Installation Manual
FOUNDATION SIPs & FROST WALLS SIPs
# PWF Foundation & Frost Wall SIPs
## Installation Manual

### Table of Contents

**Topics**
- General Requirements ............................................................................. 3
- Terms ......................................................................................................... 3
- Materials ................................................................................................... 4
- Site Preparation ........................................................................................ 5
- Footings - Concrete ................................................................................. 5
- Foundation Columns ............................................................................... 5
- Exterior Walls .......................................................................................... 5
- Concrete Slab Floors ............................................................................... 6
- Crawl Spaces ............................................................................................ 6
- First Floors ................................................................................................ 6
- Stairwell Openings .................................................................................. 6
- Support of Masonry Veneer ..................................................................... 6
- Exterior Moisture Barrier ......................................................................... 7
- PWF Wall to Existing Foundation ............................................................. 7
- Electrical Wiring ...................................................................................... 7
- Interior Finish ............................................................................................ 8
- Frost Walls ................................................................................................ 8
- Backfilling .................................................................................................. 8
- Materials Estimation ................................................................................ 9

**Details**
- Air Barrier Details for Air Barrier Sealants .......................................... AB-1
- Foundation Wall Lumber Spline Connections ....................................... FO-1
- Typical Foundation Wall (Concrete Footing) .......................................... FO-2
- Crawl Space Wall Detail ......................................................................... FO-3
- Foundation Corner Detail ....................................................................... FO-4
- Point Load Detail - Wood Column ............................................................ FO-5
- Point Load Detail - Steel Column ............................................................. FO-6
- Suspended Floor Window Header Detail .................................................. FO-7
- Suspended Floor Connections (Side Walls) ............................................. FO-8
- Suspended Floor Connections (End Walls) ............................................. FO-9
- Platform Floor Connections .................................................................... FO-10
- Stairwell Openings .................................................................................. FO-11
- Corner Stairwell Openings & Framing Table ......................................... FO-12
- Fastening PWF Wall to Existing Foundation ........................................... FO-13
- Electrical Installation ............................................................................... FO-14
- Basement PWF Wall Connection to Frost Wall ..................................... FO-15
- Frost Wall Details .................................................................................... FW-1
- Frost Wall Panel Connections ................................................................ FW-2
- Frost Wall Point Load Detail ..................................................................... FW-3
- Fastening PWF Frost Wall to Existing Foundation ................................. FW-4
1. General Requirements

1.1 Scope

The basic design and construction requirements for the Thermapan Permanent Wood Structural Insulated Panel (PW SIP) foundation systems are set forth in this specification. Criteria for materials, preservative treatment, soil characteristics, environmental control, design loads, and structural design are included. Where requirements are based on internationally recognized standards and specifications, these standards and specifications are referenced without elaboration.

Installers shall reference engineering design package for fastening arrangements.

2. Terms

End Walls are the exterior walls parallel to the floor joists. They do not support the floor joists.

Side Walls are the exterior walls that are perpendicular to the floor joists.
3. Materials

PW SIP Foundation Wall (See Figure FO-1)

3.1 The Thermapan PW SIP is composed of an expanded polystyrene (EPS) foam core laminated between two layers of preservative treated plywood with a structural adhesive.

3.2 Top Plate (See Detail FO-1). The top plate shall be untreated DOC PS 20 or NLGA No.2 or better.

3.3 Cap Plate (See Detail FO-1). The cap plate shall be untreated DOC PS 20 or NLGA No.2 or better. If the cap plate is to be used as a brick ledge, it shall be treated to AWPA UC2 or CSA O80-08 UC2.

3.4 Framing Lumber shall be pressure treated DOC PS 20 or NLGA No.2 or better and shall be treated to AWPA UC2 and CSA O80-08 UC2. Cut ends shall be treated with preservatives. (See Detail FO-1)

3.5 Fasteners and Connectors. Fasteners used shall be of Type 304, Type 316 stainless steel or ASTM A153 Hot Dip Galvanized. Connectors shall conform to ASTM A653.

3.6 Caulking Compounds shall conform to CAN/CGSB 19.13 or ASTM C 920.

3.7 Manufactured Drainage Layer shall conform to ICC-ES AC114.

3.8 Granular Drainage Layer shall consist of clean crushed stone or clean gravel which will pass through a 40 mm (1.5 in) sieve and contain not more then 10% of fine material that will pass a 4mm (0.15 in) sieve.

3.9 Low expansion foam seal shall conform to AAMA 812-04.
4. Site Preparation

4.1 Excavation requirements shall conform to those of the appropriate building code.

4.2 All top soil and vegetation matter that would be under the building must be removed.

4.3 The bottom of the excavation must be free of all organic matter and standing water.

4.4 A continuous granular drainage layer shall be installed under floors of PW-SIP-F’s and not be less than 125mm (5”).

4.5 The excavation and granular drainage layer shall drain to a sump, which shall be provided with positive drainage, by gravity or pump, to a final disposal point outside the building.

4.6 Perimeter drainage tile or pipe shall **NOT BE USED** with PW-SIP foundations.

5. Footings – Concrete

5.1 Concrete footings supporting PW SIP foundation walls shall be constructed in conformance with appropriate building code.

5.2 Concrete footings shall be placed on undisturbed soil or on 125mm (5”) granular drainage layer. **See Detail FO-2**

5.3 When concrete footings are placed on undisturbed soil, drainage shall be provided by casting 51mm (2”) inner diameter water passages (pipes) at 1200mm (4”) on centre in the footing. **See Detail FO-2**

5.4 Concrete footings shall be designed for point loads. **See Details FO-5 and FO-6.**

5.5 The use of any drainage tile or pipe will void the Thermapan warranty.

6. Foundation Columns

Columns supporting floor beams and/or point loads above shall be constructed in conformance with appropriate building code. **See Details FO-5 and FO-6**

7. Exterior Walls

Framing and fastening around wall openings shall conform to **Detail FO-7**
8. Concrete Slab Floors

Concrete slab floors shall not be less than 75mm (3”) thick exclusive of concrete topping. See Detail FO-2.

9. Crawl Spaces

Crawl spaces (with no concrete slab) shall be backfilled and compacted to a minimum of 2/5 of the exterior backfill height for lateral support and lined with a poly ground cover. See Detail FO-3.

10. First Floors

10.1 The first floor system is an integral part of the entire foundation.

10.2 Floor at the top of the foundations shall be constructed to prevent inward movement of the exterior walls due to lateral pressure.

10.3 A PW-SIP foundation shall never be backfilled before the entire first floor system (joists, subfloor, etc.) and basement floor are completely installed.

10.4 Support for side walls see Detail FO-8.

10.5 Support for end walls see Detail FO-9.

10.6 When the backfill heights are at different heights around the building, additional nailing requirements must be incorporated for the foundation wall sheathing.

11. Stairwell Openings

11.1 When openings are greater than 1200mm (4’) from a side wall and 1800mm (6’) from an endwall, stairwell opening construction shall conform to the minimum requirements for wood frame construction in the appropriate building code.

11.2 When openings are closer to their adjacent walls then specified previously, they shall conform to the following Details FO-10 and FO-11.
12. Support of Masonry Veneer  

See Detail FO-8 or FW-1.

13. Exterior Moisture Barrier  

See Detail FO-2.

13.1 The below grade portion of the exterior face of the wall sheathing on a PW-SIP foundation enclosing living space shall be protected by a moisture barrier and manufactured drainage layer.

13.2 A manufactured drainage layer shall be applied over the exterior wall sheathing and at the soil grade. The manufactured drainage layer is to be installed as per the manufacturer’s instructions.

13.3 The manufactured drainage layer shall cover the entire surface below grade and extend to the bottom edge of the concrete footing. It shall not obstruct the required drainage passages.

13.4 The adherence of any water-proofing membrane to any Thermapan SIP PWF plywood surface will void the Thermapan warranty.

14. PWF Wall to Existing Foundation  

See Detail FO-12.

15. Electrical Wiring  

15.1 All wire chases to be vertically cut into the PW-SIP at a minimum depth of 2”. See Detail FO-13.

15.2 All electrical boxes shall be plastic.

15.3 All fasteners shall be of Type 304, Type 316 stainless steel or ASTM A153 Hot Dip Galvanized.
16. **Interior Finish**  
The interior of the PW-SIP foundation can be finished with any of the common materials. The interior plywood of the SIP makes this a relatively simple operation without consuming floor area as would be the case with other types of foundations that require interior wood frame walls to be built before finishing.

17. **Frost Walls**  
See Details FW-1, FW-2, FW-3 and/or FW-4.

18. **Backfilling**  
18.1 PWF SIP foundations shall not be backfilled until the basement floor slab and the floor on top of the foundation are completely installed.

18.2 Heavy equipment and loads shall be kept a safe distance from foundations.

18.3 Backfill shall be placed in uniform lifts not exceeding 600mm (2') around the foundation.

18.4 The site shall be graded sloping away from the foundation or to appropriate building code.

18.5 For additional backfilling and site drainage details beyond this manual refer to your local building code and the following building standards: 1) Canada – CAN/CSA-S406-92 Construction of Preserved Wood Foundations and 2) USA - ANSI / AWC PWF-2015 - Permanent Wood Foundation Design Specification.
MATERIALS ESTIMATING
Foundations/Frost Walls
Estimation Only

Lumber Requirements:

- Single bottom plate: 14ft (4268mm) or 16ft (4678mm) lengths are best
- Single top plates plus a cap plate can be SPF unless siding is brick and backfill height is less than 12” (300mm) from top of the panel use PWF
- Every panel requires a stud
- Every corner requires 2 studs
- Calculate number of outside corners – every 4 requires a sheet of PWF Plywood

Caulking and Sealant Requirements:

- Every 1200 sqft (111 m²) of SIP equals 1 case of Expandable Foam
- Every 2000 sqft (185 m²) of SIP requires 1 case of Sealant

Fasteners:

- Recommend 2” (50mm) nails/screws
- 3.0 times sqft of panel equals number of fasteners
- All floor joists require framing straps [e.g. USP PWFS24]
All sealants, FOAM (A) or CAULKING (B), should be applied onto the SIP in a continuous rectangular pattern along the outer most edge of the area to be sealed.

(A) A low expansion EXPANDABLE FOAM SEALANT should conform to the AAMA 812-04 standard. Apply a 1/2 inch or a 12.5 mm diameter of a continuous bead of expandable foam sealant onto the SIP:

(B) A CAULKING SEALANT should conform to ASTM C920-02 and/or CAN/CGSB 19.13-M. Apply a 3/8 inch or a 10 mm diameter continuous bead of caulking onto the lumber spline:
NOTES: REFER TO AIR BARRIER (AB-1) DETAILS FOR SEALING SIP CONNECTIONS.
NOTES: THE ADHERENCE OF ANY WATER-PROOFING MEMBRANE TO ANY THERMAPAN SIP PWF PLYWOOD SURFACE WILL VOID THE THERMAPAN WARRANTY
REFER TO AIR BARRIER (AB-1) DETAILS FOR SEALING SIP CONNECTIONS.
NOTE: THE ADHERENCE OF ANY WATER-PROOFING MEMBRANE TO ANY THERMAPAN SIP PWF PLYWOOD SURFACE WILL VOID THE THERMAPAN WARRANTY.
REFER TO AIR BARRIER (AB-1) DETAILS FOR SEALING SIP CONNECTIONS.
INTERIOR FINISH
EXPANDABLE FOAM SEALANT

PWF PLYWOOD JOINT AT HALF OF END STUD

2" (50 mm) NAILS AT 8" (200 mm) O/C

CAULK

EXPANDABLE FOAM SEALANT

CONCRETE FOOTING

DRAINAGE PIPE @ 4FT O/C

2-1/4" DIA
NOTES: COLUMNS SUPPORTING FLOOR BEAMS SHALL BE CONSTRUCTED IN CONFORMANCE WITH LOCAL BUILDING CODE.

REFER TO AIR BARRIER (AB-1) DETAILS FOR SEALING SIP CONNECTIONS.

COLUMN FOOTING TO SUPPORT ALL LOADS

NOTE: COLUMN FOOTING TO SUPPORT ALL LOADS

TWO ROWS OF 2" (50 mm) NAILS AT 12" (305 mm) O.C.

EXPANDABLE FOAM SEALANT

0.60 PWF PLYWOOD

0.60 PWF PLYWOOD

CAULK

SECTION A-A
NOTE: COLUMNS SUPPORTING FLOOR BEAMS AND FOOTINGS SHALL CONFORM WITH LOCAL BUILDING CODE.
NOTES: REFER TO AIR BARRIER (AB-1) DETAILS FOR SEALING SIP CONNECTIONS.
EXPANDABLE FOAM SEALANT

NOTES: REFER TO AIR BARRIER (AB-1) DETAILS FOR SEALING SIP CONNECTIONS.
NOTES: REFER TO AIR BARRIER (AB-1) DETAILS FOR SEALING SIP CONNECTIONS.

<table>
<thead>
<tr>
<th>TITLE</th>
<th>SUSPENDED (HUNG) FLOOR CONNECTIONS (END WALLS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REFERENCE</td>
<td><a href="http://www.thermapan.com">www.thermapan.com</a></td>
</tr>
<tr>
<td>1-877-443-WALL (9255)</td>
<td></td>
</tr>
<tr>
<td>SCALE</td>
<td>N.T.S.</td>
</tr>
<tr>
<td>DATE</td>
<td>FEBRUARY 2012</td>
</tr>
<tr>
<td>REVISION</td>
<td>2</td>
</tr>
<tr>
<td>DWG. NO.</td>
<td>FO-9</td>
</tr>
</tbody>
</table>
NOTES: REFER TO AIR BARRIER (AB-1) DETAILS FOR SEALING SIP CONNECTIONS.
STAIRWELL OPENING PERPENDICULAR TO SIDE WALL

STAIRWELL OPENING PARALLEL TO END WALL

NOTES: ABOVE DETAILS APPLY TO OPENINGS LESS THAN 1200mm (4 FT) FROM A SIDE WALL OR LESS THAN 1800mm (6 FT) FROM AN END WALL. OPENINGS FURTHER THAN THESE MEASUREMENTS CAN BE FRAMED AS PER STANDARD FRAMING METHODS.
FRAMING FOR FLOOR OPENINGS GREATER THAN 1200mm (4 ft) IN OPENING WIDTH
(WOOD SLEEPER OR CONCRETE SLAB FLOOR TYPES)

<table>
<thead>
<tr>
<th>Stairwell Opening Width*</th>
<th>Backfill Height (Max)</th>
<th>Number of Stairwell Beam Laminations</th>
<th>Minimum No. of Joist Headers</th>
<th>Maximum spacing for subfloor joist header and trimmer joist nailing, 76 mm (3&quot;) nails</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 3200 mm 10'6&quot;</td>
<td>1500 mm (6'0&quot;)</td>
<td>3 2 -</td>
<td>2</td>
<td>2 rows, 150 mm (6&quot;) centres</td>
</tr>
<tr>
<td></td>
<td>2300 mm (7'6&quot;)</td>
<td>9 6 4</td>
<td>3</td>
<td>2 rows, 50 mm (2&quot;) centres</td>
</tr>
<tr>
<td></td>
<td>2900 mm (9'6&quot;)</td>
<td>- 10 7</td>
<td>3</td>
<td>2 rows, 50 mm (2&quot;) centres</td>
</tr>
<tr>
<td>≤ 3600 mm 12'0&quot;</td>
<td>1500 mm (6'0&quot;)</td>
<td>3 3 2</td>
<td>2</td>
<td>2 rows, 150 mm (6&quot;) centres</td>
</tr>
<tr>
<td></td>
<td>2300 mm (7'6&quot;)</td>
<td>11 8 5</td>
<td>3</td>
<td>2 rows, 50 mm (2&quot;) centres</td>
</tr>
<tr>
<td></td>
<td>2900 mm (9'6&quot;)</td>
<td>- 12 8</td>
<td>3</td>
<td>2 rows, 50 mm (2&quot;) centres</td>
</tr>
<tr>
<td>≤ 4300 mm 14'0&quot;</td>
<td>1500 mm (6'0&quot;)</td>
<td>5 3 2</td>
<td>2</td>
<td>2 rows, 150 mm (6&quot;) centres</td>
</tr>
<tr>
<td></td>
<td>2300 mm (7'6&quot;)</td>
<td>- 11 8</td>
<td>3</td>
<td>2 rows, 50 mm (2&quot;) centres</td>
</tr>
<tr>
<td></td>
<td>2900 mm (9'6&quot;)</td>
<td>- - 12</td>
<td>3</td>
<td>2 rows, 50 mm (2&quot;) centres</td>
</tr>
</tbody>
</table>

NOTES: ABOVE DETAILS AND TABLE APPLY TO OPENINGS LESS THAN 1200mm (4 FT) FROM A SIDE WALL OR LESS THAN 1800mm (6 FT) FROM AN END WALL. OPENINGS FURTHER THAN THESE MEASUREMENTS CAN BE FRAMED AS PER STANDARD FRAMING METHODS.

* THE WIDTH IS MEASURED PARALLEL TO THE FOUNDATION WALL. THE REQUIREMENTS OF THIS TABLE SHALL APPLY AS APPROPRIATE TO A STAIRWELL BEAM LYING IN THE DIRECTION OF MEASUREMENT. IN THE CASE OF A STAIRWELL CORNER OPENING, THE TABULATED WIDTH AND FRAMING REQUIREMENTS SHALL BE APPLIED SEPARATELY AND INDEPENDENTLY IN BOTH MAJOR DIRECTIONS.

** JOIST HEADERS WHICH EXCEED 3200 mm (10'6") IN UNSUPPORTED LENGTH SHALL ALSO BE SIZED BY CALCULATION OR MAY BE DETERMINED FROM TABLES FOR BUILTUP FLOOR BEAMS.
NOTE: THE ADHERENCE OF ANY WATER-PROOFING MEMBRANE TO ANY THERMAPAN SIP PWF PLYWOOD SURFACE WILL VOID THE THERMAPAN WARRANTY.
ISOMETRIC VIEW
(FINISHING NOT SHOWN)

ELECTRICAL WIRE FASTENED TO SIP

ELECTRICAL BOX CUT-OUT OR MOUNTED DIRECT TO SIP PANEL

TOP PLAN

THERMAPAN PWF PANEL

FURRING

INTERIOR FINISH

ELECTRICAL WIRE AFFIXED WITH ELECTRICAL CABLE STAPLES
PWF BASEMENT WALL ALIGNED WITH FROST WALL

- PWF FOUNDATION PANELS
- CONCRETE FOOTING AS PER LOCAL BUILDING CODE
- 2-1/4" DIA DRAINAGE PIPE @ 4FT O/C
- SUPPORT FRAME WITH PLYWOOD SHEATHING
- BACKFILL WITH GRAVEL OR COMPACTED CRUSHED STONE UP TO UNDERSIDE OF FLOOR

SIP FOUNDATION TO GARAGE FOUNDATION

- HOUSE → GARAGE
- TOP PLATE AND CAP
- PWF FOUNDATION PANELS
- CONCRETE FOOTING AS PER LOCAL BUILDING CODE
- 2-1/4" DIA DRAINAGE PIPE @ 4FT O/C
- SUPPORT FRAME WITH PLYWOOD SHEATHING
- BACKFILL WITH GRAVEL OR COMPACTED CRUSHED STONE UP TO UNDERSIDE OF FLOOR

NOTE: THE ADHERENCE OF ANY WATER-PROOFING MEMBRANE TO ANY THERMAPAN SIP PWF PLYWOOD SURFACE WILL VOID THE THERMAPAN WARRANTY.
NOTE: THE ADHERENCE OF ANY WATER-PROOFING MEMBRANE TO ANY THERMAPAN SIP PWF PLYWOOD SURFACE WILL VOID THE THERMAPAN WARRANTY.

TYPICAL FROST WALL FOUNDATION SECTION

OPTION: TOP OF SLAB FLUSH OR BELOW TOP OF FROST WALL
NOTE: THE ADHERENCE OF ANY WATER-PROOFING MEMBRANE TO ANY THERMAPAN SIP PWF PLYWOOD SURFACE WILL VOID THE THERMAPAN WARRANTY.
SECTION A-A

0.60 PWF PLYWOOD BOTH SIDES

COLUMN (BUILT-UP PT STUDS, TIMBER, STEEL, ETC)

COLUMN FOOTING TO SUPPORT ALL LOADS

AA

P

CAULK

FROST WALL
POINT LOAD DETAIL

www.thermapan.com
1-877-443-WALL (9255)
EXISTING CONCRETE FOUNDATION
SECURE PT STUD TO EXISTING FOUNDATION WALL WITH FASTENERS
EXISTING FOOTING

TOP PLAN

NEW PWF FROST WALL PANEL SECURED TO EXISTING FOUNDATION WALL
CONCRETE FOOTING UNDER FROST WALL
CONCRETE FOOTING FLUSH WITH EXISTING FOOTING
EXISTING FOOTING

EXISTING CONCRETE FOUNDATION

NOTE: THE ADHERENCE OF ANY WATER-PROOFING MEMBRANE TO ANY THERMAPAN SIP PWF PLYWOOD SURFACE WILL VOID THE THERMAPAN WARRANTY.

EXISTING CONCRETE FOUNDATION
EXISTING FOOTING

ELEVATION - NEW GARAGE FOUNDATION

NEW PWF FROST WALL PANEL SECURED TO EXISTING FOUNDATION WALL
SILL PLATE
NEW FOOTING
SUPPORT FRAME WITH PLYWOOD SHEATHING
BACKFILL WITH GRAVEL OR COMPACTED CRUSHED STONE UP TO UNDERSIDE OF FLOOR
WALL

FASTENING PWF FROST WALL TO EXISTING FOUNDATION

www.thermapan.com
1-877-443-WALL (9255)