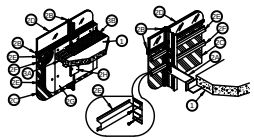
System No. CW-D-2001

F Ratings - 1-1/2 and 2 Hr (See Item 2B)
T Rating - 1/2 Hr
Integrity Ratings - 1-1/2 and 2 Hr (See Item 2B)
Insulation Rating - 1/2 Hr
Linear Opening Width - 10 In. Max
L Rating At Ambient - Less Than 1 CFM/Ln Ft
L Rating At 400°F - Less Than 1 CFM/Ln Ft
Class II Movement Capabilities - 5% Vertical Shear (See Item 3)



1. **Floor Assembly** - Min 6-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 in. thick cast-in-place structural steel angle for weld-attachment of mullion mounting clips (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Clips** - Min 4 in. long angles with one nom 4 in. leg for attachment to edge of floor assembly and with one leg approx 4 in. longer than distance to nearest face of mullion. Clips to be formed of min 1/4 in. thick steel. Clip welded to steel angle at edge of floor assembly (Item 1) on one side of each vertical mullion (Item 2B) at each floor level. Each clip to be provided with elongated holes to accommodate designed amount of movement. Top edge of each clip to be recessed min 1/2 in. below top surface of floor.
   B. **Framing** - The "I" shaped mullions (vertical members) shall be min 2-1/2 in. wide by 7 in. deep and shall be formed from min 0.125 in. thick aluminum. The horizontal framing members shall be min 2 in. wide by 2 in. deep and formed from min 0.125 in. thick aluminum. Mullions spaced max 60 in. OC and secured to mounting clips (Item 2A) at each floor level with two min 3/8 in. diameter hex head steel bolts in conjunction with steel nuts and washers. Interior face of mullions to be notched to accommodate mullion mounting clips and to be max 1/2 in. from edge of floor assembly. Horizontal framing members to be spaced min 72 in. OC. The Integrity Rating is dependent upon the minimum height from the top of the floor to the bottom of the vision panel sill, as tabulated below:

Min Vision Panel Sill Height Above Floor, In	Integrity Rating, Hr
6	1-1/2
34	2

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C. **Spandrel Panels** - Nom 1/4 in. thick opaque heat-strengthened glass panels. Each panel secured in position and four-side captured with exterior sponge gasket compressed in place with interior wedge rubber and aluminum glazing bead.
D. **Vision Panels** - Nom 1 in. thick (double pane) transparent heat-strengthened glass panels. Each panel secured in position and four-side captured with exterior sponge gasket compressed in place with interior wedge rubber and aluminum glazing bead.
E. **Steel Hat Channels** - Nom 2-1/2 in. wide by 7/8 in. deep No. 24 gauge galvanized steel hat channel installed to span from mullion-to-mullion for attachment of curtain wall insulation (Item 2G). Hat channels to be cut min 4 in. longer than on center spacing of mullions. Ends of hat channels cut, flattened and bent 90 deg to form min 2 in. long tabs for screw-attachment to mullions with No. 10 by 1 in. long self-drilling, self-tapping steel screws. Hat channels installed max 3 in. above top of vision panel, max 3 in. below bottom of vision panel and spaced max 24 in. OC. Hat channels screw-attached to mullions along sides of each spandrel panel with No. 10 by 1 in. long self-drilling, self-tapping steel screws.
F. **Stiffener Channel** - One nom 2-1/2 in. wide by 7/8 in. deep by 24 gauge (or heavier) steel hat channel installed to span between mullions at each floor level to restrain curtain wall insulation against outward movement when forming material (Item 3A) is installed. Stiffener channel to be cut min 4 in. longer than on center spacing between mullions. Ends of stiffener channel cut, flattened and bent 90 deg to form min 2 in. long tabs for screw-attachment to the mullion mounting clips (Item 2E) with No. 10 by 3/4 in. long self-drilling, self-tapping steel screws. Each stiffener channel shall be located with its stem centerline at an elevation 2 in. below the top plane of the floor.
G. **Curtain Wall Insulation*** - Nom 4 in. thick mineral wool batt insulation faced on one side with aluminum foil/scrim/kraft vapor retarder, supplied in min 72 in. long batts. Insulation batts compression-fitted between vertical mullions, flush with the interior surface of framing, with a maximum of one vertical seam and with no horizontal seams. Insulation panels secured to each hat channel with min 6-1/2 in. long steel screws with min 1-1/2 in. diameter gale steel clinch shields spaced 3 in. from each vertical edge of batt.

THERMAFIBER INC - FIRESPAN 40

H. **Mullion Insulation - Curtain Wall Insulation*** - Min 8 in. wide strips cut from min 1 in. thick mineral wool batt insulation. Framing covers to be centered over mullions and secured to the steel hat channels with min 5-1/2 in. long steel screws. Framing covers on mullions to abut the mineral wool batt safing material (Item 3A) above and below floor.

THERMAFIBER INC - FIRESPAN 90

3. **Safing System - Max separation between edge of floor assembly and face of framing members (at time of installation) is 10 in. The safing system is designed to accommodate vertical shear movement up to a max of 5 percent of its installed width.** The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Nom 4 pcf density mineral wool batt insulation. Batt sections cut to a 4 in. width and stacked to a thickness which is min 20 percent greater than the width of the linear gap between the curtain wall insulation and the edge of the concrete floor slab. The forming material is compressed and inserted cut-edge-first into linear gap such that its top surface is flush with the top surface of the floor assembly. A max of one tightly-butted seam is permitted between mullions. Additional piece of forming material to be friction-fit into gap between batt sections above mullion mounting clip at each mullion location.

THERMAFIBER INC - SAF

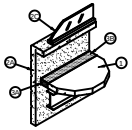
   B. **Fill, Void or Cavity Material*** - Min 1/8 in. wet thickness (min 1/16 in. dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 in. onto the top surface of the concrete floor and onto the curtain wall mullions.

SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray

*Bearing the UL Classification Mark

System No. CW-D-2005

F Rating - 3 Hr
T Rating - 1/4 Hr
Linear Opening Width - 8 In. Max
L Rating At Ambient - Less Than 1 CFM/Ln Ft
L Rating At 400°F - Less Than 1 CFM/Ln Ft
Class II Movement Capabilities - 5% Vertical Shear (See Item 3)



1. **Floor Assembly** - Min 4-1/2 in. thick steel-reinforced lightweight or normal weight (100-150 pcf) structural concrete. Floor assembly to be supported at perimeter edges by spandrel beams having a Restrained or Unrestrained Beam Rating of 3 hr.
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Spandrel Panels** - Min 36 in. high by min 4 in. thick steel-reinforced lightweight or normal weight (100-150 pcf) structural concrete spandrel panels. Wall may also consist of min 4 in. thick steel-reinforced lightweight or normal weight concrete tilt-up panels with a min 36 in. vertical separation between window openings. Panels provided with steel dead load anchors welded to steel reinforcing bars embedded in the concrete for attachment to the steel columns and spandrel beams. Panels also provided with steel lateral anchors or braces. The dead load anchors which are located in the linear gap between the concrete floor slab and the spandrel panel or tilt-up panel, are to be spaced max 72 in. (183 cm) OC. The top of the dead load anchor is to be recessed min 1/2 in. (13 mm) from top surface of floor.
   B. **Steel Channels** - Nom 2-1/2 in. wide by 7/8 in. deep No. 24 gauge galvanized steel hat channel installed to span from mullion-to-mullion for attachment of curtain wall insulation (Item 2G). Hat channels to be cut min 4 in. longer than on center spacing of mullions. Ends of hat channels cut, flattened and bent 90 deg to form min 2 in. long tabs for screw-attachment to mullions with No. 10 by 1 in. long self-drilling, self-tapping steel screws. Hat channels installed max 3 in. above top of vision panel, max 3 in. below bottom of vision panel and spaced max 24 in. OC. Hat channels screw-attached to mullions along sides of each spandrel panel with No. 10 by 1 in. long self-drilling, self-tapping steel screws.
   C. **Stiffener Channel** - One nom 2-1/2 in. wide by 7/8 in. deep by 24 gauge (or heavier) steel hat channel installed to span between mullions at each floor level to restrain curtain wall insulation against outward movement when forming material (Item 3A) is installed. Stiffener channel to be cut min 4 in. longer than on center spacing between mullions. Ends of stiffener channel cut, flattened and bent 90 deg to form min 2 in. long tabs for screw-attachment to the mullion mounting clips (Item 2E) with No. 10 by 3/4 in. long self-drilling, self-tapping steel screws. Each stiffener channel shall be located with its stem centerline at an elevation 2 in. below the top plane of the floor.
   D. **Curtain Wall Insulation*** - Min 2 in. (51 mm) thick mineral wool insulation, faced on one side with aluminum foil/scrim/kraft vapor retarder, supplied in min 24 by 48 in. (61 by 122 cm) boards. Insulation boards to be installed vertically with tightly-butted seams to cover interior surface of concrete spandrel panel. Horizontal seams of insulation boards (if necessary) to be located min 6 in. (152 mm) above and min 6 in. (152 mm) below planes of floor. Insulation boards secured to spandrel panel with impaling pins in conjunction with min 1-1/2 in. (38 mm) diameter galv steel clinch shields. Butted seams to be covered with aluminum foil tape.

THERMAFIBER INC - FIRESPAN 90

3. **Safing System - Max separation between edge of floor assembly and curtain wall insulation is 6 in. (152 mm). The safing system is designed to accommodate vertical shear movement between dead load anchors up to a max of 5 percent of its installed width between the edge of the floor assembly and the curtain wall insulation.** The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Mineral wool batt safing material to be cut into min 4 in. (102 mm) wide pieces and stacked to a thickness which is at least 25 percent greater than the width of the linear gap between the curtain wall insulation (Item 2G) and the edge of the concrete floor slab. The stacked safing material is compressed and inserted cut-edge-first into the linear gap such that its top surface is flush with the top surface of the floor assembly. A max of one tightly butted seam is permitted between spandrel panel attachment plates or tubes. An additional min 12 in. (13 mm) thick piece of mineral wool batt safing material is to be installed to cover top surface of each dead load anchor.

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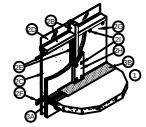
   B. **Fill, Void or Cavity Material*** - Min 1/8 in. (3 mm) wet thickness (1/16 in. (1.5 mm) dry) of fill material spray-applied over top of forming material and lapping min 1/2 in. (13 mm) onto the top surface of the concrete floor and onto the curtain wall insulation.

SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray

*Bearing the UL Classification Mark

System No. CW- D- 2024

F-Ratings - 1- 1/2 and 2 Hr (See Item 2B)
T Ratings - 0 and 1/4 Hr (See Item 2B)
Integrity Ratings - 1- 1/2 and 2 Hr (See Item 2B)
Insulation Ratings - 0 and 1/4 Hr (See Item 2B)
Linear Opening Width - 8 In. Max
L Rating At Ambient - Less Than 1 CFM/Ln Ft
L Rating At 400°F - Less Than 1 CFM/Ln Ft
Class II Movement Capabilities - 5% Vertical Shear (See Item 3)



1. **Floor Assembly** - Min 4- 1/2 in. thick reinforced lightweight or normal weight (100- 150 pcf) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 in. thick cast- in- place structural steel angle for weld- attachment of mullion mounting clips (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Angles** - Min 4 in. long angles with one nom 4 in. leg for attachment to edge of floor assembly and with one leg approx 4 in. longer than distance to nearest face of mullion. Clips to be formed of min 1/4 in. thick steel. Clips welded to steel angle at edge of floor assembly (Item 1) on each side of vertical mullion (Item 2B) at each floor level. Each clip to be provided with elongated holes to accommodate designed amount of movement. Top edge of each clip to be recessed min 1/2 in. below top surface of floor.
   B. **Framing** - The rectangular tubing mullions (vertical members) shall be min 2- 1/2 in. wide by 7 in. deep and shall be formed from min 0.188 in. thick aluminum. Mullions spaced max 60 in. OC and secured to mullion mounting clips (Item 2A) at each floor level with two 3/8- 16 in. long hex head steel bolts in conjunction with steel nuts and washers. Interior face of mullions to be max 8 in. from edge of floor assembly. Transoms to be spaced min 60 in. OC. Thermal isolation material (Item 2C) - The spandrel panel height (centre- to- center of transoms) and the min height from the top of the floor to the bottom of the vision panel sill, as tabulated below:

Min Spandrel Panel Sill Height Above Floor, In	Min Vision Panel Sill Height Above Floor, In	Integrity Rating, Hr	Insulation Rating, Hr
60	24	1-1/2	0
69	34	2	1/4

   C. **Spandrel Panels** - Nom 1- 3/16 in. thick polished granite spandrel panels with 1 in. thick gauged edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
   D. **Vision Panels** - Nom 1/4 in. thick transparent heat- strengthened glass. Each panel secured in position with aluminum pressure plates in conjunction with silicone rubber setting blocks, glazing gaskets and steel screws.
   E. **Spandrel Panel Perimeter Angles** - Nom 1- 1/2 by 1- 1/2 in. No. 22 gauge galvanized steel angles installed around entire perimeter of each spandrel panel. Angles recessed from interior face of framing as necessary to accommodate thickness of curtain wall insulation (Item 2G). Angles cut to be discontinuous at mullion mounting clips (Item 2A). Angles screw- attached to mullions and transom along sides and top of each spandrel panel with No. 8 by 1 in. long self- drilling, self- tapping steel screws spaced max 12 in. OC. Angle along bottom of each spandrel panel to be screw- attached to leg of angle on mullion at each end without any direct attachment to transom. At mullion mounting clips, a length of steel angle shall be installed to bridge between the perimeter angles over the mullion mounting clip. The "bridge" shall be cut approx 6 in. longer than the clear space between angles and shall be secured to the perimeter angles with one No. 8 by 1 in. long steel screw at each end.
   F. **Stiffener Tee** - Two nom 1- 1/2 by 1- 1/2 in. No. 20 gauge galv steel angles secured together, back- to- back, to form stiffener tee for installation in each horizontal seam of the curtain wall insulation (Item 2G). The angle legs forming the stem of the tee shall be secured together using No. 8 by 1/2 in. long self- drilling, self- tapping steel screws spaced max 8 in. OC. The tee shall be installed with a clearance of 1/8 to 1/4 in. at each end and shall be screw- attached to the spandrel panel perimeter angles (Item 2E) with No. 10 by 3/4 in. long self- drilling, self- tapping steel screws, with steel washers, through two predrilled 1/4 in. diam holes at each end. One stiffener tee shall be located with its stem at an elevation 2 in. below the top plane of the floor at each floor level.
   G. **Curtain Wall Insulation*** - Min 2 in. thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 36 in. wide batts. Insulation batts to be installed vertically without vertical seams and with horizontal seams spaced min 36 in. OC. Insulation panels tightly- fitted between vertical mullions and between the stem of the stiffener tee (Item 2F) and the transom, flush with the interior surface of framing. Insulation panels secured to spandrel panel perimeter angles and to each stiffener tee with cup head weld pins (Item 2I) spaced max 12 in OC. The horizontal seam between insulation panels shall be located 2 in. below the top plane of the floor at each floor level.

IG MINWOOL L L C - CW- II

   H. **Framing Covers - Curtain Wall Insulation*** - Min 1 in. thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 24 by 48 in. boards. Nom 8 in. wide strips to be centered over mullions and secured to the spandrel panel perimeter angles with cup head weld pins (Item 2I) spaced max 12 in. OC. Where more than one spandrel panel occurs between vertically separated vision panels, the horizontal transom between spandrel panels shall also be covered with an 8 in. wide framing cover in the same manner as on the vertical mullions. Framing covers on mullions to abut the mineral wool batt safing material (Item 3A) above and below floor.

IG MINWOOL L L C - CW- II

   I. **Weld Pin** - No. 12 gauge galv steel weld pin with nom 1- 3/16 in. diam galv steel cup head. Cup head weld pins provided in two lengths. One length to be equal to thickness of curtain wall insulation (Item 2G) and second length to be equal to thickness of curtain wall insulation plus thickness of framing cover (Item 2H). Cup head weld pins inserted through curtain wall insulation and mullion covers and welded to spandrel panel perimeter angles max 12 in. OC.
   J. **Steel Screw And Clinch Shield** - (Not Shown) - As an alternate to the weld pins (Item 2I), self- drilling, self- tapping steel screws with min 1- 1/2 in. diam galv steel clinch shields may be used to secure the curtain wall insulation and framing covers. Steel screws provided in two lengths. One length to be 1/2 in. greater than thickness of curtain wall insulation (Item 2G) and second length to be 1/2 in. greater than thickness of curtain wall insulation plus thickness of framing cover (Item 2H). Screws secured to spandrel panel perimeter angles, through curtain wall insulation and mullion covers, and spaced max 12 in. OC.
3. **Safing System Max separation between edge of floor assembly and face of framing members (at time of installation) is 8 in. The safing system is designed to accommodate vertical shear movement up to a max of 5 percent of its installed width.** - The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Nom 4 pcf density mineral wool batt insulation. Batt sections cut to a min 4- 1/2 in. width and stacked to a thickness which is min 20 percent greater than the width of linear gap between the curtain wall insulation and the edge of the concrete floor slab. The forming material is compressed and inserted cut- edge- first into linear gap such that its top surface is flush with the top surface of the floor assembly. A max of one tightly- butted seam is permitted between mullions. Additional pieces of forming material to be friction- fit into spaces between mullion mounting clips at each mullion location.

IG MINWOOL L L C - Minifloss- 1200 Safing

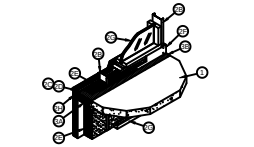
   B. **Fill, Void or Cavity Material*** - Min 1/8 in. wet thickness (min 1/16 in. dry thickness) of fill material spray- applied over top of forming material and lapping min 1/2 in. onto the top surface of the floor and onto the curtain wall insulation and framing covers.

SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray

*Bearing the UL Classification Mark

System No. CW-S-1019

F Rating - 2 Hr
T Ratings - 0 and 1/4 Hr (See Item 2K)
Linear Opening Width - 2-1/2 In. Max
L Rating At Ambient - Less Than 1 CFM/Ln Ft
L Rating At 400°F - Less Than 1 CFM/Ln Ft



1. **Floor Assembly** - Min 6-1/2 in. (164 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 in. (76 by 76 by 6 mm) thick cast-in-place structural steel angle for weld-attachment of mounting angles (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mounting Angles** - (Not Shown) - Nom 3 in. (76 mm) long angles with one nom 3 in. (76 mm) leg for attachment to edge of floor assembly and with one leg approx 4 in. longer than distance to nearest face of mullion. Clips to be formed of min 1/4 in. thick steel. Clip welded to steel angle at edge of floor assembly (Item 1) on one side of each vertical mullion (Item 2B) at each floor level. Each clip to be provided with elongated holes to accommodate designed amount of movement. Top edge of each clip to be recessed min 1/2 in. (13 mm) below top surface of floor.
   B. **Steel Studs** - C-shaped studs formed from min 0.059 in. (1.5 mm) thick galv steel. The steel studs shall be min 6 in. (152 mm) wide by 1-1/4 in. (31 mm) deep with 5/16 in. (8 mm) wide stiffening flanges and shall be assembled using screws consisting of min 0.059 in. (1.5 mm) thick galv steel. Studs spaced max 24 in. (406 mm) OC and welded, bolted or screwed to mounting angles (Item 2A) at each floor level. Interior face of studs to be max 2-1/2 in. (64 mm) from edge of floor assembly. Studs reinforced by means of nom 1-1/2 in. (38 mm) wide by 9/16 in. (14 mm) deep min 0.059 in. (1.5 mm) thick cold rolled steel channels inserted through steel stud keyways on max 48 in. (1.2 m) centers and welded to steel studs.
   B1. **King Studs** - (Optional, Not Shown) - Where required, a king stud may be substituted for Item 2B. King studs to consist of two min 6 in. (152 mm) wide by 1-1/4 in. (31 mm) deep C-shaped studs formed from min 0.059 in. (1.5 mm) thick galv steel secured together by welds. See Item 2C.
   C. **Gypsum Board*** - One layer of nom 5/8 in. (16 mm) thick, 48 in. (1.2 m) wide gypsum sheathing installed to cover entire exterior surface of wall. Sheathing applied with joints centered over studs and secured to steel studs with min 1 in. (25 mm) long bugle head steel screws spaced max 8 in. (204 mm) OC along the edges and max 12 in. (305 mm) OC in the field of each sheet.

See **Gypsum Board** (CKNX) category for names of Classified Companies and product types.

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D. **Cementitious Backer Units*** - As an alternate to the gypsum sheathing (Item 2C), nom 1/2 in. or 5/8 in. (13 or 16 mm) thick square-edge boards attached to studs with 1-1/4 in. (31 mm) long corrosion resistant self-tapping wafer-head steel screws spaced 8 in. (152 mm) OC. Joints covered with glass fiber mesh tape.

UNITED STATES GYPSUM CO - Durock Exterior Cement Board, Durock Cement Board or Durock WMB

E. **Batts and Blankets*** - Any glass fiber insulation bearing the UL Classification Marking as to fire resistance or surface burning characteristics, of a thickness and density sufficient to completely fill stud cavity. Insulation batts friction fit to completely fill all stud cavities of curtain wall above the top of the fill material (Item 6) and below the forming material (Item 3A).

See **Batts and Blankets** (BZJZ) category for names of manufacturers.

F. **Gypsum Board*** - One layer of nom 5/8 in. (16 mm) thick, 48 in. (1.2 m) wide gypsum board applied with joints centered over studs. Gypsum board secured to steel studs on interior surface of curtain wall with min 1 in. (25 mm) long bugle head steel screws spaced max 8 in. (204 mm) OC along the edges and max 12 in. (305 mm) OC in the field of each sheet. Gypsum board installed over interior surface of wall above the top of the fill material (Item 3C) for a min distance of 6 in. (152 mm). Gypsum board is optional below floor assembly.

See **Gypsum Board** (CKNX) category for names of Classified Companies and product types.

G. **Framed Window** - Metal-framed window with nom 1 in. (25 mm) thick (double pane) transparent heat-strengthened or tempered glass panels. Sill of window to be min 6 in. (152 mm) above top of floor slab. Vertical separation between window punch-outs to be min 36 in. (914 mm). Top of window to be min 22-1/2 in. (572 mm) below bottom of floor slab.
H. **Exterior Insulation and Finish System (EIFS)** - Nom 2 in. (51 mm) thick extruded polystyrene **Foamed Plastic*** insulation bearing the UL Classification Marking, attached over sheathing and finished with coating system, or Portland cement or synthetic stucco systems, in accordance with manufacturer's instructions.

See **Foamed Plastic** (BRYX or KHCZ) category for names of Classified companies.

I. **Siding, Brick or Stucco** - (Not Shown) - Aluminum siding, steel siding, brick veneer or stucco installed over gypsum sheathing or cementious backer units and meeting the requirements of local code agencies. Brick veneer wall attached to studs with corrugated metal wall ties attached to each stud with steel screws.
J. **Glass Fiber Reinforced Concrete (GFRC) Panels** - (Not Shown) - Min 1/2 in. (13 mm) thick glass fiber reinforced concrete (GFRC) panels installed over gypsum sheathing or cementitious backer units and meeting the requirements of local code agencies.
K. **Through Penetrant** - (Optional, Not Shown) - Nom 1 in. (25 mm) diam rigid Sch 5 (or heavier) steel pipe, Regular (or heavier copper pipe, or Type M (or heavier) copper tube, steel conduit, steel electrical metallic tubing (EMT), flexible steel conduit, Sch 40 PVC conduit, or max 3/C-10 AWG (or smaller) metal-clad cable may be installed within the stud cavity. The through penetrant shall be located approximately midway between studs and nominally centered within the depth of stud. A max of one through penetrant is permitted in an individual stud cavity. **When through penetrant is installed in stud cavity, the hourly F Rating of the perimeter fire containment system is 0 hr.**
3. **Safing System** - The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Nom 4 pcf (64 kg/m3) density mineral wool batt insulation. Batt sections to be cut to a min width of 4 in. (102 mm) and stacked to a thickness which is 25 percent greater than the width of linear gap between the gypsum sheathing and the edge of the concrete floor to attain a min 20 percent compression in the thickness direction when installed. The forming material is compressed and inserted cut-edge-first into linear gap between edge of floor slab and sheathing material such that its top surface is flush with the top surface of the floor assembly. Length of batt to be equal to on-center spacing of steel studs such that it is friction-fitted between studs and mounting angles without seams. Additional pieces of mineral wool batt to be stuffed inside the channel of each steel stud throughout the thickness of the forming material.

THERMAFIBER INC - SAF

   B. **Fill, Void or Cavity Material*** - **Spray** - Min 1/8 in. (3.2 mm) wet thickness (min 1/16 in. or 1.6 mm dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 in. (13 mm) onto the top surface of the floor and onto the gypsum sheathing and steel studs and optional through penetrant (Item 2K).

SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray

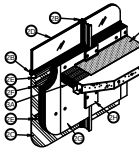
   C. **Fill, Void or Cavity Material*** - **Pillows** - (Not Shown) - Where king studs (Item 2B1) are located, channel within stud to be sealed with pillows. Max 9 in. long by 6 in. wide by 3 in. thick plastic covered intumescent pillows compressed and tightly packed into channel at each floor line.

SPECIFIED TECHNOLOGIES INC - SpecSeal Firestop Pillows

*Bearing the UL Classification Mark

System No. CW-S-2021

F Ratings - 2 and 3 Hr (See Item 2B)
T Rating - 1/2 Hr
Integrity Ratings - 1-1/2 and 2 Hr (See Item 2B)
Insulation Rating - 1/2 Hr
Linear Opening Width - 10 In. Max



1. **Floor Assembly** - Min 6-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 in. thick cast-in-place structural steel angle for weld-attachment of mullion mounting clips (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Angles** - Min 4 in. long angles with one nom 4 in. leg for attachment to edge of floor assembly and with one leg approx 4 in. longer than distance to nearest face of mullion. Clips to be formed of min 1/4 in. thick steel. Clip welded to steel angle at edge of floor assembly (Item 1) on each side of each vertical mullion (Item 2B) at each floor level. Top edge of each clip to be recessed min 1/2 in. below top surface of floor.
   B. **Framing** - The "I" shaped mullions (vertical members) shall be min 2-1/2 in. wide by 7 in. deep and shall be formed from min 0.125 in. thick aluminum. The horizontal framing members shall be min 2 in. wide by 2 in. deep and formed from min 0.125 in. thick aluminum. Mullions spaced max 60 in. OC and secured to mounting clips (Item 2A) at each floor level with two min 3/8 in. diameter hex head steel bolts in conjunction with steel nuts and washers. Interior face of mullions to be notched to accommodate mullion mounting clips and to be max 1/2 in. from edge of floor assembly. Horizontal framing members to be spaced min 72 in. OC. The Integrity Rating is dependent upon the minimum height from the top of the floor to the bottom of the vision panel sill, as tabulated below:

Min Vision Panel Sill Height Above Floor, In	Integrity Rating, Hr
6	1-1/2
34	2

   C. **Spandrel Panels** - Nom 1/4 in. thick opaque heat-strengthened glass panels. Each panel secured in position and four-side captured with exterior sponge gasket compressed in place with interior wedge rubber and aluminum glazing bead.
   D. **Vision Panels** - Nom 1 in. thick (double pane) transparent heat-strengthened glass panels. Each panel secured in position and four-side captured with exterior sponge gasket compressed in place with interior wedge rubber and aluminum glazing bead.
   E. **Steel Hat Channels** - Nom 2-1/2 in. wide by 7/8 in. deep No. 24 gauge galvanized steel hat channel installed to span from mullion-to-mullion for attachment of curtain wall insulation (Item 2G). Hat channels to be cut min 4 in. longer than on center spacing of mullions. Ends of hat channels cut, flattened and bent 90 deg to form min 2 in. long tabs for screw-attachment to mullions with No. 10 by 1 in. long self-drilling, self-tapping steel screws. Hat channels installed max 3 in. above top of vision panel, max 3 in. below bottom of vision panel and spaced max 24 in. OC. Hat channels screw-attached to mullions along sides of each spandrel panel with No. 10 by 1 in. long self-drilling, self-tapping steel screws.
   F. **Stiffener Channel** - One nom 2-1/2 in. wide by 7/8 in. deep by 24 gauge (or heavier) steel hat channel installed to span between mullions at each floor level to restrain curtain wall insulation against outward movement when forming material (Item 3A) is installed. Stiffener channel to be cut min 4 in. longer than on center spacing between mullions. Ends of stiffener channel cut, flattened and bent 90 deg to form min 2 in. long tabs for screw-attachment to the mullion mounting clips (Item 2E) with No. 10 by 3/4 in. long self-drilling, self-tapping steel screws. Each stiffener channel shall be located with its stem centerline at an elevation 2 in. below the top plane of the floor.
   G. **Curtain Wall Insulation*** - Nom 4 in. thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 72 in. long batts. Insulation batts compression-fitted between vertical mullions, flush with the interior surface of framing, with a maximum of one vertical seam and with no horizontal seams. Insulation panels secured to each hat channel with min 4-1/2 in. long steel screws with min 1-1/2 in. diameter galv steel clinch shields spaced 3 in. from each vertical edge of batt.

THERMAFIBER INC - FIRESPAN 40

   H. **Mullion Insulation - Curtain Wall Insulation*** - Min 8 in. wide strips cut from min 1 in. thick mineral wool batt insulation. Framing covers to be centered over mullions and secured to the steel hat channels with min 5-1/2 in. long steel screws. Framing covers on mullions to abut the mineral wool batt safing material (Item 3A) above and below floor.

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3. **Safing System** - The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Nom 4 pcf density mineral wool batt insulation. Batt sections cut to a 4 in. width and stacked to a thickness which is min 20 percent greater than the width of the linear gap between the curtain wall insulation and the edge of the concrete floor slab. The forming material is compressed and inserted cut-edge-first into linear gap such that its top surface is flush with the top surface of the floor assembly. A max of one tightly-butted seam is permitted between mullions. Additional piece of forming material to be friction-fit into gap between batt sections above mullion mounting clip at each mullion location.

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   B. **Fill, Void or Cavity Material*** - Min 1/8 in. wet thickness (min 1/16 in. dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 in. onto the top surface of the floor and onto the curtain wall insulation and mullion covers.

SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray

*Bearing the UL Classification Mark

GENERAL NOTES:

1. Refer to section 07 84 00 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.
2. Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:
   - Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.
3. If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Engineering Judgments shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.
4. References:
   - UL Fire Resistance Directory; Current Edition
   - Interteck Testing Services/Omega Point Labs Directory; Current Edition.
   - NFPA 101 Life Safety Code
   - All governing local and regional building codes
5. Firestop System installation must meet requirements of ASTM E 2307 tested assemblies that provide a fire rating equal to that of surrounding construction.

PROJECT NAME:

XXXXXXXXXXXXXXXXXXXXXXXXX

ARCHITECT/CONSULTANT:

XXXXXXXXXXXXXXXXXXXXXXXXX

TITLE:

STI FIRESTOP SYSTEMS
FIRESTOP THROUGH PENETRATIONS

DIVISION 7:

Thermal & Moisture Protection

Specified Technologies Inc. 210 Evans Way Somerville, NJ 08876

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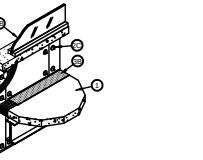
System No. CW-S-2026

F Rating - 2 Hr
T Rating - 1/4 Hr
Integrity Rating - 2 Hr
Insulation Rating - 1/4 Hr
Linear Opening Width - 8 In. Max
L Rating At Ambient - Less Than 1 CFM/sq ft
L Rating At 400 F - Less Than 1 CFM/sq ft



1. **Floor Assembly** - Min 4-1/2 in. (114 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete. Floor assembly to be supported at perimeter edges by spandrel beams having a Restrained or Unrestrained Beam Rating of 2 hr. Edge of concrete floor to be max 8 in. (204 mm) from interior surface of spandrel panel (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Spandrel Panels** - Min 36 in. (92 cm) high by min 4 in. (102 mm) thick steel-reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete spandrel panels. Wall may also consist of min 4 in. (102 mm) thick steel-reinforced lightweight or normal weight concrete blocks by min 36 in. (92 cm) vertical separation between window openings. Panels provided with steel dead load anchors welded to steel reinforcing bars embedded in the concrete for attachment to the steel columns and spandrel beams. Panels also provided with steel lateral anchors or braces. The dead load anchors, which are located in the linear gap between the concrete floor slab and the spandrel panel or the spandrel panel and the curtain wall, to be max 72 in. (183 cm) OC. The top of the dead load anchor is to be recessed min 1/2 in. (13 mm) from top surface of floor.
   B. **Framed Window** - Metal framed window with nom 1 in. (25 mm) thick (double pane) transparent heat-strengthened glass panels. Sill of window to be min 6 in. (152 mm) above top of floor.
   C. **Impaling Pins** - No. 12 gauge (2 mm) steel pins, min 1/2 in. (13 mm) longer than thickness of insulation boards (Item 2D), swaged in nom 2 by 2 in. (51 by 51 mm) galv steel base-plate. Steel base plates secured to concrete spandrel panel with steel concrete screws or powder-driven steel fasteners. Impaling pins to be spaced 3 in. (76 mm) from edges of insulation boards (Item 2D) on each side of seams and spaced max 24 in. (610 mm) OC both vertically and horizontally. A min of two horizontal arrays of impaling pins are required to be located on spandrel panel above top surface of floor.

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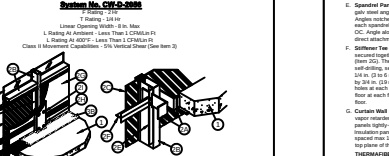
CW-S-2025 PAGE 1 OF 1

System No. CW-S-2028

F Rating - 2 Hr
T Rating - 1/4 Hr
Linear Opening Width - 8 In. Max
L Rating At Ambient - Less Than 1 CFM/Ln Ft
L Rating At 400°F - Less Than 1 CFM/Ln Ft
Class II Movement Capabilities - 5% Vertical Shear (See Item 3)



1. **Floor Assembly** - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 in. (76 by 76 by 6 mm) thick cast-in-place structural steel angle for weld-attachment of wall-to-floor mounting clips (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Clips** - Min 4 in. (102 mm) long angles with one nom 4 in. (102 mm) leg for attachment to edge of floor assembly and with one leg approx 4 in. (102 mm) longer than distance to nearest face of mullion. Clips to be formed of min 1/4 in. (6 mm) thick steel. Clips welded to steel angle at edge of floor assembly (Item 1) on each side of vertical mullion (Item 2B) at each floor level. Each clip to be provided with elongated holes to accommodate the designed amount of vertical movement. Top edge of each clip to be recessed min 1/2 in. below top surface of floor.
   B. **Framing** - The rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be min 2-1/2 in. (64 mm) wide by 5 in. (127 mm) deep and shall be formed from min 0.085 in. (2.2 mm) thick aluminum. Mullions spaced max 60 in. (1,52 m) OC and secured to mullion mounting clips (Item 2A) at each floor level with two 3/8 in. (10 mm) diam by min 3-1/2 in. (89 mm) long steel bolts with hex head and washer. Transoms to be spaced max 60 in. (1,52 m) OC. Transom framing sill of steel panel (Item 2D) to be located such that its bottom surface is at a min height of 24 in. (610 mm) above the top surface of the floor.
   C. **Spandrel Panels** - The spandrel panels shall consist of one of the following types:
      a. **Glass Panels** - Nom 1/4 in. (6 mm) opaque heat-strengthened glass panels. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
      b. **Aluminum Panels** - Nom 1/8 in. (3 mm) thick aluminum panels with 1/4 in. (6 mm) thick edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
      c. **Stone Panels** - Nom 1-3/16 in. (30 mm) thick polished granite spandrel panels with 1 in. (25 mm) thick gauged edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
   D. **Vision Panels** - Nom 1/4 in. (6 mm) thick transparent heat-strengthened glass or nom 1 in. (25 mm) thick insulated glass units with two layers of nom 1/4 in. (6 mm) thick transparent heat-strengthened glass separated by a min 1/2 in. (25 mm) air space. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.

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CW-S-2056 PAGE 1 OF 2

System No. CW-S-0002

F Rating - 2 Hr
T Rating - 1/2 Hr
Linear Opening Width - 2 In. Max

1. **Floor Assembly** - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete.
2. **Curtain Wall Assembly** - The factory-assembled curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Brackets** - Min 8 in. (203 mm) wide by 3/4 in. (19 mm) thick extruded aluminum Hatfen mounting brackets with one nom 2 in. (51 mm) leg for support and attachment of mullion and with one leg at least 6 in. (152 mm) longer than the width of linear opening between floor assembly and mullion. Mounting bracket attached to top of floor with two min 1/2 in. (13 mm) diam steel masonry anchors in conjunction with washer plates supplied with mounting bracket.
   B. **Framing** - The one or two-piece rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be min 2-1/2 in. (64 mm) wide by 5 in. (127 mm) deep and shall be formed from min 0.100 in. (2.5 mm) thick aluminum. Mullions spaced max 60 in. (1,52 m) OC and secured to mullion mounting anchors (Item 2A) at each floor level in conjunction with extruded aluminum clips bolted to the sides of the mullions and designed to engage the vertical leg of the Hatfen mullion mounting bracket in conjunction with an extruded aluminum hook/leveling connector. Interior face of mullions to be max 2 in. (51 mm) from edge of floor assembly. Transoms to be spaced min 36 in. (0,91 m) OC. Sill of vision panel to be located min 6 in. (152 mm) above top surface of floor assembly.
   C. **Spandrel Panels** - The spandrel panels shall consist of one of the following types:
      a. **Glass Panels** - Min 1/4 in. (6 mm) thick opaque heat-strengthened glass or min 1 in. (25 mm) thick insulated glass units with two layers of nom 1/4 in. (6 mm) thick heat-strengthened glass separated by a min 1/2 in. (13 mm) air space. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
      b. **Aluminum Panels** - Min 1/8 in. (3 mm) thick aluminum panels with nom 1/4 in. (6 mm) thick edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
      c. **Stone Panels** - Nom 1-3/16 in. (30 mm) thick polished granite spandrel panels with 1 in. (25 mm) thick gauged edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.

Design covered under US Patent No. 7,856,775 B2

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CW-S-0002 PAGE 1 OF 2

C1. **Clutch Clips** - (Optional, Not Shown) - Nom 2 by 2 in. (51 by 51 mm) wide by 1-1/4 in. (32 mm) high V-shaped steel clutch clips used in conjunction with impaling pins (Item 2C) to offset curtain wall insulation (Item 2D) from spandrel panel (Item 2A). Clutch clips to be used on all impaling pins. When clutch clips are used, a row of impaling pins shall be located max 3 in. (76 mm) from top and bottom surfaces of floor assembly and spaced max 18 in. (457 mm) OC.
   D. **Curtain Wall Insulation*** - Min 2 in. (51 mm) thick mineral wool board insulation, faced on one side with aluminum foil/scrim vapor retarder, supplied in min 24 by 48 in. (61 by 122 cm) boards. Insulation boards installed vertically with tightly-butted seams to cover interior surface of concrete spandrel panel. Horizontal seams of insulation boards (if necessary) to be located min 6 in. (152 mm) above and min 6 in. (152 mm) below planes of floor. Insulation boards secured to spandrel panel with impaling pins in conjunction with min 1-1/2 in. (38 mm) diameter galv steel clinch shields. Butted seams to be covered with aluminum foil tape.
   THERMAFIBER INC - FIRESPAN 90
3. **Safing System** - The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Min 4 pcf (64 kg/m3) density mineral wool batt safing material to be cut into min 4 in. (102 mm) wide pieces and stacked to a thickness which is at least 25 percent greater than the width of the linear gap between the curtain wall insulation (Item 2D) and the edge of the concrete floor slab. The stacked safing material is compressed and inserted cut-edge-first into the linear gap such that its top surface is flush with the top surface of the floor assembly. A max of one tightly-butted seam is permitted between spandrel panel attachment plates or tubes. An additional min 1/2 in. (13 mm) thick piece of mineral wool batt safing material is to be installed to cover top surface of each dead load anchor.
   THERMAFIBER INC - SAF
   B. **Fill, Void or Cavity Material*** - Min 1/8 in. (3 mm) wet thickness (1/16 in. (1,5 mm) dry) of fill material spray-applied over top of forming material and lapping min 1/2 in. (13 mm) onto the top surface of the concrete floor and onto the curtain wall insulation.
   SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray
   *Bearing the UL Classification Mark

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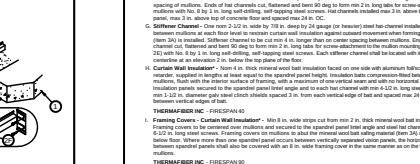
System No. CW-S-2028

F Rating - 2 Hr
T Rating - 1/4 Hr
Linear Opening Width - 8 In. Max
L Rating At Ambient - Less Than 1 CFM/Ln Ft
L Rating At 400°F - Less Than 1 CFM/Ln Ft
Class II Movement Capabilities - 5% Vertical Shear (See Item 3)



1. **Floor Assembly** - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 in. (76 by 76 by 6 mm) thick cast-in-place structural steel angle for weld-attachment of wall-to-floor mounting clips (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Angles** - Min 4 in. (102 mm) long angles with one nom 4 in. leg for attachment to edge of floor assembly and with one leg approx 4 in. longer than distance to nearest face of mullion. Clips to be formed of min 1/4 in. thick steel. Clips welded to steel angle at edge of floor assembly (Item 1) on each side of vertical mullion (Item 2B) at each floor level. Top edge of each clip to be recessed min 1/2 in. below top surface of floor.
   B. **Framing** - The rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be min 2-1/2 in. wide by 5 in. deep and shall be formed from min 0.085 in. thick aluminum. Mullions spaced max 60 in. OC and secured to mullion mounting clips (Item 2A) at each floor level with two 3/8-16 by 4 in. long hex head steel bolts in conjunction with steel nuts and washers. Interior face of mullions to be max 8 in. from edge of floor assembly. Transoms to be spaced min 60 in. OC. The insulation and Integrity Ratings are dependent upon the spandrel panel height (center-to-center of transoms) and the min height from the top of the floor to the bottom of the vision panel sill, as tabulated below.

Min Spandrel Panel Length, In	Integrity Rating, Hours	Insulation Rating, Hours
60	2	1-1/2
69	3/4	2
34	2	1/4

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C. **Spandrel Panels** - Nom 1-3/16 in. thick polished granite spandrel panels with 1 in. thick gauged edges. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
   D. **Vision Panels** - Nom 1 in. thick (double pane) transparent heat-strengthened glass panels. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
   E. **Spandrel Panel Lintel Angle** - Nom 3 by 3 in. No. 12 gauge galvanized steel angle secured to underside of transom at top of each spandrel panel. Vertical leg of angle recessed 4 in. from interior face of framing to accommodate thickness of curtain wall insulation (Item 2C). Angle installed with 1/8 in. 1 in. clearance at each end and screw-attached to transom with No. 8 by 1 in. long self-drilling, self-tapping steel screws spaced max 12 in. OC.
   F. **Steel Hat Channels** - Nom 2-1/2 in. wide by 7/8 in. deep No. 24 gauge galvanized steel hat channel installed to span from mullion-to-mullion for attachment of curtain wall insulation (Item 2H). Hat channels to be cut min 4 in. longer than on center spacing of mullions. Ends of hat channels cut, flattened and bent 90 deg to form min 2 in. long tabs for screw-attachment to mullion. Min 1 in. long tab to be left in place to form stop for insulation. Hat channels installed max 3 in. above top of vision panel, max 3 in. above top of concrete floor and spaced max 24 in. OC.
   G. **Stiffener Channel** - One nom 2-1/2 in. wide by 7/8 in. deep by 24 gauge (or heavier) steel hat-channel installed to span between mullions at each floor level to restrain curtain wall insulation against outward movement when forming material (Item 3A) is installed. Ends of channel cut, flattened and bent 90 deg to form min 2 in. long tabs for screw-attachment to mullion. Ends of stiffener channel cut, flattened and bent 90 deg to form min 2 in. long tabs for screw-attachment to the mullion mounting clips (Item 2E) with No. 8 by 1 in. long self-drilling, self-tapping steel screws. Each stiffener channel shall be located with its stem centerline at an elevation 2 in. below the top plane of the floor.
   H. **Curtain Wall Insulation*** - Nom 4 in. thick mineral wool batt insulation faced on one side with aluminum foil/scrim/kraft vapor retarder, supplied in lengths at least equal to the spandrel panel height. Insulation batts compression-fitted between vertical mullions and secured to the spandrel panel lintel angle and to each hat channel with min 4-1/2 in. long steel screws. Insulation panels secured to the spandrel panel lintel angle and to each hat channel with min 4-1/2 in. long steel screws with min 1-1/2 in. diameter galv steel clinch shields spaced 3 in. from each vertical edge of batt and spaced max 24 in. OC between vertical edges of batt.
   THERMAFIBER INC - FIRESPAN 60
   I. **Framing Covers - Curtain Wall Insulation*** - Min 8 in. wide strips cut from min 2 in. thick mineral wool batt insulation. Framing covers to be centered over mullions and secured to the spandrel panel angle and steel hat channels with min 6-1/2 in. long steel screws. Framing covers on mullions to abut the mineral wood batt safing material (Item 3A) above and below floor. Where more than one spandrel panel occurs between vertical separated vision panels, the horizontal transom between spandrel panels shall also be covered with an 8 in. wide framing cover in the same manner as on the vertical mullions.
   THERMAFIBER INC - FIRESPAN 90
3. **Safing System** - The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Nom 4 pcf density mineral wool batt insulation. Batt sections cut to a min 4-1/2 in. width and stacked to a thickness which is min 50 percent greater than the width of linear gap between the curtain wall insulation and the edge of the concrete floor. The forming material is compressed and inserted cut-edge-first into linear gap such that its top surface is flush with the top surface of the floor assembly. A max of one tightly-butted seam is permitted between mullions. Additional pieces of forming material to be friction-fit into spaces between mullion mounting clips at each mullion location.
   THERMAFIBER INC - SAF
   B. **Fill, Void or Cavity Material*** - Min 1/8 in. (3 mm) wet thickness (min 1/16 in. or 1.6 mm dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 in. (13 mm) onto the top surface of the floor and onto the curtain wall insulation and framing covers.
   SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray
   *Bearing the UL Classification Mark

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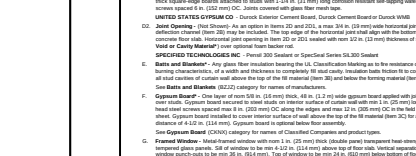
System No. CW-S-0001

F Rating - 2 Hr
T Rating - 1/2 Hr
Linear Opening Width - 2 In. Max
L Rating At Ambient - Less Than 1 CFM/Ln Ft
L Rating At 400°F - Less Than 1 CFM/Ln Ft



1. **Floor Assembly** - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete. Min 4 in. (102 mm) thick steel-reinforced lightweight or normal weight concrete blocks may also consist of min 4 in. (102 mm) thick steel-reinforced lightweight or normal weight concrete blocks by min 36 in. (92 cm) vertical separation between window openings. Panels provided with steel dead load anchors welded to steel reinforcing bars embedded in the concrete for attachment to the steel columns and spandrel beams. Panels also provided with steel lateral anchors or braces. The dead load anchors, which are located in the linear gap between the concrete floor slab and the spandrel panel or the spandrel panel and the curtain wall, to be max 72 in. (183 cm) OC. The top of the dead load anchor is to be recessed min 1/2 in. (13 mm) from top surface of floor.
   B. **Framed Window** - Metal framed window with nom 1 in. (25 mm) thick (double pane) transparent heat-strengthened glass panels. Sill of window to be min 6 in. (152 mm) above top of floor.
   C. **Impaling Pins** - No. 12 gauge (2 mm) steel pins, min 1/2 in. (13 mm) longer than thickness of insulation boards (Item 2D), swaged in nom 2 by 2 in. (51 by 51 mm) galv steel base-plate. Steel base plates secured to concrete spandrel panel with steel concrete screws or powder-driven steel fasteners. Impaling pins to be spaced 3 in. (76 mm) from edges of insulation boards (Item 2D) on each side of seams and spaced max 24 in. (610 mm) OC both vertically and horizontally. A min of two horizontal arrays of impaling pins are required to be located on spandrel panel above top surface of floor.

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D1. **Cementitious Backer Units*** - As an alternate to the gypsum sheathing (Item 2D), nom 1/2 in. or 5/8 in. (13 or 16 mm) thick square-edge boards attached to studs with 1-1/4 in. (31 mm) long corrosion resistant self-tapping wafer-head steel screws spaced 6 in. (152 mm) OC. Joints covered with glass fiber mesh tape.
   UNITED STATES GYPSUM CO - Durock Exterior Cement Board, Durock Cement Board or Durock WMB
   D2. **Joint Opening** - (Not Shown) - As an option in items 2D and 2D1, max 3/4 in. (19 mm) wide horizontal joint backed by deflection channel (Item 2B) may be included. The top edge of the horizontal joint shall align with the bottom edge of the concrete floor slab. Horizontal joint opening in Item 2D or 2D1 sealed with nom 1/2 in. (13 mm) thickness of sealant (**F/L Void or Cavity Material***) over optional foam backer rod.
   SPECIFIED TECHNOLOGIES INC - Pecora 300 Sealant or SpecSeal Series SL300 Sealant
   E. **Batts and Blankets*** - Any glass fiber insulation bearing the UL Classification Marking as to fire resistance or surface burning characteristics, of a width and thickness to completely fill stud cavity. Insulation batts friction fit to completely fill all stud cavities of curtain wall above the top of the fill material (Item 3A) and below the forming material (Item 3A).
   See **Batts and Blankets** (BZ32) category for names of manufacturers.
   F. **Gypsum Board*** - One layer of nom 5/8 in. (16 mm) thick, 48 in. (1,2 m) wide gypsum board applied with joints centered over studs. Gypsum board secured to steel studs on interior surface of curtain wall with min 1 in. (25 mm) long bugle head steel screws spaced max 8 in. (203 mm) OC along the edges and max 12 in. (305 mm) OC in the field of each sheet. Gypsum board installed to cover interior surface of wall above the top of the fill material (Item 3C) for a min distance of 4-1/2 in. (114 mm). Gypsum board is optional below floor assembly.
   See **Gypsum Board** (CKNX) category for names of Classified Companies and product types.
   G. **Framed Window** - Metal-framed window with nom 1 in. (25 mm) thick (double pane) transparent heat-strengthened or tempered glass panels. Sill of window to be min 4-1/2 in. (114 mm) above top of floor slab. Vertical separation between window punch-outs to be min 36 in. (914 mm). Top of window to be min 24 in. (610 mm) below bottom of floor slab.
   H. **Exterior Insulation and Finish System (EIFS)** - Nom 2 in. (51 mm) thick extruded polystyrene **Foamed Plastics*** insulation bearing the UL Classification Marking, attached over sheathing and finished with coating system, or Portland cement or synthetic stucco systems, in accordance with manufacturer's instructions.
   See **Foamed Plastic** (BRYX or CCVW) category for names of Classified companies.
   I. **Siding, Brick or Stucco** - (Not Shown) - Aluminum siding, steel siding, brick veneer or stucco installed over gypsum sheathing or cementitious backer units and meeting the requirements of local code agencies. Brick veneer wall attached to studs with corrugated metal wall ties attached to each stud with steel screws.
   J. **Glass Fiber Reinforced Concrete (GFRC) Panels** - (Not Shown) - Min 12 in. (13 mm) thick glass fiber reinforced concrete (GFRC) panels installed over gypsum sheathing or cementitious backer units and meeting the requirements of local code agencies.
3. **Safing System** - The safing system shall incorporate the following construction features:
   A. **Impaling Pins** - (Optional, Not Shown) - No. 12 gauge steel pins swaged to nom 2 by 2 in. (51 by 51 mm) galv steel base plate. Steel base plates secured to edge of concrete slab by means of min 1 in. (25 mm) long steel concrete screws. Impaling pins to be spaced max 16 in. (406 mm) on center.
   B. **Forming Material*** - Nom 4 pcf (64 kg/m3) density mineral wool batt insulation. Batt sections to be cut to a min width equal to thickness of floor assembly and stacked to a thickness which is 25 percent greater than the width of linear gap between the gypsum sheathing and the edge of the concrete floor to attain a min 20 percent compression in the thickness direction when installed. The forming material is installed cut-edge-first into linear gap between edge of floor slab, steel angle (Item 2C2) and sheathing material such that its top surface is flush with the top surface of the floor assembly. As an option when Item 3A is used, the batt sections can be impaled on 12 AWG pins and secured by means of nom 1-1/2 in. (38 mm) diam steel clinch shields. As an alternate to the optional impaling pin, when the steel angle is fastened to the bottom of the steel floor beams, a steel screw may be driven through the steel angle and safing insulation against the floor slab to secure batt sections.
   THERMAFIBER INC - SAF
   C. **Fill, Void or Cavity Material*** - Spray - Min 1/8 in. (3.2 mm) wet thickness (min 1/16 in. or 1.6 mm dry thickness) of fill material spray-applied at interface of steel floor runner and gypsum sheathing with min 12 in. (13 mm) overlap and at interface of steel floor runner and concrete floor with min 12 in. (13 mm) overlap.
   SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray
   *Bearing the UL Classification Mark

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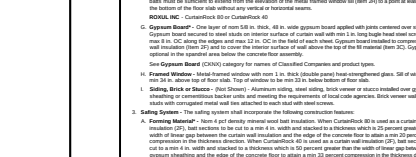
System No. CW-S-0002

F Rating - 2 Hr
T Rating - 1/2 Hr
Linear Opening Width - 2 In. Max



1. **Floor Assembly** - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete.
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Angles** - (Not Shown) - Min 3 in. long angles with one nom 4 in. leg for attachment to edge of floor assembly and with one leg approx 2-1/2 in 2 in. longer than distance to interior face of steel studs. Angles to be formed of min 18 in. thick steel. Angles welded to cast-in-place structural steel angle at edge of floor assembly (Item 1) on one side of each steel stud (Item 2B) at each floor level. Top edge of each mounting angle to be recessed 1 to 1-1/2 in. below top surface of floor.
   B. **Steel Studs** - C-shaped studs formed from min 0.034 in. thick (20 ga) galv steel. The steel studs shall be 4 in. or 6 in. wide by min 1-1/4 in. deep with min 5/16 in. wide stiffening flanges and shall be assembled using runner channels formed from min 0.034 in. thick galv steel. Studs spaced 16 or 24 in. OC and welded, bolted or screwed to mounting angles (Item 2A) at each floor level. When cementious backer units (Item 2E) are used for exterior sheathing, max stud spacing is 16 in. OC. Interior face of studs to be max 2-1/2 in. from edge of floor assembly.
   C. **Steel Studs** - Short lengths of steel stud (Item 2B) cut to have each steel stud against lateral movement. One end of stud bolted, screwed or welded to steel stud beneath plane of floor assembly. Opposite end of stud anchored to underside of floor.
   D. **Gypsum Board*** - One layer of nom 5/8 in. thick, 48 in. wide gypsum sheathing installed to cover entire exterior surface of wall. Sheathing applied with joints centered over studs and secured to steel studs with min 1 in. long bugle head steel screws spaced max 8 in. OC along the edges and max 12 in. OC in the field of each sheet.
   See **Gypsum Board** (CKNX) category for names of Classified Companies and product types.

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D. **Vision Panels** - Min 1/4 in. (6 mm) thick transparent heat-strengthened glass or min 1 in. (25 mm) thick insulated glass units with two layers of nom 1/4 in. (6 mm) thick transparent heat-strengthened glass separated by a min 1/2 in. (25 mm) air space. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
   E. **Steel Backpan** - No. 22 gauge (min 0.031 in. or 0.79 mm thick) galv steel panels installed between mullions and transoms within spandrel panel area. Steel backpan provided with min 1/2 in. (13 mm) wide lip around all four sides. Steel backpan installed with interior face of framing and cross-members to mullions and transom along all sides with min No. 8 by 1/2 in. (13 mm) long self-drilling, self-tapping steel screws spaced max 8 in. (203 mm) OC.
   F. **Stiffener Tee** - Nom 1-1/2 in. deep by 3in. wide T-shaped stiffener formed of No. 22 gauge (min 0.031 in. or 0.79 mm thick) galv steel welded to exterior surface of steel backpan. Stiffener tee installed with its stem at an elevation 2 in. (51 mm) below the top surface of the floor such that, upon installation of the safing insulation (Item 3A), the stiffener channel will be located at the middepth of the safing insulation. The spot or stitch welds securing the stiffener tee to the backpan shall be spaced max 8 in. (203 mm) OC along the length of the tee with welds alternating between the top and bottom of the tee.
   G. **Curtain Wall Insulation*** - Min 2 in. (51 mm) thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder. Insulation batts to be installed with vertical seams tightly-butted together and with one face to receive stem of stiffener tee. Insulation panels tightly-fitted between vertical mullions and the transoms and secured to steel backpan with No. 12 gauge steel swirl pins with steel clinch shields or with cup head weld pins (Item 3D) spaced max 12 in. (305 mm) OC.
   ROXUL ASA SON BIND - CURTAINROCK 80
   ROXUL INC - CURTAINROCK 80
   THERMAFIBER INC - FIRESPAN 90
   H. **Aluminum Sandwich Panel** - (Optional) - Min 1/8 in. (3 mm) solid aluminum panel or aluminum composite panel installed on exterior surface of curtain wall insulation (Item 2G).
3. **Safing System** - The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Nom 4 pcf (64 kg/m3) density mineral wool batt insulation. Batt sections cut to a width equal to the thickness of the floor and stacked to a thickness which is min 50 percent greater than the width of the linear gap between the curtain wall insulation and the edge of the concrete floor slab. The forming material is compressed min 33 percent and inserted cut-edge-first into the linear gap such that it is flush with the top and bottom surfaces of the floor assembly. Adjoining lengths of forming material to be tightly butted with butted seams spaced min 24 in. (610 mm) OC. Forming material to be continuous beneath mullion mounting brackets (Item 2A).
   ROXUL ASA SON BIND - Safe
   ROXUL INC - Safe
   THERMAFIBER INC - SAF
   B. **Fill, Void or Cavity Material*** - Min 1/8 in. (3 mm) wet thickness (1/16 in. or 1.5 mm dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 in. (13 mm) onto the top surface of the floor and onto the steel backpan.
   SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray
   C. **Safing Shelf - Curtain Wall Insulation*** - Nom 2 in. (51 mm) thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder. Min 8 in. (203 mm) wide strips cut from 2 in. thick mineral wool batt insulation. Insulation strips installed vertically against bottom of safing insulation (Item 3A), continuous over the steel backpans and mullions, and secured to the steel backpan with cup head weld pins (Item 3D) spaced max 12 in. (305 mm) OC.
   ROXUL ASA SON BIND - CURTAINROCK 80
   ROXUL INC - CURTAINROCK 80
   THERMAFIBER INC - FIRESPAN 90
   D. **Weld Pin** - Nom 2 in. (51 mm) long No. 12 gauge galv steel weld pin with nom 3-1/16 in. (30 mm) diam galv steel cup head used to secure curtain wall insulation (Item 3C) to steel backpan.
   *Bearing the UL Classification Mark

Design covered under US Patent No. 7,856,775 B2

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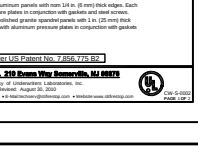
CW-S-0002 PAGE 1 OF 2

System No. CW-S-1014

F Rating - 2 Hr
T Rating - 2 Hr
Integrity Rating - 2 Hr
Insulation Rating - 1/4 Hr
Linear Opening Width - 2-1/2 In. Max
L Rating At Ambient - Less Than 1 CFM/Ln Ft
L Rating At 400 F - Less Than 1 CFM/Ln Ft



1. **Floor Assembly** - Min 4-1/2 in. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 in. thick cast-in-place structural steel angle for weld-attachment of mounting angles (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Angles** - (Not Shown) - Min 3 in. long angles with one nom 4 in. leg for attachment to edge of floor assembly and with one leg approx 2-1/2 in 2 in. longer than distance to interior face of steel studs. Angles to be formed of min 18 in. thick steel. Angles welded to cast-in-place structural steel angle at edge of floor assembly (Item 1) on one side of each steel stud (Item 2B) at each floor level. Top edge of each mounting angle to be recessed 1 to 1-1/2 in. below top surface of floor.
   B. **Steel Studs** - C-shaped studs formed from min 0.034 in. thick (20 ga) galv steel. The steel studs shall be 4 in. or 6 in. wide by min 1-1/4 in. deep with min 5/16 in. wide stiffening flanges and shall be assembled using runner channels formed from min 0.034 in. thick galv steel. Studs spaced 16 or 24 in. OC and welded, bolted or screwed to mounting angles (Item 2A) at each floor level. When cementious backer units (Item 2E) are used for exterior sheathing, max stud spacing is 16 in. OC. Interior face of studs to be max 2-1/2 in. from edge of floor assembly.
   C. **Steel Studs** - Short lengths of steel stud (Item 2B) cut to have each steel stud against lateral movement. One end of stud bolted, screwed or welded to steel stud beneath plane of floor assembly. Opposite end of stud anchored to underside of floor.
   D. **Gypsum Board*** - One layer of nom 5/8 in. thick, 48 in. wide gypsum sheathing installed to cover entire exterior surface of wall. Sheathing applied with joints centered over studs and secured to steel studs with min 1 in. long bugle head steel screws spaced max 8 in. OC along the edges and max 12 in. OC in the field of each sheet.
   See **Gypsum Board** (CKNX) category for names of Classified Companies and product types.

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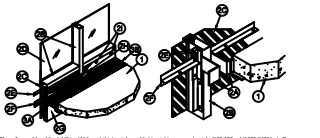
E. **Cementitious Backer Units*** - As an alternate to the gypsum sheathing (Item 2D), nom 1/2 in. or 5/8 in. thick square-edge boards attached to studs with 1-1/4 in. long corrosion resistant self-tapping wafer-head steel screws spaced 6 in. (152 mm) OC. Joints covered with glass fiber mesh tape.
   UNITED STATES GYPSUM CO - Durock Exterior Cement Board, Durock Cement Board or Durock WMB
   F. **Curtain Wall Insulation*** - Nom 4 in. or

System No. CW-S-2001
T Rating - 1 Hr
Linear Opening Width - 8 In. Max
L Rating At Ambient - Less Than 1 CFM/Lin Ft
L Rating At 400°F - Less Than 1 CFM/Lin Ft



1. **Floor Assembly** - Min 4-1/2 In. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf (1600-2400 kg/m3) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 In. (76 by 76 by 6 mm) thick cast-in-place structural steel angle for weld-attachment of mullion mounting clips (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Clips** - Min 4 In. (102 mm) long angles with one row 4 In. (102 mm) leg for attachment to edge of floor assembly and with one leg approx 4 In. (102 mm) longer than distance to nearest face of mullion. Clips to be formed of min 1/4 In. (6 mm) thick steel. Clips welded to steel angle at edge of floor assembly (Item 1) on each side of vertical mullion (Item 2B) at each floor level. Top edge of each clip to be recessed min 1/2 In. (13 mm) below top surface of floor.
   B. **Framing** - The rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be min 2-1/2 In. (64 mm) wide by 5 In. (127 mm) deep and shall be formed from min 0.085 In. (2.2 mm) thick aluminum. Mullions spaced max 60 In. (152 cm) OC and secured to mullion mounting clips (Item 2A) at each floor level with two 3/8-16 by 4 In. (102 mm) long hex head steel bolts in conjunction with Steel nuts and washers. Interior face of mullions to be max 8 In. (204 mm) from edge of floor assembly. Transoms to be spaced min 36 In. (91 cm) OC. The minimum height from the top of the floor to the bottom of the vision panel sill is 6 In. (152 mm).
   C. **Spandrel Panels** - The spandrel panels shall consist of one of the following types:
      a. **Glass Panels** - Nom 1/4 In. (6 mm) thick opaque heat-strengthened glass. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
      b. **Aluminum Panels** - Nom 1/8 In. (3 mm) thick aluminum panels with 1/4 In. (6 mm) thick edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
      c. **Stone Panels** - Nom 1-3/16 In. (46 mm) thick polished granite spandrel panels with 1 In. (25 mm) thick gauged edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
   D. **Vision Panels** - Nom 1/4 In. (6 mm) thick transparent heat-strengthened glass or nom 1 In. (25 mm) thick insulated glass units with two layers of nom 1/4 In. (6 mm) thick transparent heat-strengthened glass separated by a 1/2 In. (25 mm) air space. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
   E. **Spandrel Panel Perimeter Angles** - Nom 1-1/2 by 1-1/2 In. (38 by 38 mm) No. 22 gauge (0.031 In. or 0.79 mm thick) galvanized steel angles installed around entire perimeter of each spandrel panel. Angles recessed from interior face of framing as necessary to accommodate thickness of curtain wall insulation (Item 2G). Angles cut to be discontinuous at mullion mounting clips (Item 2A). Angles screw-attached to mullions and transom along sides and top of each spandrel panel with No. 8 by 1 In. (25 mm) long self-drilling, self-tapping steel screws spaced max 12 In. (305 mm) OC. Angle along bottom of each spandrel panel to be screw-attached to leg of angle on mullion at each end without any direct attachment to transom. At mullion mounting clips, a length of steel angle shall be installed to bridge between the perimeter angles over the mullion mounting clip. The "bridge" shall be cut approx 6 In. (152 mm) longer than the clear space between angles and shall be secured to the perimeter angles with one No. 8 by 1 In. (25 mm) long steel screw at each end.

   F. **Stiffener Tee** - Two nom 1-1/2 by 1-1/2 In. (38 by 38 mm) No. 20 gauge (0.038 In. or 0.97 mm thick) galv steel angles secured together, back-to-back, to form stiffener tee for installation in each horizontal seam of the curtain wall insulation (Item 2G). The angle legs forming the stem of the tee shall be secured together using No. 8 by 1/2 In. (13 mm) long self-drilling, self-tapping steel screws spaced max 8 In. (204 mm) OC. The tee shall be installed with a clearance of 1/8 to 1/4 In. (3 to 6 mm) at each end and shall be screw-attached to the spandrel panel perimeter angles (Item 2E) with No. 10 by 3/4 In. (19 mm) long self-drilling, self-tapping steel screws, with steel washers, through two predrilled 1/4 In. (6 mm) diam holes at each end. One stiffener tee shall be located with its stem at an elevation 2 In. (51 mm) below the top plane of the floor at each floor level.
   G. **Curtain Wall Insulation*** - Min 2 In. (51 mm) thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 36 In. (914 cm) wide batts. Insulation batts to be installed with no vertical seams. Insulation panels tightly-fitted between vertical mullions and between the stem of the stiffener tee (Item 2F) and the transom, flush with the interior surface of framing. Insulation panels secured to spandrel panel perimeter angles and to each stiffener tee with cup head weld pins (Item 2I) or 2-1/2 In. (64 mm) long steel screws with min 1-1/2 In. (38 mm) diameter galv steel clinch shields spaced max 12 In. (305 mm) OC. The horizontal seam between insulation panels shall be located 2 In. (51 mm) below the top plane of the floor at each floor level.

      THERMAFIBER INC - FIRESPAN 90
   H. **Framing Covers - Curtain Wall Insulation*** - Min 8 In. (204 mm) wide strips cut from the same min 2 In. (51 mm) thick mineral wool batt insulation used for the curtain wall insulation (Item 2G). Framing covers to be centered over mullions and secured to the spandrel panel perimeter angles with cup head weld pins (Item 2I) or 4-1/2 In. (114 mm) long steel screws with min 1-1/2 In. (38 mm) diameter galv steel clinch shields spaced max 12 In. (305 mm) OC. Where more than one spandrel panel (Item 2C) occurs between vertically separated vision panels, the horizontal transom between spandrel panels shall also be covered with an 8 In. (204 mm) wide framing cover in the same manner as on the vertical mullions. Framing covers on mullions to abut the mineral wool batt safing material (Item 3A) above and below floor.

      THERMAFIBER INC - FIREPAN 90
   I. **Weld Pin** - In lieu of steel screws, No. 12 gauge (2 mm) galv steel weld pin with nom 1-3/16 In. (30 mm) diam galv steel cup head. Cup head weld pins provided in two lengths. One length to be equal to thickness of curtain wall insulation (Item 2G) and framing cover height to be equal to thickness of curtain wall insulation plus thickness of framing cover (Item 2H). Cup head weld pins inserted through curtain wall insulation and mullion covers and welded to spandrel panel perimeter angles max 12 In. (305 mm) OC.
   J. **Light Gauge Framing*** - **Spiral Anchor** - (Not Shown) - As an alternate to the weld pins (Item 2I), galv steel wire spiral anchors may be used to secure the framing covers (Item 2H) to the curtain wall insulation (Item 2G) on each side of the mullion. Nom length of spiral anchors to be equal to thickness of curtain wall insulation plus thickness of framing cover. Spiral anchors driven through mullion covers and into curtain wall insulation and spaced max 12 In. OC.

      THERMAFIBER INC
3. **Safing System** - The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Nom 4 pcf (64 kg/m3) density mineral wool batt insulation. Batt sections cut to a min 4 In. (102 mm) width and stacked to a thickness which is min 25 percent greater than the width of linear gap between the curtain wall insulation and the edge of the concrete floor slab. The stacked forming material is compressed 20 percent in the thickness direction and inserted cut-edge-first into linear gap such that its top surface is flush with the top surface of the floor assembly. A mass of one tightly-bulled seam is permitted between mullions. Additional pieces of forming material to be friction-fit into spaces between mullion mounting clips at each mullion location.

      THERMAFIBER INC - SAF
   B. **Fill, Void or Cavity Material*** - Min 1/8 In. (3 mm) wet thickness (min 1/16 In. or 1.6 mm dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 In. (13 mm) onto the top surface of the floor and onto the curtain wall insulation and framing covers.

      SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray

      *Bearing the UL Classification Mark

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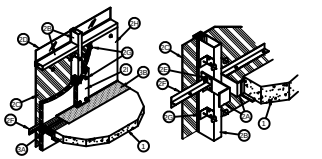
System No. CW-S-2002
F Rating - 2 Hr
T Rating - 1/4 Hr
Integrity Rating - 3 Hr
Insulation Rating - 1/4 Hr
Linear Opening Width - 8 In. Max
Rating At Ambient - Less Than 1 CFM/Lin Ft
Rating At 400°F - Less Than 1 CFM/Lin Ft



1. **Floor Assembly** - Min 4-1/2 In. thick reinforced lightweight or normal weight (100-150 pcf) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 In. thick cast-in-place structural steel angle for weld-attachment of mullion mounting clips (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Angles** - Nom 4 In. long angles with one nom 4 In. leg for attachment to edge of floor assembly and with one leg approx 4 In. longer than the distance from the floor edge to the mullion. Clips to be formed of min 1/4 In. thick steel. Clips welded to steel angle at edge of floor assembly (Item 1) on each side of vertical mullion (Item 2B) at each floor level. Top edge of each clip to be recessed min 1/2 In. below top surface of floor.
   B. **Steel Studs** - The rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be min 2-1/2 In. wide by 5 In. deep and shall be formed from min 0.100 In. thick aluminum. Mullions spaced max 60 In. OC and secured to mullion mounting clips (Item 2A) at each floor level with two 3/8-16 by 4 In. long hex head steel bolts in conjunction with steel nuts and washers. Interior face of mullions to be max 8 In. from edge of floor assembly. Transoms to be spaced min 66 In. OC. The minimum height from the top of the floor to the bottom of the vision panel sill is 32 In.
   C. **Spandrel Panels** - The spandrel panels may consist of one or more of the following types:
      a. **Glass Panels** - Nom 1/4 In. thick or nom 1 In. thick (double pane) heat-strengthened glass panels. Each panel installed on silicone rubber setting blocks and secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
      b. **Aluminum Panels** - Nom 1/8 In. thick aluminum panels with 1/4 In. thick edges. Each panel installed on silicone rubber setting blocks and secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
      c. **Stone Panels** - Nom 1-3/16 In. thick polished granite panels with 1 In. thick edges. Each panel installed on silicone rubber setting blocks and secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.

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   D. **Vision Panels** - Nom 1 In. thick insulated glass units with two layers of nom 1/4 In. thick transparent heat-strengthened glass separated by a 1/2 In. air space. Each panel installed on silicone rubber setting blocks and secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
   E. **Stiffener Tee Attachment Angles** - Nom 1-1/2 by 1-1/2 by 4 In. long No. 22 gauge galvanized steel angles. Each angle secured to steel mullion mounting clip (Item 2A) with two No. 10 by nom 1/2 In. long self-tapping steel screws. Angle recessed from interior face of framing as necessary to accommodate the thickness of curtain wall insulation (Item 2H).
   F. **Stiffener Tee** - Two nom 1-1/2 by 1-1/2 In. No. 22 gauge galv steel angles secured together, back-to-back, to form stiffener tee for installation between mullions at each floor level to restrain curtain wall insulation (Item 3A) against outward movement when forming material (Item 3A) is installed. The angle legs forming the stem of the tee shall be secured together using No. 8 by 1/2 In. long self-drilling, self-tapping steel screws spaced max 8 In. OC. The tee shall be installed with a clearance of 1/8 to 1/4 In. at each end and shall be screw-attached to the stiffener tee attachment angles (Item 2E) with No. 10 by nom 1/2 In. long self-drilling, self-tapping steel screws, with steel washers, through two predrilled 1/4 In. diam holes at each end. Each stiffener tee shall be located with its stem at an elevation 3 In. below the top plane of the floor.
   G. **Insulation Hangers** - Min 4-1/2 In. long No. 12 gauge steel pins swaged to nom 2 by 2 by 2 In. long No. 28 gauge galvanized steel angles. Insulation hangers screw-attached to mullions and transoms with two No. 10 by nom 1/2 In. long self-drilling, self-tapping steel screws per hanger. Insulation hangers to be located in each corner of spandrel panel and spaced max 12 In. OC along sides and top of each spandrel panel. No insulation hangers to be used on the transom at the head (lintel) of a vision panel.
   H. **Curtain Wall Insulation*** - Min 2 In. thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 36 In. wide batts. Insulation batts to be installed with no vertical seams and with horizontal seams spaced min 26 In. OC. Insulation panels tightly-fitted between vertical mullions and between the stem of the stiffener tee (Item 2F) and the transom, flush with the interior surface of framing. Insulation panels impaled on steel pins (Item 2G) and secured in place with nom 1-1/2 In. diam steel self-locking washers ("clinch shields"). The horizontal seam between insulation panels shall be located 3 In. below the top plane of the floor at each floor level.

      THERMAFIBER INC - FIREPAN 90
   I. **Framing Covers - Curtain Wall Insulation*** - Min 1 In. thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 24 by 48 In. boards. Nom 8 In. wide strips to be centered over mullions and impaled on the same pins (Item 2G) and secured in place with nom 1-1/2 In. diam steel self-locking washers ("clinch shields"). Where more than one spandrel panel occurs between vertically separated vision panels, the horizontal transom between spandrel panels shall also be covered with an 8 In. wide framing cover in the same manner as on the vertical mullions. Framing covers on mullions to abut the mineral wool batt safing material (Item 3A) above and below floor.

      THERMAFIBER INC - FIREPAN 90
   J. **Light Gauge Framing*** - **Spiral Anchor** - (Not Shown) - As an alternate to the insulation hangers (Item 2G), galv steel wire spiral anchors may be used to secure the framing covers (Item 2I) to the curtain wall insulation (Item 2H) on each side of the mullion. Nom length of spiral anchors to be equal to thickness of curtain wall insulation plus thickness of framing cover. Spiral anchors driven through mullion covers and into curtain wall insulation and spaced max 12 In. OC.

      THERMAFIBER INC
3. **Safing System** - The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Nom 4 pcf density mineral wool batt insulation. Batt sections cut to a min 4-1/2 In. width and stacked to a thickness, which is min 25 percent greater than the width of linear gap between the curtain wall insulation and the edge of the concrete floor slab to attain a min 20 percent compression in the thickness direction. The forming material is compressed and inserted cut-edge-first into linear gap such that its top surface is flush with the top surface of the floor assembly. A mass of one tightly-bulled seam is permitted between mullions. Additional pieces of forming material to be friction-fit into spaces between mullion mounting clips at each mullion location.

      THERMAFIBER INC - SAF
   B. **Fill, Void or Cavity Material*** - Min 1/8 In. wet thickness (min 1/16 In. dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 In. onto the top surface of the floor and onto the curtain wall insulation and framing covers.

      SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray

      *Bearing the UL Classification Mark

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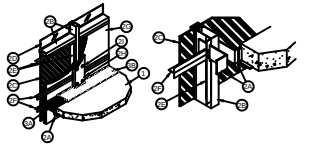
System No. CW-S-2004
F Rating - 2 Hr
T Rating - 1/4 Hr
Linear Opening Width - 8 In. Max
L Rating At Ambient - Less Than 1 CFM/Lin Ft
L Rating At 400°F - Less Than 1 CFM/Lin Ft



1. **Floor Assembly** - Min 4-1/2 In. (114 mm) thick reinforced lightweight or normal weight (100-150 pcf or 1600-2400 kg/m3) structural concrete. Perimeter of floor assembly to be provided with min 3 by 3 by 1/4 In. (76 by 76 by 6 mm) thick cast-in-place structural steel angle for weld-attachment of mullion mounting clips (Item 2A).
2. **Curtain Wall Assembly** - The curtain wall assembly shall incorporate the following construction features:
   A. **Mullion Mounting Clips** - Min 4 In. (102 mm) long angles with one row 4 In. (102 mm) leg for attachment to edge of floor assembly and with one leg approx 4 In. (102 mm) longer than distance to nearest face of mullion. Clips to be formed of min 1/4 In. (6 mm) thick steel. Clips welded to steel angle at edge of floor assembly (Item 1) on each side of vertical mullion (Item 2B) at each floor level. Top edge of each clip to be recessed min 1/2 In. (13 mm) below top surface of floor.
   B. **Framing** - The rectangular tubing mullions (vertical members) and transoms (horizontal members) shall be min 2-1/2 In. (64 mm) wide by 5 In. (127 mm) deep and shall be formed from min 0.085 In. (2.2 mm) thick aluminum. Mullions spaced max 60 In. (1.52 m) OC and secured to mullion mounting clips (Item 2A) at each floor level with two 3/8 In. (10 mm) diam by 4 In. (102 mm) long hex head steel bolts in conjunction with steel nuts and washers . Interior face of mullions to be max 8 In. (203 mm) from edge of floor assembly. Transoms to be spaced min 60 In. (1.52 m) OC. Transom forming sill of vision panel (Item 2C) to be located such that its bottom surface is at a min height of 24 In. (610 mm) above the top surface of the floor.
   C. **Spandrel Panels** - The spandrel panels shall consist of one of the following types:
      a. **Glass Panels** - Nom 1/4 In. (6 mm) thick opaque heat-strengthened glass. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.
      b. **Aluminum Panels** - Nom 1/8 In. (3 mm) thick aluminum panels with 1/4 In. (6 mm) thick edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
      c. **Stone Panels** - Nom 1-3/16 In. (30 mm) thick polished granite spandrel panels with 1 In. (25 mm) thick gauged edges. Each panel secured in position with aluminum pressure plates in conjunction with gaskets and steel screws.
   D. **Vision Panels** - Nom 1/4 In. (6 mm) thick transparent heat-strengthened glass or nom 1 In. (25 mm) thick insulated glass units with two layers of nom 1/4 In. (6 mm) thick transparent heat-strengthened glass separated by a 1/2 In. (25 mm) air space. Each panel secured in position with aluminum pressure plates in conjunction with glazing gaskets and steel screws.

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   E. **Spandrel Panel Perimeter Angles** - Nom 1-1/2 by 1-1/2 In. (38 by 38 mm) No. 20 gauge (min 0.034 In. or 0.86 mm thick) galv steel angles installed around entire perimeter of each spandrel panel, flush with inside face of mullions and transoms. Angles notched out at mullion mounting clips (Item 2A). Angles screw-attached to mullions and transom along sides and top of each spandrel panel with No. 8 by 1 In. (25 mm) long self-drilling, self-tapping steel screws spaced max 12 In. (305 mm) OC. Angle along bottom of each spandrel panel to be screw-attached to leg of angle on mullion at each end without any direct attachment to transom.
   F. **Stiffener Tee** - Two nom 1-1/2 by 1-1/2 In. (38 by 38 mm) No. 20 gauge (min 0.034 In. or 0.86 mm thick) galv steel angles secured together, back-to-back, to form stiffener tee for installation in each horizontal seam of the curtain wall insulation (Item 2G). The angle legs forming the stem of the tee shall be secured together using No. 8 by 1/2 In. (13 mm) long self-drilling, self-tapping steel screws spaced max 8 In. (203 mm) OC. The tee shall be installed with a clearance of 1/8 to 1/4 In. (3 to 6 mm) at each end and shall be screw-attached to the spandrel panel perimeter angles (Item 2E) with No. 10 by 3/4 In. (19 mm) long self-drilling, self-tapping steel screws, with steel washers, through two predrilled 1/4 In. (6 mm) diam holes at each end. One stiffener tee shall be located with its stem at an elevation 2 In. (51 mm) below the top plane of the floor at each floor level. Additional stiffener tee located with its stem a min of 6 In. (152 mm) above the top surface of the floor.
   G. **Curtain Wall Insulation*** - Min 2 In. (51 mm) thick mineral wool batt insulation faced on one side with aluminum foil/scrim vapor retarder, supplied in min 36 In. (0.91 m) wide batts. Insulation panels to be installed with no vertical seams. Insulation panels tightly-fitted between vertical mullions and between the stems of the stiffener tees (Item 2F) and the transoms. Insulation panels secured to spandrel panel perimeter angles and to each stiffener tee with cup head weld pins (Item 2I) spaced max 12 In. (305 mm) OC. The horizontal seams between insulation panels shall be located 2 In. (51 mm) below the top plane of the floor at each floor level and a min of 6 In. (152 mm) above the top surface of the floor.

      THERMAFIBER INC - FIREPAN 90
   H. **Framing Covers** - Curtain Wall Insulation* - Min 8 In. (203 mm) wide strips cut from the same min 2 In. (51 mm) thick mineral wool batt insulation used for the curtain wall insulation (Item 2G). Framing covers to be centered over mullions and secured to the spandrel panel perimeter angles with cup head weld pins (Item 2I) spaced max 12 In. (305 mm) OC. Where more than one spandrel panel occurs between vertically separated vision panels, the horizontal transom between spandrel panels shall also be covered with an 8 In. (203 mm) wide framing cover in the same manner as on the vertical mullions. Framing covers on mullions to abut the mineral wool batt safing material (Item 3A) above and below floor.

      THERMAFIBER INC - FIREPAN 90
   I. **Weld Pin** - No. 12 gauge galv steel weld pin with nom 1-3/16 In. (30 mm) diam galv steel cup head. Length of Cup head weld pins to be equal to thickness of curtain wall insulation (Item 2G) and framing cover (Item 2H). Cup head weld pin inserted through curtain wall insulation or framing cover and welded to spandrel panel perimeter angles and to stiffener tees max 12 In. (305 mm) OC.
   J. **Light Gauge Framing*** - **Spiral Anchor** - (Not Shown) - As an alternate to the weld pins (Item 2I), galv steel wire spiral anchors may be used to secure the framing covers (Item 2H) to the curtain wall insulation (Item 2G) on each side of the mullion. Nom length of spiral anchors to be equal to thickness of curtain wall insulation plus thickness of framing cover. Spiral anchors driven through mullion covers and into curtain wall insulation and spaced max 12 In. OC.

      THERMAFIBER INC
3. **Safing System** - Max separation between edge of floor assembly and face of framing members (at time of installation) is 8 In. (203 mm). The safing system shall incorporate the following construction features:
   A. **Forming Material*** - Nom 4 pcf (64 kg/m3) density mineral wool batt insulation. Batt sections cut to a min 4 In. (102 mm) width and stacked to a thickness which is min 20 percent greater than the width of linear gap between the curtain wall insulation and the edge of the concrete floor slab. The forming material is compressed and inserted cut-edge-first into linear gap such that its top surface is flush with the top surface of the floor assembly. A mass of one tightly-bulled seam is permitted between mullions. Additional pieces of forming material to be friction-fit into spaces between mullion mounting clips at each mullion location.

      THERMAFIBER INC - SAF
   B. **Fill, Void or Cavity Material*** - Min 1/8 In. (3 mm) wet thickness (min 1/16 In. or 1.5 mm dry thickness) of fill material spray-applied over top of forming material and lapping min 1/2 In. (13 mm) onto the top surface of the floor and onto the curtain wall insulation and framing covers.

      SPECIFIED TECHNOLOGIES INC - SpecSeal AS200 Elastomeric Spray or SpecSeal Fast Tack Spray

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GENERAL NOTES:

1. Refer to section 07 84 00 of the specifications. For Quality Control requirements, refer to the Quality Control portion of the specification.
2. Details shown are typical details. If field conditions do not match requirements of typical details, approved alternate details shall be utilized. Field conditions and dimensions need to be verified for compliance with the details, including but not limited to the following:
   - Type and thickness of fire-rated construction. The minimum assembly rating of the firestop assembly shall meet or exceed the highest rating of the adjacent construction.
3. If alternate details matching the field conditions are not available, manufacturer's engineering judgment drawings are acceptable. Engineering Judgments shall follow the International Firestop Council (IFC) Guidelines for Evaluating Firestop Systems Engineering Judgments.
4. References:
   - UL Fire Resistance Directory; Current Edition
   - Interteck Testing Services/Omega Point Labs Directory; Current Edition.
   - NFPA 101 Life Safety Code
   - All governing local and regional building codes
5. Firestop System installation must meet requirements of ASTM E 2307 tested assemblies that provide a fire rating equal to that of surrounding construction.

PROJECT NAME:
XXXXXXXXXXXXXXXXXXXXXXXXXX

ARCHITECT/CONSULTANT:
XXXXXXXXXXXXXXXXXXXXXXXXXX

TITLE:
STI FIRESTOP SYSTEMS
FIRESTOP THROUGH PENETRATIONS

DIVISION 7:
Thermal & Moisture Protection

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