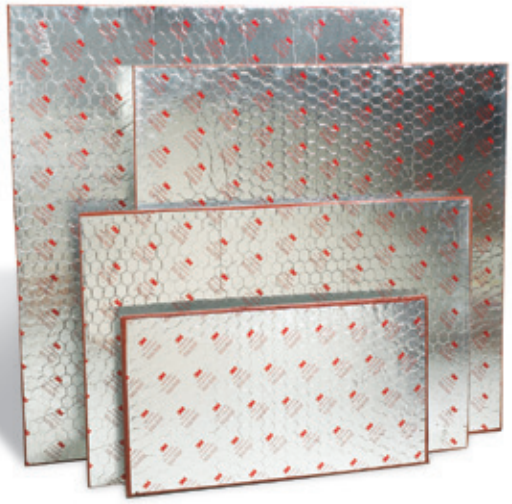


3M™ CS-195+ Composite Sheet

Product Description

3M Fire Barrier CS-195+ Composite Sheet is a one-part composite system comprised of four components. The heart of the system is an organic/ inorganic, fire-resistive elastomeric sheet. It is bonded on one side to a layer of 30 gauge galvanized steel. The other side is reinforced with hexagonal shaped steel-wire mesh and covered with aluminum foil. CS-195+ Composite Sheet is designed to seal larger penetrations through fire-rated walls and floors. It is also used for shielding cable trays and conduit, HVAC ductwork and vital process equipment from radiant heat, flame spread and smoke. CS-195+ Composite Sheet functions as an effective intermittent fire-break within horizontal and vertical cable tray runs, and is excellent for both new and retrofit construction.

The nominal 7.62 mm (0.3") thick composite sheet systems provide up to 4-hour fire ratings. It is lightweight and can be easily installed with common trade tools.

When exposed to temperatures in excess of 121˚C (250˚F), the fire-resistive sheet begins to volumetrically expand and swells 8-10 times its original size, forming a high strength, hard char that retards heat transmission. This expansion process is called ‘intumescence.’

Under normal operating conditions, CS-195+ Composite Sheet is a good thermal conductor which allows unwanted heat build-up to escape from process and control equipment and also minimizes power cable derating.

Product Features

- Intumesces (expands with heat) to form a hard char that tightly seals penetrations against flame spread, smoke and toxic fumes
- Multiple applications – through penetration firestop, heat shield and firebreak protection
- Easy to install using common trade tools
- Lightweight – easy to handle, cut and form to desired shape
- Easy to fasten – bolt punch or drill through. Use self-tapping screws or anchor bolts
- Thermally conductive – allows unwanted heat build-up to escape
- Non-flame supporting
- Cost effective, high performance versus installed cost
- No mixing or damming – is clean to install
- Versatile: can be cut to fit irregular shapes
- Re-enterable
- Low odor
- Tested in accordance with AS1530.4, EN1366 and ASTM E814 (UL Listed).
- Assessed in accordance with A.S.4072.1 – 2005
- EWFA Report No. RIR 22695

Maintenance

3M Fire Barrier CS-195+ Composite Sheet remains stable for an indefinite period of time. CS-195+ Composite Sheet should be stored in the original shipping container until used. The materials are non-impaired by freezing or storage at temperatures up to 86°C (187°F).

Physical Properties

Sheet Sizes
406.4 mm x 711.2 mm (16" x 28")
711.2 mm x 1320.8 mm (28" x 52")
914.4 mm x 609.6 mm (36" x 24")
914.4 mm x 914.4 mm (36" x 36")
914.4 mm x 1.041 mm (36" x 41")

Component	Thickness
Galvanized sheet steel	0.399 mm ± 0.076 mm (0.0157" ± 0.003 in.) 30 gauge
Fire-resistive sheet	7.24 mm ± 1.27 mm (0.285" ± 0.05")
Hexagonal restraining wire	20 gauge
Aluminum foil	0.0508 mm ± 0.00508 mm (0.002" ± 0.0002")
Complete material	7.70 mm ± 1.37 mm (0.303" ± 0.054")

A. Physical and Electrical Properties CS-195+ Composite sheet as installed	
Normal Weight	13.4 kg/m² (2.75 lb/ft²)

Intumescent Activation Sequence	
Expansion begins	150°C (302°F)
Significant expansion	177°C (350°F)
Weight loss (TGA)	20.1% @ 350°C (662°F); 31.0% @ 500°C (932°F); 53.2% @ 1000°C (1,832°F)
Expansion	8-10 typical

Intumescent Sheet Properties (as part of composite)	
Domestic Strength (ASTD 149)	119 volts/mil average
Non-flame supporting hardness	45 to 65 Shore A
Tensile strength/elongation (ASTM D 412, Method A)	0.645 MPa (93.6 psi) /489%
Compression set	25% (maximum)
Surface Burning Characteristics ASTM E 84 (ANSI/UL 723)	Flame Speed 5 Smoke Development 50

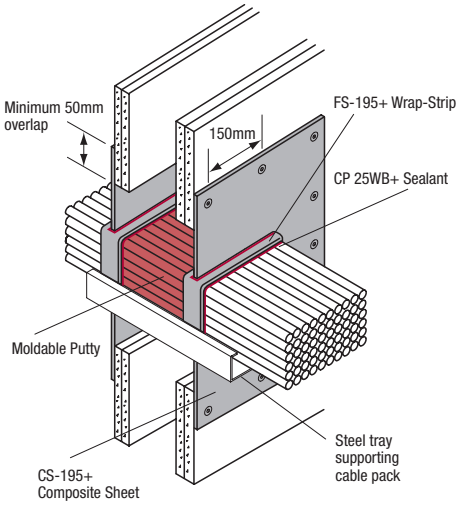
Availability

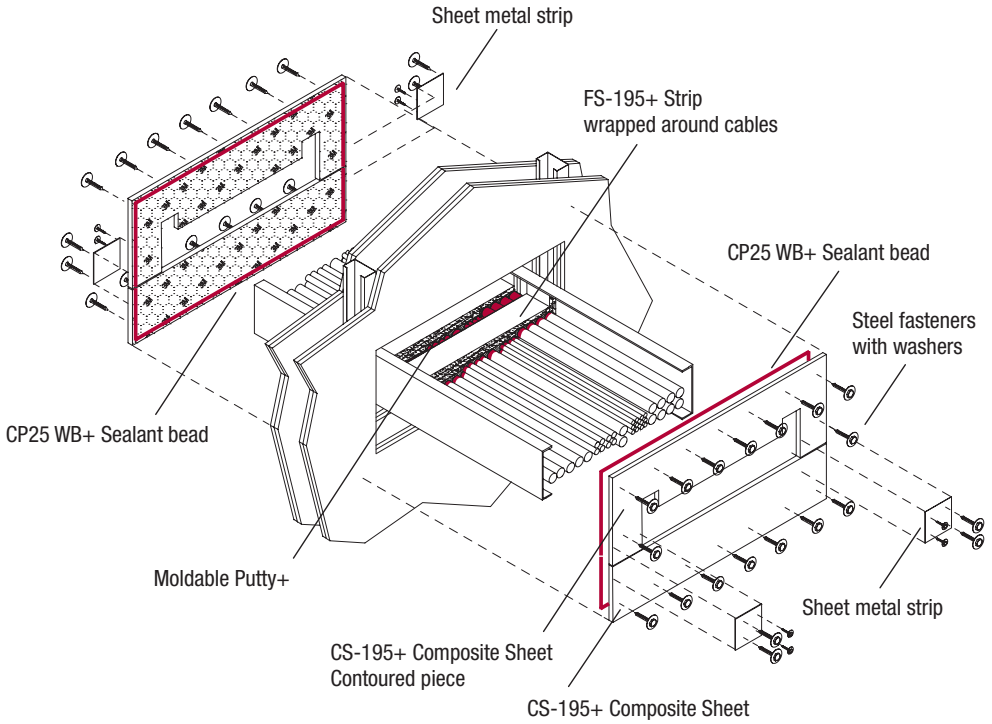
3M™ Brand Fire Barrier CS-195+ Composite Sheet is available from Authorized 3M Fire Protection Products Distributors.

3M Order Code	Packing	Unit/Case
98040026019	Boxed 406.4 mm x 711 mm (16" x 28")	1
98040029476	Boxed 711 mm x 1321 mm (28" x 52")	1
98040024071	Boxed 914.4 mm x 610 mm (36" x 24")	1
98040024089	Boxed 914.4 mm x 914.4 mm (36" x 36")	1
98040024097	Boxed 914.4 mm x 1041.4 mm (36" x 41")	1

Installation Techniques:

1. For drywall constructions, add metal framing to the top and bottom of the opening. If metal studs are used, the top (flat) surface should be facing toward and flush with the opening, and the channel of the stud should be facing into the wall cavity.
2. Wrap cables and metal pipes with a single layer of 3M Fire Barrier Moldable Putty+ Pad for the full depth of the seal.
3. Install 3M Fire Barrier FS-195+ Wrap/Strip around cables and metal pipes on both sides of the fire seal. Use steel wire to hold the FS-195+ Wrap/Strip in place.
4. Use cardboard, marking pencils and scissors to make templates of the exact size and shape of CS-195+ Composite Sheet pieces. Ensure that a 50mm overlap is allowed around the sides of the opening. The template will generally need to be made in at least two pieces. Plan the size of the first piece so only one piece requires contour cuts. The fewer pieces that need contour cuts, the quicker the installation will be.
5. Use a jigsaw to cut the CS-195+ Composite Sheet to the cardboard template.
6. Run a bead of 3M CP 25WB+ Sealant around the opening within 50mm of the edge.
7. Secure the CS-195+ Composite Sheet into place using 6mm steel fasteners with washers placed with 150mm spacing around the opening. Ensure that there is at least 50mm overlap around the opening.
8. Use 40mm wide steel sheet metal strips and sheet metal screws to cover the CS-195+ Composite Sheet seams.
9. Apply Fire Barrier CP 25WB+ Sealant around the cable tray and fill spaces between CS-195+ Composite Sheet and FS-195+ Wrap/Strip. Also, cover edges of the Wrap/Strip and fill any spaces that smoke would likely penetrate.





Performance Specifications for Installers

Australian Standard FRLs: 3M CS-195+ Composite Sheet				
Building Element	**Blank (Unpenetrated) Seal**	**PVC Insulated Cables, Cable trays and Cable bundles**	**Copper or Steel Pipes Small*** 15mm diameter or smaller 0.9mm wall thickness or thicker	**Steel Pipes Small*** 34mm diameter or smaller 3.5mm wall thickness or thicker
Floor: Concrete slab. *Minimum 120mm thickness*	-/240/120	-/180/30	-/240/-	-/240/-
Wall: Plasterboard Dry Wall. *Minimum 116mm thickness*	-/120/30	-/120/30	-/120/-	-/120/-
Wall: Solid masonry, hollow masonry or concrete construction. *Minimum 116mm thickness*	-/240/90	-/180/30	-/180/-	-/180/-

In order to achieve the above FRLs you must ensure that the CS-195+ Composite Sheet is installed as per the Installation Techniques and the building element you are installing into has an FRL performance equal to or better than that of the CS-195+ system. The Installation Techniques can be found on the final page of this document.

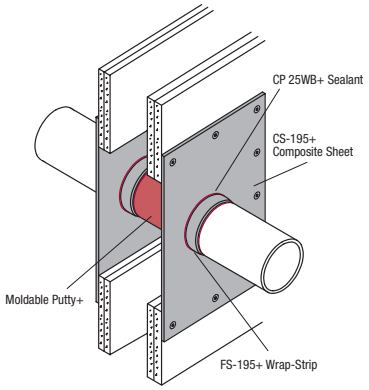
What does FRL mean?

FRL stands for 'Fire Resistance Level'. For example, an FRL of '-/240/120' indicates:

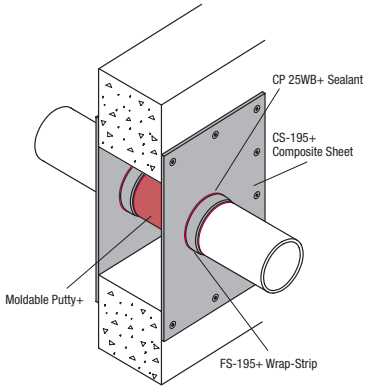
- **Structural Adequacy.** The first dash '-' indicates that CS-195+ is non load bearing
- **Integrity.** The middle number '240' indicates for how many minutes the CS-195+ system can resist the passage of flames and hot gasses
- **Insulation.** The last number '120' indicates how many minutes it takes the unexposed face to heat up by more than 140°C.

Metal Pipes*

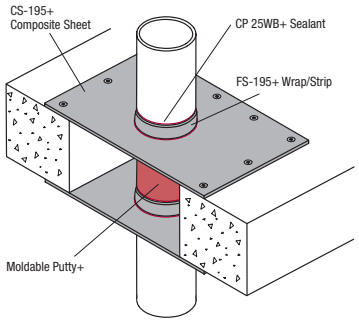
* With or without up to 19mm Armaflex insulation



Dry Wall 116mm
Copper: 15mm dia, 0.91mm wall: FRL: -/120/-
Steel: 34mm dia, 3.5mm wall: FRL: -/120/-



Solid Masonry, Hollow Masonry or Concrete Wall 120mm
Copper: 15mm dia, 0.91mm wall: FRL: -/180/-
Steel: 34mm dia, 3.5mm wall: FRL: -/180/-

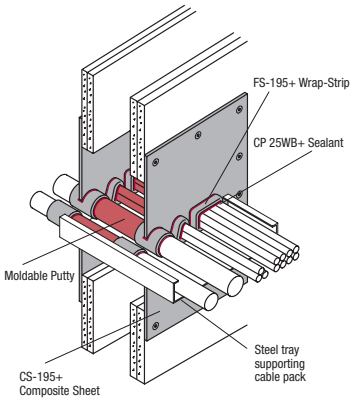


Concrete Floor 120mm
Copper: 15mm dia, 0.91mm wall: FRL: -/240/-
Steel: 34mm dia, 3.5mm wall: FRL: -/240/-

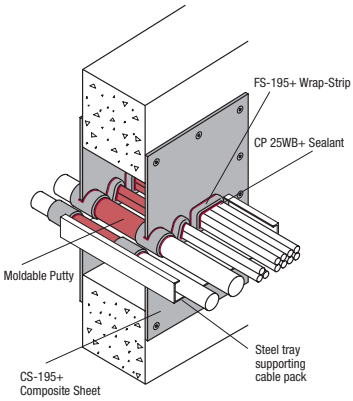
Performance Specifications for Engineers and Specifiers

3M Fire Barrier CS-195+ Composite Sheet has been tested in accordance with AS1530.4-2005 and assessed in accordance with AS4072.1-2005 under BWA Report No: 22695. The following illustrations provide a summary of the test results for D1 and D2 cable configurations, metal pipe penetrations and blank unpenetrated seals with CS-195+ installed as per the Installation Techniques. Specifications for standard D1 and D2 cable configurations can be found in AS1530.4-2005 Appendix D.

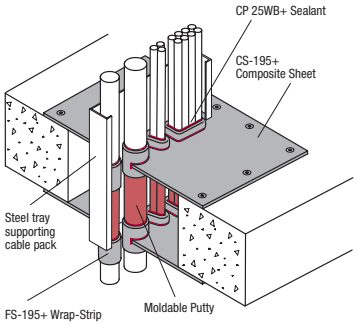
D1 Cable Pack – Power Transmission Cables.



Dry Wall 116mm – FRL: -/120/30

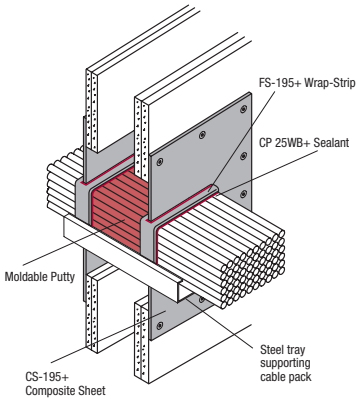


Solid Masonry, Hollow Masonry or Concrete Wall 116mm – FRL: -/180/30

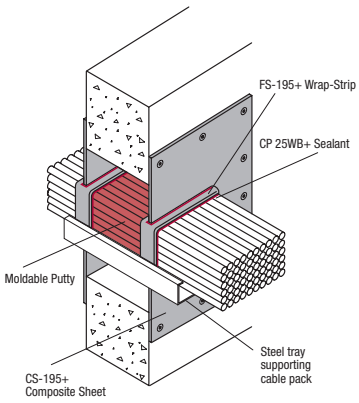


Concrete Floor 120mm – FRL: -/180/30

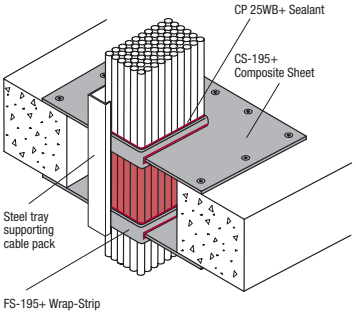
D2 Cable Pack – Telecom Cables.



Dry Wall 116mm – FRL: - /120/30

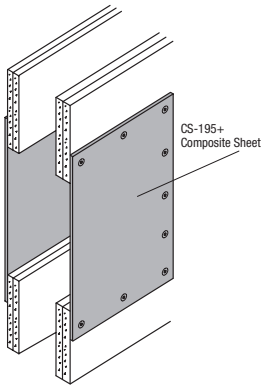


Solid Masonry, Hollow Masonry or Concrete Wall 116mm – FRL: -/180/90

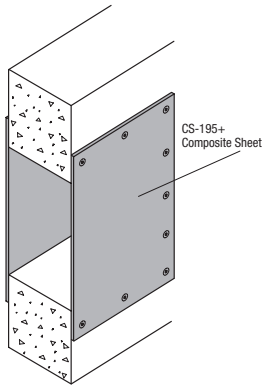


Concrete Floor 120mm – FRL: -/180/90

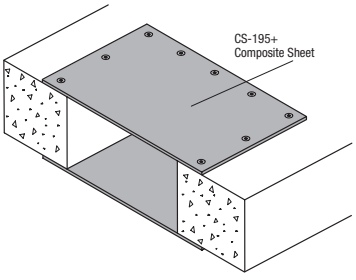
Blank Openings (unpenetrated)



Dry Wall 116mm – FRL: -/120/30



Solid Masonry, Hollow Masonry or Concrete Wall 116mm – FRL: -/240/90



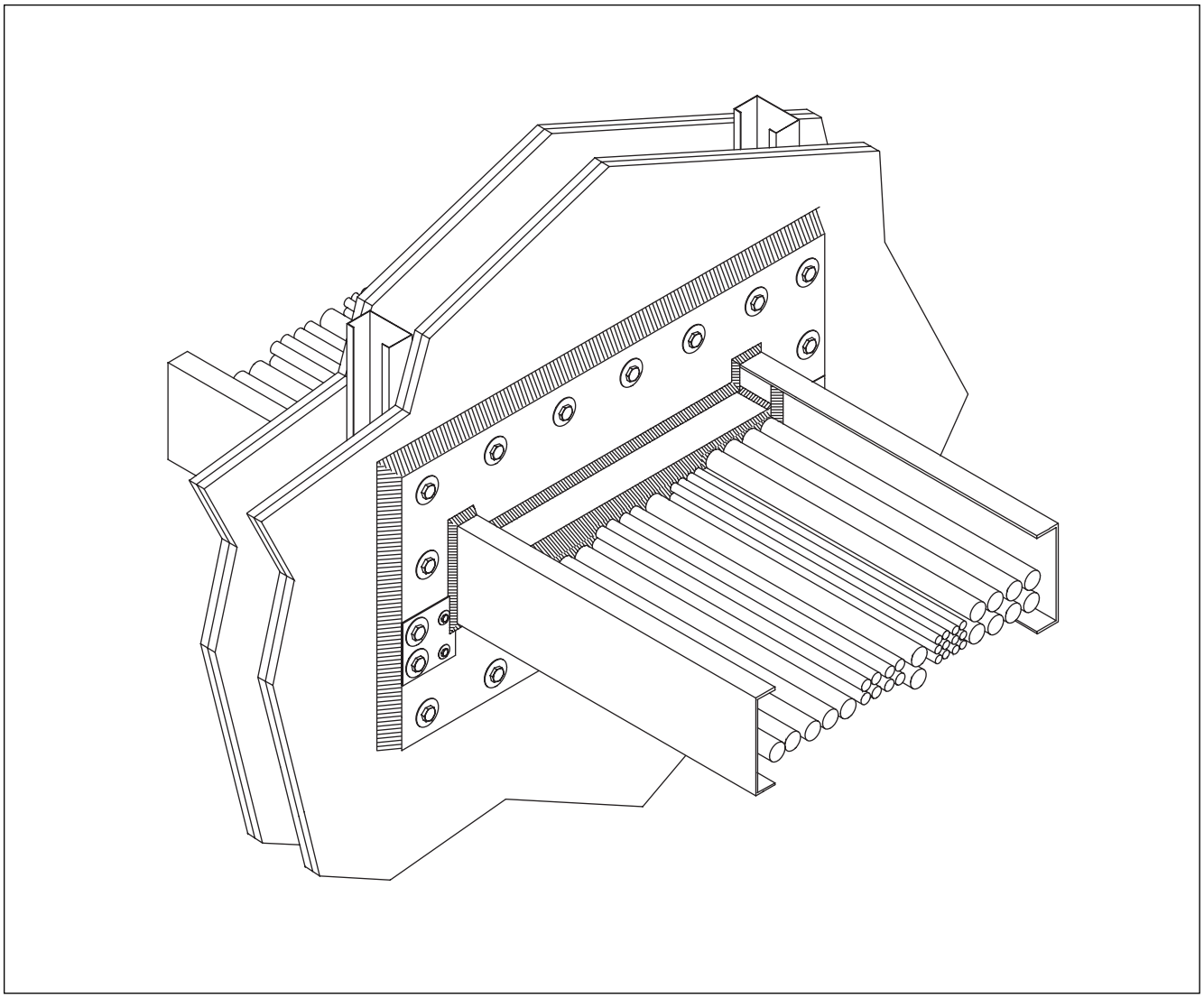
Concrete Floor 120mm – FRL: -/240/120

3M

Fire Barrier

Composite Sheet CS-195+

Installation Guide For
Telecommunications and Electrical Applications



3M

Fire Protection Products

November 3, 1995

TO WHOM IT MAY CONCERN

Re: Aging of Intumescent Products

To prevent misunderstanding or confusion regarding the long-term performance of the 3M FS-195+ Wrap/Strip or CS-195+ Composite Sheet, we make the following statement:

> During the development process of its intumescent products, 3M established design and performance criteria to address the aging properties of these materials. Our FS-195+ and CS-195+ products have successfully passed the test procedures necessary to qualify for UL Component Recognition Listing. Component Recognition subjects the products to a series of aging standards to determine the effect of various environmental conditions on the intumescent properties. including such conditions as high temperature aging (95ºC), moist air, CO_2-SO_2, temperature cycling, high humidity, wet-freeze-dry and weatherometer exposure.
>
> In addition, 3M successfully fire tested penetrations using worse case aged products versus "as produced" products in full-scale UL wall tests.

Through its International organization, 3M has documented Arrhenius Plot/data from CEI, IEC 216-1, "Guide for the Determination of Thermal Endurance Properties of Electrical Materials" to show the performance life of FS-l95+ and CS-195+ to be in excess of 100 years to the minimum designed expansion.

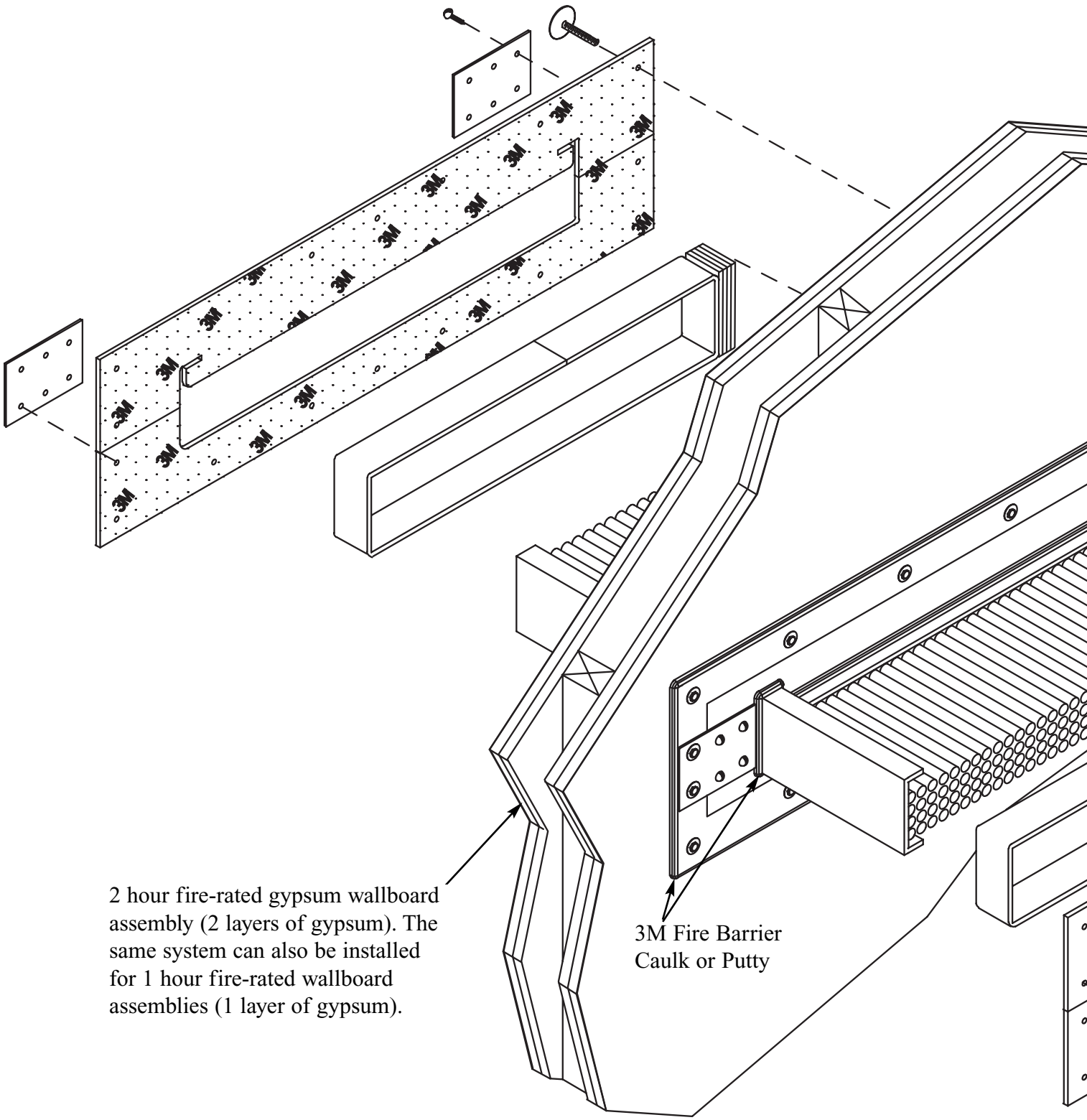
Please call 3M technical service (800) 458-4452 if you have any questions.

Regards,

Richard R. Licht
Technical Manager

RRL/ks

Typical System Overview



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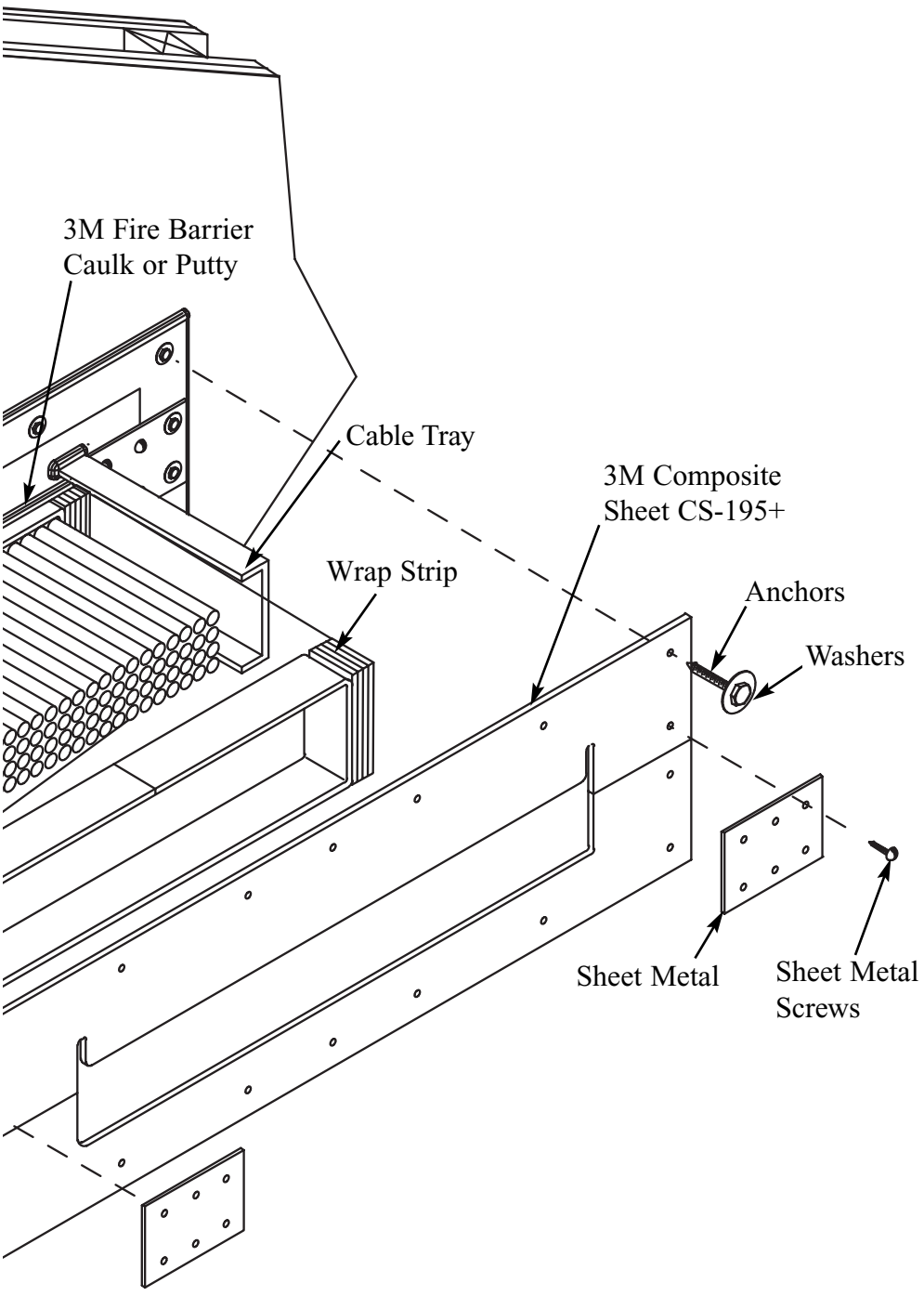
Introduction



This installation guide highlights requirements for 3M Fire Barrier Composite Sheet CS-195+ for firestopping cable assemblies typical in the telecommunications industry.

The information contained herein is based on Underwriters Laboratories Inc.® published system requirements found in the current UL Fire Resistance Directory and engineering studies performed by UL referenced herein.

Written requirements for system construction are intended only to highlight important features of different systems or methods and are not intended to describe all the requirements.

Refer to current Underwriters Laboratories Inc.®, Fire Resistance Directory and referenced engineering studies for additional information and system details.

See page 16 on the back cover of this document for a Typical Bill of Materials

based on the system shown to the left.

Detailed Step-by-Step Instructions

Based on W-L-4004

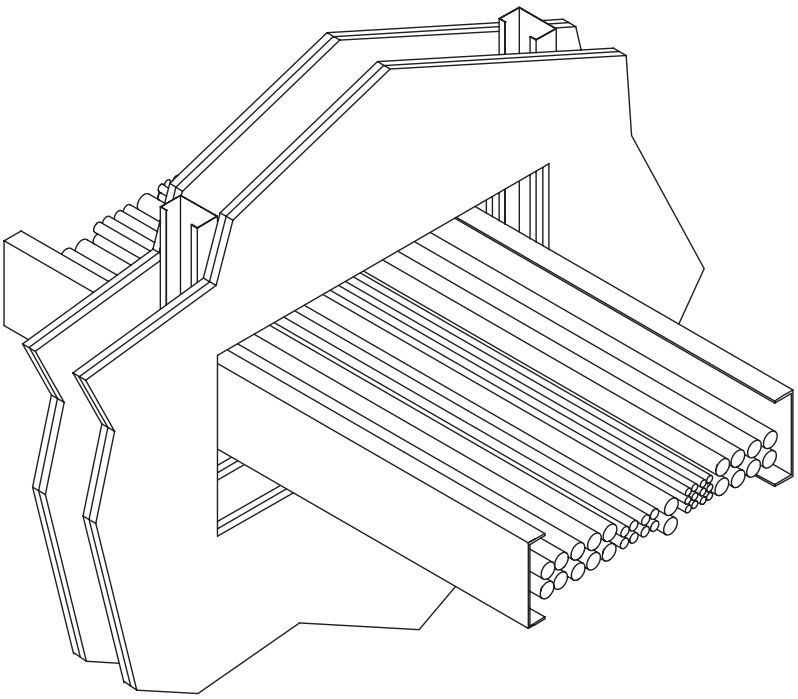


Figure 1: Single Cable Tray
2 hour fire-rated gypsum wallboard assembly with a single cable tray. Tray must be centered in opening and supported on each side of the wall. Studs must be located on each side of the opening.

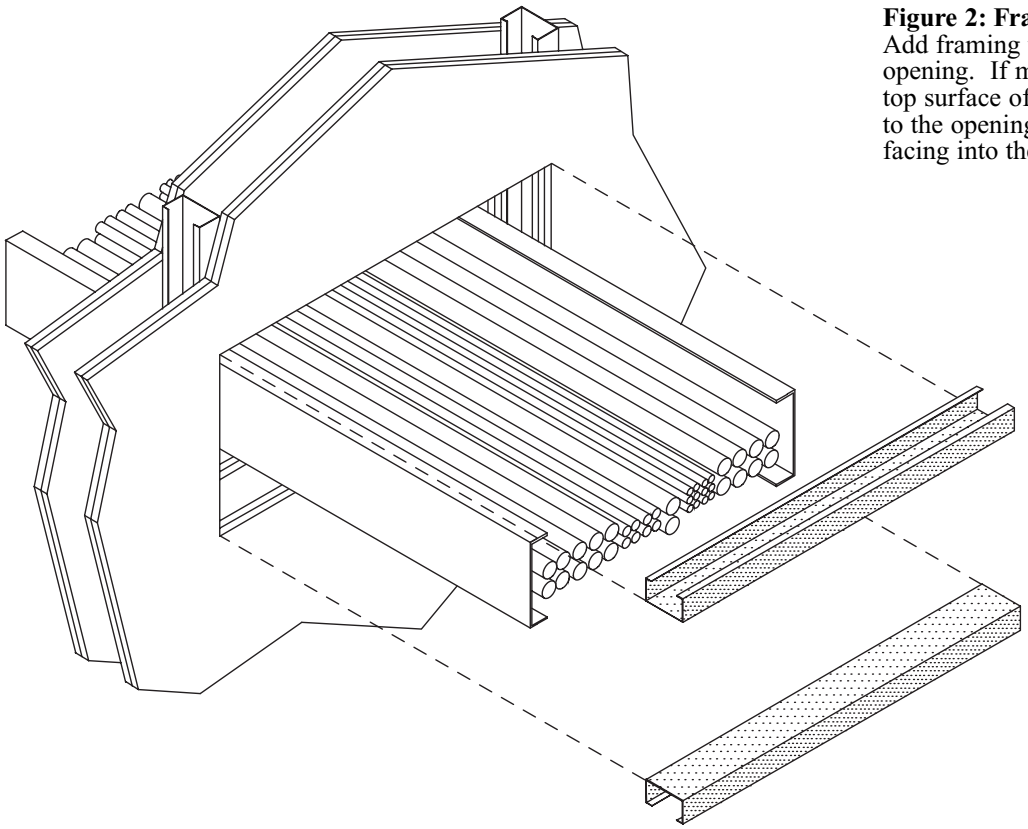


Figure 2: Frame Opening
Add framing to top and bottom of opening. If metal studs are used, the top surface of the stud should be facing to the opening with the channel opening facing into the wall cavity.

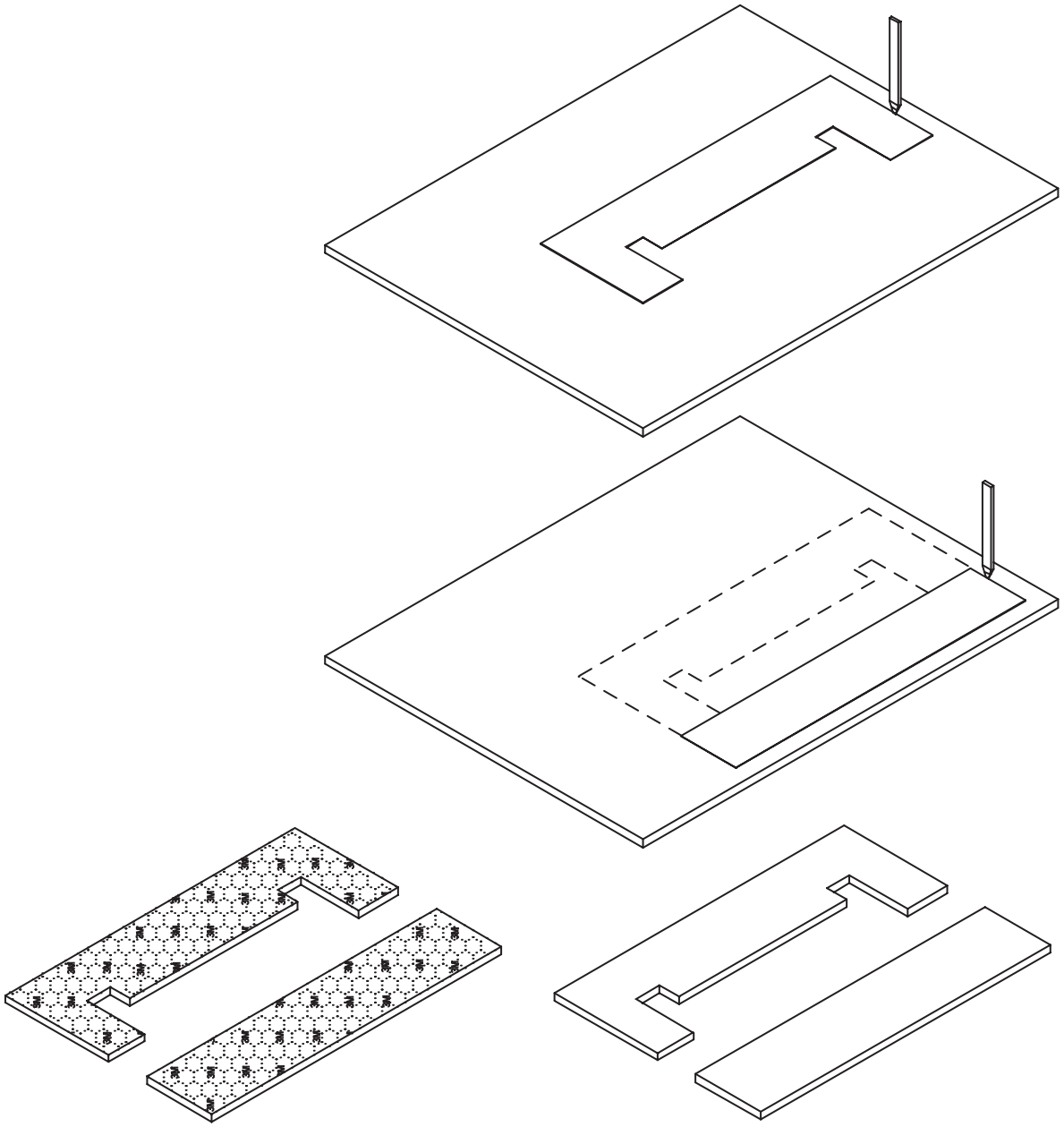


Figure 7: Cut Composite Sheet
Use the cardboard template to mark the 3M™ Fire Barrier CS-195+ Composite Sheet. Mark the sheet metal side not the foil side that is printed with 3M logos and has chicken wire embedded under the foil. Cut two pieces from the template. Then cut two more pieces for the bottom of the opening. With proper planning many applications will only require one contour cut piece for each side the other can be measured and cut rectangular as shown above. Four pieces total will be needed, two for each side of the wall. Cut the composite sheet using an electric jig saw. Use a metal file to remove burs from the cut edges.

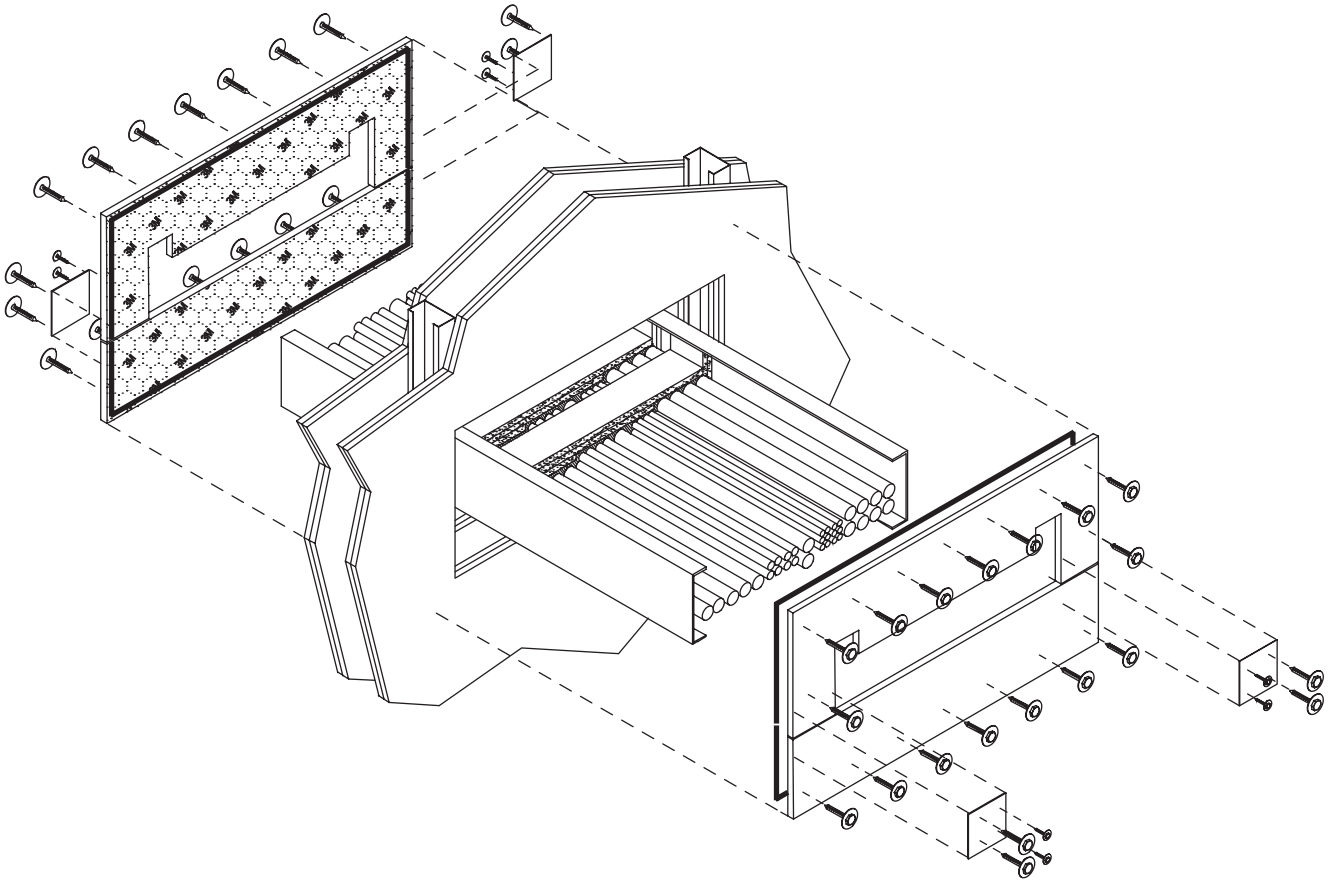


Figure 8: Fasten Composite Sheet to Wall.
Apply 3M™ Graphite Intumscent Seal (GIS) to the back side of the composite sheet (the side with the 3M logos). Position the GIS slightly away from the edge of the composite sheet. Fasten the composite sheet in place. Use sheet metal and sheet metal screws to cover the composite sheet seams.

Alternate anchoring methods for gypsum wall systems include threaded rod through the walls with wing nuts. Occasionally the composite sheet needs to be removed. An anchoring system that allows easy removal and re-installation decreases labor and prevents workers from having to install new composite sheet if a penetration has to be modified.

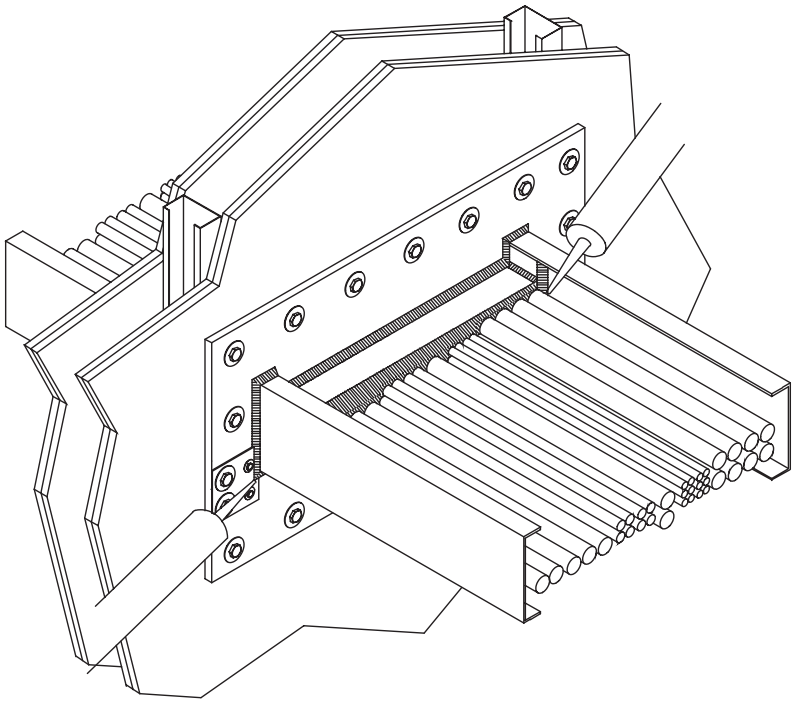


Figure 9: Apply Caulk or Putty
Apply 3M™ Fire Barrier CP 25WB+ Caulk or 3M™ Fire Barrier Moldable Putty+ around cable tray to fill the annular space between the edge of the composite sheet and the wrap strip. Also, cover the edges of the wrap strip and fill any spaces between layer, rails and other crack where smoke could penetrate during a fire. If 3M™ GIS is used as the smoke seal, no caulk or putty is needed at the outer perimeter of the composite sheet.

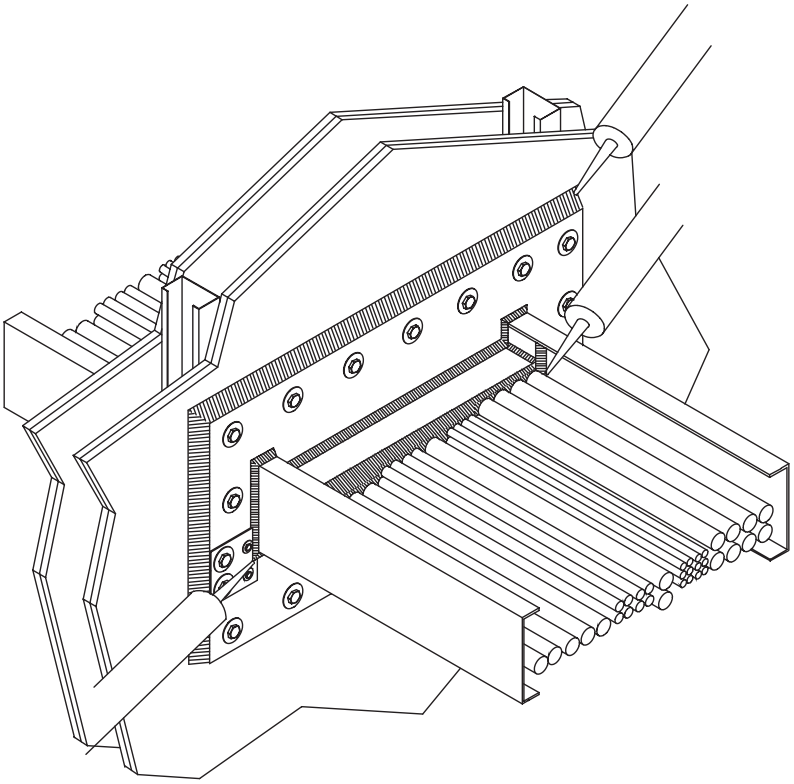


Figure 10: Alternate Perimeter Smoke Seal
If 3M™ GIS was not used on the back side of the composite sheet before fastening it to the wall, apply caulk or putty at the composite sheet perimeter as a smoke seal.

Concrete Floor Systems

C-AJ-4003 with Single Cable Tray and Multiple Cable Tray

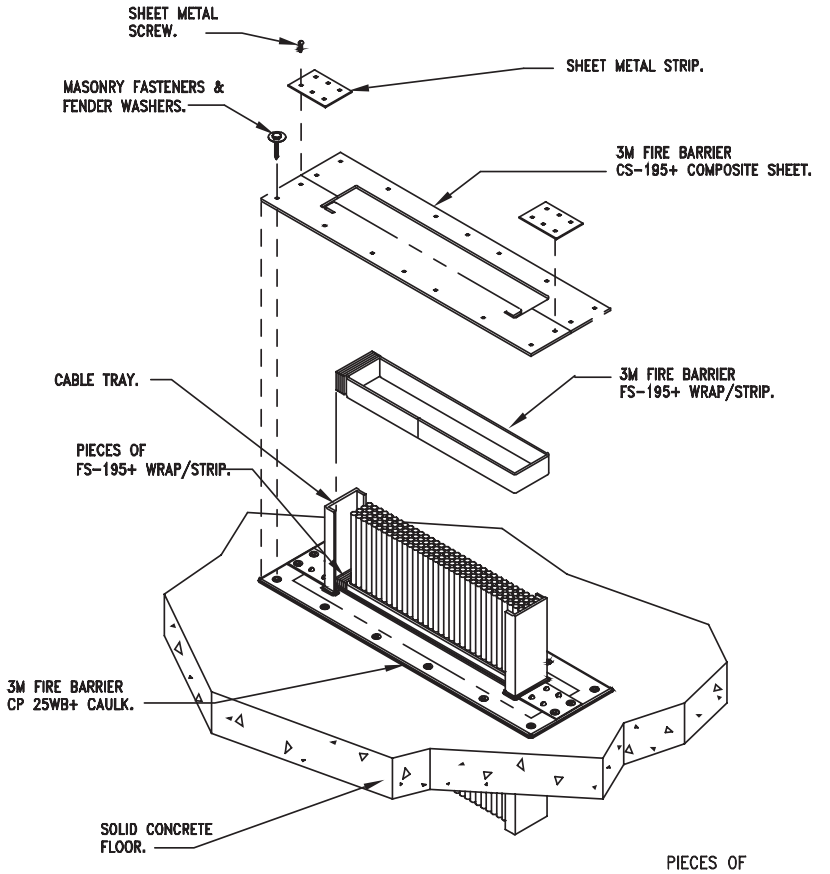


Figure 11: Single Cable Tray Option C-AJ-4003

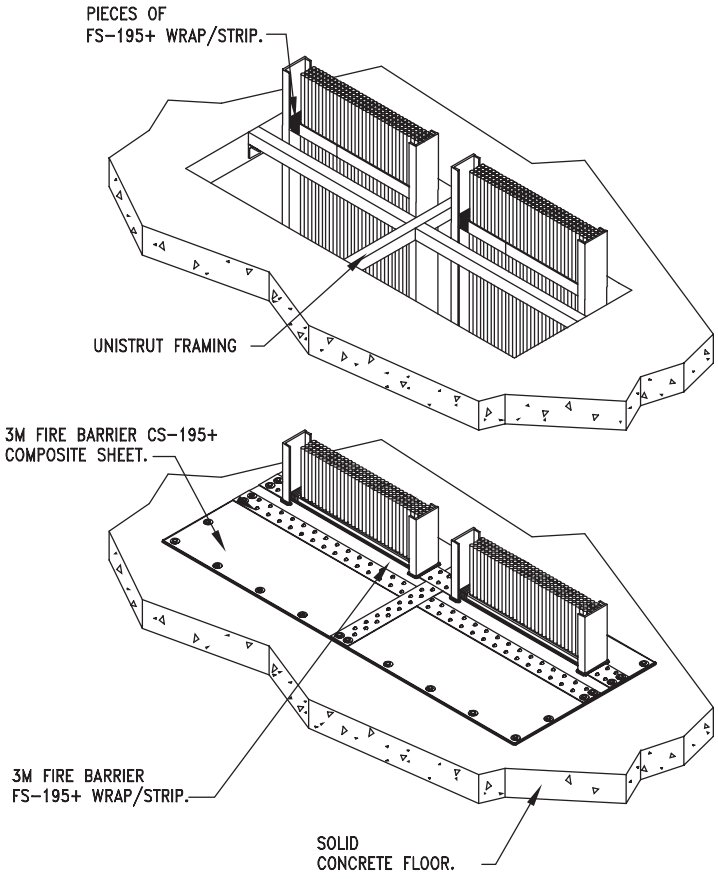


Figure 12: Double Cable Tray Option C-AJ-4003

Concrete Floor Systems

F-B-3004 Cable Penetration With Curb Retrofit

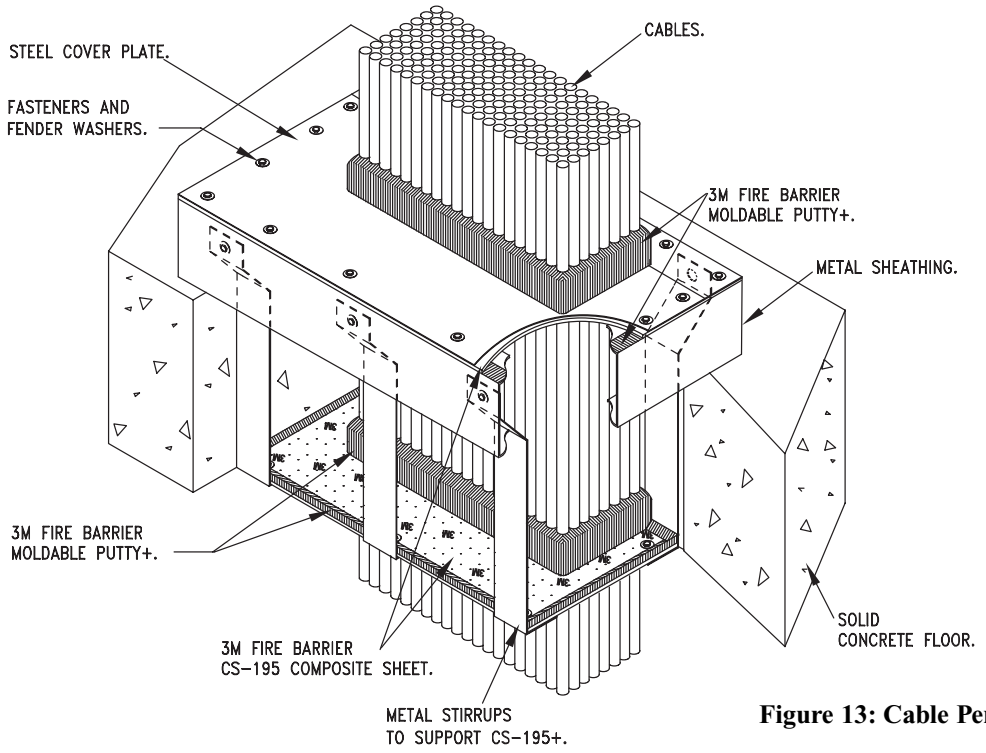


Figure 13: Cable Penetration with Curb Retrofit

Concrete Wall Systems

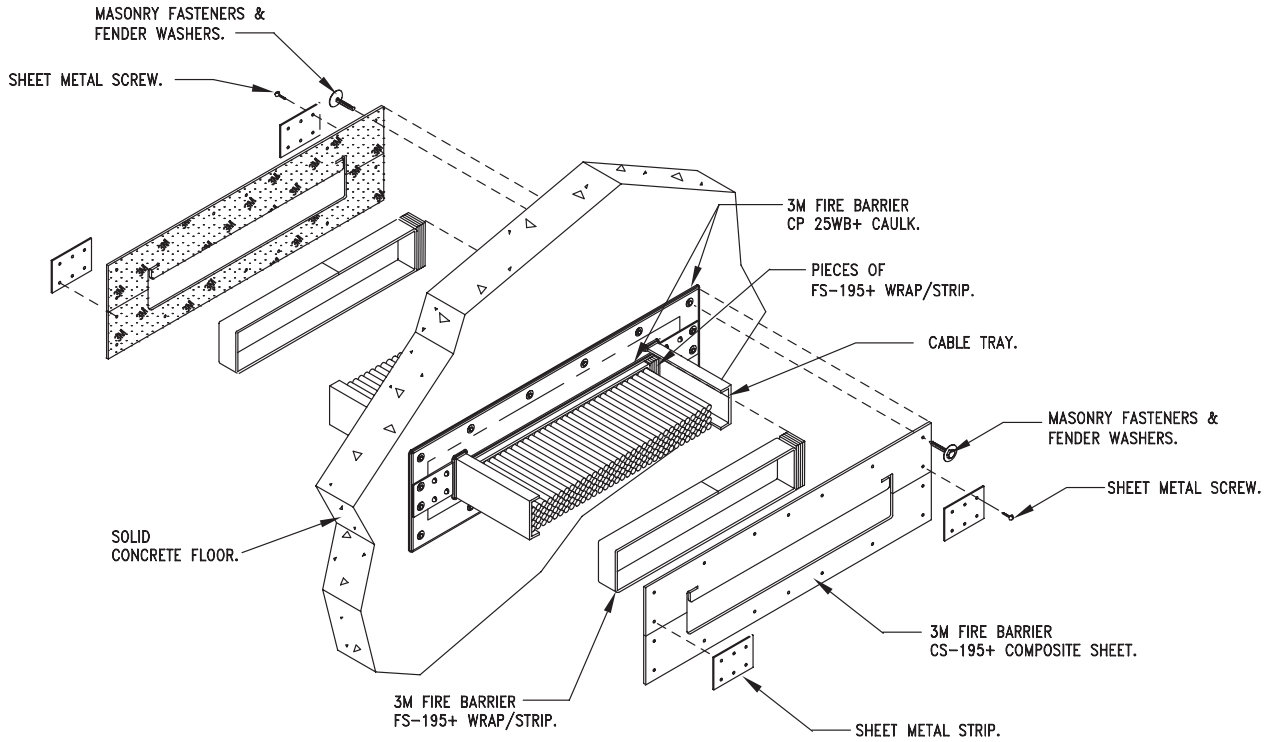


Figure 14: Concrete Wall Application

Cable Bundle Systems

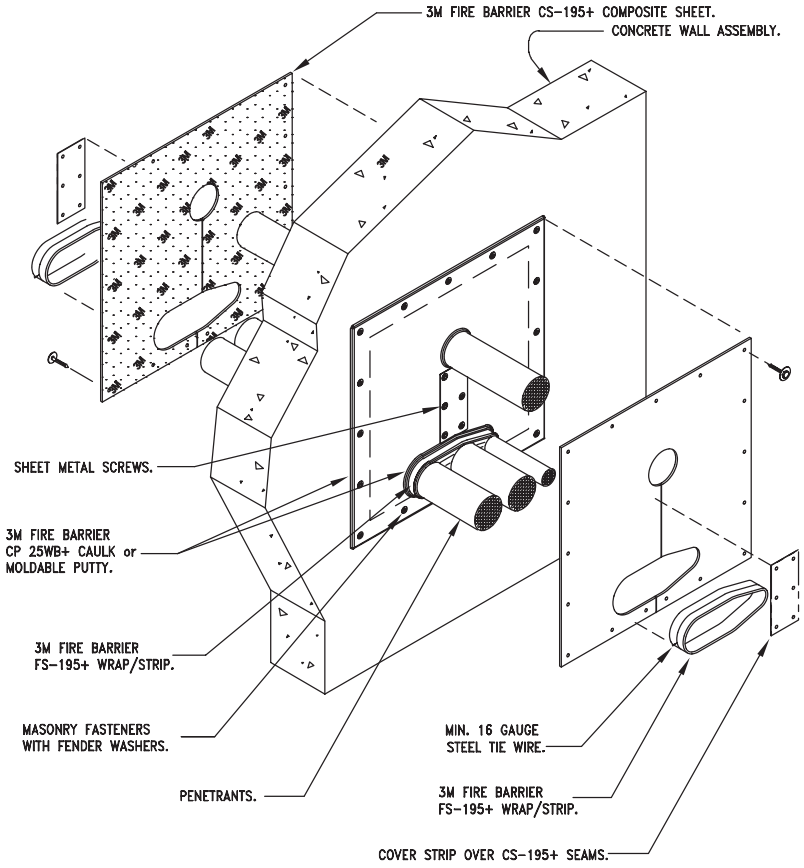


Figure 15: Multiple Cable Bundles Through Concrete

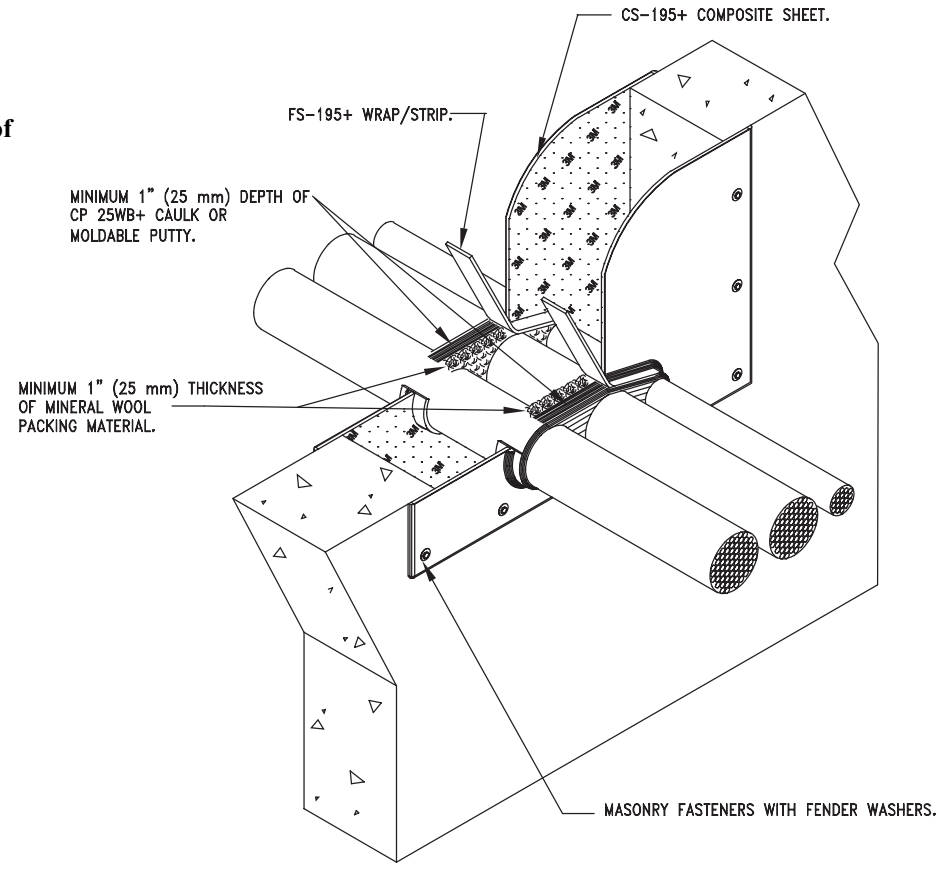


Figure 16: Cut away detail view of above drawing

Corner Applications

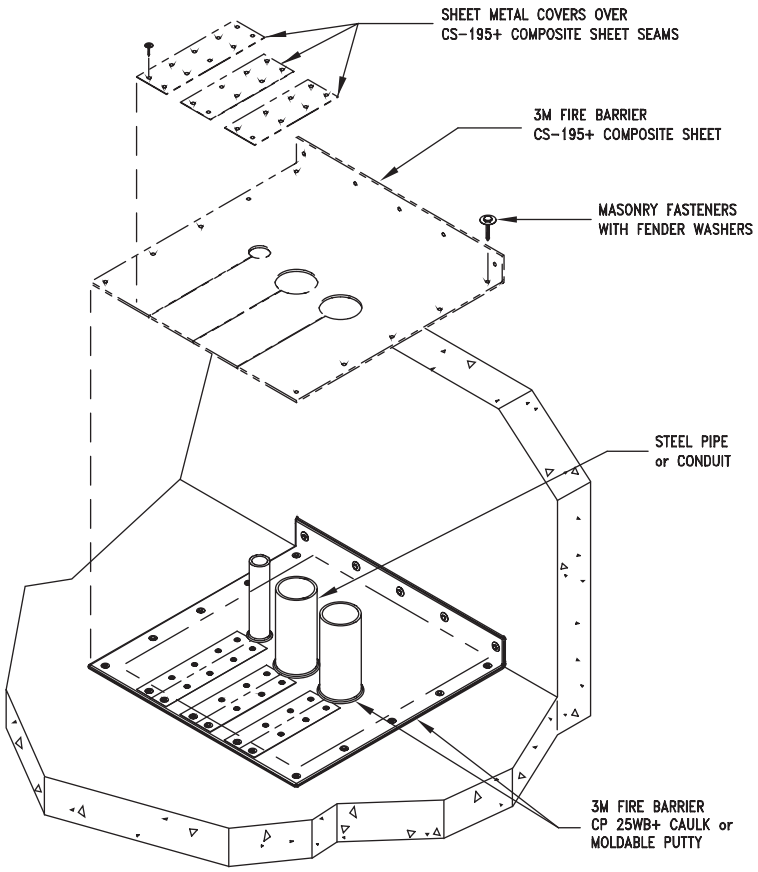
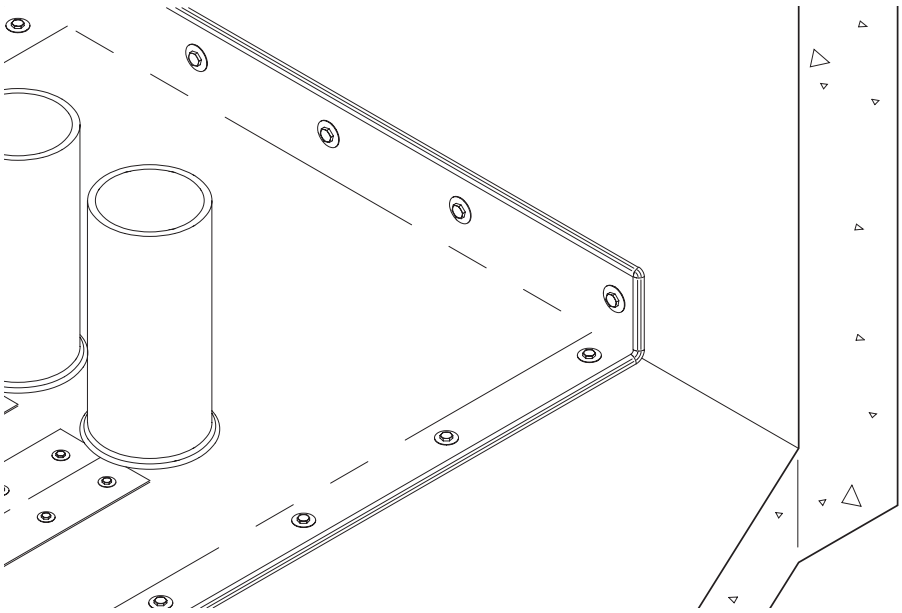


Figure 17: Bending composite sheet around a corner

Figure 18: Detail view of above



Composite Sheet Seaming Details

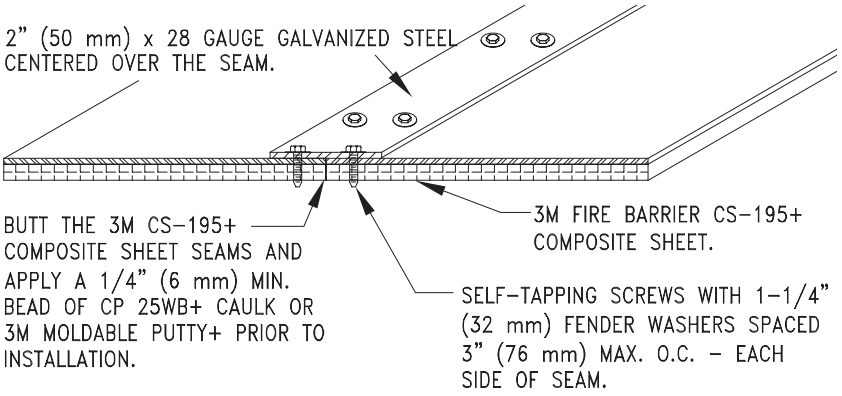
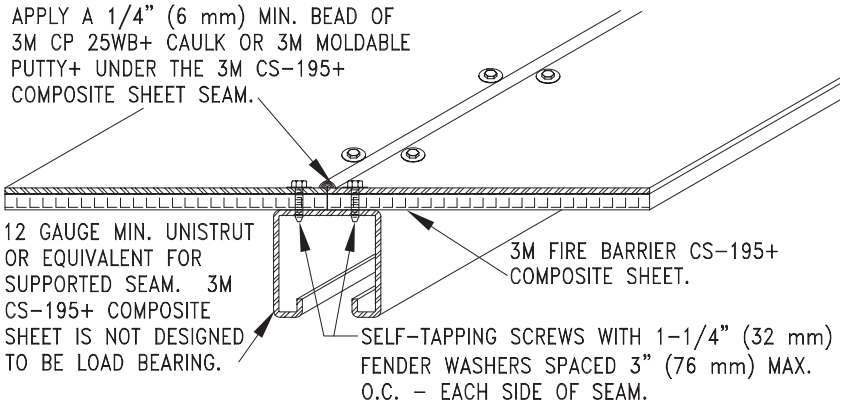


Figure 19: Butt seam

Figure 20: Supported seam



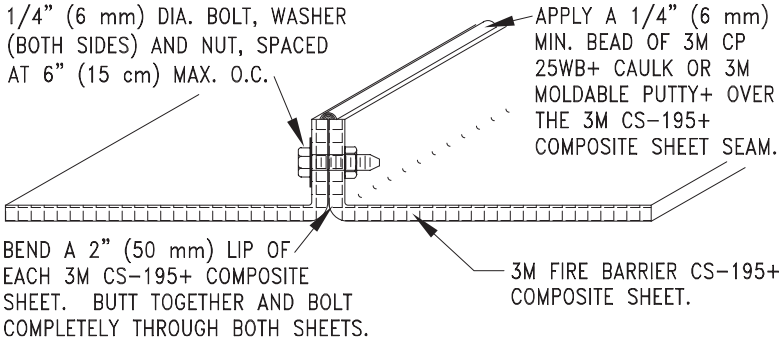
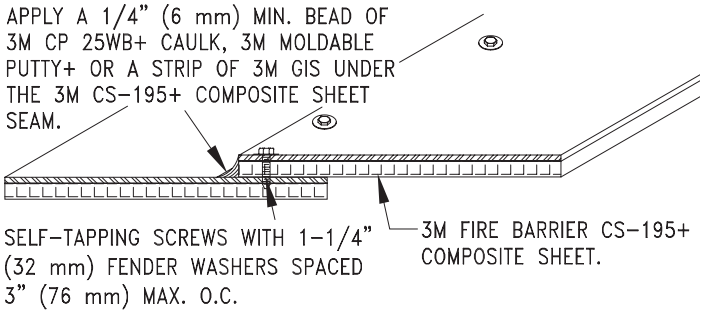


Figure 21: Flange seam

Figure 22: Overlap seam onto composite sheet



Composite Sheet Anchoring Details

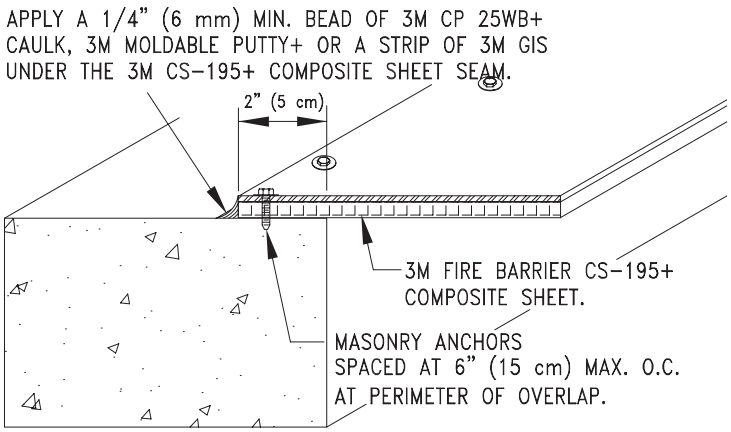
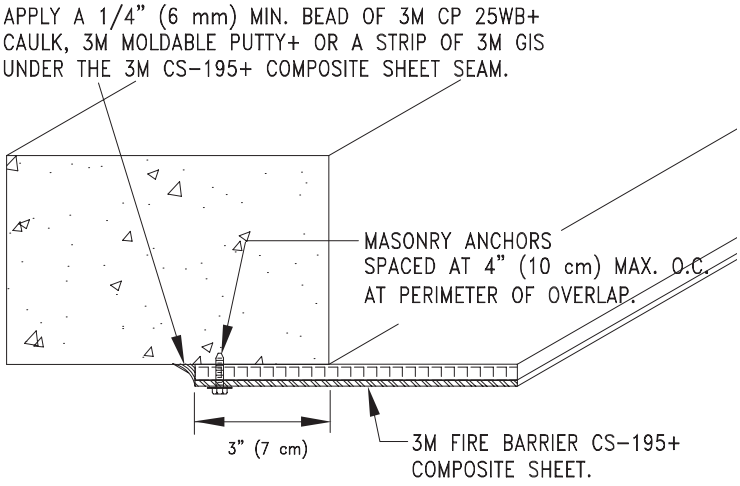


Figure 23: Overlap seam onto concrete top

Figure 24: Overlap seam onto concrete bottom



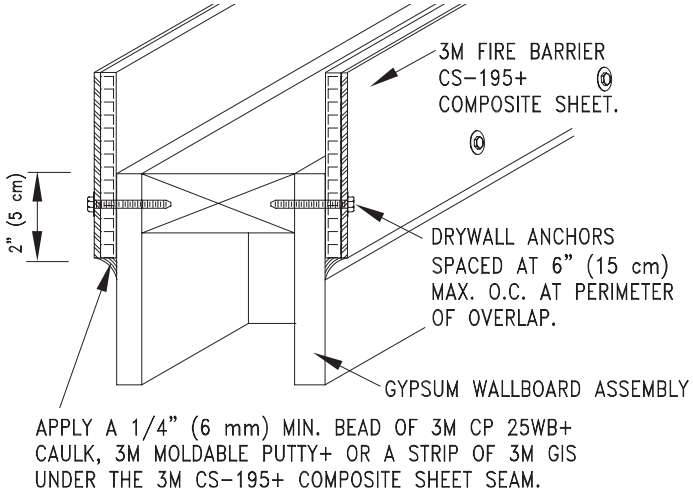


Figure 25: Overlap seam onto gypsum wall