ASSEMBLY of
ProTEC CONCRETE STRUCTURAL INSULATED PANEL

The ProTEC panels are manufactured with grooves on all four sides to accept the steel components. This grooving applies to the regular panel whose sides are 90 degrees to the panel face as well as the corner unit panel which normally has one side cut at 45 degrees to the panel face. The following is a simple explanation on the building of a wall and a corner using the ProTEC panel, the steel components and the proprietary fasteners.

In the building of a wall, the steel base or sill "C" channel is anchored to a slab, foundation wall, floor or platform, with the web side down and the legs projecting up from the mounting surface. Appropriate fasteners such as ½" diameter by 3" to 4" long wedge bolts or ½" x 3" or 4" lag bolts or cast in place ½" dia. Bolts are used to secure the sill channel to the floor.

The recommended method of fastening panels to the Sill channel and the "H" and half "H" studs as well as the top track is to apply the FOMO brand expanding urethane adhesive in the slots of the panels to be joined as well as a serpentine bead of the adhesive applied between the grooves of the panel edges and top and bottom. Apply the adhesive in the side grooves to within 4" of the top of the panel. If applied any higher, the adhesive will expand into the top and side grooves and will prevent the top track from properly seating when it is later installed. A panel is then set on the sill channel with the channel legs in the bottom grooves of the panel. Steel H-studs are then inserted into the panel's side grooves and a second panel is installed on the sill channel and slid into the first panel so that the H-studs are inserted into the side grooves of this second panel. The proprietary #14 x 4-1/4" dual threaded fasteners are placed thru the face of the concrete skin and into both legs of the "H", Half "H" or top and bottom track. These screws should not be placed in the upper corners of the panels until the Top Track is installed as it must be fastened to the "H" and "H/2" studs.

The head of the fastener should slightly imbed into the concrete face of the panels and flush with the surface. These dual threaded fasteners are placed in each corner of the panel and at the 1/3 points on the vertical edges of the panels. Eight fasteners are placed on each side of the panel for a total of 16 fasteners per panel. When 4 or 5 panels have been installed on the sill channel and secured to it and the H-studs, the steel top track "C" channel can be installed, web side up with the legs into the grooves on the top of the panels. All panels should be secured to the top plate with the fasteners. Adhesive must be used when using the #14 x 4-1/4" fasteners in the above described pattern.

In building a corner, the steel base or sill channel is anchored as above forming a 90-degree corner. One corner panel unit is set on top of the sill channel at the corner with the sill channel legs in the bottom grooves of the panel. The steel angles are installed into the grooves on the 45-degree side of the corner unit panel. The second corner unit panel is set on the sill channel with the sill channel legs in the bottom grooves of the corner unit panel. This second corner unit panel is slid into place so that the steel angle legs fit into the grooves on the 45-degree side of this corner unit panel. Both corner unit panels are then connected to the steel sill channel and the steel angles with the proprietary fasteners thus forming a corner. When sufficient panels are connected to the corner, the steel top plate is installed and connected as explained above, using the FOMO adhesive and the #14 x 4-1/4" screws.

To assist the reader in understanding this process, enclosed is a 19 page section entitled Illustrated Assembly Instructions, which pictorially shows how the panels go together to build an exterior load bearing wall for a small building.

Also enclosed is a section entitled Construction Details, which includes various typical construction details and perspective drawings.

GENERAL INFORMATION, RECOMMENDATIONS & INSTRUCTIONS

GENERAL

- Keep all panels, steel components and fasteners protected from the elements prior to installation.
- Store the panels laying flat.
- Do not drop panels.
- Remove debris from the foundation wall, slab, or floor, so that the sill channel can be connected securely thereto.
- Remove debris from sill channel area prior to the placement of a panel on the sill channel.
- Use care in placing panels on the sill channels.
- The sill channel must be installed back from the edge of the foundation wall, slab, or floor, so that the outer panel skin bears on the foundation, slab, or floor.
- The sill and top channels shall be installed so that the butt joint between channels does not occur less than 12" from any panel joint.
- The top channel shall be installed so that the overlap joint between channels does not occur in the header above a window, door, or other opening in the wall.

- During the process of assembling and plumbing the panels, and prior to the use of the pneumatic nails, connect the corners of the panels to the steel components with the proprietary screws.
- It is recommended that the building of the panel wall start with the assembly an erection of a corner.
- The corner panel units and steel angles making up the corner assembly shall be plumbed and fastened together before proceeding further.
- When the next panel is installed snug to the corner, plumb the corner and the panel and fasten them to the sill channel and to each other.
- As additional panels are installed, they must be snug to the previously erected panels and plumbed prior to the installation of the fasteners.
- Adequate bracing of panel walls must be provided during erection. Bracing should occur every 10' to 15' of wall length and should be temporarily secured to the wall panel and the interior floor or staked to the exterior ground to insure against blow over in the event of excessive wind conditions.
- It is recommended that the top channel be installed and secured as the erection of the wall proceeds and only after there is sufficient length of wall to accommodate a top channel.

FOUNDATION & SLAB ON GRADE

- Foundation walls and the outer edges of slabs on grade should be level, square, have a smooth top free of irregularities, and have sides that are straight. Standard corners should be 90 degrees. Corners other than 90 degrees can be accommodated with custom-made panels.
- The use of Sill Seal or equivalent material, or silicone caulking is recommended between the top of the foundation wall or slab and the steel sill channel.
- Steel bottom track shall be anchored to the foundation as per code. Where permitted by local building codes, 3" or 4" Wedge Bolts are to be used every three feet on center to anchor sill channel to the foundation or slab. They should be placed within 6" of the intersection of the "H" or "H/2" studs.
- When the steel channel is used as a sole plate attached to a wood substructure and perpendicular to the floor joists, it will be attached to each joist it crosses using a Lag Screw. Where the steel sole channel is laid parallel to the floor joists, on an end or rim joist, as shown in Detail FS-4, it shall be attached every three feet on center using the same screw indicated above. They should be placed within 6" of the intersection of the "H" or "H/2" studs.

- It is recommended that at the corners, the still channels be formed and installed as shown in Detail FS-9.
- To prevent water infiltration at the sill channel, it is recommended that Moist Stop e-Z Seal or equivalent material be used as shown in Details FS-1, FS-1A and FS-3A through FS-8A.
- In situations where the exterior wall finish is applied directly to the panel, such as a hard coat or elastomeric finish, Urethane Caulking as shown in Detail FS-2, is recommended to prevent water infiltration. In addition Urethane Caulking can be used as an alternate for Forti-Flash E-Z Seal type material.
- It is recommended that THERMADRY® Insulating Drainage Panels be installed on the exterior of the foundation walls, as shown in Details FS-4 through FS-7.

STEEL COMPONENTS & FASTENERS

- All steel components, angles, channels, splines and H-studs, used as part of the ProTEC® panel system shall be G-60 Galvanized Steel. Top and bottom track and the flat splines shall be a minimum of 20 gauge and the "H" and "H/2" studs shall be a minimum of 18 gauge.
- All steel components not normally part of the ProTEC panel system, but used as part of the structure with the ProTEC® panel system, i.e. the studs, structural C channel and structural track shown in Detail WC-11, shall be a minimum of 20 gauge G-60 steel and sufficient to handle the loads placed upon them.

WALLS

- Walls having corners other than 90 degrees can generally be constructed by using metal components having corresponding angles and using standard fabrication procedures. Unusually shaped corners may require specialized fabrication.
- It is recommended that at the corners, the top channel be installed as shown in Detail RJC-1.
- In situations where one 2" x 4" wood top plate is used in addition to the steel top channel, as shown in Detail RJC-8 OR RJC-8A, the wood top plate shall be connected to the steel top channel with a corrosion resistant 2 ¼" flat or pan head screw every 24" on center, and to the outer skin of the panel using the 1 ½" pneumatic nails every 16" on center.
- In situations where a second 2" x 4" wood top plate is used on top of a wood top plate that is already connected to the steel top channel, as indicated above, the second wood top plate can be connected to the steel top channel, as indicated above, the second wood top plate can be connected using nails or screws, as per code requirement.

- All panel joints shall be sealed with the fiberglass mesh and WaterArmor. For rough openings for standard windows, steel channels shall be inserted into the jamb, sill, and header panels. Steel splines shall also be used between the header panel and the side support panels. All panel components shall be connected to the steel components using the T Clear proprietary fasteners. See Details WD-1, WD-2 and WD-3.
- For rough openings for standard doors, steel and panel components are connected in the same fashion as described above, without the sill panel or bottom track. See Details WD-2 and WD-3
- For exterior rough openings, all headers, jambs and sills shall be back wrapped with T Clear Fiberglass mesh embedded in WaterArmor or equal.
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ROOF TO EXTERIOR WALL CONNECTIONS

- Whether the roof structure is joist and rafter construction or roof truss construction, it is connected to the exterior wall steel top channel using steel connectors (Truss Clips/Joist Hangers). Refer to Details RJC-2 through RJC-7 and RJC-9
- Where the roof structure is metal, screws shall be used to connect the USP Ties, or equivalents, to metal roof components and the proprietary screws used to connect the Ties to the metal top channel.
- Where the roof structure is wood, nails or screws can be used to connect the USP Ties to wood roof components and the proprietary used to connect the Ties to the metal top channel.
- Where it is necessary to connect three metal components to the panel, i.e. a USP Tie to an H-stud and a top C channel, only the proprietary screw fastener shall be used.

ELECTRICAL

- Each panel has two vertical electrical chases, See Detail WC-9
- Electrical boxes can be installed in the panel by lining up the box location with the electrical chase, cutting the panel skin to accommodate the box and removing enough panel core material to accommodate the box. A Roto Zip tool is recommended for cutting the panel skin and a Hot Knife can be used for quick and easy removal of the foam core.
- The electrical box is secured to the panel by using what is commonly called an “old work box” or by using metal “F Clips or Hold-Its”.
- Panels are available with electrical box cutouts already cut along the vertical electrical chase that the electrician can easily install the electrical boxes.
- Never cut the panel’s skin to provide an additional electrical chase or change the direction of the electrical chase.

- Cut, punch or saw 1 ¼" diameter holes in the top and/or bottom channels so that these holes line up with the electrical chases that will be used. A drill with a step drill bit is recommended.
- Remove the burr from these holes and install an appropriately sized grommet prior to the installation of electrical wire.
- When the electrical wires are being run from below, the 1 ¼" hole should be made in the sole channel so it lines up with the vertical electrical chase, prior to the installation of the panel on the bottom track channel.
- When the electrical wires are being run from above, the 1 ¼" hole should be made in the top channel so it lines up with the vertical electrical chase, prior to or during the installation of the top channel.
- Be sure to cut, punch or drill holes before installing roof trusses, rafters, or joists. It is recommended that all wire chases be drilled and grommets inserted to allow for future expansion.
- Window bases that sit directly on a concrete slab or foundation shall have no electrical outlets for there is no way to run the wiring to the outlet

FIELD FABRICATION

- Even on factory fabricated panels; slight modifications may be necessary to accommodate variations due to field conditions. The most common modifications include cutting the panel to reduce its width, cutting headers and windowsills, and cutting panels to accommodate special situations. In most cases, modifications to panels are not difficult to make.

- It is recommended that a circular saw with a carbide tip blade be used to cut the panel. Because of the thickness of the panel, the use of a hand held circular saw requires a cut be made on each side of the panel, unless using a Makita 16" circular saw available through T. Clear Corporation.
- It is important that accurate measurements are made and the cut line is marked on each side of the panel. Mark the first side and square across the panel to transfer reference points to the second side. Using the reference points, mark the second side.
- The marking of both sides of the panel should be complete before any cut is made.
- It is recommended that a pencil be used to mark the cut lines. The use of a chalk line is not generally recommended, because the chalk line can be easily wiped away in handling or blown away b y the approaching saw blade. Thus, there is little or no cut line to follow.
- Metal straight edges and framing squares are helpful tools for marking lines.
- Care should be taken to follow the cut line. Where applicable, use should be made of the guide bar on the circular saw.

- Use the maximum depth of cut setting and make a straight cut following the cut line. Flip the panel over and make another straight cut following the cut line.
- For cuts close to the panel's edge, use the guide bar on the circular saw.
- The cutting of the panel will remove some or the entire factory installed slots necessary for the installation of the steel components. These will have to be replaced as follows:
    - Set the circular saw blade depth at 2 1/8".
    - If the factory install slots have been completely removed, set the circular saw guide bar, if possible, so that the blade will cut along the slots to deepen them to 2 1/8"
    - If the factory-installed slots have been removed, use the slots on both ends of the panel to set the guide bar on the circular saw, if possible. If it is not possible to use the guide bar, mark the cut lines on the panel. Then either using the guide bar or cut lines, cut the new 2 1/8" deep slots.

Headers cut for spans greater than 3 feet should not contain an electrical chase.

Should there be any questions during the installation process, please call the T. Clear Toll Free number 800-544-7398 prior to performing a non-reversible process.