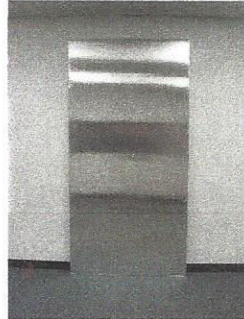


# Installing ELF TruProtect EMI / RFI Shielding (Commercial with Metal Studs) Installation Instructions

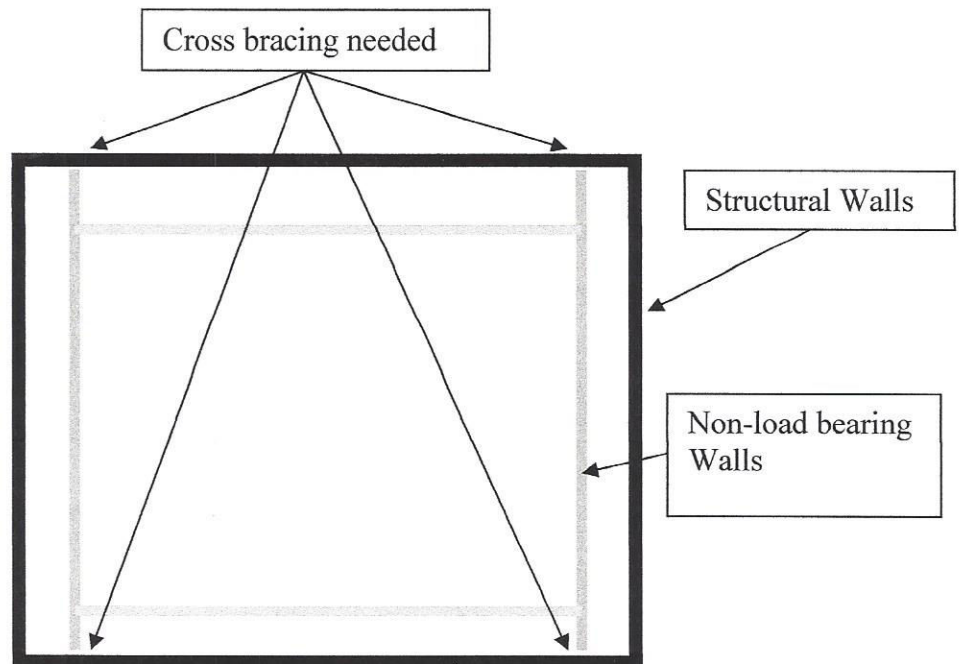


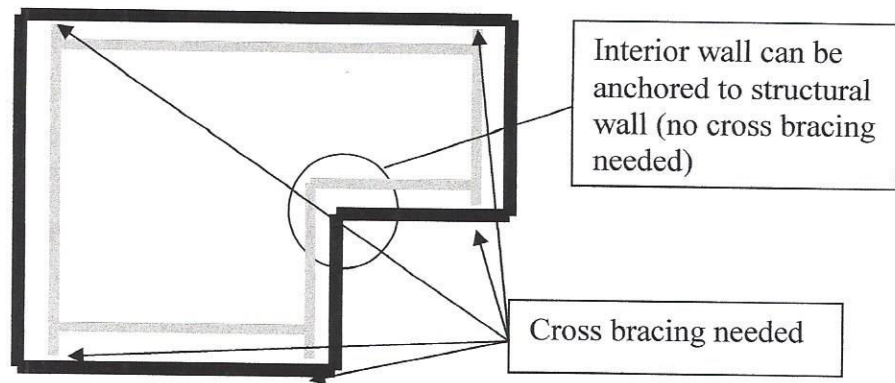
The general procedure for installing ELF TruProtect panels starts with preparing the metal stud walls. Make sure all the metal studs (structural wall or center wall) are electrically connected to the earth or electrical ground.

This system requires an interior metal wall, typically a 1-5/8" wide no-load bearing metal stud. Install bridge bracing, flat strap bracing or cross bracing between the corner stud and the first wall stud in all four corners. Only two walls will be needed to be anchored to the structural wall, so the cross bracing will only be needed in four areas. The cross bracing will need to be installed from the floor to the height of the drop in ceiling.

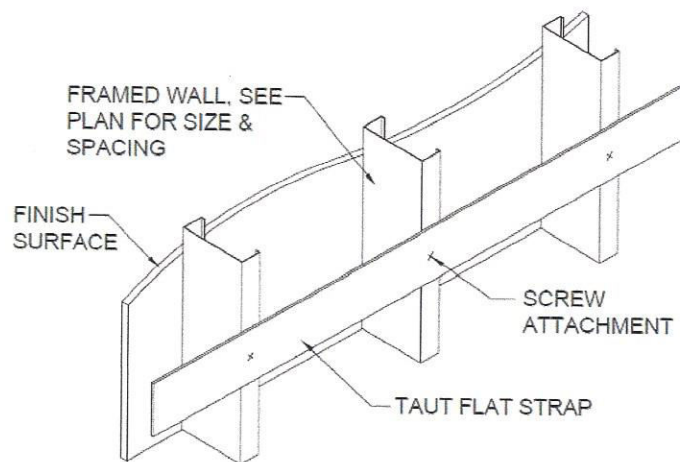
The interior non-load bearing wall will essentially form a "H" pattern, so cross bracing is needed in 4 locations at the minimum.

Below is an exaggerated H pattern (top view).

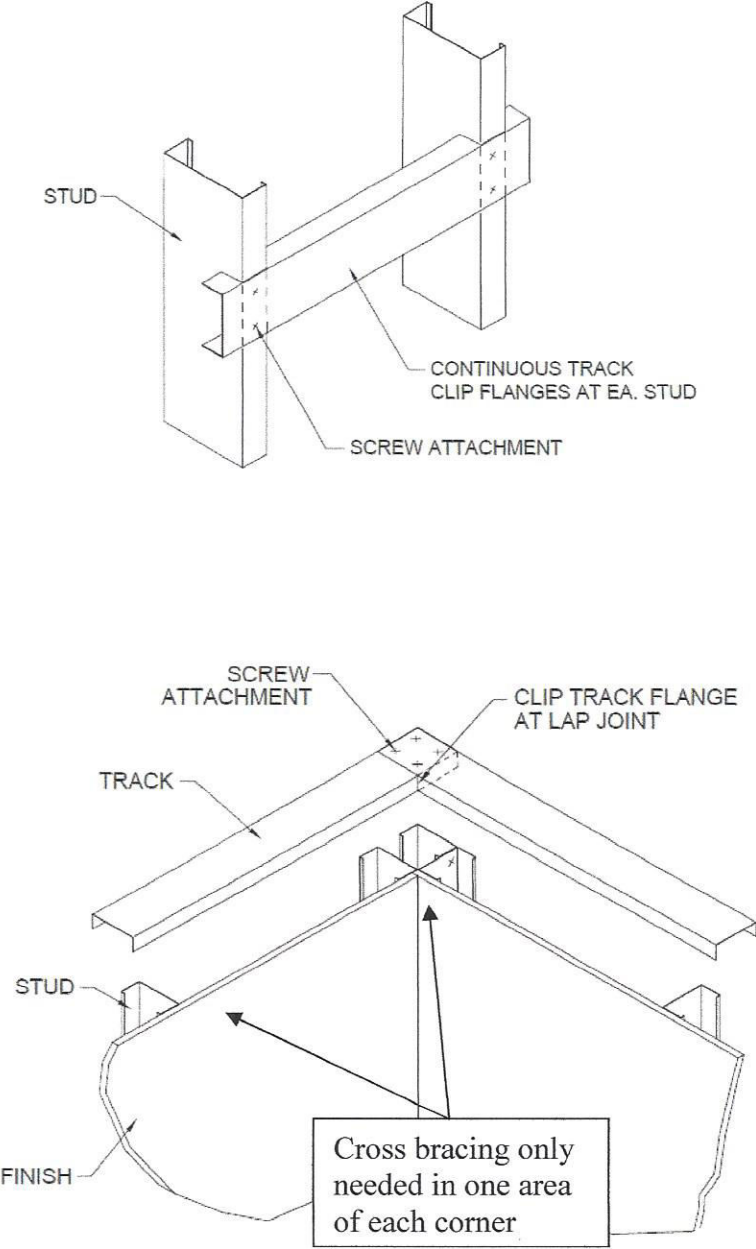




Example of Flat Strap cross bracing



Example of Continuous Track cross bracing

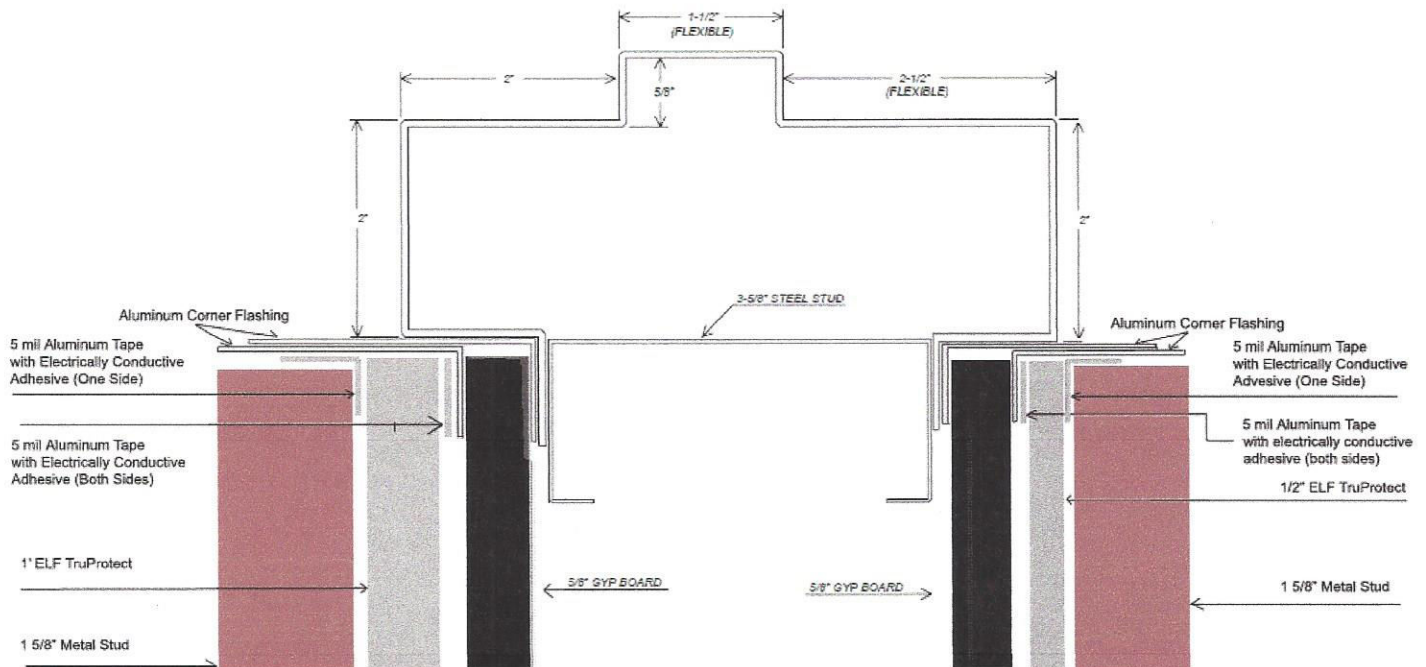


## Installing the RF shielded door:

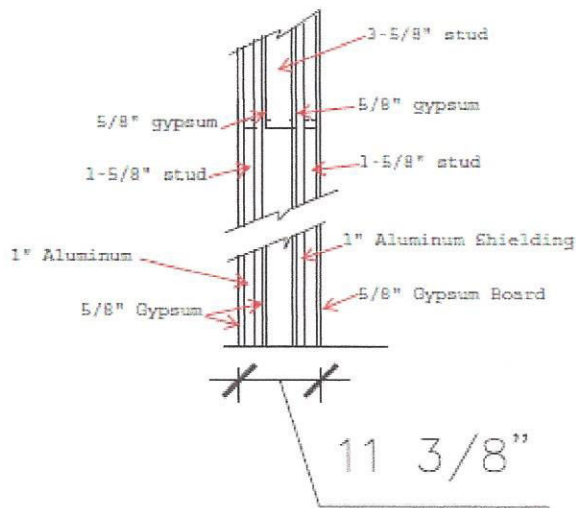
The typical 60 dB RF shielded door that has the ADA approved threshold, is a one piece jamb (see below). Typically the door jamb studs are anchored at the bottom and left lose at the top. Then the RF shielded door is dropped in from the top. The door jamb studs are then raised to vertical and anchored. Then the header stud is installed. Square the RF shielded door and attach it to the studs. Caution, if you frame in the door opening first, you will have to disassemble the metal stud framing to get it installed.

The remainder of the room can be framed out with metal studs, just be aware of the door installation.

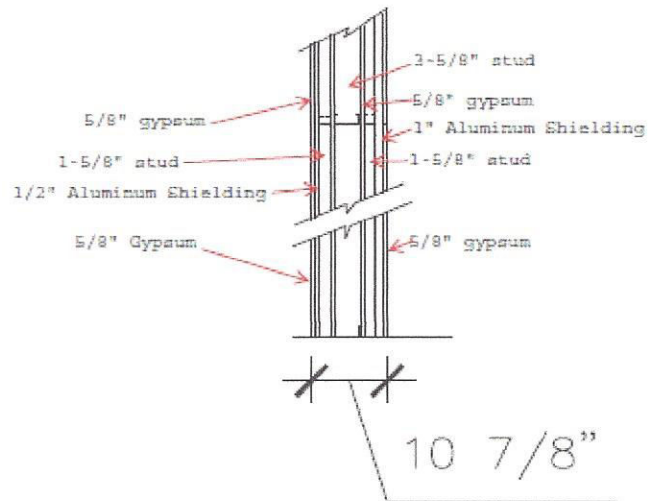
### RF Shielded Door ELF TruProtect Panels



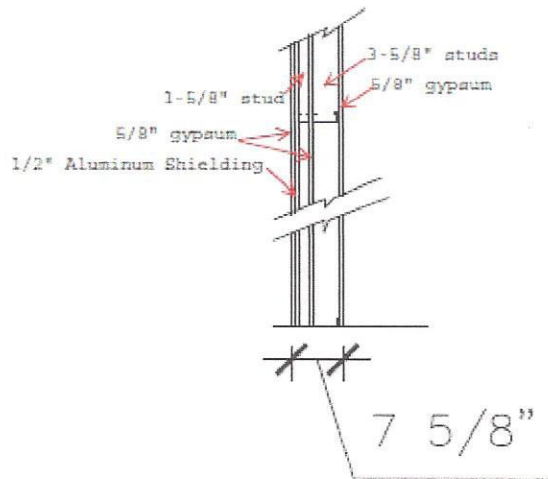
# RF Shielded Wall Types:



Partition A

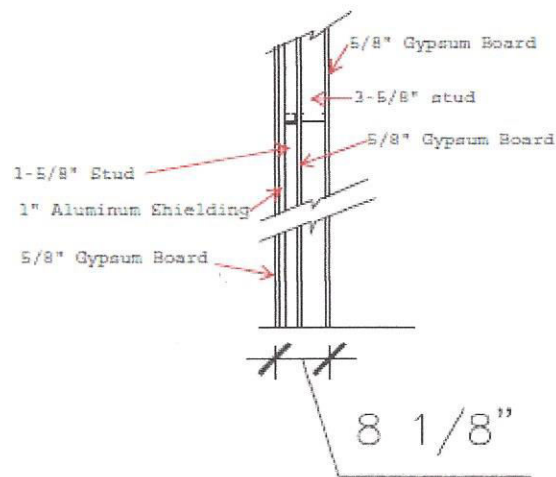


Partition Type B



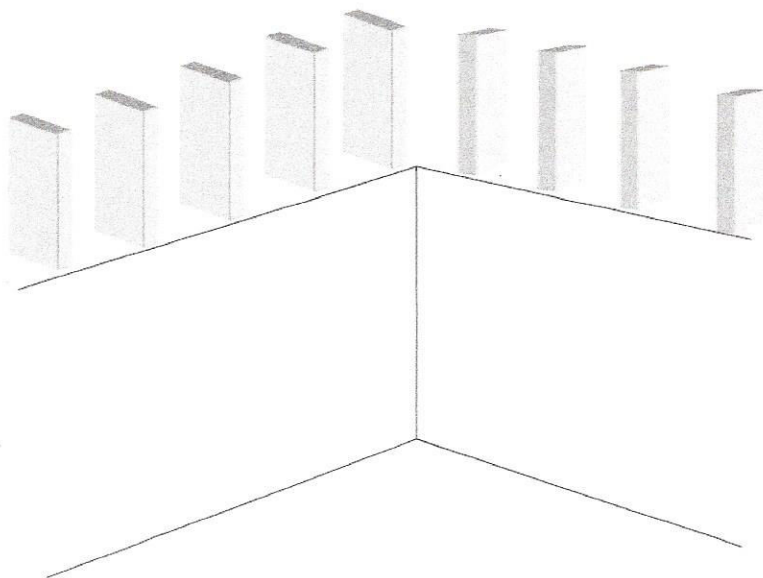
1/2" shielding one side only

Partition C

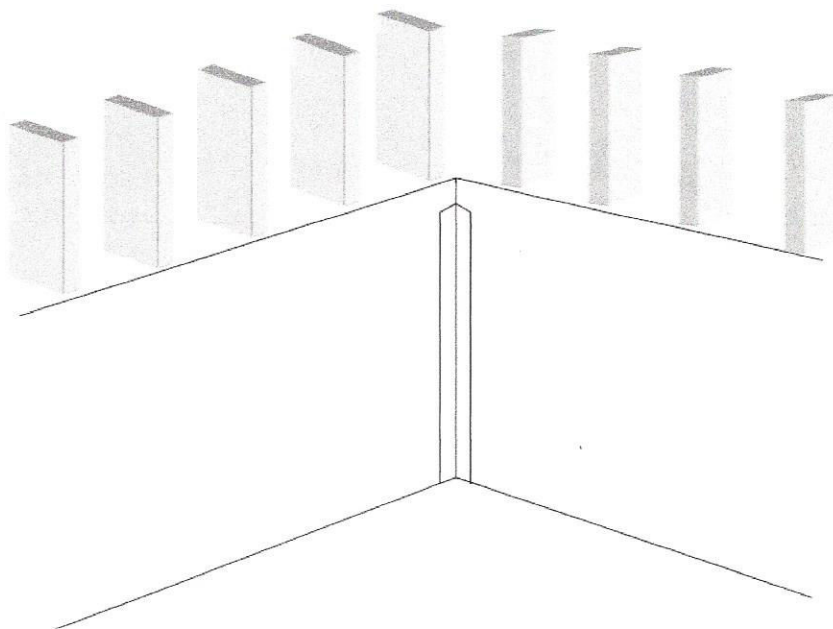


Partition Type D

Metal stud wall with insulation (as required) and first layer of sheetrock installed (standard commercial installation). Finish the sheet rock as required, some require taping and some do not. Taping is not required for the RF shielding. Sheet rock should be 12" or higher than the drop in ceiling height. Entire wall can be sheet rocked to meet fire or acoustic requirements.

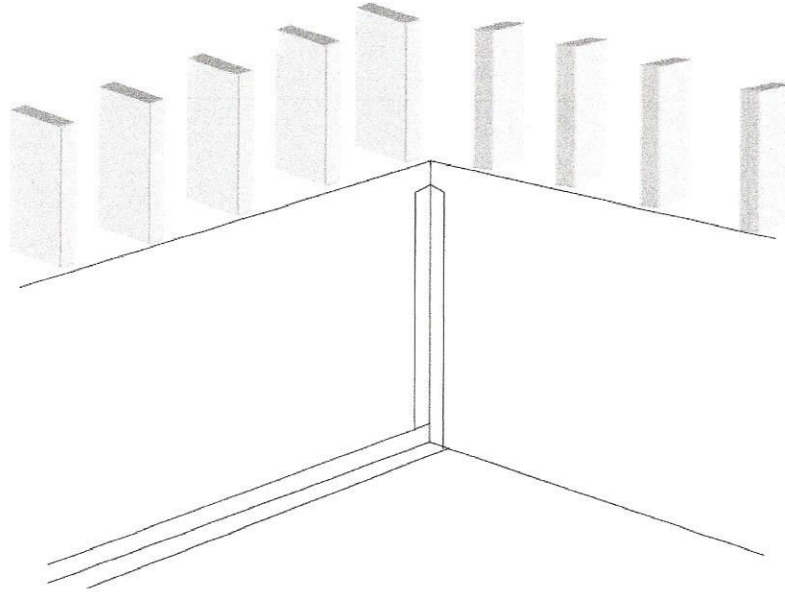


Install the flashing on all wall to wall intersections. Install flashing using metallic self drilling sheetrock screws (Use the same screws as the approved sheet rock screws, for the project). Flashing should be 3" x 3" (minimum) aluminum corner flashing (flashing must be 10 mil thick or thicker). The flashing will be from the floor to the height of the drop in ceiling.

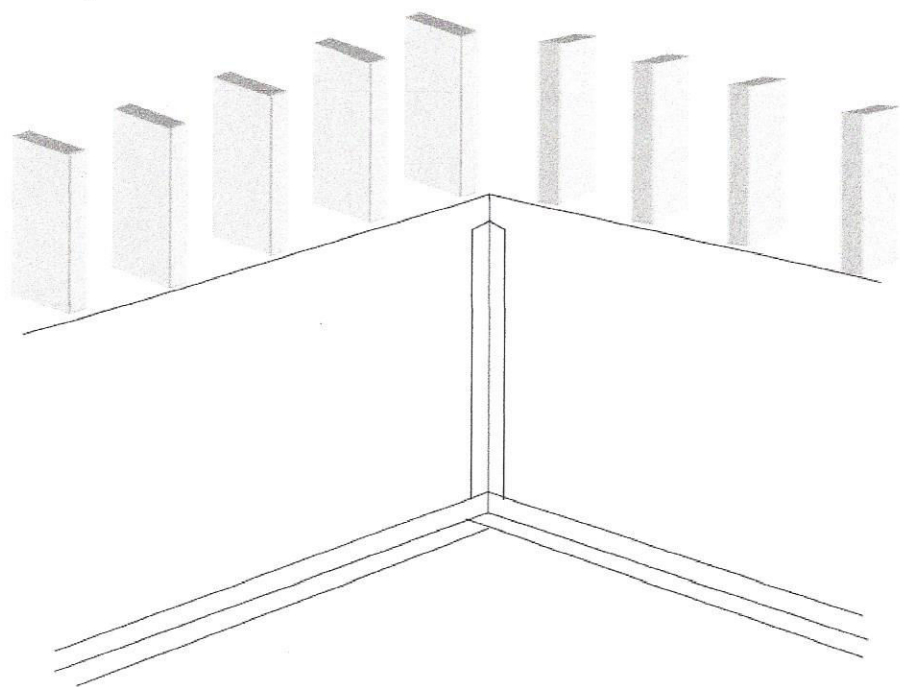


Install the flashing on all wall to floor intersections. Install flashing using metallic self drilling sheetrock screws to the vertical wall studs (Use the same screws as the approved sheet rock screws, for the project). Flashing should be 3" x 3" (minimum) aluminum corner flashing (flashing must be 10 mil thick or thicker). The flashing will run the entire length of the wall. Size the flashing that is on the floor, so it extends 2" past the final interior finished wall.

Example, you are installing 1" TruProtect, a 1-5/8" metal stud interior wall with 5/8" sheetrock, the flashing should be 3' (wall) x 5-1/4" (floor) as a minimum. A 3" x 6" or 6" x 5" flashing would work fine. If you are required to install multiple flashing pieces, overlap the pieces by 3" minimum. Do not anchor the floor flashing to the floor.

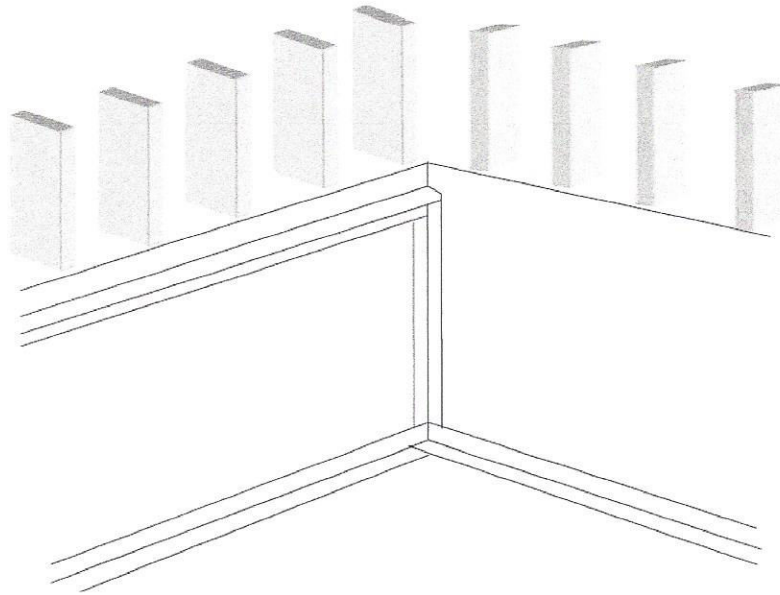


Overlap the floor flashing in the corners.

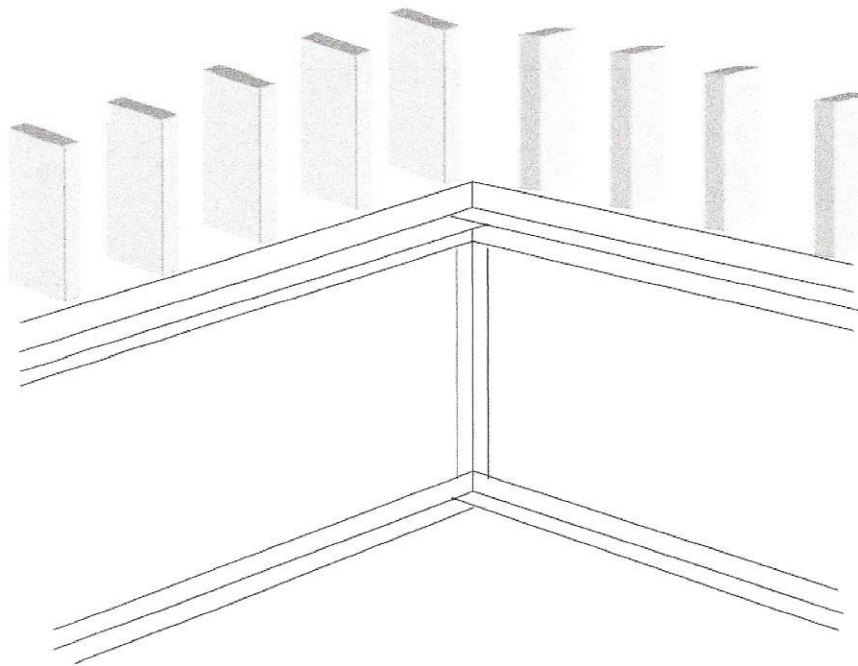


Install the flashing on all wall to ceiling intersections. Install flashing using metallic self drilling sheetrock screws to the vertical wall studs (Use the same screws as the approved sheet rock screws, for the project). Flashing should be 3" x 3" (minimum) aluminum corner flashing (flashing must be 10 mil thick or thicker). The flashing will run the entire length of the wall. Size the flashing that is on the ceiling (facing the interior of the room), so it extends to the interior of the finished wall.

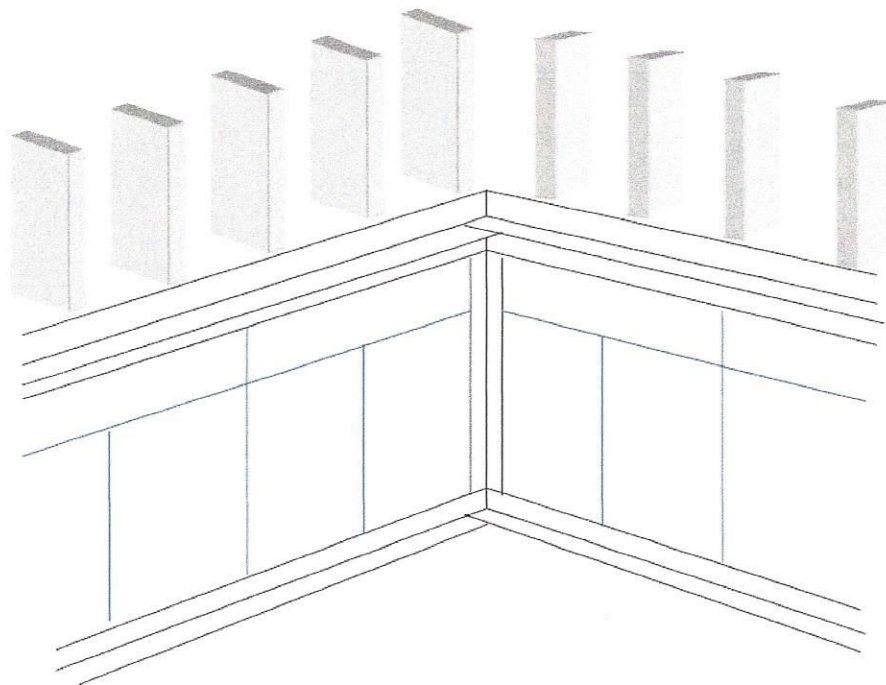
Example, you are installing 1" TruProtect, a 1-5/8" metal stud interior wall with 5/8" sheetrock, the flashing should be 3' (wall) x 3-1/4" (ceiling). If you are required to install multiple flashing pieces, overlap the pieces by 3" minimum.



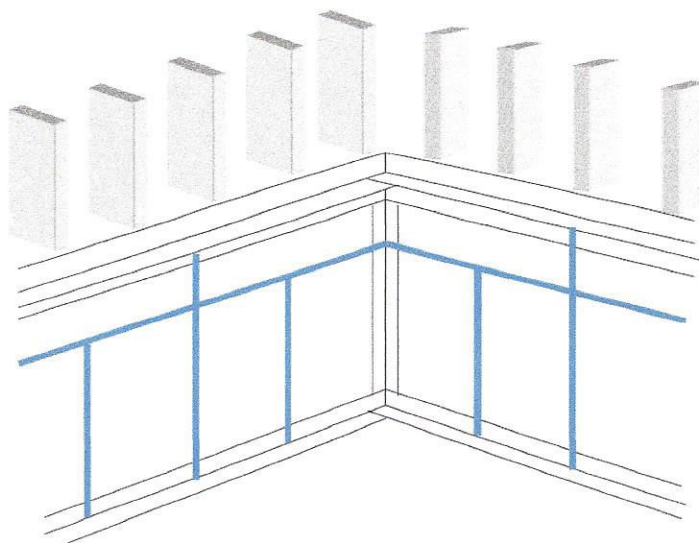
Overlap the ceiling flashing in the corners.



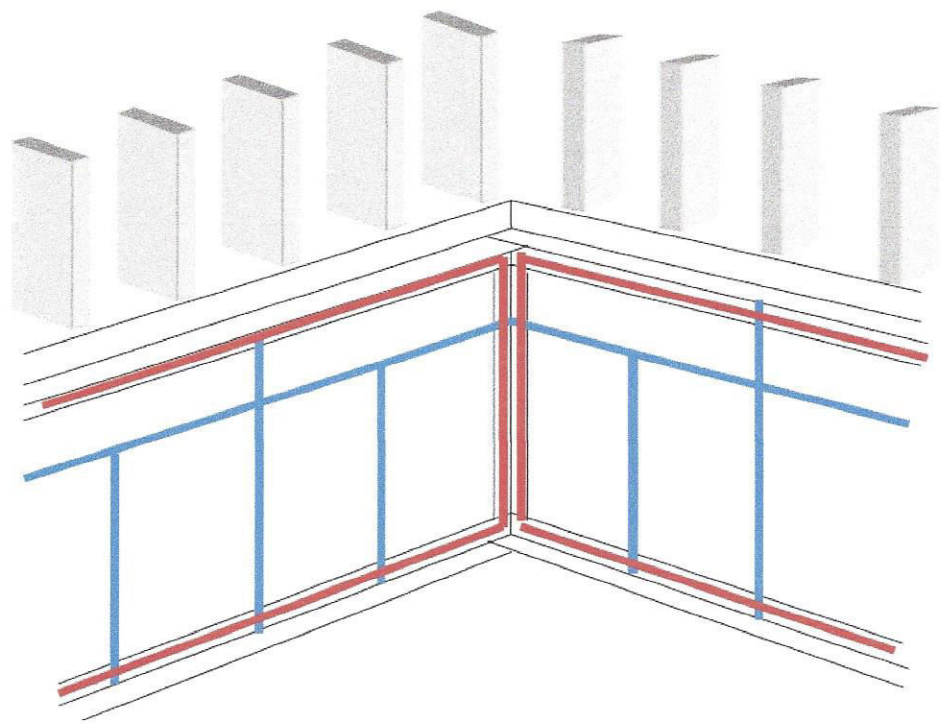
The TruProtect panels are 4' x 8', so lay out the wall that involves the least amount of cutting. Chalk line the walls, in the pattern you have chosen. The TruProtect panels are ½" or 1" thick, the first wall installed will go all the way into the corner and the TruProtect panel on the perpendicular wall will butt up against it. Adjust your chalk lines accordingly.



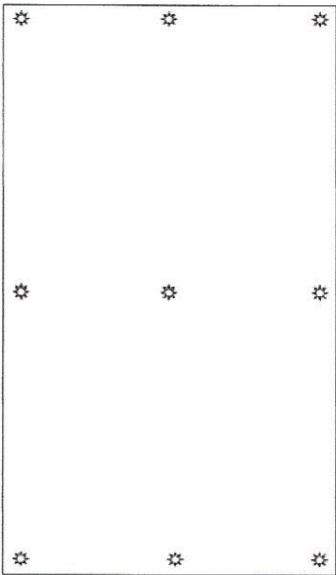
Apply the 4" wide, 5 mil Aluminum tape with Standard PSA (PSA) (non-conductive) one side and Electrically Conductive PSA (ECPSA) on the other. Install the Standard PSA side to the sheet rock. Remove the backing of the Standard PSA as you go. Start from the corner flashing corner and apply all the way to the opposite wall corner flashing corner. Centering the tape on the chalk lines you have applied. Do this for all the chalk lines you have. Where the tape overlaps (intersections) take a razor knife and carefully cut out the section of release paper that is already attached to tape on the wall. Then run the intersecting tape over the top of the already installed tape. Leave the backing on the ECPSA at this time.



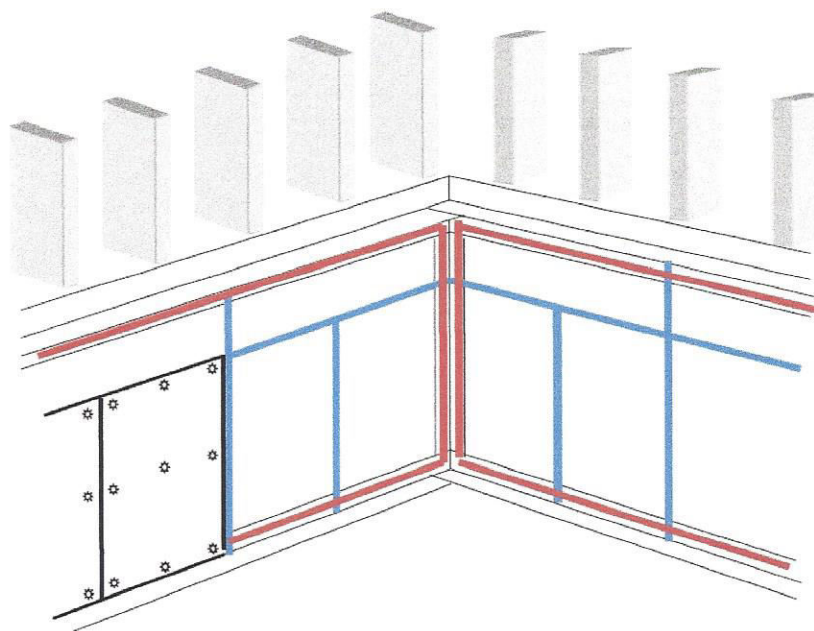
Apply the 2" wide, 5 mil Aluminum tape with Electrically Conductive PSA (ECPSA) on both sides around the perimeter of the wall, on the flashing installed earlier. Install the tape 1" off of the corner. Where the tape overlaps (intersections) take a razor knife and carefully cut out the section of release paper that is already attached to tape on the wall. Then run the intersecting tape over the top of the already installed tape. Leave the backing on the ECPSA at this time.



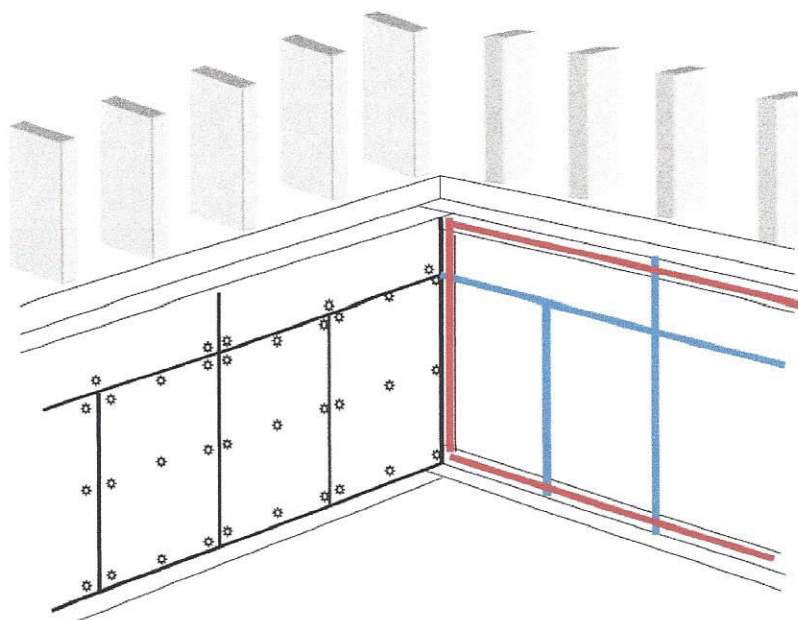
TruProtect 4' x 8' Panel, Attachment Screw Locations



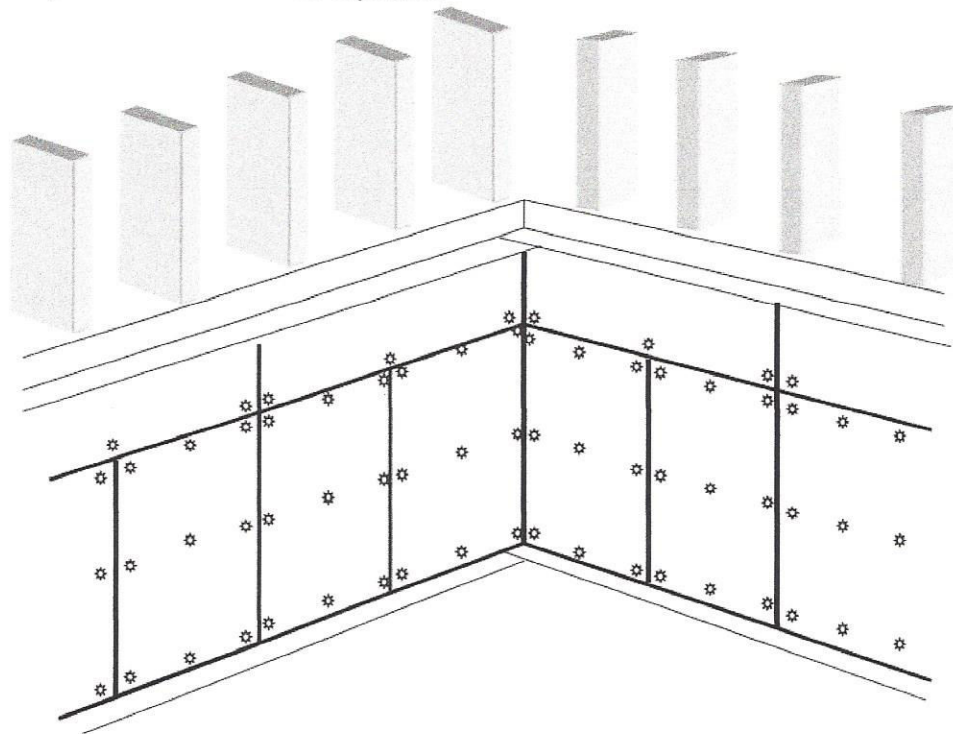
All the tape that is facing into the room is ECPSA. Only remove the release paper on the tape for the area you will complete in the next couple of hours. Start in one corner and install the TruProtect panels, so the edges match up with the center of the tape that is not in the corners. The panel will go up tight in the corner. Panels that need to be cut, should be done with a fine tooth metal blade, via table saw, circular saw or reciprocating saw. The cut edges need to be sealed up using 3" ECPSA tape. Screw through the panels using the same screws used for the sheet rock, but length adjusted accordingly. The screws will anchor into the metal structural wall studs. If the screw misses the stud, leave it in place. The final seeming tape will cover it up, if it is near the edge. If it is in a center area, cut a piece of 4" x 4" of the ECPSA tape, remove the release paper and install the patch, so the screw is in the center.



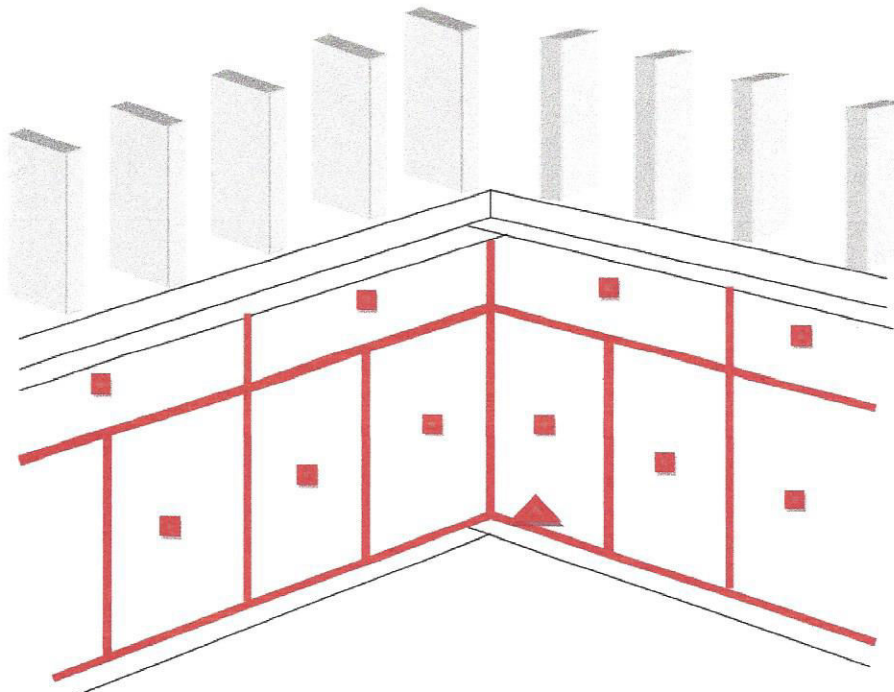
Install TruProtect on first wall, from corner to corner. Install the TruProtect on the opposite wall (parallel wall). Then install the remaining walls.



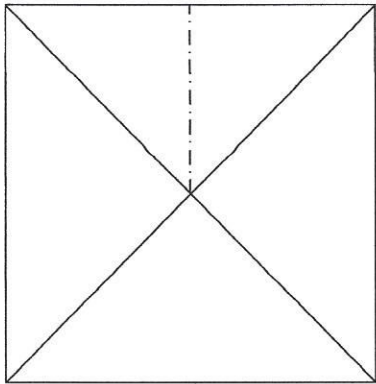
All walls completely covered with TruProtect panels.



Using the one sided 4" wide ECPSA tape, tape over all the panel butt joints, with the butt joint in the center of the tape. Cut 4" x 4" pieces of the same tape and cover over any screw heads. In the wall to wall corners, wall to ceiling corners and wall to floor corners, fold the 4" tape in half before or as you go and apply into all the corners.

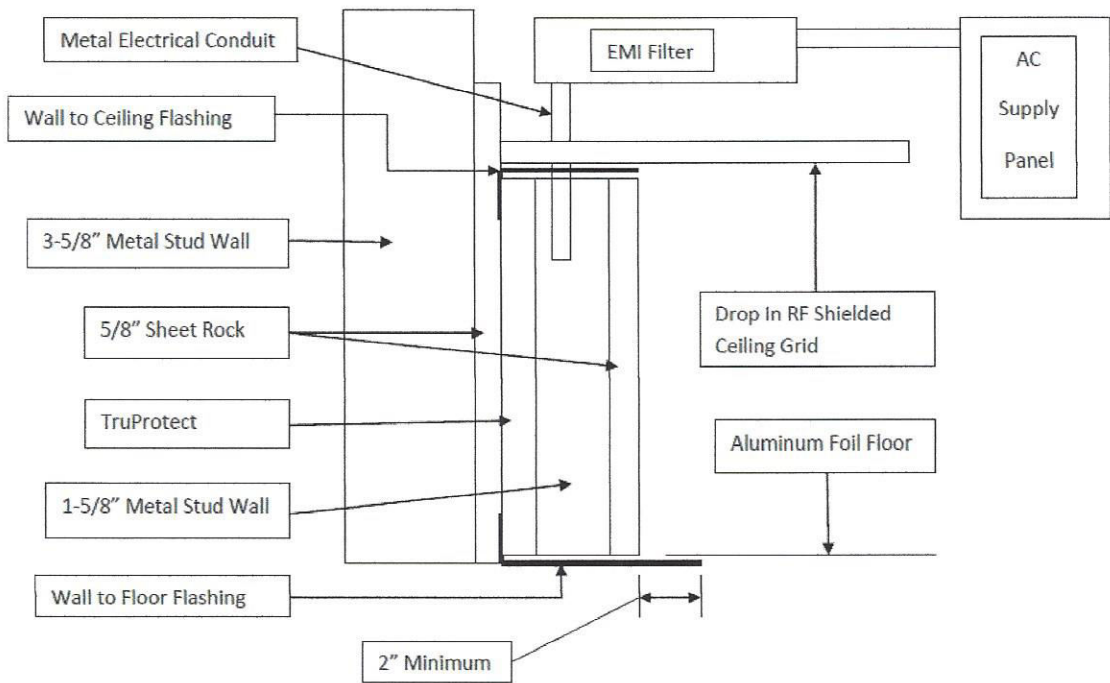


Finally, install the three-way corners upper and lower corners of the room. The installation is accomplished by cutting a 4" x 4" piece of the ECPSA tape, creasing the material into four quarters, and then folding the material back onto itself in one of the quadrants forming it into a three-way corner. Practice with a piece of paper first. Be sure to fit the foil flush on all sides since most corners are not square. The



Now install the inner metal stud wall, right up against the TruProtect panels. The bottom plate is placed on top of the aluminum flashing and anchored the same as the structural metal stud wall was, using the same approved anchors. Cut the vertical studs, so that when the top plate is installed the height is the same as the drop in ceiling. The vertical studs are mounted up against the TruProtect panels and anchored to through the TruProtect panels and sheet rock into the cross brace studs you installed earlier. Cut 2" x 2" pieces of ECPSA and cover over the screws that penetrate the shield panels. The top aluminum flashing can now be attached to the top plate of the inner metal stud wall. Also attach all the door flashing to the inner metal stud wall.

Side View of Structural Stud Wall with TruProtect RF Shield Panels



All conduit penetrations must come down from above. Install metallic electrically conductive conduit through the top aluminum flashing and the inner metal stud wall top plate. Use multiple 2" wide ECPSA tape pieces and on the top side, seal the conduit to the top of the aluminum flashing, sealing the hole. All metallic wires must be EMI filtered and go into metallic conduit into the RF shield. If you have fiber-optic communication lines, it still is a good practice to install the metallic conduit inside the RF shield. Install conduit, switches, outlets, etc. as would normally. Install the final layer of sheet rock and finish as required. Do Not install the kick panels yet.



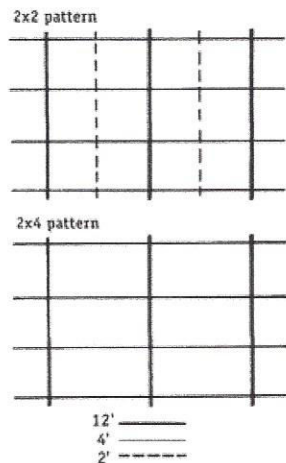
## Installing TruProtect RF Shielded Ceiling Tiles

A drop down or suspended RF shielded ceiling is composed of a **metal grid** (non-metallic grid systems will not work) and TruProtect ceiling panels that are placed in that grid. The two sizes that are available: 2 feet by 4 feet and 2 feet by 2 feet. RF Shielded LED Light fixtures with metallic housings should be used in the drop ceilings.

**TruProtect RF shielded ceiling tiles are design to be inserted into a metallic grid that is electrically grounded**

**PLANNING FOR A RF SHIELDED SUSPENDED CEILING** First, get the exact measurements of the room where the suspended ceiling will be installed. Use special care in measuring any odd-shaped alcoves, bays, etc.

You can choose from either a 2x2 or a 2x4 pattern (Fig. 1). The pattern you pick will determine the material requirements for your ceiling.



**FIG. 1** - Select the grid pattern you want to use.

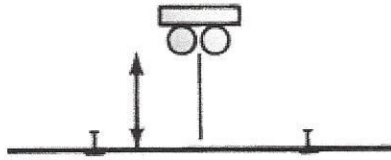
It is important to space the cross tees so the border panels at the ends of the room are equal and as large as possible. If you are using a 2'x4' pattern, space the 4' cross tees 2' apart. For a 2'x2' pattern, add 2' cross tees between the midpoints of the 4' cross tees (Fig. 1).

The grid system, must be metallic, most common is aluminum or steel. Non-metallic grid systems will create gaps in the shielding, effectively making the shield useless. The best type of metallic grid system, only has the portion facing into the room coated or painted.



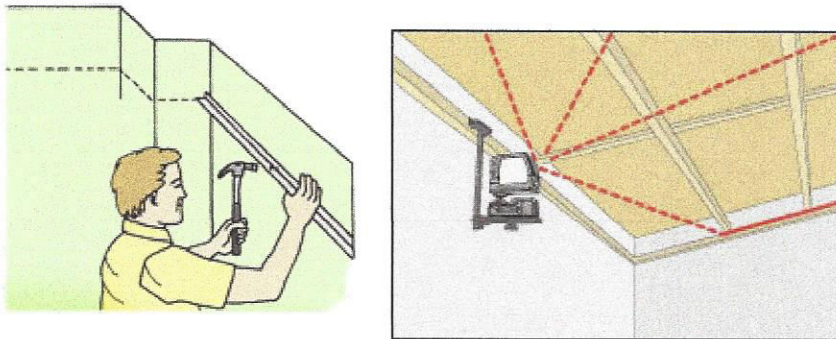
Only the portion facing into the room is coated or painted

The metallic ceiling grid will sit right on top the top aluminum flashing. Allow a minimum of 8" clearance between the parent room ceiling and the new ceiling for installation of the ceiling panels. The TruProtect ceiling panels are very rigid, unlike standard acoustic tiles. Additional clearance will be required if you are using recessed lighting (Fig.2).



**FIG. 2** - Allow a minimum of 8" space between the ceilings if you're using recessed lights.

After locating the exact position for the suspended ceiling, use a laser level to draw a line completely around the room indicating where the wall angle will be applied (Fig. 3). Don't assume the original ceiling is level—use a laser level for accuracy. Set the wall angle low enough to conceal as many pipes, ducts, etc., as possible.

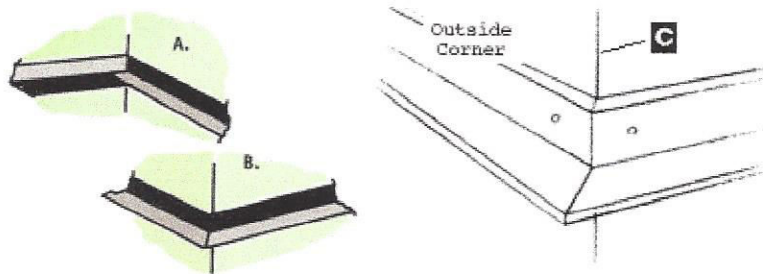


**FIG. 3** - Use a level to apply the wall angle at a proper height around the room.

For RF shielded walls, you must maintain the shielding integrity of the wall system you are attaching or anchoring through. The outer ceiling grid perimeter will set right on top of the top aluminum flashing. The grid will be anchored through the sheet rock into the structural metal stud wall.

Position the wall angle so that the bottom flange rests on the level line you have drawn on the wall. Take the time to do this right!

Overlap the wall angle on inside corners and miter the wall angle on outside corners ( Fig. 5). Make a temporary wooden miter box if you don't have one. Cut any needed angles with metal cutting snips or a saw. Tape the top of the joint seams with foil tape with conductive adhesive.



**FIG. 5** - Overlap the inside corners and miter the outside corners.

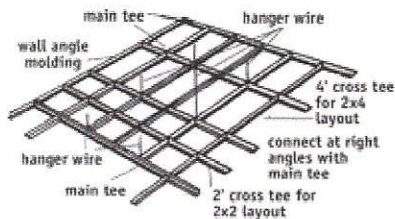
## BEFORE INSTALLING CEILING PANELS

You need to make sure that every grid component is connected electrically to earth or electric ground. You might have to make more than one connection from the metallic grid to a good ground. Verify that all grid components are grounded by continuity checking them using an ohmmeter or multimeter.



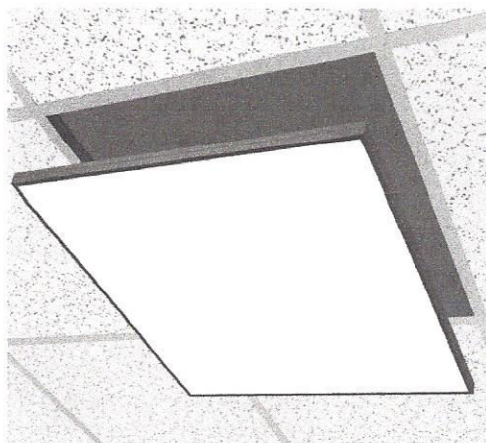
If there are any pieces that must be cut down or an irregular size, the TruProtect ceiling panels can be cut down. Panels that need to be cut, should be done with a fine tooth metal blade, via table saw, circular saw or reciprocating saw. The cut edges need to be sealed up using 3" ECPSA tape. Cut through all the layers of foil except for the painted layer, do not cut through the final layer of foil. Peel off the layers that have been cut through and remove from the panel. Then fold the remaining foil layer with the paint coating up along the freshly cut exposed area and fold it over the panel and tape into place. You can trim off any extra foil with paint if needed. Seal the vertical seems with foil tape with conductive adhesive.

Your final main and cross tee arrangement will look similar to below. The top part of the illustration shows an arrangement of a 2'x4' layout, while the lower half shows main and cross tees arranged for a 2'x2' layout.

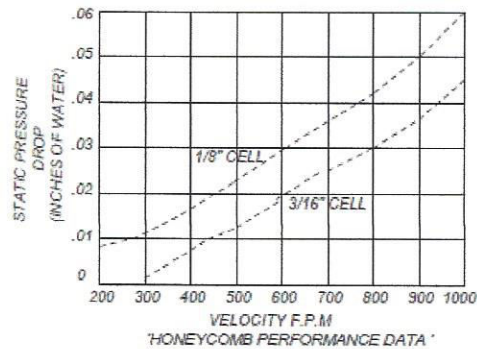
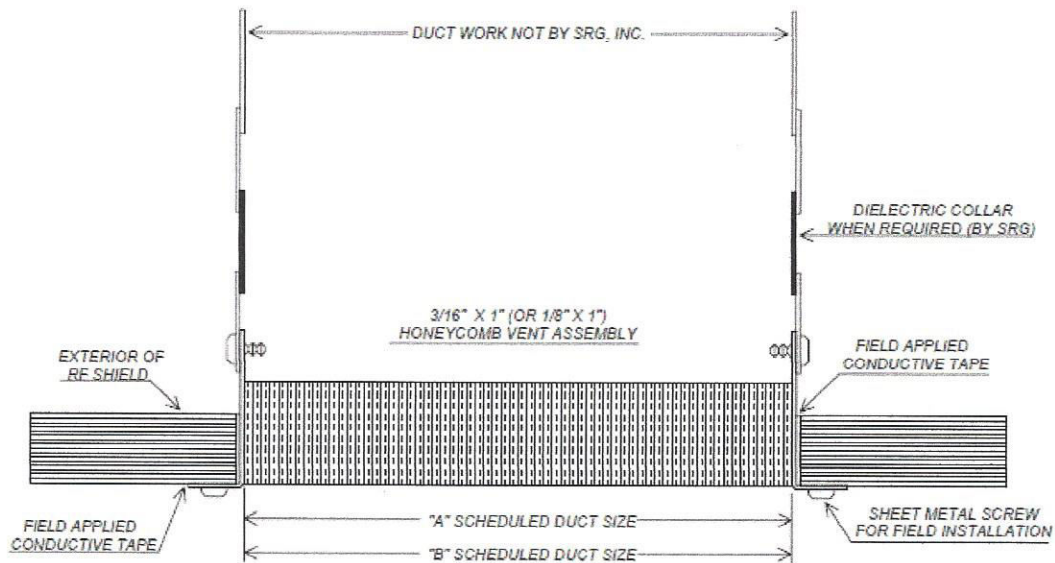


Your final tee arrangement will look similar to this.

Install the RF Shielded LED light fixtures, the electrical contractor can connect the conduit and wiring.



Install the RF Shielded air vents into the ceiling grid, HVAC Contractor can hook up the adapter and ductwork.



"DIRECT ATTACHMENT VENT ASSEMBLY"

If there are going to be sprinklers installed in the ceiling, use a fine toothed hole saw to drill a hole in the ceiling panel that matches up with the sprinkler down pipe. The hole is usually larger than the pipe but smaller than the surround flange, that is up against the ceiling. Use multiple 2" wide ECPSA tape pieces and on the top side, seal the pipe to ceiling hole gap.



Drop the ceiling panels into position by tilting them slightly, lifting them above the framework and letting them fall into place. You might have to work from an open area and push the panels down if they are a tight fit. Be careful not to tear the foil on the TruProtect panels. If you have done everything correctly there will be no visible gaps between the grid and panels.



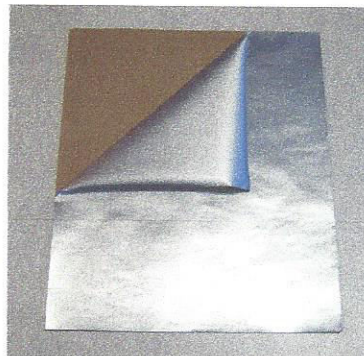
### **Aluminum Foil Floor Installation**

Do Not Install the aluminum foil floor, until you are ready to put in the final floor, be it wood, ESD tile, vinyl tile, etc.

Thoroughly clean the floor of all dust, debris, oil, water, etc. If the concrete floor is very porous you might have to apply a sealer first.

There should be a 2" or more aluminum foil flashing around the floor perimeter of the room.

Remove the paper support backing from the aluminum foil as the foil is applied to the surface. Keep the foil tight and avoid entrapped air bubbles. Using a rubber roller to smooth the foil as you would traditional wallpaper. Be careful not to rip or tear the foil. The foil should be as flat and smooth as possible.



Start at one wall corner and overlap the 48" wide foil end so 1" of the flashing is not covered and overlap the flashing leaving 1" along the adjacent wall. Butt joint the 48" wide aluminum foil, until the entire floor is covered, leaving a 1" perimeter of the aluminum flashing.

The final step is to apply 4" wide ECPSA tape, over every butt join seam.

Then go around the room perimeter with the same 4" wide ECPSA tape and tape over the 1" exposed aluminum flashing, 3" onto the foil floor.



**4" Electrically Conductive Tape (Seal butt joints)**