thickness, type and number of layers and fasteners shall be as specified in individual wall and partition design.

3. **Through Penetrant** – One metallic pipe, conduit or tubing to be centered within the firestop system. Pipe, tubing or conduit to be rigidly supported on both sides of floor-ceiling assembly. A nom. annular space of 1/8 in. is required within the firestop system. The following types and sizes of metallic pipes, tubing or conduits may be used:
   a) Steel pipe – Nom. 4 in. diameter (or smaller) Schedule 10 (or heavier) steel pipe
   b) Conduit – Nom. 4 in. diameter (or smaller) electrical metallic tubing or steel conduit
   c) Copper Tubing – Nom. 4 in. diameter (or smaller) Type L (or heavier) copper tubing
   d) Copper Pipe – Nom. 4 in. diameter (or smaller) Regular (or heavier) copper pipe.

4. **Fill, void or cavity material** – Sealant – NSi FireStop Silicone. Minimum 1 1/8 in. thickness of fill material applied within the annulus, flush with top surface of floor. A generous bead of fill material also applied within the annulus of the top plate, flush with bottom surface of lower top plate.



UL SYSTEM NO. C-AJ-2479

F Rating – 2 hr., T Ratings – 1 and 2 hr. (See Item 3)

1. **Floor or wall assembly** – Minimum 4 1/2 in. thick reinforced normal weight concrete floor or min. 5 1/2 in. thick reinforced normal weight concrete wall. Wall may also be constructed of any UL Classified concrete blocks. Maximum diameter of opening is 4 1/2 in. See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

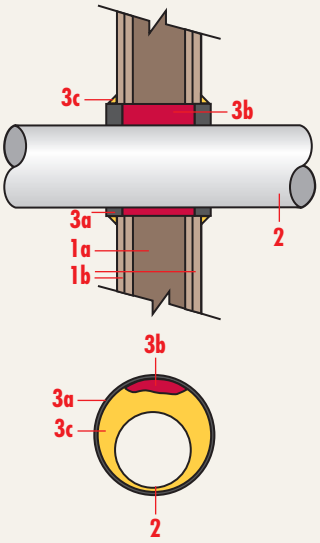
2. **Metallic Sleeve** (optional) – Nom. 4 in. diameter (or smaller) Schedule 40 (or heavier) steel sleeve cast or grouted into floor or wall assembly, flush with floor or wall surfaces. The use of steel sleeve is dependent upon the nom. diameter of the through penetrant as tabulated in Item 3.

3. **Through Penetrant** – One nonmetallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe, conduit or tubing and the periphery of opening shall be a minimum of 3/4 in. to a maximum of 1 3/8 in. Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall. The following types and sizes of pipes, conduits or tubing may be used:
   a) Polyvinyl Chloride (PVC) Pipe – Nom. 2 in. diameter (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems
   b) Chlorinated Polyvinyl Chloride (CPVC) Pipe – Nom. 2 in. diameter (or smaller) SDR 13.5 CPVC pipe for use in closed (process or supply) piping systems
   c) Rigid Nonmetallic Conduit – Nom. 2 in. diameter (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70). See Rigid Nonmetallic Conduit (DZYR) category in the Electrical Construction Material Directory for names of manufacturers
   d) Electrical Nonmetallic Tubing – (ENT) Nom. 1 1/2 in. diameter (or smaller) Electrical Nonmetallic Tubing. ENT installed in accordance with Article 331 of the National Electrical Code (NFPA No. 70). See Electrical Nonmetallic Tubing (FKHU) category in the Electrical Consruction Material Directory for names of manufacturers.

   The T-Rating of the Firestop system is dependent upon the use of the steel sleeve and the maximum diameter of the through penetrant as tabulated below:

USE OF STEEL SLEEVE	MAXIMUM DIAMETER OF THROUGH PENETRANT (IN.)	T-RATING (HR.)
Optional	1 1/2	1
Not permitted	2	2

4. **Firestop System** – The firestop system shall consist of the following:
   a) Packing material – NSi FireStop Mineral Wool. Minimum 3 1/2 in. thickness of minimum 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material
   b) Fill, void or cavity material – Sealant – NSi FireStop Silicone. Minimum 1 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall.



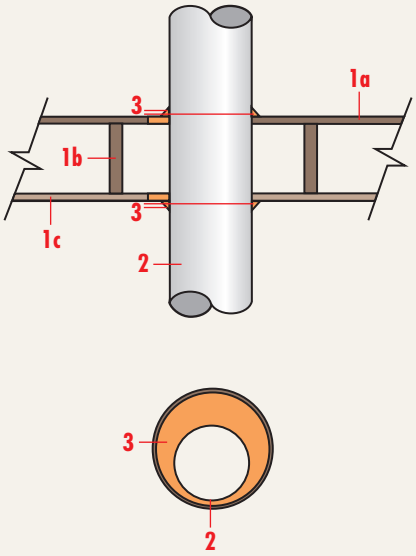
UL SYSTEM NO. W-L-2393

F Rating – 2 hr., T Rating – 1 hr.

1. **Wall Assembly** – The 2 hr. fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom. 2 x 4 in. lumber spaced 16 in. oc. Steel studs to be minimum 3 5/8 in. wide and spaced maximum 24 in. oc.
   b) Wallboard, Gypsum – 1/2 in. thick, 4 ft. wide with square or tapered edges. The gypsum wall board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Maximum diameter of opening is 4 in.

2. **Through Penetrant** – One nonmetallic pipe or conduit to be installed either concentrically or eccentrically within the firestop system. The annular space between pipe or conduit and the periphery of opening shall be a minimum of 1/2 in. to a maximum of 1 1/8 in. Pipe or conduit to be rigidly supported on both sides of wall. The following types and sizes of nonmetallic pipes or conduits may be used:
   a) Polyvinyl Chloride (PVC) Pipe – Nom. 2 in. diameter (or smaller) Schedule 40 solid core PVC pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems
   b) Chlorinated Polyvinyl Chloride (CPVC) Pipe – Nom. 2 in. diameter (or smaller) SDR 17 CPVC pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems
   c) Rigid Nonmetallic Conduit – Nom. 2 in. diameter (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

3. **Firestop System** – The firestop system shall consist of the following:
   a) Steel Sleeve – Cylindrical sleeve fabricated from 0.022 in. (No. 26 gauge) galv. sheet steel and having a minimum 2 in. lap along the longitudinal seam. Length of steel sleeve to be equal to the thickness of the wall plus 1 in. such that when installed, the ends of the steel sleeve extend 1/2 in. beyond each surface of the wall. Sleeve installed by coiling the sheet steel to a diameter smaller than the through opening, inserting the coil through the opening and releasing the coil to let it uncoil against the circular cutouts in the gypsum wallboard layers
   b) Packing material – NSi FireStop Mineral Wool. Minimum 2 in. thickness of minimum 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form on each side of wall. Packing material to be recessed from each surface of wall to accommodate the required thickness of fill material
   c) Fill, void or cavity material – Sealant – NSi FireStop Silicone. Minimum 3/4 in. thickness of fill material applied within the annulus, flush with both ends of steel sleeve. A minimum 1/2 in. bead of fill material shall be applied at the steel sleeve/gypsum wallboard interface on both surfaces of wall.



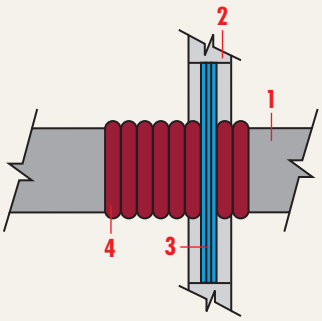
UL SYSTEM NO. F-C-2297

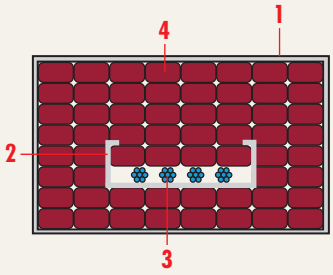
F Rating – 1 hr., T Rating – 0 hr.

1. **Floor-Ceiling Assembly** – The fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L505, L511, or L536 Designs in the UL Fire Resistance Directory and shall include the following construction features:
   a) Flooring System – Lumber or plywood subfloor with finish floor of lumber, plywood or Floor-Topping Mixture as specified in the individual floor-ceiling design. Maximum diameter of opening is 2.875 in.
   b) Wood Joists – Nom. 2 x 10 in. lumber joists spaced 16 in. oc. with nom. 1 x 3 in. lumber bridging and with ends firestopped
   c) Wallboard, Gypsum – Nom. 4 ft. wide x 5/8 in. thick as specified in the individual floor-ceiling design. Maximum diameter of ceiling opening is 2.875 in.

2. **Through Penetrant** – One nonmetallic pipe or conduit to be installed approximately midway between wood joists and centered within the firestop system. Diameter of openings hole-sawed through flooring system and one layer through gypsum wallboard ceiling to be nom. 1/2 in. larger than the outside diameter of through penetrant. Pipe or conduit to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of nonmetallic pipes or conduits may be used:
   a) Polyvinyl Chloride (PVC) Pipe – Nom. 2 in. diameter (or smaller) Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems
   b) Acrylonitrile Butadiene Styrene (ABS) Pipe – Nom. 2 in. diameter (or smaller) Schedule 40 cellular or solid core ABS pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems
   c) Chlorinated Polyvinyl Chloride (CPVC) Pipe – Nom. 2 in. diameter (or smaller) SDR 17 CPVC pipe for use in closed (process or supply) or vented (drain, waste, or vent) piping systems
   d) Rigid Nonmetallic Conduit – Nom. 2 in. diameter (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA No. 70).

3. **Fill, void or cavity material** – NSi FireStop Intumescent Caulk. Minimum 3/4 in. thickness of fill material applied within the annulus on top surface of floor. Minimum 5/8 in. thickness of fill material applied within annulus on bottom surface of ceiling or top plate of chase wall assembly. Additional fill material to be installed such that a minimum 1/8 in. thick crown is formed around the through penetrant on top surface of floor-ceiling assembly.





UL SYSTEM NO. C-AJ-4073

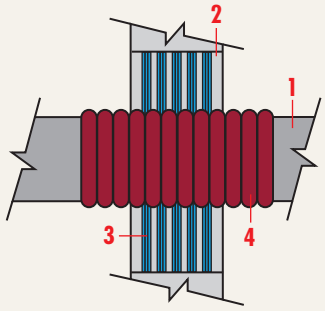
F Rating – 3 hr., T Rating – 1½ hr.

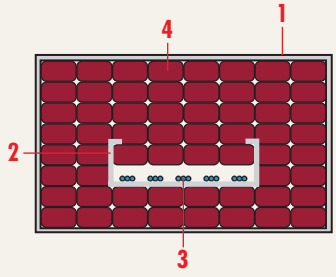
1. **Floor or wall assembly** – Minimum 5 in. thick reinforced normal weight concrete. Wall may also be constructed of any UL Classified concrete blocks. Maximum area of opening is 288 sq. in. with a maximum dimension of 24 in. See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cable Tray** – Maximum 12 in. wide by maximum 3 5/8 in. deep (maximum 3 in. deep loading depth) trough type cable tray with channel-shaped side rails formed of No. 18 MSG (0.048 in.) thick galvanized steel and with 4 in. wide by No. 18 MSG (0.048 in.) thick ventilated type rungs spaced 10 in. oc. Maximum one cable tray to be installed either concentrically or eccentrically within the firestop system. The annular space between the cable tray and the periphery of opening shall be a minimum of 1½ in. to a maximum of 7 in. Cable tray to be rigidly supported on both sides of floor or wall assembly.

3. **Cables** – Maximum four individual cable bundles, each containing a maximum seven cables, to be installed within cable tray. Maximum diameter of individual cable bundles shall be 2 in. Cable bundles to be spaced a minimum 1½ in. to a maximum 3 in. oc. Any combination of the following types and sizes of cables may be used:
   a) Maximum 3 pair No. 24 AWG (or smaller) copper conductor cables with polyvinyl chloride (PVC) insulation and jacket
   b) Maximum 2 fiber 62.5/125 uM fiber optic cable with PVC insulation and jacket
   c) Maximum RG/U (or smaller) coaxial copper conductor cable with fluorinated ethylene insulation and jacket materials.

4. **Fill, Void or Cavity Materials** – NSi FireStop Pillows. Maximum 8 in. long x 4 in. wide x 2 in. deep thick pillow-like material. Pillows shall be tightly packed into opening to fill the annular space between cables and periphery of opening and between cable tray and periphery of opening. Pillows installed with 8 in. dimension projecting through floor or wall and centered within the opening.





UL SYSTEM NO. C-AJ-4074 (For Horizontal or Vertical Separations)

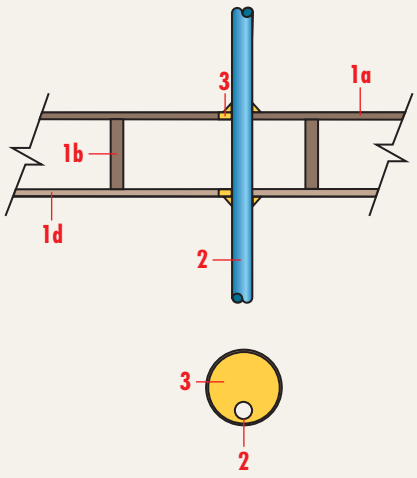
F Rating – 3 hr., T Rating – 0 hr.

1. **Floor or wall assembly** – Minimum 4½ in. thick reinforced lightweight (100 pcf) concrete. Maximum size of opening is 288 sq. in. with maximum dimension of 24 in. Wall may also be constructed of any UL Classified concrete blocks. See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cable Tray** – Maximum 12 in. wide by maximum 3 5/8 in. deep (maximum 3 in. deep loading depth) trough type cable tray with channel-shaped side rails formed of No. 18 MSG (0.048 in.) thick galvanized steel and with 4 in. wide by No. 18 MSG (0.048 in.) thick ventilated type rungs spaced 10 in. oc. Maximum one cable tray to be installed either concentrically or eccentrically within the firestop system. The annular space between the cable tray and the periphery of opening shall be a minimum of 1½ in. to a maximum of 7 in. Cable tray to be rigidly supported on both sides of floor or wall assembly.

3. **Cables** – Aggregate cross-sectional area of cables in cable tray to be 25% of the cross-sectional area of the cable tray based on a maximum 3 in. cable loading within the cable tray. Any combination of the following types and sizes of cables may be used:
   a) Maximum 287 lengths of cables, each with 3 pair No. 24 AWG Type D telephone cables with PVC insulation and jacket
   b) Maximum 24 lengths of double stranded fiber optic cables, 1/8 in. diameter with PVC insulation and jacket
   c) Maximum 12 lengths of coaxial cable, 1/4 in. diameter, 22 AWG solid copper conductor with polyethylene insulation and PVC jacket
   d) Maximum 12 lengths of data cable, Alcatel 380100, E107890, 24 AWG CMR, with PVC jacket.

4. **Fill, Void or Cavity Materials** – NSi FireStop Pillows. Maximum 8 in. long x 4 in. wide x 2 in. deep thick pillow-like material. Pillows shall be tightly packed into opening to fill the annular space between cables and periphery of opening and between cable tray and periphery of opening. Pillows installed with 8 in. dimension projecting through floor or wall and centered within the opening.



UL SYSTEM NO. F-C-3081

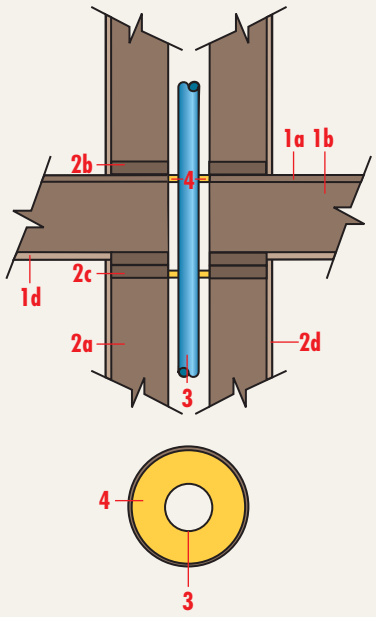
F Rating – 1 hr., T Rating – 1 hr.

1. **Floor-Ceiling Assembly** – The fire-rated solid wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in Design No. L512, L513 or L514 in the UL Fire Resistance Directory and shall include the following construction features:
   a) Flooring System – Lumber or minimum 1/2 in. plywood subfloor with lumber or minimum 3/4 in. plywood finish floor or Floor-Topping Mixture as specified in the individual floor-ceiling design. Maximum diameter of opening is 2 in.
   b) Wood Joists – Nom. 2 x 10 in. lumber joists, spaced 16 in. oc. with nom. 1 x 3 in. lumber bridging and with ends firestopped
   c) Furring Channels (not shown) – Resilient galv. steel furring installed perpendicular to wood joists between wallboard and wood joists and spaced maximum 24 in. oc.
   d) Wallboard, Gypsum – Nom. 4 ft. wide x 1/2 or 5/8 in. thick as specified in the individual floor-ceiling design. Wallboard attached to wood joists or furring channels as specified in the individual floor-ceiling design. Maximum diameter of ceiling opening is 2 in.

2. **Cables** – One cable to be installed approximately midway between wood joists and centered within the firestop system. Diameter of openings hole-sawed through flooring system and through gypsum wallboard ceiling to be nom. 1/4 in. larger than the outside diameter of through penetrant. Cable to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of copper conductor cables may be used:
   a) 1/C-500 kcmil (or smaller) cable with cross-linked polyethylene insulation and jacket
   b) Maximum 100 pair No. 24 AWG cable (or smaller) with polyvinyl chloride (PVC) insulation and jacket
   c) Type RG/U coaxial cable with fluorinated ethylene propylene insulation and jacket
   d) Maximum 2/C – No. 12 AWG (or smaller) cable with PVC insulation and jacket
   e) Maximum 3/C with ground - No. 10 AWG (or smaller) Type NM nonmetallic sheathed cable
   f) Maximum 3/C – No. 4/0 AWG (or smaller) aluminum conductor service entrance cable with PVC insulation and jacket.

2a. **Cables** (not shown) – As an alternative to Item 2, a maximum of seven cables bundled together and centered within the firestop system. Diameter of openings hole-sawed through flooring system and through gypsum wallboard ceiling to be nom. 1/4 in. larger than the outside diameter of cable bundle. Cables to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of copper conductor cables may be used:
   a) Maximum 4 pair No. 24 AWG (or smaller) cable with polyvinyl chloride (PVC) insulation and jacket
   b) Type RG/U coaxial cable with fluorinated ethylene propylene insulation and jacket.

3. **Fill, void or cavity material** – Sealant – NSi FireStop Silicone. On top of assembly, a minimum 1 1/8 in. thickness of fill material applied within the annulus on top surface of floor. On bottom of assembly, a minimum 1/2 in. thickness of fill material applied within annulus on bottom surface of ceiling. Additional fill material to be installed such that a minimum 1/2 in. thick crown is formed around the through penetrant on both sides of floor-ceiling assembly.



UL SYSTEM NO. F-C-3083

F Rating – 1 hr., T Rating – 1 hr.

1. **Floor-Ceiling Assembly** – The fire-rated solid or trussed lumber joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in the individual L500 Series Floor-Ceiling Designs in the UL Fire Resistance Directory and shall include the following construction features:
   a) Flooring System – Lumber or plywood subfloor with finish floor of lumber, plywood or Floor-Topping Mixture as specified in the individual floor-ceiling design. Maximum diameter of floor opening is 2 in.
   b) Joists – Nom. 10 in. deep (or deeper) lumber and steel joist, trusses or structural wood members with bridging as required and with ends firestopped
   c) Furring Channels (not shown) – Resilient galv. steel furring installed perpendicular to wood joists between wallboard and wood joists, spaced maximum 24 in. oc.
   d) Wallboard, Gypsum – Nom. 4 ft. wide x 1/2 or 5/8 in. thick as specified in the individual floor-ceiling design. Wallboard secured to wood joists or furring channels as specified in the individual floor-ceiling design. Maximum diameter of ceiling opening is 2 in.

2. **Chase Wall** – The fire-rated single or double wood stud/gypsum wallboard chase wall shall be constructed of the materials and in the manner specified in the individual U300 Series Wall and Partition Designs in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Nom. 2 x 6 in. or double nom. 2 x 4 in. lumber studs
   b) Sole Plate – Nom. 2 x 6 in. or parallel. 2 x 4 in. lumber plates, tightly butted
   c) Top Plate – The double top plate shall consist of two nom. 2 x 6 in. or two sets of parallel. 2 x 4 in. lumber plates, tightly butted Maximum diameter of opening is 2 in.
   d) Wallboard, Gypsum – Thickness, type and number of layers and fasteners shall be as specified in individual wall and partition design.

...continued

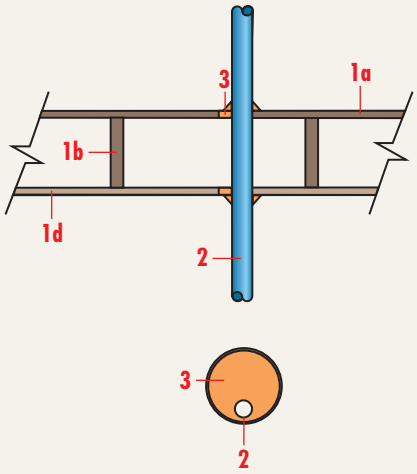
UL SYSTEM NO. F-C-3083 (Continued)

3. **Cables** – One cable to be centered within the firestop system. Diameter of openings hole-sawed through flooring system and through sole and top plates of chase wall assembly to be nom. 1/4 in. larger than the outside diameter of cable. Cable to be rigidly supported on both sides of floor-ceiling assembly. The following types and sizes of copper conductor cables may be used:
   a) Maximum 100 pair No. 24 AWG (or smaller) cable with polyvinyl chloride (PVC) insulation and jacket
   b) Maximum 1/C-500 kcmil (or smaller) cable with cross-linked polyethylene insulation and jacket
   c) Maximum 3/C (with ground) No. 12 AWG (or smaller) nonmetallic sheathed (Rom) cable with PVC insulation and jacket
   d) Maximum RG/U (or smaller) coaxial cable with fluorinated ethylene propylene insulation and jacket
   e) Max 2/C No. 12 AWG (or smaller) cable with PVC insulation and jacket
   f) Max 3/C – No. 4/0 AWG (or smaller) aluminum conductor service entrance cable with PVC insulation and jacket.

4. **Fill, void or cavity material** – Sealant – NSi FireStop Silicone. Minimum 1 1/8 in. thickness of fill material applied within the annulus, flush with top surface of floor. A generous bead of fill material also applied within the annulus of the top plate, flush with bottom surface of lower top plate.

UL SYSTEM NO. F-C-3084

F Rating – 1 hr., T Ratings – 3/4 hr. and 1 hr. (See Item 2)



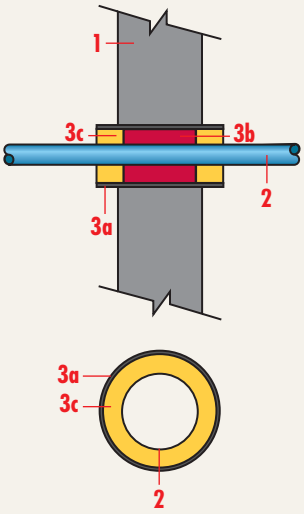
1. **Floor-Ceiling Assembly** – The fire-rated wood joist floor-ceiling assembly shall be constructed of the materials and in the manner specified in Design No. L512, L513 or L514 in the UL Fire Resistance Directory and shall include the following construction features:
   a) Flooring System – Lumber or minimum 1/2 in. plywood subfloor with lumber or minimum 3/4 in. plywood finish floor or Floor-Topping Mixture as specified in the individual floor-ceiling design. Maximum diameter of floor opening is 5/8 in.
   b) Wood Joists – Nom. 2 x 10 in. lumber joists, spaced 16 in. oc. with nom. 1 x 3 in. lumber bridging and with ends firestopped
   c) Furring Channels (not shown) – Resilient galv. steel furring installed perpendicular to wood joist between wallboard and wood joist and spaced maximum 24 in. oc.
   d) Wallboard, Gypsum – Nom. 4 ft. wide x 5/8 in. thick as specified in the individual floor-ceiling design. Wallboard attached to wood joists or furring channels as specified in the individual floor-ceiling design. Maximum diameter of ceiling opening is 5/8 in.

2. **Cables** – One cable to be installed either eccentrically or concentrically in opening with annular space between the cable and periphery of opening of min. 0 in. (point contact) to maximum 14 in. Cable to be rigidly supported on both sides of floor-ceiling assembly. The following types of cables may be used:
   a) Maximum 3/C (with ground) No. 12 AWG (or smaller) with polyvinyl chloride (PVC) insulation and jacket
   b) Maximum 3/C (with ground) No. 14 AWG (or smaller) with PVC jacketed aluminium or steel clad, Type RW90
   c) Type RG6U coaxial cable with fluorinated ethylene propylene insulation and jacket
   d) Maximum 2/C (with ground) No. 14 AWG (or smaller), type NM90, with nylon jacket
   e) Maximum 8/C No. 24 AWG (or smaller), type CMR MPR, with polyvinyl chloride (PVC) insulation and jacket.

   The T Rating of the firestop system is dependent upon the type of cable used, as tabulated below:

CABLE TYPE	T-RATING (HR.)
a, b, c and e	1
d	3/4

3. **Fill, void or cavity material** – NSi FireStop Intumescent Caulk. On top of assembly, a minimum 1 1/4 in. thickness of fill material applied within the annulus on top surface of floor. On bottom assembly, a minimum 1/2 in. thickness of fill material applied within annulus on bottom surface of ceiling. Additional fill material to be installed such that a minimum 1/2 in. thick crown is formed around the through penetrant on both sides of floor-ceiling assembly.



UL SYSTEM NO. W-J-3129

F Rating – 2 hr., T Ratings – 0 and 2 hr. (See Item 2)

1. **Wall assembly** – Minimum 6 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete wall. Wall may also be constructed of any UL Classified concrete blocks. Maximum diameter of opening is 2 in. See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

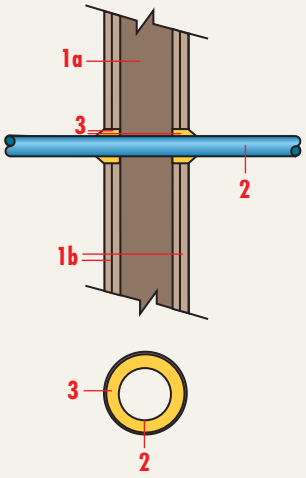
2. **Cables** – One cable to be centered within the firestop system. A nom. annular space of 1/4 in. is required within the firestop system. Cable to be rigidly supported on both sides of wall assembly. The following types and sizes of copper conductor cables may be used:
   a) 1/C-500 kcmil (or smaller) cable with cross-linked polyethylene insulation and jacket
   b) 100 pair No. 24 AWG (or smaller) cable with polyvinyl chloride (PVC) insulation and jacket
   c) Type RG/U coaxial cable with fluorinated ethylene propylene insulation and jacket
   d) Maximum 2/C No. 12 AWG (or smaller) cable with PVC insulation and jacket
   e) Maximum 3/C (with ground) No. 10 AWG (or smaller) Type NM nonmetallic sheathed cable.

2a. **Cables** (not shown) – As an alternative to Item 2, a maximum of seven cables bundled together and centered within the firestop system. The following types and sizes of copper conductor cables may be used:
   a) Maximum 4 pair No. 24 AWG (or smaller) cable with polyvinyl chloride (PVC) insulation and jacket
   b) Type RG/U coaxial cable with fluorinated ethylene propylene insulation and jacket.

   The T Rating of the firestop system is dependent upon the type of cable used, as tabulated below:

CABLE TYPE	T-RATING (HR.)
1/C-500 kcmil	0
100 pair No. 24 AWG	0
RG/U	2
3/C No. 10 AWG	0
2/C No. 12 AWG	0
4 pair No. 24 AWG	0

3. **Firestop System** – The firestop system shall consist of the following:
   a) Steel Sleeve – Cylindrical sleeve fabricated from 0.022 in. (No. 26 gauge) galv. sheet steel and having a minimum 2 in. lap along the longitudinal seam. Length of steel sleeve to be equal to the thickness of the wall plus 1 in. such that when installed, the ends of the steel sleeve extend 1/2 in. beyond each surface of the wall. Sleeve installed by coiling the sheet steel to a diameter smaller than the through opening, inserting the coil through the opening and releasing the coil to let it uncoil against the periphery of the opening.
   b) Packing material – NSi FireStop Mineral Wool. Minimum 2 in. thickness of minimum 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form on each side of wall. Packing material to be recessed from each surface of wall to accommodate the required thickness of fill material.
   c) Fill, void or cavity material – Sealant – NSi FireStop Silicone. Minimum 3/4 in. thickness of fill material applied within the annulus, flush with both ends of steel sleeve. A minimum 1/2 in. bead of fill material shall be applied at the steel sleeve/concrete interface on both surfaces of wall.



UL SYSTEM NO. W-L-3253

F Rating – 1 and 2 hr. (See Item 2), T Rating – 0, 1 and 2 hr. (See Item 2)

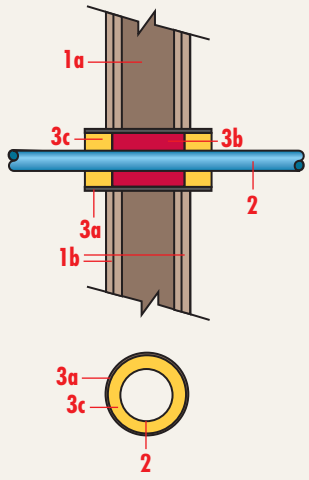
1. **Wall Assembly** – The fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom. 2 x 4 in. lumber spaced 16 in. oc. Steel studs to be minimum 2 1/2 in. wide and spaced maximum 24 in. oc.
   b) Wallboard, Gypsum – 1/2 in. thick, 4 ft. wide with square or tapered edges. The gypsum wall board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Maximum diameter of opening is 2 in.

2. **Cables** – One cable to be centered within the firestop system. A nom. annular space of 1/4 in. is required within the firestop system. Cable to be rigidly supported on both sides of wall assembly. The following types and sizes of copper conductor cables may be used:
   a) 1/C-500 kcmil (or smaller) cable with cross-linked polyethylene insulation and jacket
   b) 100 pair No. 24 AWG (or smaller) cable with polyvinyl chloride (PVC) insulation and jacket
   c) Type RG/U coaxial cable with fluorinated ethylene propylene insulation and jacket
   d) Maximum 2/C – No. 12 AWG (or smaller) cable with PVC insulation and jacket
   e) Maximum 3/C with ground – No. 10 AWG (or smaller) Type NM nonmetallic sheathed cable.

   The F and T Ratings of the firestop system are dependent upon the hourly fire-rating of the wall assembly and type of cable used, as tabulated below:

FIRE RATING OF WALL ASSEMBLY, HR.	CABLE TYPE	F RATING, HR.	T RATING, HR.
1	1/C-500 kcmil	1	0
1	100 pair No. 24 AWG	1	0
1	RG/U	1	1
2	1/C-500 kcmil	2	0
2	100 pair No. 24 AWG	2	0
2	RG/U	2	2

3. **Fill, void or cavity material** – Sealant – NSi FireStop Silicone. In 2 hr. fire-rated assemblies, minimum 1 in. thickness of fill material applied within the annulus on both surfaces of wall. Additional fill material to be installed such that a minimum 1/4 in. crown is formed around the penetrating item. In 1 hr. fire-rated assemblies, minimum 1/2 in. thickness of fill material applied within annulus on both surfaces of wall. Additional fill material to be installed such that a minimum 3/4 in. crown is formed around the penetrating item and lapping 1 in. beyond periphery of opening.



UL SYSTEM NO. W-L-3254

F Ratings – 1 and 2 hr. (See Item 1), T Rating – 0, 1 and 2 hr. (See Item 2)

1. **Wall Assembly** – The 1 or 2 hr. fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom. 2 x 4 in. lumber spaced 16 in. oc. Steel studs to be minimum 2 1/2 in. wide and spaced maximum 24 in. oc.
   b) Wallboard, Gypsum – 1/2 in. thick, 4 ft. wide with square or tapered edges. The gypsum wall board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Maximum diameter of opening is 2 in. The hourly F rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

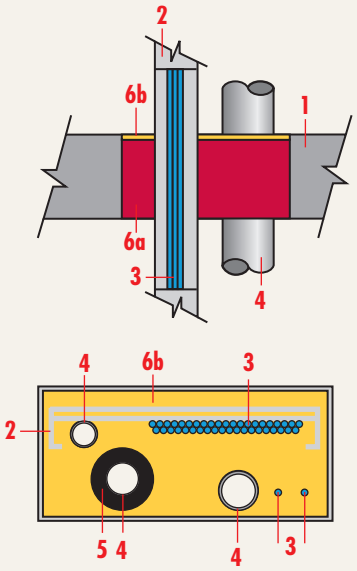
2. **Cables** – One cable to be centered within the firestop system. A nom. annular space of 1/4 in. is required within the firestop system. Cable to be rigidly supported on both sides of wall assembly. The following types and sizes of copper conductor cables may be used:
   a) 1/C-500 kcmil (or smaller) cable with cross-linked polyethylene insulation and jacket
   b) 100 pair No. 24 AWG (or smaller) cable with polyvinyl chloride (PVC) insulation and jacket
   c) Type RG/U coaxial cable with fluorinated ethylene propylene insulation and jacket
   d) Max 2/C No. 12 AWG (or smaller) cable with PVC insulation and jacket
   e) Maximum 3/C (with ground) No. 10 AWG (or smaller) Type NM nonmetallic sheathed cable.

2a. **Cables** (not shown) – As an alternative to Item 2, a maximum of seven cables bundled together and centered within the firestop system. A nom. annular space of 1/4 in. is required within the firestop system. Cables to be rigidly supported on both sides of wall assembly. The following types and sizes of copper conductor cables may be used:
   a) Maximum 4 pair No. 24 AWG (or smaller) cable with polyvinyl chloride (PVC) insulation and jacket
   b) Type RG/U coaxial cable with fluorinated ethylene propylene insulation and jacket
   c) Maximum 3/C (with ground) No. 10 AWG (or smaller) Type NM nonmetallic sheathed cable.

The T Rating of the firestop system is dependent upon the hourly fire-rating of the wall assembly and type of cable used, as tabulated below:

FIRE RATING OF WALL ASSEMBLY, HR.	CABLE TYPE	T RATING, HR.
1	1/C-500 kcmil	0
1	100 pair No. 24 AWG	0
1	4 pair No. 24 AWG	0
1	RG/U	1
1	3/C No. 10 AWG	0
1	2/C No. 12 AWG	0
2	1/C-500 kcmil	0
2	100 pair No. 24 AWG	0
2	RG/U	2
2	3/C No. 10 AWG	0
2	2/C No. 12 AWG	0
2	4 pair No. 24 AWG	0

3. **Firestop System** – The firestop system shall consist of the following:
   a) Steel Sleeve – Cylindrical sleeve fabricated from 0.022 in. (No. 26 gauge) galv. sheet steel and having a minimum 2 in. lap along the longitudinal seam. Length of steel sleeve to be equal to the thickness of the wall plus 1 in. such that when installed, the ends of the steel sleeve extend 1/2 in. beyond each surface of the wall. Sleeve installed by coiling the sheet steel to a diameter smaller than the through opening, inserting the coil through the opening and releasing the coil to let it uncoil against the circular cutouts in the gypsum board layers.
   b) Packing material – NSi FireStop Mineral Wool. Minimum 2 in. thickness of minimum 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form on each side of wall. Packing material to be recessed from each surface of wall to accommodate the required thickness of fill material.
   c) Fill, void or cavity material – Sealant – NSi FireStop Silicone. Minimum 3/4 in. thickness of fill material applied within the annulus, flush with both ends of steel sleeve. A minimum 1/2 in. bead of fill material shall be applied at the steel sleeve/gypsum board interface on both surfaces of wall.



UL SYSTEM NO. C-AJ-8146

F Rating – 3 hr., T Rating – 0 hr.

1. **Floor or wall assembly** – Minimum 4 1/2 in. thick reinforced normal weight (140- 150 pcf) concrete. Wall may also be constructed of any UL Classified concrete blocks. Floor may also be constructed of any minimum 8 in. thick UL Classified hollow-core Precast Concrete Units. Maximum area of opening is 312 sq. in. with maximum dimension of 26 in. If the firestop system is installed within a hollow-core precast concrete unit, the maximum area of opening is 49 sq. in. with maximum dimension of 7 in. See Concrete Blocks (CAZT) and Precast Concrete Units (CFTV) categories in the Fire Resistance Directory for names of manufacturers.

2. **Cable Tray** – Maximum 24 in. wide by maximum 4 in. deep open-ladder cable tray with channel-shaped side rails formed of minimum 0.065 in. thick steel with 3 in. wide by 1/2 in. deep rungs spaced 14 1/2 in. oc. One cable tray to be installed in the opening. The annular space between the cable tray and the periphery of opening shall be a minimum of 1 in. to a maximum of 6 in. Cable tray to be rigidly supported on both sides of floor or wall assembly.

3. **Cables** – Aggregate cross-sectional area of cables in cable tray to be maximum 40% of the cross-sectional area of the cable tray based on a maximum 3 in. cable loading depth within the cable tray. Any combination of the following types of copper conductor cables may be used:
   a) Maximum of 1/C-500 kcmil (or smaller) cable with cross-linked polyethylene insulation and jacket
   b) Maximum 100 pair No. 24 AWG telephone cable with polyvinyl chloride (PVC) insulation and jacket
   c) Maximum RG 11/U coaxial cable (or smaller) with fluorinated ethylene propylene insulation and jacket
   d) Maximum 2/C No. 12 AWG (or smaller) cable with PVC insulation and jacket.

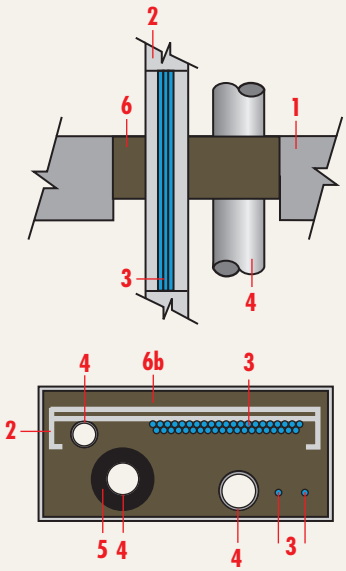
   In addition, a maximum of two cables may be installed within the opening. The cables shall be spaced a nom. 2 in. apart and a nom. 2 in. from the periphery of the opening. The cables shall be spaced a minimum 2 in. to a maximum 4 in. from the through penetrants (Item Nos. 2, 4, and 5). Cables to be rigidly supported on both sides of floor or wall assembly.

4. **Through Penetrants** – Two pipes, conduits or tubes to be installed within the opening. The space between pipes, conduits or tubes shall be a nom. 6 3/4 in. The space between pipes, conduits or tubes and the periphery of opening shall be a minimum of 1 1/2 in. to a maximum of 6 1/2 in. Pipes, conduits or tubing shall be spaced a minimum 2 in. to a maximum 4 in. from the through penetrants (Item Nos. 2, 3 and 5). Pipes, conduits or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   a) Steel pipe – Nom. 3 in. diameter (or smaller) Schedule 40 (or heavier) steel pipe
   b) Iron pipe – Nom. 3 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 3 in. diameter (or smaller) electrical metallic tubing or steel conduit
   d) Copper Tubing – Nom. 3 in. diameter (or smaller) Type M (or heavier) copper tubing
   e) Copper Pipe – Nom. 3 in. diameter (or smaller) Regular (or heavier) copper pipe.

   In addition, one nom. 2 in. diameter (or smaller) electrical metallic tubing or steel conduit may be installed within the cable tray. The conduit or tubing shall be spaced a nom. 1 in. from the side rail of the cable tray and a minimum 1 in. from the cable bundles.

5. **Pipe Covering** – The following types of pipe coverings may be used on the steel pipe (Item 4a):
   a) Pipe and Equipment Covering – Materials – Nom. 1 in. thick hollow cylindrical heavy density (min. 3.5 pcf) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied, self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. See Pipe and Equipment Covering – Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used
   b) Pipe Covering Materials – Nom. 1 in. thick unfaced mineral fiber pipe insulation having a nom. density of 3.5 pcf (or heavier) and sized to the outside diameter of pipe or tube. Pipe insulation secured with minimum 8 AWG steel wire spaced maximum 12 in. oc. IIG MINWOOL L L C – High Temperature Pipe Insulation 1200, High Temperature Pipe Insulation BWT or High Temperature Pipe Insulation Thermaloc
   c) Sheathing Material (not shown) – Used in conjunction with Item 5b. Foil-scrim-kraft or all service jacket material shall be wrapped around the outer circumference of the pipe insulation (Item 3b) with the kraft side exposed. Longitudinal joints and transverse joints sealed with metal fasteners or with butt tape. See Sheathing Materials (BVDV) category in the Building Materials Directory for names of manufacturers. Any sheathing material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used. The space between the insulated pipe and the periphery of the opening shall be a minimum 1 1/2 in. to a maximum 6 1/2 in. The insulated pipe shall be minimum 2 in. to a maximum 6 3/4 in. from the other through penetrants (Item numbers 2, 3 and 4).

6. **Firestop System** – The firestop system shall consist of the following:
   a) Packing material – NSi FireStop Mineral Wool. Minimum 4 in. thickness of minimum 4 pcf mineral wool batt insulation firmly packed into opening as a permanent form. Packing material to be recessed from top surface of floor or from both surfaces of wall as required to accommodate the required thickness of fill material
   b) Fill, void or cavity material – Sealant – NSi FireStop Silicone (SL – floors only or GG – floors or walls). Minimum 1/4 in. thickness of fill material applied within the annulus, flush with top surface of floor or with both surfaces of wall
   c) Fill, void or cavity material – Mortar (not shown) – NSi FireStop Mortar. If Precast Concrete Units (Item 1) are used, the hollow cores within the units are to be filled with a minimum 4 in. thickness of fill material. Mortar to be mixed at a rate of 2.7 parts dry mixture to one part water by weight in accordance with the installation instructions supplied with the product.



UL SYSTEM NO. C-AJ-8147

F Rating – 3 hr., T Rating – 0 hr.

1. **Floor or wall assembly** – Minimum 4½ in. thick reinforced normal weight concrete. Wall may also be constructed of any UL Classified concrete blocks. Maximum area of opening is 312 sq. in. with maximum dimension of 26 in. See Concrete Blocks (CAZT) category in the Fire Resistance Directory for names of manufacturers.

2. **Cable Tray** – Maximum 24 in. wide by maximum 4 in. deep open-ladder cable tray with channel-shaped side rails formed of minimum 0.065 in. thick steel with 3 in. wide by ½ in. deep rungs spaced 14½ in. oc. One cable tray to be installed in the opening. The annular space between the cable tray and the periphery of opening shall be a minimum of 1 in. to a maximum of 6 in. Cable tray to be rigidly supported on both sides of floor or wall assembly.

3. **Cables** – Aggregate cross-sectional area of cables in cable tray to be maximum 40% of the cross-sectional area of the cable tray based on a maximum 3 in. cable loading depth within the cable tray. Any combination of the following types of copper conductor cables may be used:
   a) Maximum of 1/C-500 kcmil (or smaller) cable with cross-linked polyethylene insulation and jacket
   b) Maximum 100 pair No. 24 AWG (or smaller) telephone cable with polyvinyl chloride (PVC) insulation and jacket
   c) Maximum RG 11/U coaxial cable (or smaller) with fluorinated ethylene propylene insulation and jacket

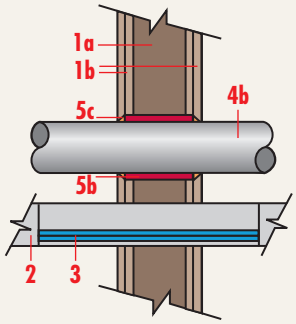
   In addition, a maximum of two cable lengths may be installed within the opening. The cables shall be spaced a nom. 2 in. apart and a nom. 2 in. from the periphery of the opening. Cables to be rigidly supported on both sides of floor or wall assembly.

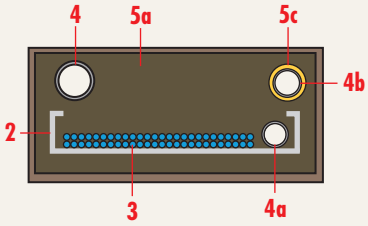
4. **Through Penetrants** – Two pipes, conduits or tubes to be installed within the opening. The space between pipes, conduits or tubes shall be a nom. 6¾ in. The space between pipes, conduits or tubes and the periphery of opening shall be a minimum of 1½ in. to a maximum of 6½ in. Pipes, conduits or tubes to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   a) Steel pipe – Nom. 3 in. diameter (or smaller) Schedule 40 (or heavier) steel pipe
   b) Iron pipe – Nom. 3 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 3 in. diameter (or smaller) electrical metallic tubing or steel conduit
   d) Copper Tubing – Nom. 3 in. diameter (or smaller) Type M (or heavier) copper tubing
   e) Copper Pipe – Nom. 3 in. diameter (or smaller) Regular (or heavier) copper pipe.

   In addition, one nom. 2 in. diameter (or smaller) electrical metallic tubing or steel conduit may be installed within the cable tray. The conduit or tubing shall be spaced a nom. 1 in. from the side rail of the cable tray and a minimum 1 in. from the cable bundles.

5. **Pipe Covering** – The following types of pipe coverings may be used on the steel pipe (Item 4a):
   a) Pipe and Equipment Covering – Materials – Nom. 1 in. thick hollow cylindrical heavy density (min. 3.5 pcf) glass fiber units jacketed on the outside with an all service jacket. Longitudinal joints sealed with metal fasteners or factory-applied, self-sealing lap tape. Transverse joints secured with metal fasteners or with butt tape supplied with the product. See Pipe and Equipment Covering – Materials (BRGU) category in the Building Materials Directory for names of manufacturers. Any pipe covering material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used
   b) Pipe Covering Materials – Nom. 1 in. thick unfaced mineral fiber pipe insulation having a nom. density of 3.5 pcf (or heavier) and sized to the outside diameter of pipe or tube. Pipe insulation secured with minimum 8 AWG steel wire spaced maximum 12 in. oc. IIG MINWOOL L L C – High Temperature Pipe Insulation 1200, High Temperature Pipe Insulation BWT or High Temperature Pipe Insulation Thermaloc
   c) Sheathing Material (not shown) – Used in conjunction with Item 5b. Foil-scrim-kraft or all service jacket material shall be wrapped around the outer circumference of the pipe insulation (Item 3b) with the kraft side exposed. Longitudinal joints and transverse joints sealed with metal fasteners or with butt tape. See Sheathing Materials (BVDV) category in the Building Materials Directory for names of manufacturers. Any sheathing material meeting the above specifications and bearing the UL Classification Marking with a Flame Spread Index of 25 or less and a Smoke Developed Index of 50 or less may be used. The space between the insulated pipe and the periphery of the opening shall be a minimum 1½ in. to a maximum 6½ in. The insulated pipe shall be minimum 2 in. to a maximum 6¾ in. from the other through penetrants (Item numbers 2, 3 and 4).

6. **Firestop System** – The firestop system shall consist of the following:
   a) Forms (not shown) – Used as a form to prevent leakage of fill material during installation. Forms to be a rigid sheet material, cut to fit the contour of the penetration item and friction fitted into the opening. Forms to be recessed from top surface of floor or both surfaces of wall as required to accommodate the required thickness of fill material. Forms to be removed after fill material has cured
   b) Fill, void or cavity material – Mortar – NSi FireStop Mortar. Minimum 3 in. thickness of fill material installed flush with top surface of floor and both surfaces of wall. Mortar to be mixed at a rate of 2.7 parts dry mixture to one part water by weight in accordance with the installation instructions supplied with the product.





UL SYSTEM NO. W-L-8053

F Ratings – 1 and 2 hr. (See Item 2), T Rating – 0 hr.

1. **Wall Assembly** – The 1 or 2 hr. fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U400 Series Wall and Partition Design in the UL Fire Resistance Directory and shall include the following construction features:
   a) Studs – Wall framing to consist of steel channel studs, minimum 2 1/2 in. wide and spaced maximum 24 in. oc. Additional framing shall be installed horizontally so as to form a 22 5/8 in. wide x 11 13/16 in. high opening. The horizontal framing members shall be installed such that the flanges of the framing members are flush with the edges of the gypsum wallboard
   b) Wallboard, Gypsum – 1/2 in. thick, 4 ft. wide with square or tapered edges. The gypsum wall board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Maximum diameter of opening is 267.3 sq. in. with max. dimensions of 22 5/8 in.

   The hourly F rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

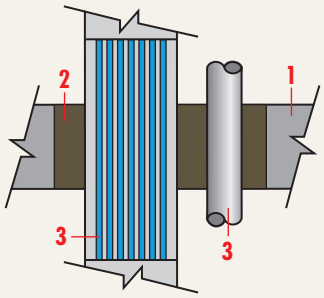
2. **Cable Tray** – Maximum 18 in. wide by maximum 3 1/2 in. deep open-ladder cable tray with channel-shaped side rails formed of minimum 0.065 in. thick steel with 3 1/2 in. wide by 1/2 in. deep rungs spaced 14 1/2 in. oc. One cable tray to be installed in the opening. The annular space between the cable tray and the periphery of opening shall be a minimum of 1 1/2 in. to a maximum of 5 13/16 in. Cable tray to be rigidly supported on both sides of wall assembly.

3. **Cables** – Aggregate cross-sectional area of cables in cable tray to be maximum 40% of the cross-sectional area of the cable tray based on a maximum 3 in. cable loading depth within the cable tray. Any combination of the following types of copper conductor cables may be used:
   a) Maximum of 1/C-500 kcmil (or smaller) cable with cross-linked polyethylene insulation and jacket
   b) Maximum 100 pair No. 24 AWG telephone cable with polyvinyl chloride (PVC) insulation and jacket
   c) Maximum RG 11/U coaxial cable (or smaller) with fluorinated ethylene propylene insulation and jacket
   d) Maximum 2/C – No. 12 AWG (or smaller) cable with PVC insulation and jacket.

4. **Through Penetrants** – Two pipes, conduits or tubes to be installed within the opening. The space between pipes, conduits or tubes shall be a nom. 11 5/8 in. The space between pipes, conduits or tubes and the periphery of opening shall be a minimum of 1 in. to a maximum of 5 7/16 in. The space between the pipes and cable tray shall be a nom. 1/2 in. Pipes, conduits or tubes to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:
   a) Steel pipe – Nom. 4 in. diameter (or smaller) Schedule 40 (or heavier) steel pipe
   b) Iron pipe – Nom. 4 in. diameter (or smaller) cast or ductile iron pipe
   c) Conduit – Nom. 4 in. diameter (or smaller) electrical metallic tubing or steel conduit
   d) Copper Pipe – Nom. 4 in. diameter (or smaller) Regular (or heavier) copper pipe
   e) Copper Tubing – Nom. 4 in. diameter (or smaller) Type L (or heavier) copper tubing.

   Of the through penetrants, only one through penetrant shall have a nom. diameter greater than 3 in. In addition, one nom. 2 in. diameter (or smaller) electrical metallic tubing or steel conduit may be installed within the cable tray. The conduit or tubing shall be spaced a nom. 1 in. from the side rail of the cable tray and a minimum 1 in. from the cable bundles.

5. **Firestop System** – The firestop system shall consist of the following:
   a) Fill, void or cavity material – Mortar – NSi FireStop Mortar. For 2 hr. fire-rated assemblies, minimum 4 1/2 in. thickness of fill material installed flush with both surfaces of wall. For 1 hr. fire-rated assemblies, minimum 3 1/2 in. thickness of fill material installed flush with both surfaces of wall. Mortar to be mixed at a rate of 2.7 parts dry mixture to one part water by weight in accordance with the installation instructions supplied with the product
   b) Packing material – NSi FireStop Mineral Wool. As an option in 2 hr. fire-rated assemblies, one 3 1/8 in. diameter hole can be drilled through the mortar. After the mortar cures, one nom. 2 in. diameter EMT (or smaller) shall be centered within the opening. A minimum 4 in. thickness of 4 pcf mineral wool batt insulation shall be firmly packed into opening as a permanent form. Packing material to be recessed from both surfaces of wall as required to accommodate the required thickness of fill material
   c) Fill, void or cavity material – Sealant – NSi FireStop Silicone. Minimum 1/4 in. thickness of fill material applied within the annulus on both surfaces of wall. Additional fill material to be installed such that a minimum 1/4 in. thick crown is formed around the penetrating item.



ITS DESIGN NO. AD/PHV 180-01

Horizontal or Vertical (floor or wall)
F Rating – 3 hr., T Rating – No penetrations - 3 hr., 3a, b, c, d - 15 minutes, 3e - 0 minutes

1. **Floor or wall assembly** – Minimum 3 in. (75 mm) thick normal or lightweight concrete. Maximum size of opening is 57 1/2 in. x 60 in. (1460 mm x 1525 mm).

2. **Fill, void or cavity material** – Mortar – NSi FireStop Mortar mixed with water in accordance with the manufacturer's instructions and trowelled in place to fill the opening to a minimum depth of 3 in. (75 mm).

3. **Through Penetrants**
   a) Nom. 3 1/2 in. (90 mm) x 24 in. (620 mm) steel ladder type cable tray. Maximum cable and conduit loading not to exceed 32% by area of cable tray
   b) Type 500 MCM CORFLEX II RA90 XLPE or #6 AWG/4 90 XLPE TECK HL FT4 cables installed individually or 1/2 in. (13 mm) apart in cable tray
   c) 2 in. (50 mm) OD and 13/64 in. (5 mm) wall thickness steel conduit, spaced a minimum of 2 in. (50 mm) from the cables in the tray
   d) Schedule 40 steel pipe, nom. 3 1/2 in. (90 mm) OD
   e) Nom. 3 1/4 in. (82 mm) OD copper pipe.

   The T Rating is dependent upon the type of penetrant as tabulated below:

PENETRANT TYPE	T-RATING (HR.)
No penetrant	3
3a, b, c, d	15 min.
3e	0

FIRESTOP™ INTUMESCENT CAULK

Installation: Clean all openings to be firestopped by removing all foreign matter and contaminants such as oil, dust, grease, frost, water, surface dirt, old sealants, glazing compound, protective coatings, etc. Refer to fire test design/system.

Priming and Masking: NSi Intumescent Caulk does not require any priming. However, in view of the unpredictability of surface characteristics, it is recommended that a test sample of sealant be applied on the surface to test adhesion. Areas adjacent to openings to be firestopped can be masked to assure a neat appearance. The masking tape should not be allowed to touch the clean surfaces to which the caulk is to adhere. Remove masking tape immediately.

Applications: For "caulk and walk" systems, simply apply the product where required and let cure. Where backer material (mineral wool, backer rod, etc.) is required by fire test design or system, install backer material as specified. Surfaces of backer material to receive caulk should be recessed in the opening to a depth equal to the required thickness of the sealant. Apply NSi Intumescent Caulk in a continuous operation to fill and seal the opening. Tool the caulk to spread it against the backer material and the opening surfaces. Simply fill the annular space to the required depth and form a smooth bead or crown at the surfaces. Excess sealant should be cleaned with water. Cured sealant is usually very difficult to remove without altering or damaging the surface to which it has been misapplied.

Precautions: NSi Intumescent Caulk is a water based product. No acetic acid or objectionable by-products are evolved during application. On direct contact, uncured caulk may irritate eyes. Flush with water and call a physician. Avoid prolonged contact with skin. Keep out of reach of children. To safely use this product, read and abide by Material Safety Data Sheet (MSDS).

Limitations: NSi Intumescent Caulk is intended for use at interior locations in building only. Protect from direct contact with water until cured. Curing time will vary with temperature and humidity. Do not use where abrasion or physical use is anticipated. Installation in confined or air-free spaces may inhibit cure. Do not apply to surfaces with special protective or cosmetic coatings without prior consultation with NSi and first testing adhesion. For optimum economy and performance, apply to a thickness equal to or slightly greater than the minimum test design thickness. Excessive depth to width ratios may cause sealant failure. Do not apply excessive thickness. We recommend the minimum tested system thickness not be exceeded by more than 25%.

PHYSICAL PROPERTIES*

PROPERTIES	RESULTS
Appearance	Orange
Odor	Mild
Uncured	
Flow rate (ASTM C920)	115 mils/min
Volatile by volume	16.3%
Tack free time	30 min. (@ 70°F (21°C) 50% RH)
Specific gravity	1.2657
VOC (ASTM D 3960-92)	1.2 lb/gal US (138 g/L)
Cured	
Flow, sag or slump	Nil
Hardness (A) (ASTM D2240)	45
Elongation at break (ASTM D412)	110%
Tensile strength (ASTM D412)	160 psi
Effects of accelerated weathering	
UV exposure (ASTM C920)	No cracking
Cold temperature (ASTM C920)	No cracking

*Values given are not intended for specification preparation.

FIRESTOP™ SILICONE

Installation: Clean all openings to be firestopped by removing all foreign matter and contaminants such as oil, dust, grease, frost, water, surface dirt, old sealants, glazing compound, protective coatings, etc. Refer to fire test design/system.

Priming and Masking: NSi FireStop Silicone does not generally require any priming. However, in view of the unpredictability of surface characteristics, it is recommended that a test sample of sealant be applied on the surface to test adhesion. Areas adjacent to openings to be firestopped can be masked to assure a neat appearance. The masking tape should not be allowed to touch the clean surfaces to which the sealant is to adhere. Remove masking tape immediately.

Applications: NSi FireStop Mineral Wool is the required backer material in most systems. The material allows a controlled depth of sealant to be applied for maximum economy. Install backer material as specified. Surfaces of mineral wool to receive sealant should be recessed in the opening to a depth equal to the required thickness of the sealant. Apply NSi FireStop Silicone in a continuous operation to fill and seal the opening. Tool the sealant to spread it against the backer material and the opening surfaces. Individual penetrations through drywall may not require a backing material for the silicone. Simply fill the annular space to the required depth and form a smooth bead or crown at the surfaces. Excess sealant should be dry-wiped from glass, metal and plastic surfaces while still uncured, following with a commercial solvent such as xylol, toluol, or methyl ethyl ketone. Cured sealant is usually very difficult to remove without altering or damaging the surface to which it has been misapplied.

Precautions: NSi FireStop Silicone uses a neutral cure system. No acetic acid or objectionable by-products are evolved during application. On direct contact, uncured sealant may irritate eyes. Flush with water and call a physician. Avoid prolonged contact with skin. Keep out of reach of children. To safely use this product, read and abide by Material Safety Data Sheet (MSDS).

Limitations: Do not use where abrasion or physical use is anticipated. Installation in confined or air-free spaces may inhibit cure. Silicones may be painted, but movement of the silicone may cause the paint film to crack and peel. We recommend the sealant be applied after painting is completed. Do not apply to surfaces with special protective or cosmetic coatings without prior consultation with NSi and first testing adhesion. Do not apply to surfaces that will be in contact with food. For optimum economy and performance, apply to a thickness equal to or slightly greater than the minimum test design thickness. Excessive depth to width ratios may cause sealant failure. Do not apply excessive thickness. We recommend the minimum tested system thickness not be exceeded by more than 25%.

PHYSICAL PROPERTIES*

PROPERTIES	RESULTS
Appearance	Red
Odor	Mild
Uncured	
Tool/work time	5 minutes
Skin over time @ 25°C (77°F) 50% RH	Less than 60 minutes
Curing time @ 25°C (77°F) 50% RH	48 hours
Flow, sag or slump	Nil
Specific gravity	1.13
Maximum strength	After 21 days
VOC (ASTM D 3960-92)	Less than 0.69 lb/gal US
Cured	7 days @ 25°C (77°F) 50% RH
Hardness (A) (ASTM D2240)	12
Tear strength (ASTM D624, Die B)	3.5 kN/m (20 ppi)
Elongation at break (ASTM D412)	600%
Shrink factor	Negligible
ASTM C 920	Type S, NS, 25, NT, G, A and M

*Values given are not intended for specification preparation.

FIRESTOP™ SILICONE SL

Installation: Clean all openings to be firestopped by removing all foreign matter and contaminants such as oil, dust, grease, frost, water, surface dirt, old sealants, glazing compound, protective coatings, etc. Refer to fire test design/system.

Priming and Masking: NSi FireStop Silicone SL does not generally require any priming. However, in view of the unpredictability of surface characteristics, it is recommended that a test sample of sealant be applied on the surface to test adhesion. Areas adjacent to openings to be firestopped can be masked to assure a neat appearance. The masking tape should not be allowed to touch the clean surfaces to which the sealant is to adhere. Remove masking tape immediately.

Applications: NSi FireStop Mineral Wool is the required backer material in most systems. The material allows a controlled depth of sealant to be applied for maximum economy. Install backer material as specified. Surfaces of mineral wool to receive sealant should be recessed in the opening to a depth equal to the required thickness of the sealant. Apply NSi FireStop Silicone SL in a continuous operation to fill and seal the opening to the specified depth. It is self-levelling and therefore no tooling is required. Excess sealant should be dry-wiped from glass, metal and plastic surfaces while still uncured, following with a commercial solvent such as xylol, toluol, or methyl ethyl ketone. Cured sealant is usually very difficult to remove without altering or damaging the surface to which it has been misapplied.

Precautions: NSi FireStop Silicone SL uses a neutral cure system. No acetic acid or objectionable by-products are evolved during application. On direct contact, uncured sealant may irritate eyes. Flush with water and call a physician. Avoid prolonged contact with skin. Keep out of reach of children. To safely use this product, read and abide by Material Safety Data Sheet (MSDS).

Limitations: Do not use where abrasion or physical use is anticipated. Installation in confined or air-free spaces may inhibit cure. Silicones may be painted, but movement of the silicone may cause the paint film to crack and peel. We recommend the sealant be applied after painting is completed. Do not apply to surfaces with special protective or cosmetic coatings without prior consultation with NSi and first testing adhesion. Do not apply to surfaces that will be in contact with food. NSi FireStop Silicone SL is self-levelling and is therefore limited to horizontal applications.

PHYSICAL PROPERTIES*

PROPERTIES	RESULTS
Odor	Mild
Uncured	
Color	Red
Skin over time @ 25°C (77°F)	75 minutes
Curing time @ 25°C (77°F)	48 hours
Flow, sag or slump	Self-levelling
Specific gravity	1.15
VOC (ASTM D 3960-92)	Less than 0.50 lb/gal US
Cured	21 days @ 25°C (77°F) 50% RH
Color	Red
Hardness (A) (ASTM D2240)	5
Elongation at break (ASTM D412)	600%
Movement capability (ASTM C719)	+100/-50%
Tensile strength (ASTM D412)	98.5 kg/cm² (140 psi)
Adhesion in peel (ASTM C794)	15.7 lbs. (180, 2 in. per min., mortar, cohesive failure)

*Values given are not intended for specification preparation.

FIREBLOCK 814™ (COMMERCIAL/RESIDENTIAL)

Installation: Clean the area to be protected so that it is clear of debris. When encountering large voids, mineral or rock wool batts may be used as a backer material to help hold the material in place until cured. Fill the annular space or void with NSi FireStop 814 material to a depth of no less than one inch, making sure there are no visible air passages. Allow 48 to 72 hours for proper cure time.

Applications: NSi FireStop 814 is an approved firestop designed to be applied in openings around wires, pipes, ducts, blank voids or openings and other electrical and mechanical penetrating items at ceiling and floor levels in one- and two-hour fire rated assemblies. FireStop 814 meets UL 1479/ ASTM-E814 standards for firestopping in commercial and residential requirements.

Precautions: No acetic acid or objectionable by-products are evolved during application. Contact with acid will cause evolution of heat. On direct contact, may irritate eyes and skin. Flush with water and call a physician. Avoid prolonged contact with skin. It is recommended to wear rubber gloves, protective eyewear and rubber apron when using NSi FireStop 814. Keep out of reach of children. To safely use this product, read and abide by Material Safety Data Sheet (MSDS).

PHYSICAL PROPERTIES*

PROPERTIES	RESULTS
Uncured	
Color	Red
Curing time @ 25°C (77°F)	48 to 72 hours
Specific gravity	1.8

*Values given are not intended for specification preparation.

FIREBLOCK136™ (RESIDENTIAL)

Installation:Clean the area to be protected so that it is clear of debris. When encountering large voids, mineral or rock wool batts may be used as a backer material to help hold the material in place until cured. Fill the annular space or void with NSi FireBlock136 material to a depth of no less than one inch, making sure there are no visible air passages. Allow 48 to 72 hours for proper cure time.

Applications: NSi FireBlock136 is an approved fire, smoke and draft sealant designed for use in steel and wood frame residential construction. It is to be applied in openings around wires, pipes, ducts, blank voids or openings and other electrical and mechanical penetrating items at ceiling and floor levels in non-rated assemblies. FireBlock exceeds ASTM-E136 standards for fireblocking residential requirements prescribed by all major-model building codes, and also meets or exceeds requirements of UBC, BOCA, SBC, IRC, NYS and MA codes.

Precautions: No acetic acid or objectionable by-products are evolved during application. Contact with acid will cause evolution of heat. On direct contact, may irritate eyes and skin. Flush with water and call a physician. Avoid prolonged contact with skin. It is recommended to wear rubber gloves, protective eyewear and rubber apron when using NSi FireBlock136. Keep out of reach of children. To safely use this product, read and abide by Material Safety Data Sheet (MSDS).

PHYSICAL PROPERTIES*

PROPERTIES	RESULTS
Uncured	
Color	Red
Curing time @ 25°C (77°F)	48 to 72 hours
Specific gravity	1.8
VOC (ASTM D 3960-92)	

*Values given are not intended for specification preparation.

FIRESTOP™ MORTAR

Installation: Clean all openings to be firestopped by removing all foreign matter and contaminants such as oil, dust, grease, frost, water, surface dirt, old sealants, glazing compound, protective coatings, original formwork etc.

Priming and Keying: NSi FireStop Mortar does not generally require any priming. For large horizontal openings, it is recommended that NSi FireStop Mortar be mechanically keyed into the concrete surround, and/or that intermediate support be provided.

Mixing: NSi FireStop Mortar is mixed with water in the ratio of 2.6 US quarts (2.5L) of water to each 15.5 lb. (7 kg) bag. A measuring cup is supplied in each bag for convenience when mixing.

Forming or Damming: Horizontal openings may be dammed temporarily with any convenient material (plywood etc.). Damming is generally not required for vertical openings due to the low slump, dimensional stability and cohesive strength of the mortar paste. Forms, if used, can be removed after 24 hours.

Placement: Apply NSi FireStop Mortar paste into opening with trowel or pour into large horizontal openings from mixer or mixing container. Work paste with trowel to ensure that all voids are filled. Give particular attention to voids between multi-cable/pipe installations. Product may be vibrated for this purpose. Tool surface to desired finish. Clean up with water.

Re-penetration: If it is necessary to penetrate cured NSi FireStop Mortar for new or additional building services, simply drill or poke through mortar to provide opening of sufficient size. After installation of new items, firestop the remaining voids with fresh NSi FireStop Mortar or NSi FireStop Mineral Wool and FireStop Silicone.

Precautions: Avoid inhalation of dust or contact with eyes. Use of dust mask and eye protection is recommended. Thoroughly wash skin after contact and before eating, etc. Keep out of reach of children. To safely use this product, read and abide by Material Safety Data Sheet (MSDS).

Limitations: Do not install when temperature is below 40°F (5°C). In horizontal applications, intermediate support may be required. Do not permit pedestrian or other traffic. Where NSi FireStop Mortar may be subject to acidic exposure, like other Portland cement-based products, it may require a protective coating.

PHYSICAL PROPERTIES*

PROPERTIES	RESULTS
Before Curing	
Mix time	1.5 to 5 min.
Pot life	50 min. (max.)
Workability	Excellent
Wet density	700 ± 10 kg/m³ (43.7 ± 0.6 pcf)
Set time	10 to 15 hr.
After Curing	
Density	640 ± 40 kg/m³ (40 ± 2.5 pcf)
Compressive strength (28 days)	3.3 ± 0.3 Mpa (478 ± 44 psi)
Shrinkage	None
Noncombustibility (CAN4-S114)	Noncombustible
Combustibility (CAN4-S114)	Noncombustible
Thermal conductivity (ASTM C-518)	0.197 W/m. °K @ 24°C (1.365 Btu. In/ft².h.°f)

*Values given are not intended for specification preparation.

FIRESTOP™ MINERAL WOOL

Installation: Install NSi FireStop Mineral Wool to the minimum 25% to 33% compression required by the tested firestop system. See table. Compression must always be perpendicular to the grain. Butt adjacent sections of NSi FireStop Mineral Wool tightly against each other. Leave no voids. NSi FireStop Mineral Wool is the recommended backing material for NSi FireStop Silicone, Silicone SL and Intumescent Caulk. Determine the depth of firestop sealant required and recess the mineral wool to the appropriate depth.

Precautions: To safely use this product, read and abide by Material Safety Data Sheet (MSDS). Avoid inhalation of dust during use and avoid skin and eye contact. Mineral wool, like other nuisance particulates, may cause itching and possible irritation of eyes and/or upper respiratory tract.

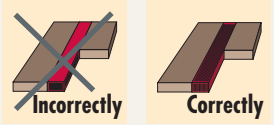
PHYSICAL PROPERTIES*

PROPERTIES	RESULTS
Density	Nominal 4 lb./ft³ (64kg/m³)
Moisture absorption	<1%; inorganic, will not mildew
Service temperatures	Continues use to 1200°F (649°C)
Linear shrinkage	0% @ 1050°F (551°C); <1% @ 1200°F (649°C)
Recovery after 10% compression	100%
Asbestos	None
Surface burning, CAN4-S102, ASTM E84 and UL723	Flame spread – 5; smoke developed – 0
Non-combustibility, CAN4-S114	Listed as noncombustible by ULC
Non-corrosive, NRC 1.36, ASTM C692, C795 and C871	Will not cause or contribute to corrosion

*Values given are not intended for specification preparation.

THICKNESS AND COMPRESSION DATA

NOMINAL BATT THICKNESS		MAX. WIDTH OF OPENING FOR 25% COMPRESSION		MAX. WIDTH OF OPENING FOR 33% COMPRESSION	
In.	mm.	In.	mm.	In.	mm.
1	25	3/4	19	5/8	17
1.5	38	1 1/8	29	1	25
2	50	1 1/2	38	1 5/16	34
3	75	1 1/4	57	2	51
4	100	3	75	2 5/8	68
5 (4+1)	125 (100 + 25)	3 3/4	95	3 5/16	85
5.5 (4 + 1.5)	138 (100 + 38)	4 1/8	105	3 5/8	94
6 (4 + 2)	150 (100 + 50)	4 1/2	114	4	100
7 (4 +3)	175 (100 + 75)	5 1/4	133	4 5/8	119
8 (4 + 4)	200 (100 + 100)	6	150	5 5/16	136



Always install NSi FireStop Mineral Wool so that it is compressed perpendicular to the grain.

FIRESTOP PILLOWS

Installation: Do not open bags. NSi FireStop Pillows are installed easily by compressing them to fit tightly in the voids between penetrating items and the perimeter of the opening. They are to be installed with minimum 25% compression of their thickness (the 2 inch dimension). No wire lath or mesh is required. Be careful of sharp corners and protrusions so as not to damage the bags.
Precautions: To safely use this product, read and abide by Material Safety Data Sheet (MSDS). Do not open bags.
Limitations: Do not install NSi FireStop Pillows where they will be subject to abrasion, physical abuse or traffic. They are not structural and are not designed to support the penetration items they protect nor can they support traffic of any kind.

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