

FIELD INSTALLATION MANUAL

TABLE OF CONTENTS

INTRODUCTION	2
BEFORE YOUR BUILD SMART COMPONENTS ARRIVE.....	3
TABLE 1: PRE-CONSTRUCTION CHECKLIST.....	3
FIELD ASSEMBLY EQUIPMENT AND MATERIALS CHECKLIST FOR BUILDER	4
J-FORM AND SLAB SYSTEMS.....	6
TABLE 2: J-FORM CHECKLIST AND RESOURCES	6
EXPLODED AND ASSEMBLY DRAWING 1: J-FORMS AND SLAB.....	7
TABLE 3: SLAB PREPARATION CHECKLIST AND RESOURCES	11
EXPLODED AND ASSEMBLY DRAWING 2: J-FORMS AND SLAB.....	12
PRECAST FOUNDATION SYSTEMS	20
TABLE 4: FOUNDATION PREPARATION CHECKLIST AND RESOURCES	20
PANEL DELIVERY	25
PANEL INSTALLATION	27
EXPLODED AND ASSEMBLY DRAWING 3: WALL PANELS ON SLAB	27
EXPLODED AND ASSEMBLY DRAWING 4: OUTSIDE CORNER WALL PANELS ON SLAB.....	28
EXPLODED AND ASSEMBLY DRAWING 5: INSIDE CORNER WALL PANELS ON SLAB	29
EXPLODED AND ASSEMBLY DRAWING 6: 3 STORY WALL PANELS SYSTEM.....	30
EXPLODED AND ASSEMBLY DRAWING 7: ROOF AND CEILING SYSTEM	31
TABLE 5: WALL PANEL CHECKLIST AND RESOURCES	32
TABLE 6: WALL PANEL INSTALLATION CHECKLIST AND RESOURCES	46
APPENDICES	47
PROJECT CHECKLISTS	47
PERSONNEL TOOL CHECKLIST	52
STANDARD DETAILS	54
PRODUCT DATA SHEETS AND MSDS	70
ENGINEERING DOCUMENTS.....	107
TECHNICAL BULLETINS	125

INTRODUCTION

Prior to beginning installation of Build SMART components for your project, it is highly recommended to **browse through this entire field installation manual**, and to at least **read the introduction that follows**. Chapter 1 outlines some of the steps that need to be taken to prepare for the project, including a critical **materials and equipment checklist**. It will also be important to **review design details and sections with the entire team** and to highlight the **importance of the air barrier**.

Be sure to review complete construction, Passive House Planning Package (PHPP) and related documents to be certain of placement and alignment of all air and thermal barriers. It is **CRITICAL** that all of these barriers are installed and aligned per the approved plans, PHPP and energy models.

IT IS CRITICAL that all air barriers (typically the slab vapor barriers, the foundation wall systems and seams, OSB layer of the wall panels and OSB ceiling lids) are sealed completely and continuously, without voids or thin spots. All components which utilize sealants at their interfaces need to be joined together directly after sealant is applied (wet set). Constant inspection and monitoring of all assemblies during erection is critical and can help avoid the time-consuming process of chasing air barrier leaks later.

Chapters 2 and 3 cover J-form, slab, and precast foundation systems. For all such systems, **all “deep plumbing” and any other laterals, utilities and conduits must be in place prior to the pouring of any concrete**. Be sure to understand any issues of time sensitivity where certain procedures must be completed without interruption and the **circumstances that dictate stopping the work to make corrections**. The slab air/vapor barrier that remains exposed after the slab pour must be protected from damage to prevent difficult repairs later in the process. Also make sure to have the proper materials referenced in this manual on hand, including glues, air sealing products, foam inserts for at the top of the J-forms at the exterior doors, concrete/cement filler/repair products, and excess vapor barrier. **Always follow code and manufacturer instructions**, for and not limited to air sealing, concrete repair, further termite treatment (if necessary), soil compaction, damp proofing, and modifications to Build SMART components.

Chapter 4 concerns the delivery of Build SMART components. It is recommended to **read Chapter 4 well in advance of delivery** as it contains details on preparing the site for navigation of unloading equipment and delivery vehicles. **Always follow safety protocols** when using machinery and handling heavy loads. **Immediately inspect all bundles upon delivery** for order completeness and accuracy. If any parts are missing, incorrect, or damaged, Build SMART must be notified immediately, to provide prompt resolution.



Chapter 5 contains the detail of wall panels, floor band and roof band systems. Please examine this in detail to gain a thorough understanding.

Please refer to all of the standard details in the Appendices section at the end of this manual.

DISCLAIMER: This manual contains information that goes beyond instruction on how to install our products. That is because our Founder and Technical Director Adam Cohen and our Field Technical Manager Rob Leonard have years of experience building Passive House structures, and we have elected to share that free of charge as a courtesy to our customers. However, all designs and construction techniques are ultimately the responsibility of the designer and builder for the project.



1. Before Your Build SMART Components Arrive

Congratulations on your decision to work with Build SMART for your latest project. Prior to the arrival of your Build SMART materials, there are a few steps that you as a builder will need to taken to ensure a quick and problem-free installation. The checklist below summarizes the preconstruction process, with a full checklist for all project phases included in the appendices.

PHASE	ITEM	PRODUCT (if applicable)	NOTES
Preconstruction			
<input type="checkbox"/>	Verify understanding of PHPP calculations & design requirements and review of project specific assemblies		Preconstruction Planning with Designer, Architect, Engineer, Contractor, CPHC and all Raters is critical
<input type="checkbox"/>	Basement insulation		Thickness, location, assembly
<input type="checkbox"/>	Slab insulation		Thickness, location, assembly
<input type="checkbox"/>	Wall insulation		Thickness, location, assembly
<input type="checkbox"/>	Roof/ceiling insulation		Thickness, location, assembly
<input type="checkbox"/>	Air barrier strategy		Location, assembly, transitions
<input type="checkbox"/>	Windows & doors		Specs, assembly, air tightness
<input type="checkbox"/>	Shading & exterior		Location, assembly, air tightness
<input type="checkbox"/>	Mechanical design		Layout, insulation, air tightness, flow requirements, structural integration
<input type="checkbox"/>	Plumbing design		Pipe lengths and DHW and water sense requirements
<input type="checkbox"/>	PHIUS+ certification		1. Pre-certification prior to construction 2. Energy Star requirements
<input type="checkbox"/>	Team preparation		
<input type="checkbox"/>	Detailed section presentation		Review and emphasize construction details
<input type="checkbox"/>	Importance of air barrier		Educate field crew and build team on importance of air barrier continuity and integrity, demonstrate and display materials and products
<input type="checkbox"/>	Rater equipment, procedures, and milestones		Engage with rater prior to construction of project to define testing procedures, protocols, and timelines and explain rater value to team

Table 1: Preconstruction checklist

NOTE: Variations from Build SMART building assembly details

Any variation from Build SMART details, assembly directions, etc. shall be preapproved by Build SMART **in the form of written authorization from Build SMART**. If the builder or owner vary from any Build SMART authorized assemblies, they accept all responsibility stemming from such variation.

NOTE: Factory Cut Roof and Floor Band component height dimensions and roof band angle cuts

In order to assure that all floor and roof system Build SMART band components can be produced in the factory to final intended design dimensions for the floor band heights and roof band heights and roof band angles, the final project specific floor band height and roof band height dimensions as well as the angles of the roof bands will need to be issued to Build SMART, in writing by the purchaser at the time the purchase agreement is finalized by the purchaser and Build SMART. If the dimensions are not confirmed by the time of purchase it is likely that the band components will be sent in oversized dimensions which will need to be field cut by the purchaser's installers. Field cutting can be time consuming and can result in poor quality cuts which can make field installation more difficult to install and properly seal.



In addition to review of the design and calculations and preparation of the team, materials and equipment should be secured in advance for successful project completion. There is a checklist on the following two pages (also included in the appendices) with item descriptions, quantities required, and notes.



FIELD ASSEMBLY EQUIPMENT and MATERIALS CHECKLIST for BUILDER



Field Carpentry Crew needs to be equipped with standard compliment of wood wall framing tools-Power and Hand

X	Item Description	Quantity	Supplied By	Confirmed Delivered to site by	Notes
	Safety and MSDS Program, Training and Equipment				Specific to Project, implented by Builder
	16D Nails-Hand Nails	25 #	Builder		
	8D Nails	25#	Builder		
	Gun Nails		Builder		16D, 8D type per Carpenter's equipment
	20oz. Sausage Tube Gun(s)	2	Builder		
	20oz. Cordless Sausage Tube Gun(s)		Optional		Optional
	20oz. Standard Large Tube Caulk Gun(s)	2	Builder		
	20oz. Cordless Standard caulk Gun(s)		Optional		Optional
	Extra Sausage Gun Tips		Builder		
	Build Smart Sealant		Builder		Provided by Build Smart
	Huber Zip Tape or Huber Fluid Applied Sealant		Builder		Enough for Zip Wall Seams on Panels, per manufacturer's instructions
	Titebond Polyurethane Glue 8oz. Bottles		Builder		Moisture Cured Polyurethane Glue
	Water Spray bottle	2	Builder		For Moistening Moisture Cured Products
	Case of 12 Large Tube Construction Adhesive		Builder		Band Adhesive
	Rags		Builder		
	Long Jabber for Cleaning out Sausge Gun Tips	2	Builder		
	Spray Foam & Foam Gun		Builder		
	Lifting Straps		Builder		Assorted Sizes including 8' sling
	Lifting Plates	4	Builder		The follwing or similar, for panel lifting plate:Upgear Temporary Fall Protection Model#A210402 (5000lb capacity), can be obtained at Home Depot
	#10 x 2-1/2" Hex Head Wood Screws	50	Builder		For Extra Lifting Plate Screws
	Pressure Treated Sill Plates	Per Builder			Screed boards (if using J-forms). Ripped to total width of wall panel bottom plate and stud wall sheathing thickness
	Wall Top Plates	Per Builder	Builder		Per Project Wall Plate Width
	Band or Ribbon Materials as required by Floor System Manufacturer	Per Builder	Builder		Per Wood Floor Truss Manufacturer
	Flashing at Panel to Basement Wall	Per Builder			Field Bent Aluminum Metal Flashing Per Build Smart Detail at Build Smart Panel Band to Precast Basement, dimensions per specific project OR PROSOCO FastFlash applied to complete underside of Wall Panel or Band Panel ZIP/ EPS / OSB
	Dryvit Rasp	1	Builder		
	Flat Bars	2	Builder		
	Digging Bar	1	Builder		
	Crow Bars	2	Builder		
	6" C-Clamps	2	Builder		Build Smart will have this when they are on site, recommend Builder has when Build Smart is not on site
	8" C-Clamps	2	Builder		Build Smart will have this when they are on site, recommend Builder has when Build Smart is not on site
	12" C-Clamps	2	Builder		Build Smart will have this when they are on site, recommend Builder has when Build Smart is not on site
	Build SMART Clamping Tool				Consult with Build SMART for details
	Step Ladder-6'		Builder		
	Step Ladder-8'		Builder		
	Step Ladder-10'				
	3 legged ladder				Optional
	Fall Protection Program, Training and Equipment				Specific to Project, implented by Builder
	Impact Drill	2	Builder		Cordless Preferred
	Hammer Drill	1	Builder		For Drilling Tacons
	Cordless Drill Driver & Assorted Bits	1	Builder		



X	Item Description	Quantity	Supplied By	Confirmed Delivered to site by	Notes
	GRK Brand "R4-10x2-3/4" or Similar		Builder		Will Be used Panel to Panel and Second Floor Sill Plates to Wood Floor System. Enough for Each Bottom Plate and end of panels and 2'-0" OC and enough for vertical Panel to Panel Seams-adjacent to top and bootom plate and then 2'-0" OC
	Bits for GRK Brand or Panel Screws	10	Builder		
	Tapcons -1/4" x 3" Hex		Builder		For PT Sill Plates into concrete slab, confirm and specify type and spacing per local code official and requirements
	Drill Bits and Driver for setting Tapcons	1 Set			
	3/16" x 4-1/2" Tapcon or Masonry Bits	N/A	Builder		
	5/16" Hex Impact Hex Bits for setting Tapcons	N/A	Builder		
	#9 x2-1/2" Wood Screws		Builder		For Securing Build Smart Floor System Bands, Perpendicular to Trusses
	#9 x3" Wood Screws		Builder		For Securing Build Smart Floor System Bands, Parallel to Floor Trusses & Perpendicular Roof Trusses
	Wedge Anchors/ Thunderstuds		Builder		For Final PT Sill Plate Setting into Concrete Slab, FINAL SIZING QUANTITY AND SPACING TO BE DETERMINED BY Builder, Depth Requirement Per Project Specific Assembly and Local Code Requirements
	Wedge Anchors/ Thunderstuds Drill Bit		Builder		FINAL Drill Bit SIZING TO BE DETERMINED BY ENGINEERING
	Simpson "SWDC truss screw"		Builder		Need Two per each end of roof truss
	Concrete Slab /Vapor Barrier:				
	Vapor Block Tape				Enough for Vapor Block Vapor Barrier Seams and Vapor Boots
	Vapor Block Boots				Enough for Vapor Block Penetrations
	Automotive Undercoating	2 Cans			
	J-Forms Prior to Walls				
	Dryvit Primus or Genesis (NEEDS TO BE COMPLETED at THE ENTIRE J-FORM FACE AND FILLER STRIP PRIOR TO ANY WALLS BEING INSTALLED		Builder		Enough to cover top of J-Form and perimeter face of exposed J-Form, per manufacturer coverage rate
	Dryvit Fiberglass Mesh (NEEDS TO BE COMPLETED at THE ENTIRE J-FORM FACE AND FILLER STRIP PRIOR TO ANY WALLS BEING INSTALLED		Builder		Enough to cover top of J-Form and perimeter face of exposed J-Form



2. J-Form and Slab Systems

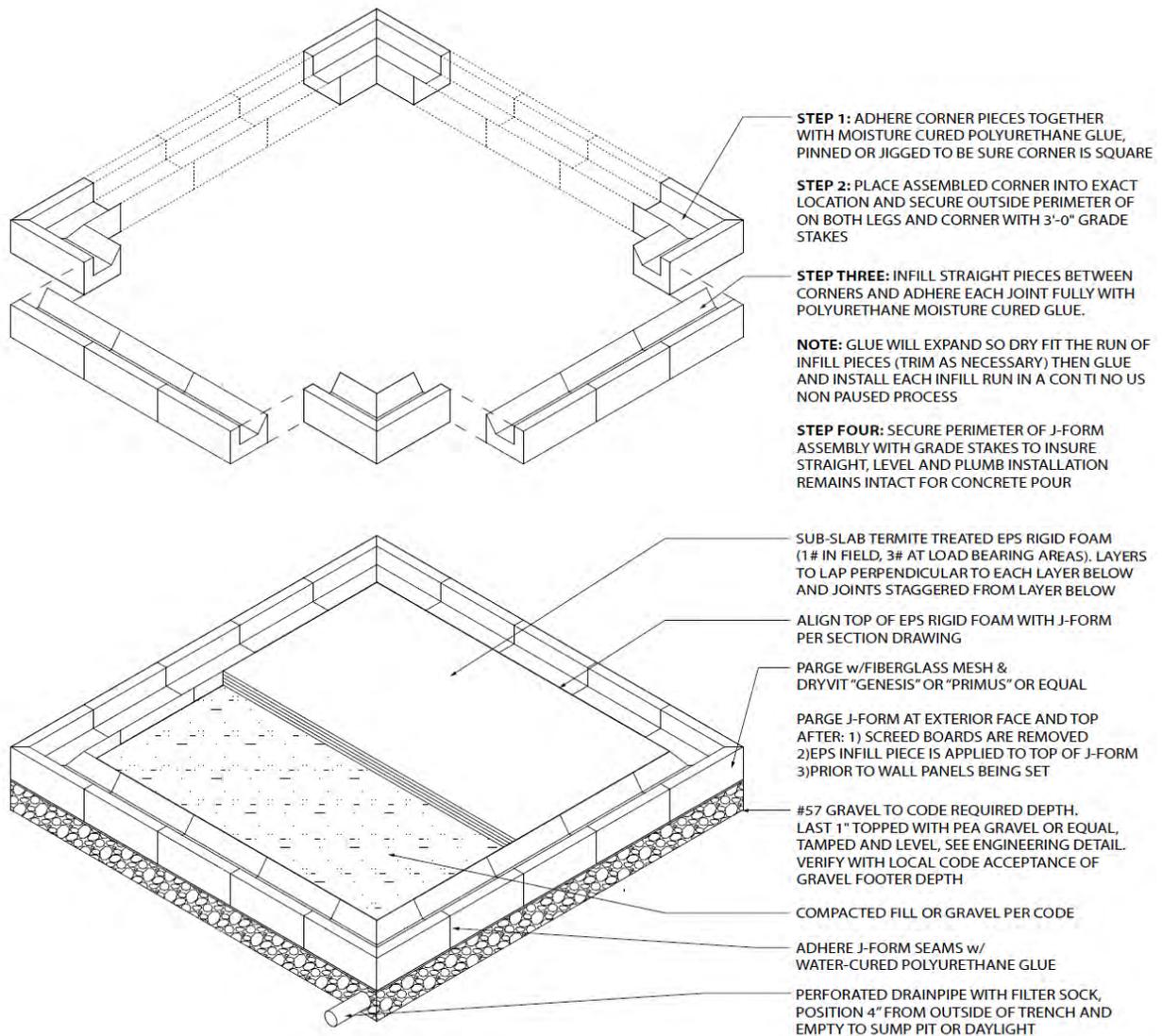
The Build SMART J-form system is a quick and affordable insulation solution for high performance building foundations. Using this system allows for the building slab’s footing and slab edge to be thermally isolated from ground contact. It works in conjunction with the locally-purchased insulation that is placed in the excavation and that receives the slab pour. The J-forms are high density, termite treated insulation, and they cut out a number of steps for the contractor. In order for the J-form installation to be completed efficiently, the contractor should read and understand the following instructions for a successful installation.

PHASE	ITEM	PRODUCT (if applicable)	NOTES
Slab			
Refer to applicable details, photos and drawings			
<input type="checkbox"/>	Build SMART J Form Passiv Foundation System		
<input type="checkbox"/>	Footing prep		
<input type="checkbox"/>	Drain tile installed	Filter Socked Drain Tile	Daylighted on initial excavation
<input type="checkbox"/>	Compact gravel	#68 or #57 gravel is acceptable for the gravel footer, but do not use anything smaller	8" Thickness (Verify with Local Code Official). ALL GRAVEL MUST BE LEVEL TO INSURE PROPER J-FORM Installation an wall panel installation erection and sealing.
<input type="checkbox"/>	Sand leveling bed installed	Some installers use well tamped gravel and forego the sand leveler	Thin Layer <1" of cement sand/gravel over the gravel is best for leveling forms. ALL GRAVEL MUST BE LEVEL TO INSURE PROPER J-FORM installation and wall panel erection and sealing.
<input type="checkbox"/>	J Forms (See additional detailed information in J-Form Narrative)		<ol style="list-style-type: none"> 1. Start with inside and outside corners 2. Pre-assemble corners, stake in place 3. Pre-assemble straight forms 4. Infill with straight forms. ALL J-FORMS MUST BE INSTALLED STRAIGHT AND LEVEL TO INSURE PROPER WALL PANEL INSTALLATION AND SEALING 5. Wrap air barrier into the forms leaving enough material to cover the bottom of the forms and overlap the edge of the form by 12" minimum (EPS Slab Foam must be installed prior to the Vapor (Air) Barrier being installed. 6. Install 2x PT plate temporarily on top of J Form to form screed edge 7. After slab is prepped and poured install infill piece on top of J Forms with polyurethane moisture cured glue after slab is poured 8. Install High Density insert @ door locations 9. Parge top and face of J Form with Dryvit fiberglass mesh and "Primus" or "Genesis" prior to setting any wall panels
<input type="checkbox"/>	J Form glue	Titebond Polyurethane glue: Franklin International Obtained from: www.demandproducts.com TB12 Polyurethane glue 12 oz. OR Similar Moisture Cured Polyurethane Glue	<ol style="list-style-type: none"> 1. Use Protective Gloves 2. Moisten foam joints with H2O using spray bottle 3. Apply glue with disposable brushes 4. This glue EXPANDS (like spray foam) be sure forms are pinned prevent expansion.

Table 2: J-form checklist and resources

BE SURE ALL “deep plumbing” and any other laterals, utilities and conduits that need to be placed under footers are done so prior to installing J-form systems.





NOTE: ALL BUILD SMART FORMS AND SLABS TO BE INSTALLED SQUARE, PLUMB AND LEVEL COMPLETELY TO ASSURE EFFICIENT PLUMB AND LEVEL ASSEMBLY OF BUILD SMART PANELS

NOTE: VERIFY WITH LOCAL CODE AND LENDER THE PEST (TERMITE) TREATMENT REQUIREMENTS AT ALL GRAVEL AREAS



Exploded and Assembly Drawing 1: J-Forms and Slab

1. The trench excavation should allow for a minimum of 8” of engineer-specified gravel below the form. The final 2” should be a finer type of pea gravel (as allowed by engineer detail). Be sure all gravel is tamped and leveled. Check with local codes for required depth minimum.





Fig. 2: All deep plumbing and utilities installed, #57 or #68 gravel installed and compacted.

2. Perforated drainpipe with filter sock must be placed 4” from the outside of the trench and empty to a sump pit or daylight drain or according to local codes.
3. #68 or #57 gravel is acceptable for the gravel footer, but do not use anything smaller.
4. A thin layer (< 1”) of crushed stone sand or sand over the gravel is best for leveling forms (some experienced installers use well-tamped gravel and forego the sand leveler).



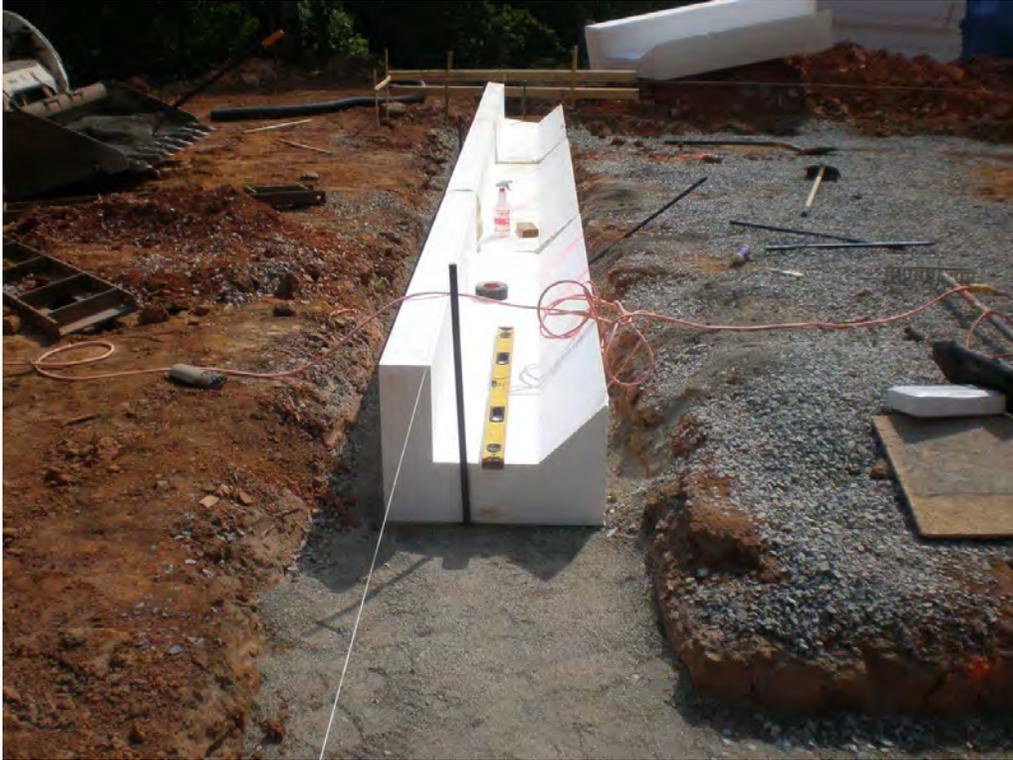


Fig. 3: Fine gravel installed and compacted. ALL J-FORMS MUST BE STRAIGHT AND LEVEL. Temporarily stake ends of J-form runs if adjacent J-form install lags < 3 minutes.

5. Start with inside and outside corner J-forms (similar to block foundation installation); by pre-assembling them using moisture cured polyurethane glue. Use protective gloves and eye protection with the glue. Moisten foam joints with H₂O to activate the foam adhesive using a spray bottle. Apply glue with disposable brushes or scrap wood.

Fig. 4: Example of polyurethane moisture cured adhesive



Fig. 5: Example spray bottle for moistening foam



6. The glue EXPANDS (similar to spray foam), so be sure forms are pinned at corners to prevent expansion.
7. Temporarily secure corners with 3'-0" grade stake dowels or similar.

Fig. 6: Be sure all corners are secured with temporary dowels to eliminate overall dimension creep created by expanding foam adhesive. Corners can also be preassembled and adhered, BE SURE ALL CORNERS ARE SQUARED.



8. Pre-assemble straight forms in runs up to 24' long and infill between corners with straight forms as foam will expand. If work flow needs to break prior to corner to corner J-form completion then a temporary stake or dowel needs to be set at the end of the overall run, as foam adhesive will expand.



9. ALL J-Forms MUST BE STRAIGHT AND LEVEL TO INSURE PROPER WALL PANEL ALIGNMENT AND INSTALLATION

SLAB PREPARATION PRIOR TO COMPLETING J-FORM INSTALLATION

PHASE	ITEM	PRODUCT (if applicable)	NOTES
Slab			
Refer to applicable details, photos and drawings			
<input type="checkbox"/>	Slab section details-see project specific design and construction documents.		
<input type="checkbox"/>	Product layers	Termite treated for ground contact	Type, thickness, order
<input type="checkbox"/>	Under slab rough-in strategy		Location of MEP, load bearing / piers / footer locations. Install deep plumbing and other utilities under footer locations prior to preparing for footers
<input type="checkbox"/>	Vapor barrier	10 mil Vapor Block 10, Vapor Bond and accessories www.buyplasticnow.com OR Similar	1. Install with enough lap to tape joints together & enough to lap the ends over the forms & under the air shell wall 2. Tape to join the Vapor Sheets together
<input type="checkbox"/>	Vapor boots & vapor tape	Vapor Boot System & Butyl Seal Tape www.BuyPlasticNow.com OR Similar	Order enough quantity to seal penetrations joints to the Vapor Block System
<input type="checkbox"/>	Vapor barrier protection		Vapor Barrier System must be protected from penetrations during construction
<input type="checkbox"/>	Additional undercoating sealant	Car undercoating	Undercoating can be applied to the vapor barrier penetrations at areas difficult to address with tape (Check with other project certification requirements and restrictions to assure this is acceptable material)
<input type="checkbox"/>	Wrap vapor barrier over J		Remove after pour and cover holes w/ tape
<input type="checkbox"/>	Multiple penetrations		1. Grouped penetrations are not recommended 2. May need "pitch pocket" strategy for grouped penetrations

Table 3: Slab preparation checklist and resources

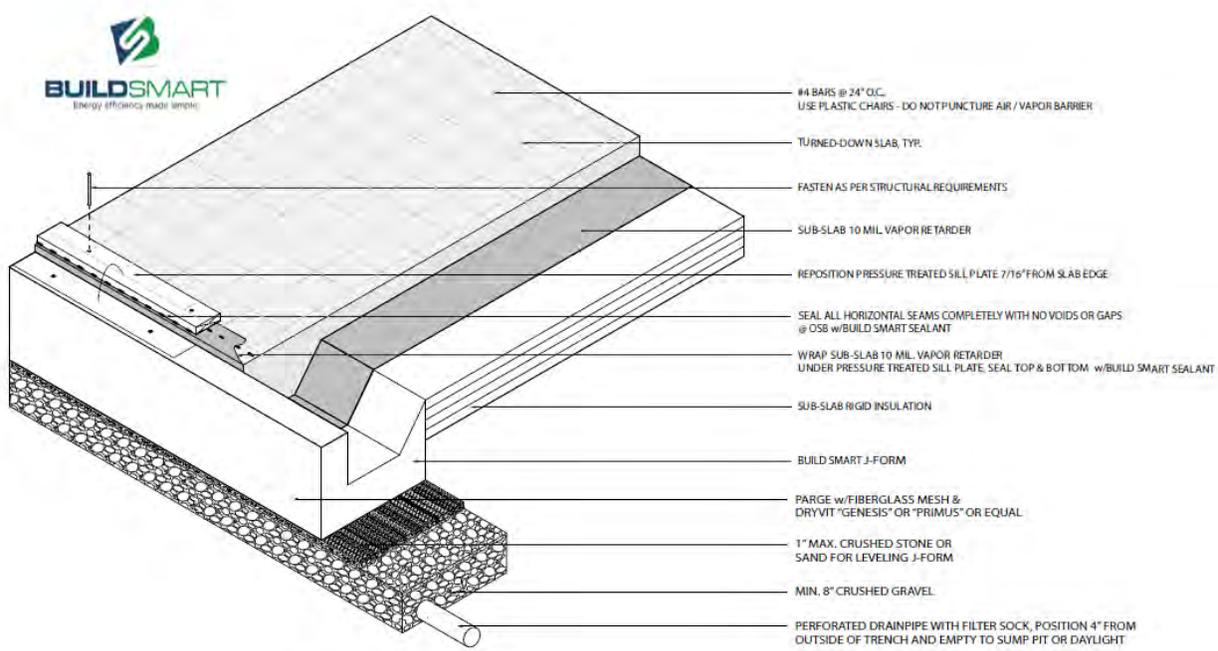
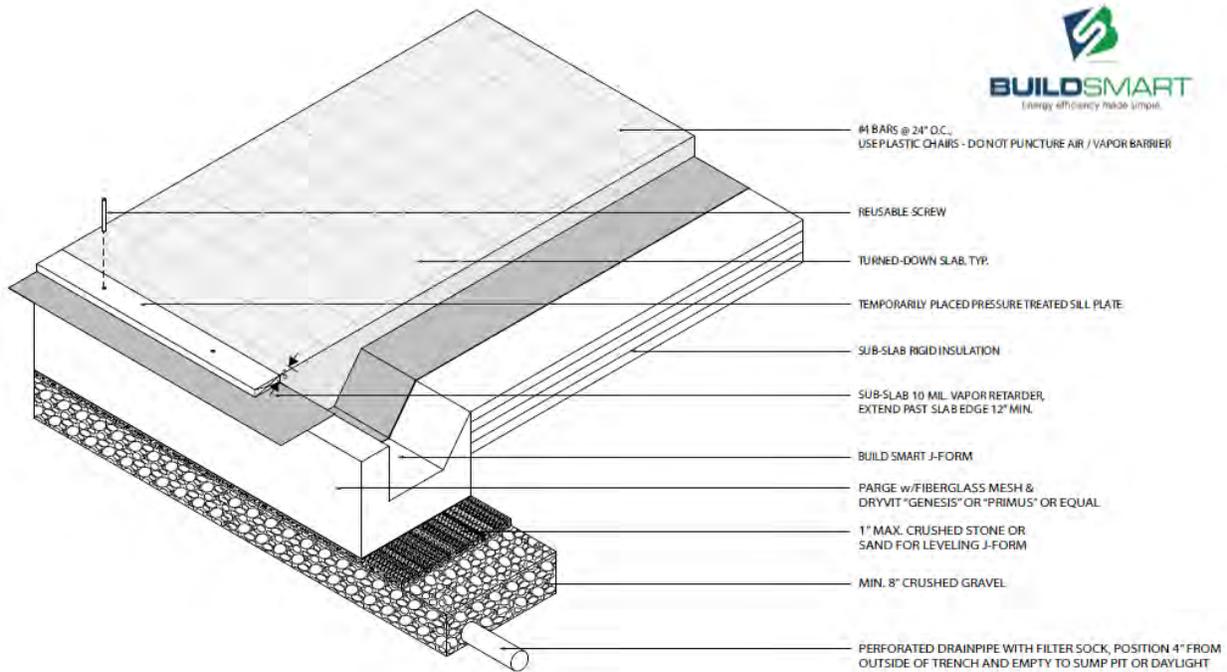
NOTE: Termite Treatment

Although Build SMART slab and foam form systems are termite treated, there is no implied or direct warranty or guarantee of any pest control. Owners are encouraged to consult with their local building code requirements, lending institution requirements and a pest control expert.

The Build SMART EPS slab foam system is comprised of slab insulation that is purchased from local vendors by the builder, J-Forms for slab-on-grade construction, and precast foundation panels for basement designs. The system is a quick and affordable solution for high performance building foundations by providing thermal isolation from ground contact. The slab insulation is standard density EPS foam. It is termite treated insulation as are the J-forms and Build SMART basement foundation panels. In order for the installation to be completed efficiently, the contractor should read and understand these instructions for a successful installation..

BE SURE ALL "Deep plumbing" and any other laterals, utilities and conduits that need to be placed under footers are done so prior to installing J-form systems and basement wall systems.





Exploded and Assembly Drawing 2: J-Forms and Slab

10. Be sure that all under slab rough-ins are completed and terminated/temporarily sealed to a height that will accommodate the final utility trim out above the slab.
11. Gravel (#57) is to be installed at a minimum of 4" depth below the EPS Slab foam and at the correct elevation as per the Build SMART detail and cross sections and approved project details, documents and drawings. Be sure all gravel is level.
12. Review the slab EPS layout plans and sections to verify where the footer density and standard density foam are to be placed.
13. Install the EPS foam according to the layout, staggering the joints. If there are multiple layers of foam on the project, make effort to stagger the joints of each successive layer from the layer below.
14. Joints are to be installed as tightly as possible to minimize thermal breaks.
15. Once all of the EPS is installed, check the entire installation and seal any gaps that are 1/8" or greater with spray foam.
16. Prior to installation of air/vapor barrier, be sure all Slab Foam connections and seams are continuous and complete.
17. Prior to installation of Air/ Vapor Barrier be sure all pest and termite treatments required by local code, lender, owner are applied to sub-form and sub-slab soils and gravel.
18. Field check prior to install that all slab offsets, depressions, penetrations, rough ins, turn downs, portal frames and other hold downs etc. are complete and accurate. Trying make corrections later and repair Vapor / Air barrier later is possible but difficult.
19. Install vapor (air) barrier system as per manufacturer's instructions. Use complimenting accessories, tapes and boots from manufacturer to complete the system, seal the seams and seal around all penetrations.



Fig. 7: Example of a vapor/air barrier boot system for vapor barrier penetrations.

20. Vapor (air) barrier must be continuous, complete and sealed throughout all vertical and horizontal assemblies of the slabs, footers, pier footings, etc.
21. Multiple tight penetrations are best grouped within a “pitch pocket” type of bulk headed system where the vapor barrier can be cleanly terminated to the small bulk head and turned upwards towards the top of the slab to where it can be sealed after the slab pour. The grouping of multiple penetrations can be encased in a liquid filled termination that can be sealed with fiberglass or other suitable resin to properly and fully vapor and air seal.
22. Protect all vapor barrier, including excess, during construction from penetrations and grinding in of any debris. Limit foot and construction activity traffic only necessary to complete pre-pour related activities.
23. For any transitions from slab to other floor assemblies, the vapor barrier needs to be turned up to allow for future termination and sealing above the slab and at the transition areas.
24. See J-form installation section for tips on allowing excess air barrier (vapor barrier) length.
25. When installing reinforcing materials, use plastic chairs and accessories to help insure there are no unintended vapor (air) barrier penetrations.
26. Wrap air (vapor) barrier into the forms leaving enough material to cover the bottom of the forms and overlap the outer edge of the J-form by 12” minimum, with enough excess length at all outboard edges so that once the concrete pulls the vapor barrier into the J-form there will be enough excess to overlap the outside edge of the J- form by minimum of 12”.
27. Temporarily install 2x PT plates on top of J-forms and Overlapped Vapor/ Air Barrier to form a concrete form / screed edge. Use 6” course thread screws to temporarily hold the 2x PT plate in place for the pour. Pre-drill holes for the screws and hand tighten them into the J-form. Screws should be snug. Do not use a mechanical driver so as not to strip foam from screw threads. The next greater dimensional 2x width of PT lumber than the wall panel plate widths should be considered (i.e., 2x4 wall panels to use 2x6 PT screed boards, 2x6 wall panels to use 2x8 PT screed boards), this will allow “ripping” of the temporary screed boards to the full width of the wall panel bottom plate/exterior sheathing dimension and can therefore be utilized for the slab/sill plate to receive the Build SMART wall panels.





Fig. 8: Vapor/air barrier placed over slab foam and into/over J-forms to allow excess for concrete to pull the barrier into the form and allow for enough to pull inboard after pour (see Fig. 11) .



Fig. 9: PROSOCO R-Guard Joint & Seam Filler being applied approximately 1” to top of slab prior to slab vapor/air barrier being flipped onto top of slab.





Fig. 10: PROSOCO R-Guard Joint & Seam Filler applied to slab vapor/air barrier after vapor/air barrier is flipped to the top of the foundation. Take extra care at corners to keep cuts neat and sealant complete.



Fig. 11: Vapor/air barrier pulled inboard towards slab and PT sill plates installed with Tapcon or similar fasteners. EPS infill pieces installed on top of J-forms.

28. After the slab is prepped and poured, remove the temporary screed boards, which can then be ripped to the combined dimension of the Build SMART wall panel bottom plate/wall sheathing (i.e., 2x4 walls would be total ripped width of 4”).
29. PROSOCO R-Guard Joint & Seam Filler will then be applied to the top of the slab approximately 1” inboard of slab edge. **ALL SEALANTS TO BE APPLIED CONTINUOUS, WITH NO VOIDS or THIN AREAS, approximately ½” bead, no less. All interfacing materials need to be wet set in sealants.**



30. Wrap vapor barrier over the top of the slab towards the interior. Apply two beads of PROSOCO R-Guard Joint & Seam Filler to top of vapor barrier, approximately 2” inboard of exterior slab edge. **ALL SEALANTS TO BE APPLIED CONTINUOUS, WITH NO VOIDS or THIN AREAS, approximately ½” bead, no less. All interfacing materials need to be wet set in sealants.**
31. Install PT sill plates onto the slab according to coordinated and approve drawing dimensions.
32. Temporarily install the sill plates utilizing low profile Tapcons (or similar). The final local code-required hold downs and fasteners will be installed after all the wall panels are installed.
33. Install the EPS infill pieces on top of the J-forms with moisture cured polyurethane glue after the slab is poured. Do not adhere EPS foam filler at door panel areas.
34. Install high density foam inserts at door locations.
35. Parge the top and face of J-forms with Dryvit fiberglass mesh and “Primus” or “Genesis.”



Fig. 12: Example of high density foam installed to align with door panel areas.



Fig. 13: Fiberglass Dryvit mesh installed at face of J-form at over top of J-foam top filler.



Fig. 14: Dryvit Primus started to be coated at top of EPS filler strip and down the face of the J-form.





Fig. 15: Dryvit Primus started to be coated at top of EPS filler strip and down the face of the J-form.

3. Precast Foundation Systems

The Build SMART pre-cast basement system is a quick and affordable solution for high performance building basements. Using this system allows for the basement space to be finished to the same level of comfort and energy performance as the rest of the structure. The basements are insulated and come with an integral footing, cutting out a number of steps for the contractor. In order for the installation to be completed efficiently, the contractor must prepare the site for a successful installation.

PHASE	ITEM	PRODUCT (if applicable)	NOTES
Basement foundation			Refer to applicable details, photos and drawings
<input type="checkbox"/>	Cast-in-place		
<input type="checkbox"/>	Slab/wall intersection		Location of bearing, detail, sub slab insulation, vapor barrier detail
<input type="checkbox"/>	Vapor barrier connection slab/wall	SIGA Dockskin primer, Wigluv tape. Vapor bond tape. Prosoco Joint & Seam	
<input type="checkbox"/>	Wall penetrations		Location, details
<input type="checkbox"/>	Build SMART Precast Walls		
<input type="checkbox"/>	Slab/wall intersection		Location of bearing, detail, sub slab insulation, VB detail, construction sequence
<input type="checkbox"/>	Vapor barrier connection slab/wall and at all vertical joints at wall	SIGA Dockskin primer, wigluv tape.	ALL underslab vapor Barrier is to be terminated and Sealed to the Interior of The Build SMART foundation wall systems, then the vertical joints are to be sealed to the top of the foundation wall and terminated at the underside of the floor framing system sill plate gasketing
<input type="checkbox"/>	Termination sealing of Vertical Build SMART Foundation Seams to top of foundation using Floor System Sill Gasketing	http://www.conservationtechnology.com/	ALL underslab vapor Barrier is to be terminated and Sealed to the Interior of The Build SMART foundation wall systems, then the vertical joints are to be sealed to the top of the foundation wall and terminated at the underside of the floor framing system sill plate gasketing

Table 4: Foundation preparation checklist and resources

The following items must be completed and coordinated to ensure the project goes smoothly:

1. The excavation should be over-dug by contractor to comply with applicable safety requirements, a minimum of 24” on all sides for proper sealing of the joints. Trenches must be at least 32” wide at the base.





Fig. 16: Example of installed precast foundation.

2. Perforated drainpipe must be placed by the contractor 12” from the inside or outside of the basement wall leading to a sump pit or daylight drain or according to local codes.
3. The contractor must supply corner pins at all outside corners that accurately define the position of the foundation. If sufficient pins are not in place, the contractor will reimburse the supplier at a rate of \$250.00 per hour to establish such pins.
4. The contractor shall prepare the work site and provide access to the work site for a tractor-trailer and a crane as per specifications set forth. Contractor is responsible for damage to sidewalks, driveways, etc. whenever equipment leaves public roadways to access the job site. Site access considerations include:
 - a. No limitations in the approach to the site including bridges with weight or clearance limitations, lower overpasses, gravel or dirt roads, tight turning radius, steep grades, etc.
 - b. At the site the truck will be able to access, turn around or departure access, unloading access from the side of the truck, etc.
 - c. It is the responsibility of the purchaser to inform Build SMART of any local site access limitations prior to shipping. Any additional handling will result in additional shipping charges.
5. If the work site is not accessible or prepared in accordance with the specifications, the contractor agrees to pay any expense incurred by the supplier for crane, truck, crew, and other costs associated with preparing the site (i.e., bulldozer, loader, etc.)
6. Contractor is responsible for providing adequate protection for frost conditions that may occur as well as protecting the stone from freezing while the excavation is open.
7. Contractor, all employees and subcontractors of the contractor, shall comply with all applicable building codes and safety requirements. Contractor agrees to instruct the owner that the owner must comply with all applicable building codes when finishing or modifying in any manner the walls supplied by the supplier.



8. The contractor must prepare the work site according to the specifications and supply a minimum of 6" of clean ½" crushed gravel over the entire floor of excavation and must be level to within +/- 1".
9. If the site is not prepared according to the specifications or the gravel is not level within +/- 1", the contractor will be charged and agrees to pay the supplier at a rate of \$250.00 per hour for lost time.
10. For any job requiring a crane larger than 50 tons, or a reach exceeding 60', the contractor agrees to pay additional cost.
11. The slab and floor framing diaphragm must be installed prior to backfilling the foundation.



Fig. 17: Example of installed precast foundation with interior wall seams taped and sealed.

12. Prior to installing the wood floor system gasket and wood sill plate, be sure that the top surface of the concrete foundation is clean and level. Check all holes, pockets, and voids. Pay special attention to voids that could create air barrier breaches at the sill gasket area. Voids, pockets, etc. can be filled with Quickrete FastSet Concrete Repair or Quickrete Quick-Setting cement or similar. Be sure to follow manufacturer's instructions for application and verify if the product you select requires a fortifier or bonding agent.
13. Seal the top terminated edge of the under slab vapor (air) barrier to the interior of the foundation walls completely and without voids. SIGA Dockskin primer and SIGA Wigluv tape or similar products can be used to seal and tape the vapor barrier to the foundation wall. Follow manufacturer's installation instructions.
14. Seal ALL vertical seams to the interior of the foundation walls completely and without voids. SIGA Dockskin primer and SIGA Wigluv tape or similar products can be used. Follow manufacturer's installation instructions.
15. Terminate the vertical seam tape at the top of the foundation wall by applying two runs of primer and tape across the top of the foundation walls completely and without voids so that it can be capped by the floor system sill and sill gasket, which brings the air barrier to the outer face of the wood floor system sill plate. SIGA Dockskin primer and SIGA



Wigluv tape or similar products can be used. Follow manufacturer's installation instructions.



Fig. 18: Example of installed precast foundation with interior wall seams taped and sealed and terminated at the top of the wall with horizontal primer and tape that will interface with floor system sill gasket.



Fig 19: Wood floor system sill plate gasketed over top of precast basement foundation system tape and primer cap.

16. Compaction of soil adjacent to the foundation is not recommended. If you intend to backfill with solid compaction adjacent to foundation, this must be approved by manufacturer prior to backfill.
17. It is recommended that the backfill be self-compacting gravel.
18. Apply foundation damp proofing in accordance with manufacturer instructions, approved construction documents and code requirements.

4. Panel Delivery

The Build SMART wall panels and bands (panels without stud-wall framing) are packed on a skid system and wrapped in sheet poly that protects during shipping and storage on the site. If your order includes loose shipped windows and doors that are to be field installed, they will ship in separate crates that will arrive with the panels and the bands. The window and door hardware will also arrive with the shipment in small shipping boxes.

1. The Sales Agreement establishes the estimated ship date.. Please allow at least two weeks prior to the Estimated ship date to arrange a specific shipping date.
2. Please confirm with Build SMART that there is adequate site space to accommodate:
 - a. Delivery access
 - b. Delivery vehicle departure
 - c. Offloading area
 - d. Storage footprint to accommodate all packages and panel packages
 - e. Dry protected storage for loose ship items



Fig. 20: Example of wall panel packages.

3. The panels will arrive on a full size flatbed truck that will have at least a 48' trailer.
4. Please be sure that the truck will have access to the site, including:
 - a. No limitations in the approach to the site including bridges with weight or clearance limitations, lower overpasses, gravel or dirt roads, tight turning radius, steep grades, etc.
 - b. At the site the truck will be able to access the unloading area, will have turn around or departure access, and unloading access from the side of the truck, etc.
 - c. It is the responsibility of the purchaser to inform Build SMART of any local site access limitations prior to shipping. Any additional handling will result in additional shipping charges.
5. When receiving date is confirmed, please arrange for your field personnel to be on site to receive the wall panels and bands.



6. The panel packages will typically be shipped in vertical packages. Custom panels, floor and roof bands will typically arrive in horizontal packages.
7. All packages must be inspected prior to off-loading and any damage must be photo documented and reported to the shipping driver and Build SMART immediately, as well as noted on the receiving ticket.



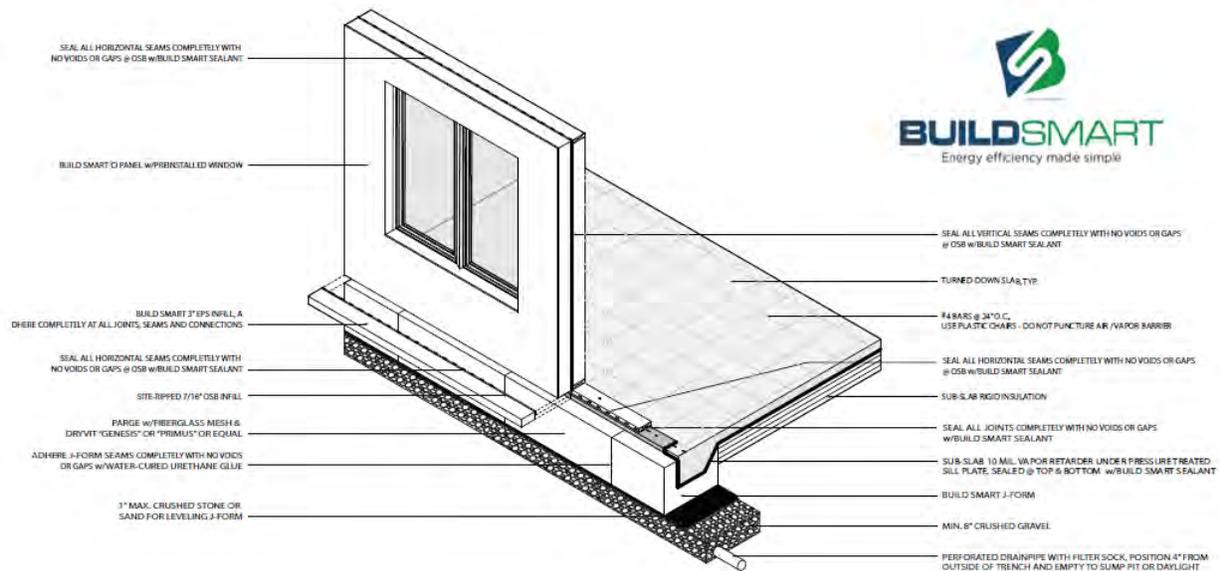
Fig. 21: Example of wall panel packages unwrapped on level site.

8. Check that all contents are complete per packing slip and shipping confirmation.
9. The packages are best unloaded with an all-terrain construction fork lift from the side of the flat bed.
10. Panel packages must be stored on a flat, firm, well-draining or rain-protected surface.
11. Sites that are not firm, not level or exposed to windy conditions will require that the packages be braced with bracing members staked to the ground.
12. Please make arrangements for safe, dry and secure storage of the loose ship items which could include small boxes of sealants, window and door hardware, crated loose windows and doors for field installation.



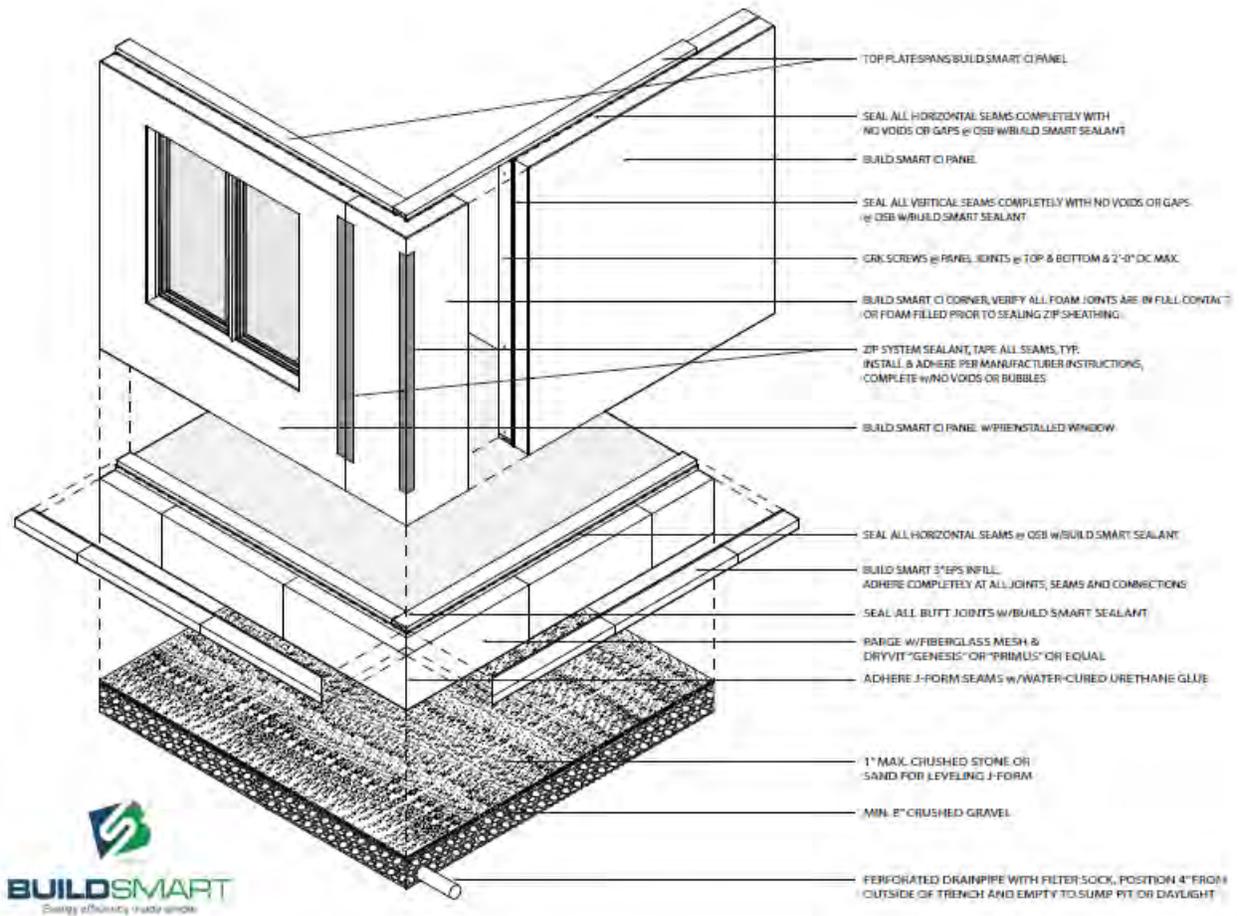
5. Panel Installation

The Build SMART wall system is a quick and affordable solution for high performance buildings. Using this system allows for the simultaneous installation of the structural wall, air barrier, exterior insulation, nail base, weather resistant barrier and pre-installed and pre-irtighted windows and doors. The walls come in pre-manufactured sections, cutting out a number of steps for the contractor. In order for the installation to be completed efficiently, the contractor should completely read and understand the following instructions for a successful installation. Please refer to all details and photos in this section and other related sections of the manual. It is critical that all foundation, slab and floor systems be straight, square and level for wall panels and band systems to interface correctly.

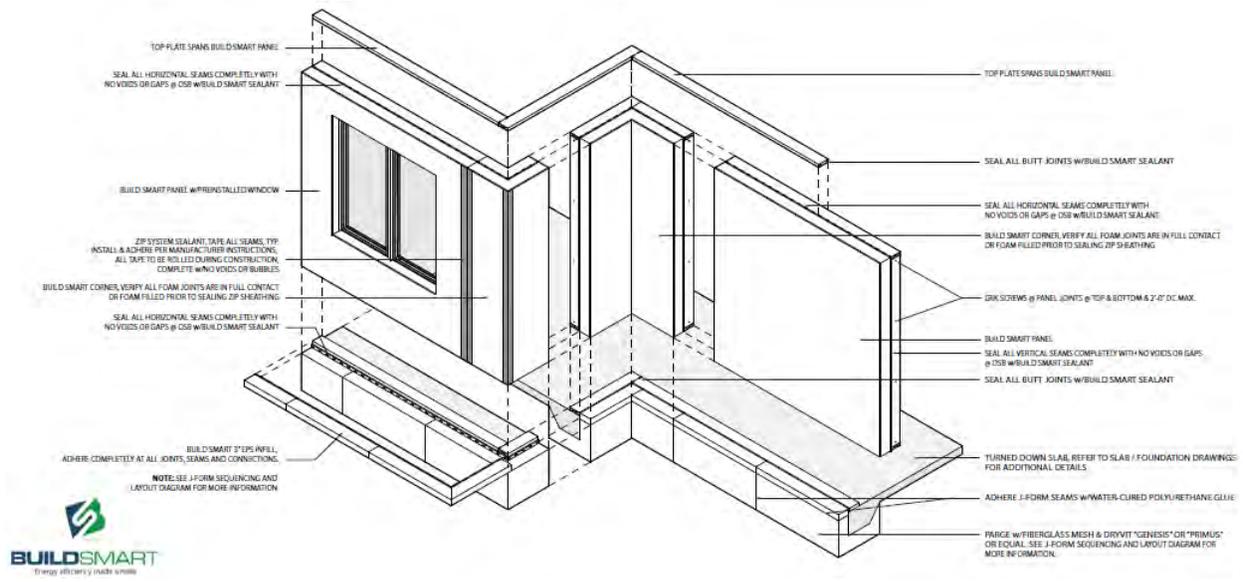


Exploded and Assembly Drawing 3: Wall Panels on Slab



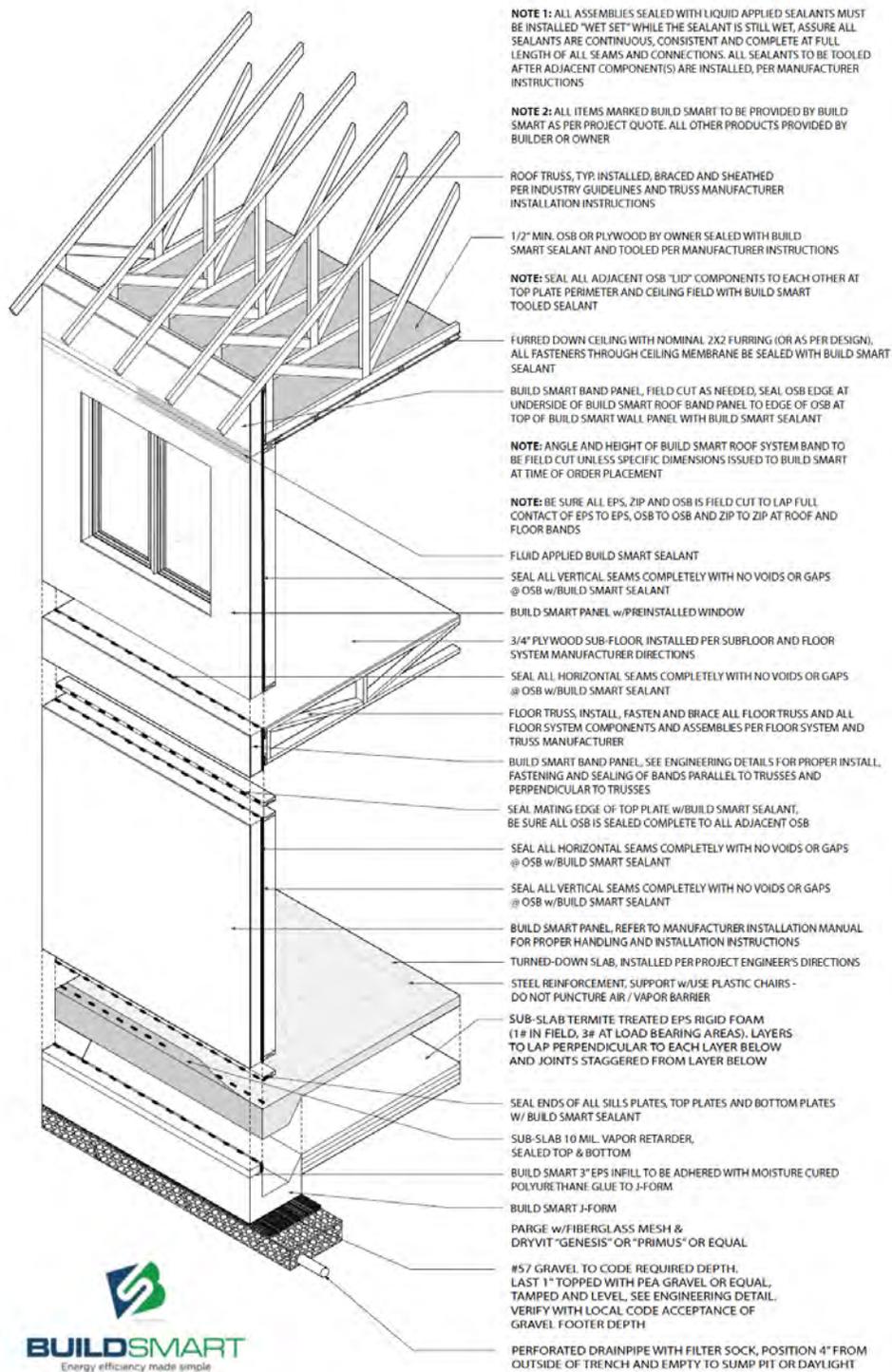


Exploded and Assembly Drawing 4: Outside Corner Wall Panels on Slab



Exploded and Assembly Drawing 5: Inside Corner Wall Panels on Slab



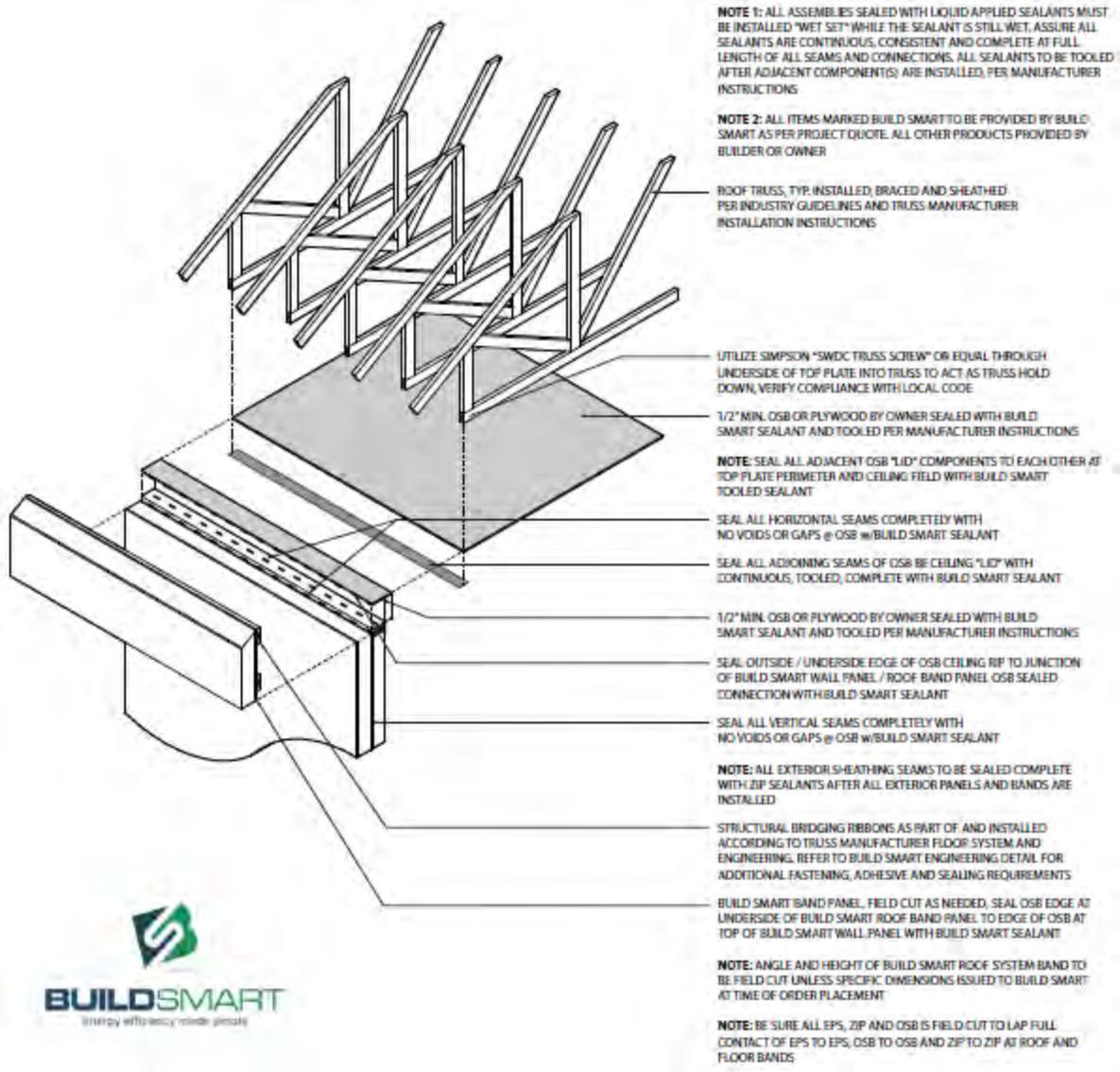


NOTE: REFER TO SEQUENTIAL DIAGRAMS FOR MORE INFORMATION ABOUT EACH COMPONENT OF THE BUILD SMART SYSTEM.

NOTE: ALL BUILD SMART FORMS AND SLABS TO BE INSTALLED SQUARE AND LEVEL COMPLETELY TO ASSURE EFFICIENT PLUMB AND LEVEL ASSEMBLY OF BUILD SMART PANELS.

Exploded and Assembly Drawing 6: 3 Story Wall Panels System





Exploded and Assembly Drawing 7: Roof and Ceiling System



PHASE	ITEM	PRODUCT (if applicable)	NOTES
Build SMART Wall & Roof		Refer to applicable details, photos and drawings	
<input type="checkbox"/>	Frame walls on slab		
<input type="checkbox"/>	Install pressure treated bottom plate that is ripped equal in width to the full width of the exterior framed wall studs and exterior OSB sheathing	Sealant: Prosoco Joint and Seam	<ol style="list-style-type: none"> 1. Install sealant on slab 2. Wrap under slab poly air barrier over sealant 3. Install sealant on poly air barrier 4. Install pressure treated bottom plates with exterior OSB rip on poly 5. Ensure plates are square and level 6. Install bottom plates installed in seamless manner
<input type="checkbox"/>	Frame walls on wood		
<input type="checkbox"/>	Install structural insulated band @ the exterior perimeter of floor system	Sealant: Prosoco Joint and Seam	<ol style="list-style-type: none"> 1. Install sealant on top of basement wall/insulated band intersection 2. Install construction adhesive on top and bottom ribbon boards 3. Screw insulated band from interior as per engineering details
<input type="checkbox"/>	Install vertical sealant at band panel to band panel	Prosoco Joint and Seam	
<input type="checkbox"/>	All frame walls/roof		
<input type="checkbox"/>	Begin at corner and apply horizontal sealant to pressure	Prosoco Joint and Seam	<ol style="list-style-type: none"> 1. Sealant must be continuous & even bead 2. Apply horizontal sealant 2" longer than wall length
<input type="checkbox"/>	Apply vertical sealant at panel to panel OSB Air Barrier	Prosoco Joint and Seam	<ol style="list-style-type: none"> 1. Sealant must be continuous & even bead 2. Apply vertical sealant complete to ENTIRE top to bottom
<input type="checkbox"/>	Apply two vertical beads of Construction Adhesive at		
<input type="checkbox"/>	Fasten Panels together with Structural Screws	GRK-R4-10x2-3/4" or Equal	<ol style="list-style-type: none"> 1. Install screws starting at within 3" from bottom of top plate and within 3" from top of bottom plate and then 2'-0" OC
<input type="checkbox"/>	Inspect wall panel foam to foam for gaps. Apply spray foam to gaps of 1/8" or greater		<ol style="list-style-type: none"> 1. Inspect from top of panels once all panels are set 2. Mark face of panels that have gaps of 1/8" or greater 3. Drill series of holes large enough to accept spray foam nozzle starting at 3" from bottom of panel and the 16" OC to top 4. Work from bottom hole to top and insert spray foam nozzle and insert foam to be sure it fills the entire seam. Work spray nozzle to interior of panel and pull out as foam fills
<input type="checkbox"/>	Seal WRB zip sheathing with tape or liquid sealant		Apply ZIP tape or Fluid Applied Sealant per Manufacturer's Instructions
<input type="checkbox"/>	ZIP Wall seam & wall fastener inspection		<ol style="list-style-type: none"> 1. Inspect that all seams are taped & tape is not wrinkled or breached 2. Be sure all fasteners are sealed
<input type="checkbox"/>	Top plate ZIP cap extension		Top plate ZIP cap must be nailed to top plate & installed at least 2" beyond interior of top plate
<input type="checkbox"/>	Top plate ZIP cap extension sealing	Dockskin primer, Wigluv tape, Prosoco Joint and Seam	<ol style="list-style-type: none"> 1. Be Sure that top plate cap is continuously sealed with tape or liquid sealant 2. Do not forget to seal bottom of butt joints between OSB cap extension
<input type="checkbox"/>	Top plate ZIP cap extension inspection after truss setting		<p>After trusses are set be sure that the seal is not breached and repair any breaches</p> <p><u>CARE SHOULD BE APPLIED WHEN SETTING TRUSSES TO MINIMIZE BREACHES</u></p>
<input type="checkbox"/>	Application & sealing of OSB or ZIP to ceiling	Dockskin primer, Wigluv tape, Prosoco Joint and Seam or ZIP Sealants	<ol style="list-style-type: none"> 1. OSB or ZIP applied to bottom chords of trusses with screws, be sure all screws go into chords 2. All seams need sealing with OSB or ZIP compatible TAPE & primer or liquid sealant 3. All fasteners must be sealed 4. Inspect all
<input type="checkbox"/>	Bottom plate penetrations	Prosoco Joint and Seam	All anchor bolts and other bottom plate penetrations are sealed

Table 5: Wall panel checklist and resources



The ease of installation of this product is directly related to the surface it is bearing on. **It is critical that the bearing surface be square and level. This will greatly speed the installation of the panels. Making the effort to square and level your bearing surface is well worth the time.**

Be sure all sealants, tapes and gaskets are applied and installed per manufacturer's instructions. Be sure all components are assembled in a wet set of the sealant, do not allow sealant to begin to cure prior to setting adjoining components. NO "cold joints."

1. Please read, understand and utilize the following overall protocol throughout the erection and installation process:
 - a. Follow all sealant manufacturers' application and installation instructions.
 - b. All air barriers must align and all air barriers and connections must be sealed continuously and completely, **NO EXCEPTIONS**. Do this as the construction occurs (very difficult to "come back" to an air barrier connection repair).
 - c. Inspect all connections during each assembly installation to catch ANY breaches in sealants or air barrier connections. View all adjoining surfaces from all visible sides and junctions.
 - d. Once each assembly phase is completed, then the complete assembly needs to be inspected from all visible sides to identify any breaches or potential penetrations and corrected prior to moving onto the next phase. Air and thermal penetrations are far easier to repair "as you go."
 - e. Apply the PROSOCO Joint and Seam sealant on any fastener penetrating an air barrier.
 - f. All exterior fasteners which breach the air barrier must have PROSOCO Joint and Seam sealant applied or assurances that the fasteners have made a full stud or plate connection.
 - g. All wall assemblies are to be lifted onto sealants to best prevent sealants from being scraped off. Inspect sealants at each wall panel installation to be sure sealants are complete. Prevent "cold joints" between panel sill sealants from panel to panel. If there is a work break between wall panel installations be sure sealants are scraped to properly receive the next adjacent panel.
 - h. It is imperative, to best assure airtightness, that the panel to panel connection sealants need to be applied continuously and completely at OSB to OSB air barrier connections. **ALL SEALANTS NEED TO BE CONTINUOUS.**
 - i. All wall panels are to be plumbed and braced at each end and no greater than 8'-0" o.c. as each panel is erected.
 - j. Any panel greater than 10'-0" in height or with a hinge point from panel below will need an appropriate length brace that will not exceed a 60 degree angle from the bracing connection and shall have a counter purlin type of brace to prevent any excess brace flexing.
 - k. All sill plate junctions need to be filled completely and continuously top to bottom and side to side with PROSOCO Joint and Seam sealant.
 - l. Start panel installation with a corner panel.



- m. Continue to check overall exterior wall line dimension string as you proceed. Occasionally the foundation or floor system will vary from the overall combined wall panel dimensions. Please refer to the appropriate section of this manual for the remedy.
- n. Wall top plates at outside faces need to be sealed continuous to the top portion of the OSB wall panel air barrier. Please refer to drawing details and diagrams.
- o. Once all panels are installed, perform inspection of installation from all sides to be sure all sealants are complete and EPS does not have voids in excess of 1/8". Critical inspection is best viewed from the top of the wall panel connections prior to final top plate being installed. Apply additional PROSOCO Joint and Seam at areas that are not filled to the top. Areas where the EPS to EPS voids are greater than 1/8" need to be marked at an easily viewed area of those panels at the face of the ZIP wall.
 - i. EPS voids in excess of 1/8" between adjacent panels need to be foam filled from the bottom to the top by way of drilling holes large enough for the spray foam application nozzle to access the EPS void. Drill holes immediately adjacent to the top and bottom plates and then 16" o.c. between top and bottom. Starting from the bottom inject spray foam from the back of the EPS closest to the EPS and keep working and filling each successive hole to the top.



Fig. 22: Inspect all junctions to be sure all sealants and foam are connected and complete.

- p. Additional thermal barrier and air barrier performance assurances can be inspected through infrared camera testing by creating a minimum 18 degree ΔT for a minimum of 18 hours once the air envelope is complete. Thermal and air barrier penetrations, breaches and leaks should be corrected prior to ZIP tape installation.
- 2. Preparing to install Build SMART wall panels on a Build SMART slab system:
 - a. Install sealant on top slab edge and wrap slab poly air barrier over sealant.
 - b. Install sealant on poly air barrier and install ripped pressure treated bottom plate prior to wall installation. It is critical that the plate be square and level. Install bottom plates and seal all butt seams with sealant.
 - c. Inspect all bottom plate penetrations. Seal all anchor bolts and other bottom plate penetrations.
 - d. Install flashing/termite shield or PROSOCO Fast Flash to the underside of wall panel EPS/ZIP (as applicable to specific project details or requirements) between J-form and bottom of wall panel.
 - e. Proceed to Step 4.
- 3. Installing floor band system at framed floor systems:
 - a. Be sure all floor systems are installed per project specific design, details, drawings, local code requirements and manufacturer instructions.
 - b. Be sure all foundation coatings and flashing systems are installed per project specific design, details, drawings, local code requirements and manufacturer instructions section and applicable drawing details in this manual.
 - c. Install floor system to foundation sill plates and seal all butt seams with PROSOCO Joint and Seam sealant. It is critical that the sill plate be square and level. Be sure floor system sill gaskets are in place, complete, without voids and connected to the foundation system air sealing tapes and sealants.
 - d. Be sure all foundation coatings and flashing systems are installed per project specific design, details, drawings, local code requirements and manufacturer instructions section and applicable drawing details in this manual.
 - e. Coat bottom of all Build SMART bands with PROSOCO Fast Flash that will be in contact with foundation systems.





Fig. 23: Floor band system being prepared with PROSOCO FastFlash to interface with concrete foundation.

- f. Apply PROSOCO Joint and Seam sealant continuously and without voids to the floor system sill plate connected to the foundation to continue the air barrier per manual details and sections and project drawings. Be sure to wet set the Build SMART bands into the PROSOCO Joint and Seam sealant prior to sealant curing.





Fig. 24: Sealant applied to foundation to connect wood floor system air barrier to band system air barrier.

- g. Be sure that all the OSB layers at the Build SMART band are sealed completely and continuously with PROSOCO Joint and Seam to the wood floor sill/foundation connection to assure continuity of the air barrier.
- h. Apply adhesive to the ribbon or floor framing system per drawing detail in this section and project specific drawing sections and details.





Fig. 25: Adhesive applied to wood floor system ribbon to adhere Build SMART panel to wood floor system.



Fig. 26: Sealant applied to connect lower level wall panel air barrier to band system air barrier.



- i. Fasten the Build SMART bands from the interior as per section details in this manual and applicable project specific drawings and specifications.
 - j. As the floor bands are being installed, be sure that all vertical band to band OSB seams are sealed completely with PROSOCO Joint and Seam.
 - k. Install and sheath the floor system per design and project specific documents. It is critical that the floor system be square and level.
 - l. Floor trusses need to be designed with a top and bottom ribbon board per detail.
 - m. Proceed to Step 4.
4. Installing Build SMART wall panels:
- a. The OSB layer is the air barrier component of the assemblies, so it is critical that all OSB edges receive continuous and complete sealants at all OSB connections.
 - b. The PROSOCO Joint and Seam sealant must be a continuous in an even bead approximately $\frac{3}{4}$ " wide. Apply the horizontal sealant 2" longer than wall length you are setting.
 - c. Install PROSOCO Joint and Seam sealant at ALL OSB panel to panel and band connections.
 - d. Fasten bottom plates of walls as per code requirements. Minimum needs to be GRK R4-10x2-3/4" structural screws or equal at the end of each panel and no greater than 2'-0" o.c.
 - e. Apply PROSOCO Joint and Seam to the OSB top edge of the Build SMART band/wood floor system area where the underside of the Build SMART wall panel OSB will interface with the band OSB. If it is a slab system be sure the top side at the outermost edge of the sill plate has the bead of PROSOCO Joint and Seam applied where the underside of the wall panel OSB will interface. Be sure sealant is COMPLETE FROM TOP TO BOTTOM AND CONTINUOUS WITHOUT VOIDS.
 - f. Begin at a corner and apply PROSOCO Joint and Seam sealant to pressure treated bottom plate/wall bottom plate intersection or the floor system/wall bottom plate intersection at the stud/OSB interface.
 - g. Apply PROSOCO Joint and Seam to the OSB vertical side edge of the corner panel at the side of the next adjacent panel to be installed. Be sure sealant is COMPLETE FROM TOP TO BOTTOM AND CONTINUOUS WITHOUT VOIDS.
 - h. Stand the next panel up adjacent to the corner.
 - i. TAKE CARE NOT TO SCRAPE ANY PROSOCO JOINT AND SEAM OFF ANY OF THE VERTICAL OR HORIZONTAL CONNECTIONS.
 - j. Stand all adjoining panels to a clearance of about 1" apart from the previously installed panel and be sure underside of OSB at wall panel lands squarely on the Joint and Seam sealant at the band or slab sill plate, then laterally slide panel to abut the adjacent panel.
 - k. Fasten panels together with GRK R4-10x2-3/4" structural screws or equal. Install screws just above the bottom plate and below the top plate and 2'-0" o.c. maximum spacing along the length of the mating studs.



- l. Once the walls are set, install a second top plate to align and tie the wall panels. Brace the wall panels at a minimum of 8'-0" o.c. Straighten and align the walls using standard construction methods, processes, tolerances and standards.
- m. If there is another floor repeat Step 4, if not proceed to Step 5.



Fig. 27: Example of corner panel being prepared to set.



Fig. 28: Example of wall panel being transported to be set with all terrain lift and lifting plates/sling.





Fig. 29: Example of wall panel corners and wall panels set.





Fig. 30: Example of wall panel with door being set, note that door panel is set directly to slab with sill plates cut to accommodate door panel.



Fig. 31: Example of wall panel air barrier (vertical OSB edge) sealant being applied.





Fig. 32: Example of sill sealant to interface with wall panel air barrier (horizontal wall panel OSB) being applied.



Fig. 33: Temporary block installed to allow levering panel tightly to adjacent panel.





Fig. 34: Temporary angle clips and C-clamps to assist in fitting panels tight.

5. Installing the Build SMART roof band and complimenting ceiling system:
 - a. After installing the second top plate atop the Build SMART wall panel top plate, install the OSB or ZIP top plate cap extension. This is a rip of 7/16" sheet goods (OSB, plywood or ZIP). Top plate cap extension must be nailed to top plate & installed at least 2 1/2" beyond the interior of the wall top plate, so a 2x4 wall would have rips of 6" (minimum) x 8' of sheet goods.
 - b. Be sure that top plate cap is continuously sealed with tape or liquid sealant to the OSB layer of the Build SMART panel. Do not forget to seal the bottom of butt joints between OSB cap extensions to prevent air bypass at the butt joints.
 - c. Set the roof trusses on the top plate cap extension. Install Simpson "SWDC truss screw" or equal for required hold down. (NOTE: standard roof hold down clips will not interface with the air barrier ceiling system) After trusses are set, inspect the installation to verify that the seal is not breached and repair any breaches. Care should be taken to minimize breaches during installation.
 - d. Install the roof sheathing and temporary roof protection.
 - e. Install the air tight "lid" with OSB or ZIP applied to the bottom chords of trusses with screws, be sure all screws go into chords.
 - f. Seal all seams in the OSB with compatible primer and tape or liquid sealant. If using ZIP system, utilize ZIP system sealants per manufacturer's instructions. All fasteners should be sealed.



6. Conduct the first air test after all air barriers are completely sealed and installed. After successful completion of the air test install the Build SMART insulated roof band as per engineering requirements.
7. Seal the entire project exterior WRB ZIP sheathing with tape or liquid sealant per manufacturer's instructions.

PHASE	ITEM	PRODUCT (if applicable)	NOTES
Hand Framed Wall & Roof			Refer to applicable details, photos and drawings
<input type="checkbox"/>	Frame walls with ZIP wall air		
<input type="checkbox"/>	Bottom plate gasketing	Conservation Technology http://www.conservationtechnology.com/	Bottom plates installed in seamless manner
<input type="checkbox"/>	Verify if glued ZIP wall or sheathing is required		If glue is to be applied it must be continuous and even bead at all studs and plates
<input type="checkbox"/>	Be sure all sheathing is complete from bottom of wall		One door opening is allowed for access and to facilitate blower door set up
<input type="checkbox"/>	Be sure all exterior sheathing tape is applied at all wall air barrier	Huber ZIP wall Prosoco coatings	ZIP tape with squeegee at ZIP wall. Alternates include Prosoco coatings, tape on OSB with primer (refer to assembly plan callouts)
<input type="checkbox"/>	Slab vapor barrier to ZIP wall	Wigluv & Dockskin Primer (www.smallplanetworkshop.com) or Vapor Barrier Butyl Tape (www.buyplasticnow.com)	Be sure vapor barrier and ZIP wall are taped & sealed together both at the seam of tape/ZIP wall prior to folding up the ZIP wall and after the vapor barrier is lapped up to the ZIP wall <u>INSPECT ALL VAPOR BARRIER & REPAIR ANY BREACHES & HOLES</u>
<input type="checkbox"/>	Wall seam & wall fastener inspection		1. Inspect that all seams are taped & tape is not wrinkled or breached 2. Be sure all fasteners are sealed
<input type="checkbox"/>	Top plate ZIP cap extension		Top Plate Zip Cap must be nailed to top plate & installed at least 2" beyond top plate
<input type="checkbox"/>	Top plate ZIP cap extension taping		Be Sure that Top Plate Cap is continuously taped to wall sheathing at exterior with Zip Tape
<input type="checkbox"/>	Top plate ZIP cap extension taping inspection after truss setting		After Trusses are set be sure that the Tape is not breached and repair any breaches <u>CARE SHOULD BE APPLIED WHEN SETTING TRUSSES TO MINIMIZE BREACHES</u>
<input type="checkbox"/>	Application & sealing of OSB to ceiling		1. OSB applied to bottom chords of trusses with screws, be sure all screws go into chords. 2. All seams need sealing with OSB compatible TAPE & primer 3. All fasteners must be sealed 4. Inspect all
<input type="checkbox"/>	Bottom Plate Penetrations		All anchor bolts and other bottom plate penetrations are sealed with polyurethane caulk
<input type="checkbox"/>	Frame walls – exterior insulation		
<input type="checkbox"/>	Install vinyl termite shield		Not required for Rockwool
<input type="checkbox"/>	Min ¼"/ft fall @ window sills		

Table 6: Wall panel installation checklist and resources



6. Appendices

a. Project Checklists

PHASE	ITEM	PRODUCT (if applicable)	NOTES
Preconstruction			
<input type="checkbox"/>	Verify understanding of PHPP calculations & design requirements and review of project specific assemblies		Preconstruction Planning with Designer, Architect, Engineer, Contractor, CPHC and all Raters is critical
<input type="checkbox"/>	Basement insulation		Thickness, location, assembly
<input type="checkbox"/>	Slab insulation		Thickness, location, assembly
<input type="checkbox"/>	Wall insulation		Thickness, location, assembly
<input type="checkbox"/>	Roof/ceiling insulation		Thickness, location, assembly
<input type="checkbox"/>	Air barrier strategy		Location, assembly, transitions
<input type="checkbox"/>	Windows & doors		Specs, assembly, air tightness
<input type="checkbox"/>	Shading & exterior		Location, assembly, air tightness
<input type="checkbox"/>	Mechanical design		Layout, insulation, air tightness, flow requirements, structural integration
<input type="checkbox"/>	Plumbing design		Pipe lengths and DHW and water sense requirements
<input type="checkbox"/>	PHIUS+ certification		1. Pre-certification prior to construction 2. Energy Star requirements
<input type="checkbox"/>	Team preparation		
<input type="checkbox"/>	Detailed section presentation		Review and emphasize construction details
<input type="checkbox"/>	Importance of air barrier		Educate field crew and build team on importance of air barrier continuity and integrity, demonstrate and display materials and products
<input type="checkbox"/>	Testing equipment		Demonstrate testing and equipment and explain their value throughout the construction process
PHASE ITEM PRODUCT (if applicable) NOTES			
Slab			
<input type="checkbox"/>	Build SMART J Form Passiv Foundation System		Refer to applicable details, photos and drawings
<input type="checkbox"/>	Footing prep		
<input type="checkbox"/>	Drain tile installed	Filter Socked Drain Tile	Daylighted on initial excavation
<input type="checkbox"/>	Compact gravel	#68 or #57 gravel is acceptable for the gravel footer, but do not use anything smaller	8" Thickness (Verify with Local Code Official). ALL GRAVEL MUST BE LEVEL TO INSURE PROPER J-FORM Installation an wall panel installation erection and sealing.
<input type="checkbox"/>	Sand leveling bed installed	Some installers use well tamped gravel and forego the sand leveler	Thin Layer <1" of cement sand/gravel over the gravel is best for leveling forms. ALL GRAVEL MUST BE LEVEL TO INSURE PROPER J-FORM installation and wall panel erection and sealing.
<input type="checkbox"/>	J Forms (See additional detailed information in J-Form Narrative)		1. Start with inside and outside corners 2. Pre-assemble corners, stake in place 3. Pre-assemble straight forms 4. Infill with straight forms. ALL J-FORMS MUST BE INSTALLED STRAIGHT AND LEVEL TO INSURE PROPER WALL PANEL INSTALLATION AND SEALING 5. Wrap air barrier into the forms leaving enough material to cover the bottom of the forms and overlap the edge of the form by 12" minimum (EPS Slab Foam must be installed prior to the Vapor (Air) Barrier being installed. 6. Install 2x PT plate temporarily on top of J Form to form screed edge 7. After slab is prepped and poured install infill piece on top of J Forms with polyurethane moisture cured glue after slab is poured 8. Install High Density insert @ door locations 9. Parge top and face of J Form with Dryvit fiberglass mesh and "Primus" or "Genesis" prior to setting any wall panels
<input type="checkbox"/>	J Form glue	Titebond Polyurethane glue: Franklin International Obtained from: www.demandproducts.com TB12 Polyurethane glue 12 oz. OR Similar Moisture Cured Polyurethane Glue	1. Use Protective Gloves 2. Moisten foam joints with H2O using spray bottle 3. Apply glue with disposable brushes 4. This glue EXPANDS (like spray foam) be sure forms are pinned prevent expansion.



PHASE	ITEM	PRODUCT (if applicable)	NOTES
Slab			Refer to applicable details, photos and drawings
<input type="checkbox"/>	Slab section details-see project specific design and construction documents.		
<input type="checkbox"/>	Product layers	Termite treated for ground contact	Type, thickness, order
<input type="checkbox"/>	Under slab rough-in strategy		Location of MEP, load bearing / piers / footer locations. Install deep plumbing and other utilities under footer locations prior to preparing for footers
<input type="checkbox"/>	Vapor barrier	10 mil Vapor Block 10, Vapor Bond and accessories www.buyplasticnow.com OR Similar	1. Install with enough lap to tape joints together & enough to lap the ends over the forms & under the air shell wall 2. Tape to join the Vapor Sheets together
<input type="checkbox"/>	Vapor boots & vapor tape	Vapor Boot System & Butyl Seal Tape www.BuyPlasticNow.com OR Similar	Order enough quantity to seal penetrations joints to the Vapor Block System
<input type="checkbox"/>	Vapor barrier protection		Vapor Barrier System must be protected from penetrations during construction
<input type="checkbox"/>	Additional undercoating sealant	Car undercoating	Undercoating can be applied to the vapor barrier penetrations at areas difficult to address with tape (Check with other project certification requirements and restrictions to assure this is acceptable material)
<input type="checkbox"/>	Wrap vapor barrier over J		Remove after pour and cover holes w/ tape
<input type="checkbox"/>	Multiple penetrations		1. Grouped penetrations are not recommended 2. May need "pitch pocket" strategy for grouped penetrations
PHASE	ITEM	PRODUCT (if applicable)	NOTES
Basement foundation			Refer to applicable details, photos and drawings
<input type="checkbox"/>	Cast-in-place		
<input type="checkbox"/>	Slab/wall intersection		Location of bearing, detail, sub slab insulation, vapor barrier detail
<input type="checkbox"/>	Vapor barrier connection slab/wall	SIGA Dockskin primer, Wigluv tape. Vapor bond tape. Prosoco Joint & Seam	
<input type="checkbox"/>	Wall penetrations		Location, details
<input type="checkbox"/>	Build SMART Precast Walls		
<input type="checkbox"/>	Slab/wall intersection		Location of bearing, detail, sub slab insulation, VB detail, construction sequence
<input type="checkbox"/>	Vapor barrier connection slab/wall and at all vertical joints at wall	SIGA Dockskin primer, wigluv tape.	ALL underslab vapor Barrier is to be terminated and Sealed to the Interior of The Build SMART foundation wall systems, then the vertical joints are to be sealed to the top of the foundation wall and terminated at the underside of the floor framing system sill plate gasketing
<input type="checkbox"/>	Termination sealing of Vertical Build SMART Foundation Seams to top of foundation using Floor System Sill Gasketing	http://www.conservationtechnology.com/	ALL underslab vapor Barrier is to be terminated and Sealed to the Interior of The Build SMART foundation wall systems, then the vertical joints are to be sealed to the top of the foundation wall and terminated at the underside of the floor framing system sill plate gasketing
PHASE	ITEM	PRODUCT (if applicable)	NOTES
Build SMART Wall & Roof			Refer to applicable details, photos and drawings
<input type="checkbox"/>	Frame walls on slab		
<input type="checkbox"/>	Install pressure treated bottom plate that is ripped equal in width to the full width of the exterior framed wall studs and exterior OSB sheathing	Sealant: Prosoco Joint and Seam	1. Install sealant on slab 2. Wrap under slab poly air barrier over sealant 3. Install sealant on poly air barrier 4. Install pressure treated bottom plates with exterior OSB rip on poly 5. Ensure plates are square and level 6. Install bottom plates installed in seamless manner
<input type="checkbox"/>	Frame walls on wood		
<input type="checkbox"/>	Install structural insulated band @ the exterior perimeter of floor system	Sealant: Prosoco Joint and Seam	1. Install sealant on top of basement wall/insulated band intersection 2. Install construction adhesive on top and bottom ribbon boards 3. Screw insulated band from interior as per engineering details
<input type="checkbox"/>	Install vertical sealant at band panel to band panel	Prosoco Joint and Seam	



<input type="checkbox"/>	All frame walls/roof		
<input type="checkbox"/>	Begin at corner and apply horizontal sealant to pressure	Prosoco Joint and Seam	1. Sealant must be continuous & even bead 2. Apply horizontal sealant 2" longer than wall length
<input type="checkbox"/>	Apply vertical sealant at panel to panel OSB Air Barrier	Prosoco Joint and Seam	1. Sealant must be continuous & even bead 2. Apply vertical sealant complete to ENTIRE top to bottom
<input type="checkbox"/>	Apply two vertical beads of Construction Adhesive at		
<input type="checkbox"/>	Fasten Panels together with Structural Screws	GRK-R4-10x2-3/4" or Equal	1. Install screws starting at within 3" from bottom of top plate and within 3" from top of bottom plate and then 2'-0" OC
<input type="checkbox"/>	Inspect wall panel foam to foam for gaps. Apply spray foam to gaps of 1/8" or greater		1. Inspect from top of panels once all panels are set 2. Mark face of panels that have gaps of 1/8" or greater 3. Drill series of holes large enough to accept spray foam nozzle starting at 3" from bottom of panel and the 16" OC to top 4. Work from bottom hole to top and insert spray foam nozzle and insert foam to be sure it fills the entire seam. Work spray nozzle to interior of panel and pull out as foam fills
<input type="checkbox"/>	Seal WRB zip sheathing with tape or liquid sealant		Apply ZIP tape or Fluid Applied Sealant per Manufacturer's Instructions
<input type="checkbox"/>	ZIP Wall seam & wall fastener inspection		1. Inspect that all seams are taped & tape is not wrinkled or breached 2. Be sure all fasteners are sealed
<input type="checkbox"/>	Top plate ZIP cap extension		Top plate ZIP cap must be nailed to top plate & installed at least 2" beyond interior of top plate
<input type="checkbox"/>	Top plate ZIP cap extension sealing	Dockskin primer, Wigluv tape, Prosoco Joint and Seam	1. Be Sure that top plate cap is continuously sealed with tape or liquid sealant 2. Do not forget to seal bottom of butt joints between OSB cap extension
<input type="checkbox"/>	Top plate ZIP cap extension inspection after truss setting		After trusses are set be sure that the seal is not breached and repair any breaches <u>CARE SHOULD BE APPLIED WHEN SETTING TRUSSES TO MINIMIZE BREACHES</u>
<input type="checkbox"/>	Application & sealing of OSB or ZIP to ceiling	Dockskin primer, Wigluv tape, Prosoco Joint and Seam or ZIP Sealants	1. OSB or ZIP applied to bottom chords of trusses with screws, be sure all screws go into chords 2. All seams need sealing with OSB or ZIP compatible TAPE & primer or liquid sealant 3. All fasteners must be sealed 4. Inspect all
<input type="checkbox"/>	Bottom plate penetrations	Prosoco Joint and Seam	All anchor bolts and other bottom plate penetrations are sealed

PHASE	ITEM	PRODUCT (if applicable)	NOTES
Hand Framed Wall & Roof			Refer to applicable details, photos and drawings
<input type="checkbox"/>	Frame walls with ZIP wall air		
<input type="checkbox"/>	Bottom plate gasketing	Conservation Technology http://www.conservationtechnology.com/	Bottom plates installed in seamless manner
<input type="checkbox"/>	Verify if glued ZIP wall or sheathing is required		If glue is to be applied it must be continuous and even bead at all studs and plates
<input type="checkbox"/>	Be sure all sheathing is complete from bottom of wall		One door opening is allowed for access and to facilitate blower door set up
<input type="checkbox"/>	Be sure all exterior sheathing tape is applied at all wall air barrier	Huber ZIP wall Prosoco coatings	ZIP tape with squeegee at ZIP wall. Alternates include Prosoco coatings, tape on OSB with primer (refer to assembly plan callouts)
<input type="checkbox"/>	Slab vapor barrier to ZIP wall	Wigluv & Dockskin Primer (www.smallplanetnetworkshop.com) or Vapor Barrier Butyl Tape (www.buyplasticnow.com)	Be sure vapor barrier and ZIP wall are taped & sealed together both at the seam of tape/ZIP wall prior to folding up the ZIP wall and after the vapor barrier is lapped up to the ZIP wall <u>INSPECT ALL VAPOR BARRIER & REPAIR ANY BREACHES & HOLES</u>



<input type="checkbox"/>	Wall seam & wall fastener inspection		1. Inspect that all seams are taped & tape is not wrinkled or breached 2. Be sure all fasteners are sealed
<input type="checkbox"/>	Top plate ZIP cap extension		Top Plate Zip Cap must be nailed to top plate & installed at least 2" beyond top plate
<input type="checkbox"/>	Top plate ZIP cap extension taping		Be Sure that Top Plate Cap is continuously taped to wall sheathing at exterior with Zip Tape
<input type="checkbox"/>	Top plate ZIP cap extension taping inspection after truss setting		After Trusses are set be sure that the Tape is not breached and repair any breaches <u>CARE SHOULD BE APPLIED WHEN SETTING TRUSSES TO MINIMIZE BREACHES</u>
<input type="checkbox"/>	Application & sealing of OSB to ceiling		1. OSB applied to bottom chords of trusses with screws, be sure all screws go into chords. 2. All seams need sealing with OSB compatible TAPE & primer 3. All fasteners must be sealed 4. Inspect all
<input type="checkbox"/>	Bottom Plate Penetrations		All anchor bolts and other bottom plate penetrations are sealed with polyurethane caulk
<input type="checkbox"/>	Frame walls – exterior insulation		
<input type="checkbox"/>	Install vinyl termite shield		Not required for Rockwool
<input type="checkbox"/>	Min ¼"/ft fall @ window sills		
PHASE	ITEM	PRODUCT (if applicable)	NOTES
Window & Door Installation			Refer to applicable details, photos and drawings
<input type="checkbox"/>	Fabricate window brackets		
<input type="checkbox"/>	Flashing & sealing		
<input type="checkbox"/>	Rough Opening	PROSOCO FastFlash	Applied to interior jacks, sills, header of rough opening
<input type="checkbox"/>	Exterior	ZIP tape	
<input type="checkbox"/>	Shims	Nylon	
<input type="checkbox"/>	Insulation	Backer Rod	Between window & rough opening
<input type="checkbox"/>	Interior	PROSOCO AirDam	Between window & rough opening
<input type="checkbox"/>	Screen installation details		Verify strategy and if parts need to be installed as windows / doors are installed
<input type="checkbox"/>	Measure & order screens		
<input type="checkbox"/>	Verify solar reflective % with	http://www.metroscreenworks.com/	
PHASE	ITEM	PRODUCT (if applicable)	NOTES
MEP Rough In			
<input type="checkbox"/>	Review all rough-ins with each sub prior to starting of work		Emphasize air sealing priorities, potential pathways & methods for air sealing
<input type="checkbox"/>	Photograph and document all rough-ins and framing		Prior to insulation, moisture content of framing must be <17%
<input type="checkbox"/>	Flashing & sealing		
<input type="checkbox"/>	Exterior		
<input type="checkbox"/>	Cavities		
<input type="checkbox"/>	Interior		
<input type="checkbox"/>	Inspect all penetrations		All air shell areas need inspections including exterior walls & ceilings



PHASE	ITEM	PRODUCT (if applicable)	NOTES
Inspections			
<input type="checkbox"/>	PH inspection of slab		
<input type="checkbox"/>	Under slab insulation		
<input type="checkbox"/>	Under slab vapor barrier		
<input type="checkbox"/>	Wall/ceiling		
<input type="checkbox"/>	Slab vapor barrier to wall		
<input type="checkbox"/>	Panel seam & fastener		
<input type="checkbox"/>	Top plate "LID" Extension		
<input type="checkbox"/>	Bottom plate penetrations		
<input type="checkbox"/>	Ceiling seam & fastener		
<input type="checkbox"/>	MEP rough-in		
<input type="checkbox"/>	Wall penetrations		
<input type="checkbox"/>	Ceiling penetrations		
<input type="checkbox"/>	PHIUS+		REFER TO ALL PHIUS+ Checklists
<input type="checkbox"/>	Pre-pour		
<input type="checkbox"/>	Insulation	Thermal Imaging	PHIUS will require minimum 18 degree Delta heated minimum of 24 hours at insulation inspection
<input type="checkbox"/>	Final		
<input type="checkbox"/>	Energy Star		REFER TO ALL ENERGY STAR Checklists
<input type="checkbox"/>	Grade 1 batt insulation		Min grade 2 batts required
<input type="checkbox"/>			
<input type="checkbox"/>			
PHASE	ITEM	PRODUCT (if applicable)	NOTES
Air Testing Method			
<input type="checkbox"/>	First air test after panel		Prior to any exterior insulation installed
<input type="checkbox"/>	Target benchmark		
<input type="checkbox"/>	< 10,000 CF	0.45 ACH ₅₀	
<input type="checkbox"/>	10,000 – 20,000 CF	0.40 ACH ₅₀	
<input type="checkbox"/>	20,000 – 30,000 CF	0.35 ACH ₅₀	
<input type="checkbox"/>	> 40,000 CF	0.30 ACH ₅₀	
<input type="checkbox"/>	Second air test after MEP rough-		Prior to any interior or exterior insulation installed
<input type="checkbox"/>	Target benchmark		
<input type="checkbox"/>	< 10,000 CF	0.60 ACH ₅₀	
<input type="checkbox"/>	10,000 – 20,000 CF	0.55 ACH ₅₀	
<input type="checkbox"/>	20,000 – 30,000 CF	0.50 ACH ₅₀	
<input type="checkbox"/>	> 40,000 CF	0.45 ACH ₅₀	
<input type="checkbox"/>			
<input type="checkbox"/>			



b. Personnel Tool Checklist

Field Carpentry Crew needs to be equipped with standard compliment of wood wall framing tools-Power and Hand					
X	Item Description	Quantity	Supplied By	Confirmed Delivered to site by	Notes
	Safety and MSDS Program, Training and Equipment				Specific to Project, implented by Builder
	16D Nails-Hand Nails	25 #	Builder		
	8D Nails	25#	Builder		
	Gun Nails		Builder		16D, 8D type per Carpenter's equipment
	20oz. Sausage Tube Gun(s)	2	Builder		
	20oz. Cordless Sausage Tube Gun(s)		Optional		Optional
	20oz. Standard Large Tube Caulk Gun(s)	2	Builder		
	20oz. Cordless Standard caulk Gun(s)		Optional		Optional
	Extra Sausage Gun Tips		Builder		
	Build Smart Sealant		Builder		Provided by Build Smart
	Huber Zip Tape or Huber Fluid Applied Sealant		Builder		Enough for Zip Wall Seams on Panels, per manufacturer's instructions
	Titebond Polyurethane Glue 8oz. Bottles		Builder		Moisture Cured Polyurethane Glue
	Water Spray bottle	2	Builder		For Moistening Moisture Cured Products
	Case of 12 Large Tube Construction Adhesive		Builder		Band Adhesive
	Rags		Builder		
	Long Jabber for Cleaning out Sausge Gun Tips	2	Builder		
	Spray Foam & Foam Gun		Builder		
	Lifting Straps		Builder		Assorted Sizes including 8' sling
	Lifting Plates	4	Builder		The follwing or similar, for panel lifting plate:Upgear Temporary Fall Protection Model#A210402 (5000lb capacity), can be obtained at Home Depot
	#10 x 2-1/2" Hex Head Wood Screws	50	Builder		For Extra Lifting Plate Screws
	Pressure Treated Sill Plates	Per Builder			Screed boards (if using J-forms). Ripped to total width of wall panel bottom plate and stud wall sheathing thickness
	Wall Top Plates	Per Builder	Builder		Per Project Wall Plate Width
	Band or Ribbon Materials as required by Floor System Manufacturer	Per Builder	Builder		Per Wood Floor Truss Manufacturer
	Flashing at Panel to Basement Wall	Per Builder			Field Bent Aluminum Metal Flashing Per Build Smart Detail at Build Smart Panel Band to Precast Basement, dimensions per specific project <u>OR</u> PROSOCO FastFlash applied to complete underside of Wall Panel or Band Panel ZIP/ EPS / OSB
	Dryvit Rasp	1	Builder		
	Flat Bars	2	Builder		
	Digging Bar	1	Builder		
	Crow Bars	2	Builder		
	6" C-Clamps	2	Builder		Build Smart will have this when they are on site, recommend Builder has when Build Smart is not on site
	8" C-Clamps	2	Builder		Build Smart will have this when they are on site, recommend Builder has when Build Smart is not on site
	12" C-Clamps	2	Builder		Build Smart will have this when they are on site, recommend Builder has when Build Smart is not on site
	Build SMART Clamoing Tool				Consult with Build SMART for details
	Step Ladder-6'		Builder		
	Step Ladder-8'		Builder		
	Step Ladder-10'				
	3 legged ladder				Optional
	Fall Protection Program, Training and Equipment				Specific to Project, implented by Builder
	Impact Drill	2	Builder		Cordless Preferred
	Hammer Drill	1	Builder		For Drilling Tacons
	Cordless Drill Driver & Assorted Bits	1	Builder		

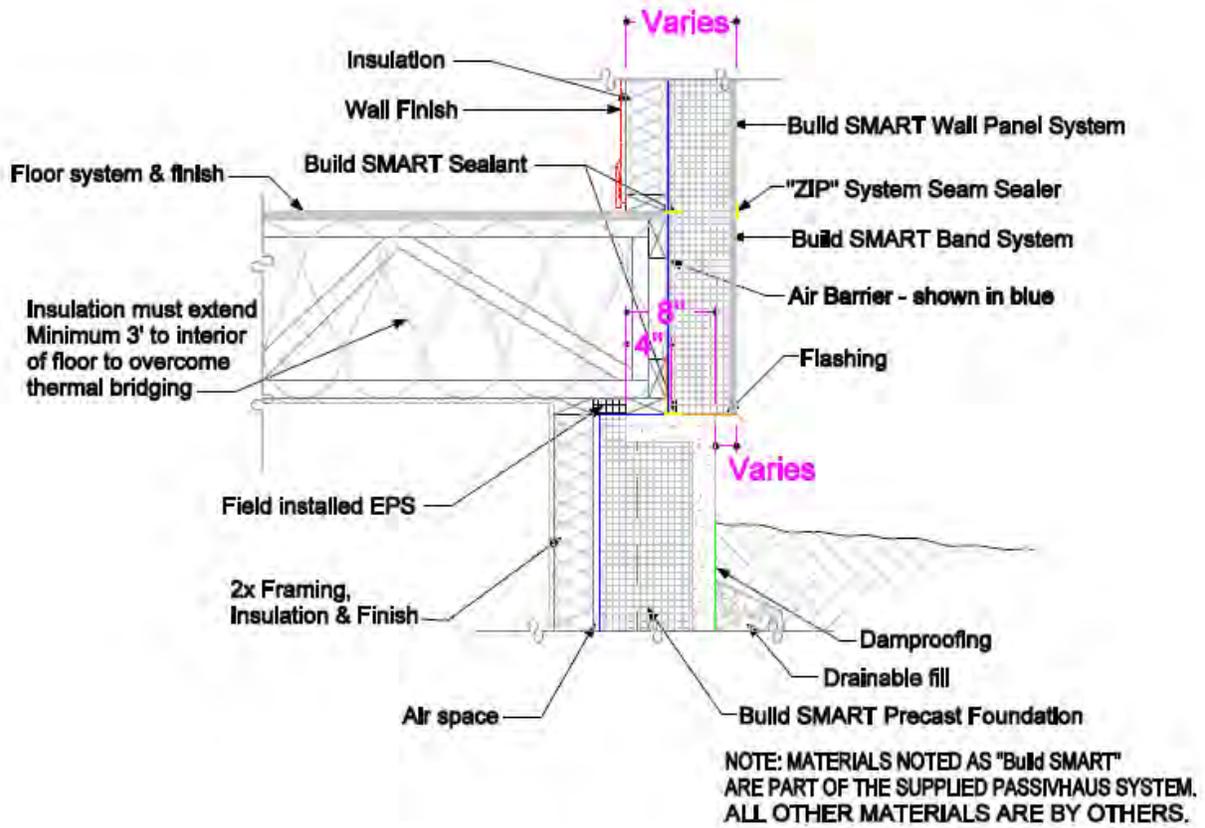


X	Item Description	Quantity	Supplied By	Confirmed Delivered to site by	Notes
	GRK "R4-10x2-3/4" or Similar		Builder		Will Be used Panel to Panel and Second Floor Sill Plates to Wood Floor System. Enough for Each Bottom Plate and end of panels and 2'-0" OC and enough for vertical Panel to Panel Seams-adjacent to top and bootom plate and then 2'-0" OC
	Bits for GRK or Panel Screws	10	Builder		
	Tapcons -1/4" x 3" Hex		Builder		For PT Sill Plates into concrete slab, confirm and specify type and spacing per local code official and requirements
	Drill Bits and Driver for setting Tapcons	1 Set			
	3/16" x 4-1/2" Tapcon or Masonry Bits	N/A	Builder		
	5/16" Hex Impact Hex Bits for setting Tapcons	N/A	Builder		
	#9 x2-1/2" Wood Screws		Builder		For Securing Build Smart Floor System Bands, Perpendicular to Trusses
	#9 x3" Wood Screws		Builder		For Securing Build Smart Floor System Bands, Parallel to Floor Trusses & Perpendicular Roof Trusses
	Wedge Anchors/ Thunderstuds		Builder		For Final PT Sill Plate Setting into Concrete Slab, FINAL SIZING QUANTITY AND SPACING TO BE DETERMINED BY Builder, Depth Requirement Per Project Specific Assembly and Local Code Requirements
	Wedge Anchors/ Thunderstuds Drill Bit		Builder		FINAL Drill Bit SIZING TO BE DETERMINED BY ENGINEERING
	Simpson "SWDC truss screw"		Builder		Need Two per each end of roof truss
	Concrete Slab /Vapor Barrier:				
	Vapor Block Tape				Enough for Vapor Block Vapor Barrier Seams and Vapor Boots
	Vapor Block Boots				Enough for Vapor Block Penetrations
	Automotive Undercoating	2 Cans			
	J-Forms Prior to Walls				
	Dryvit Primus or Genesis (NEEDS TO BE COMPLETED at THE ENTIRE J-FORM FACE AND FILLER STRIP PRIOR TO ANY WALLS BEING INSTALLED		Builder		Enough to cover top of J-Form and perimeter face of exposed J-Form, per manufacturer coverage rate
	Dryvit Fiberglass Mesh (NEEDS TO BE COMPLETED at THE ENTIRE J-FORM FACE AND FILLER STRIP PRIOR TO ANY WALLS BEING INSTALLED		Builder		Enough to cover top of J-Form and perimeter face of exposed J-Form

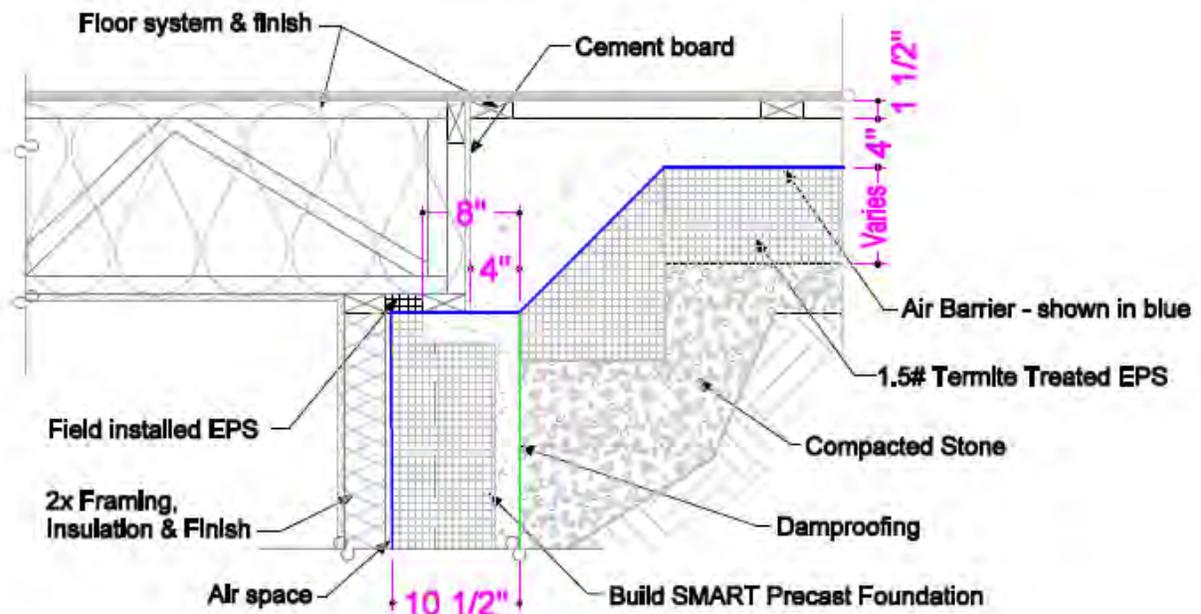


c. Standard Details

Detail #1: Passiv Basement to Wood Floor System



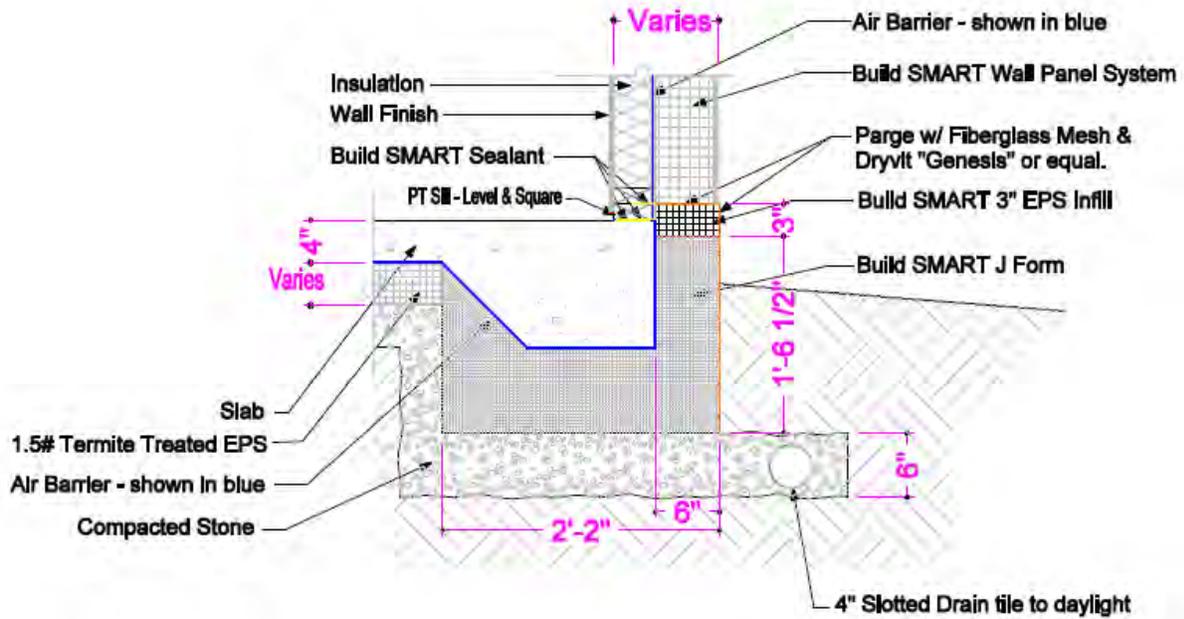
Detail #2: Slab to Framed Floor



NOTE: MATERIALS NOTED AS "Build SMART" ARE PART OF THE SUPPLIED PASSIVHAUS SYSTEM. ALL OTHER MATERIALS ARE BY OTHERS.



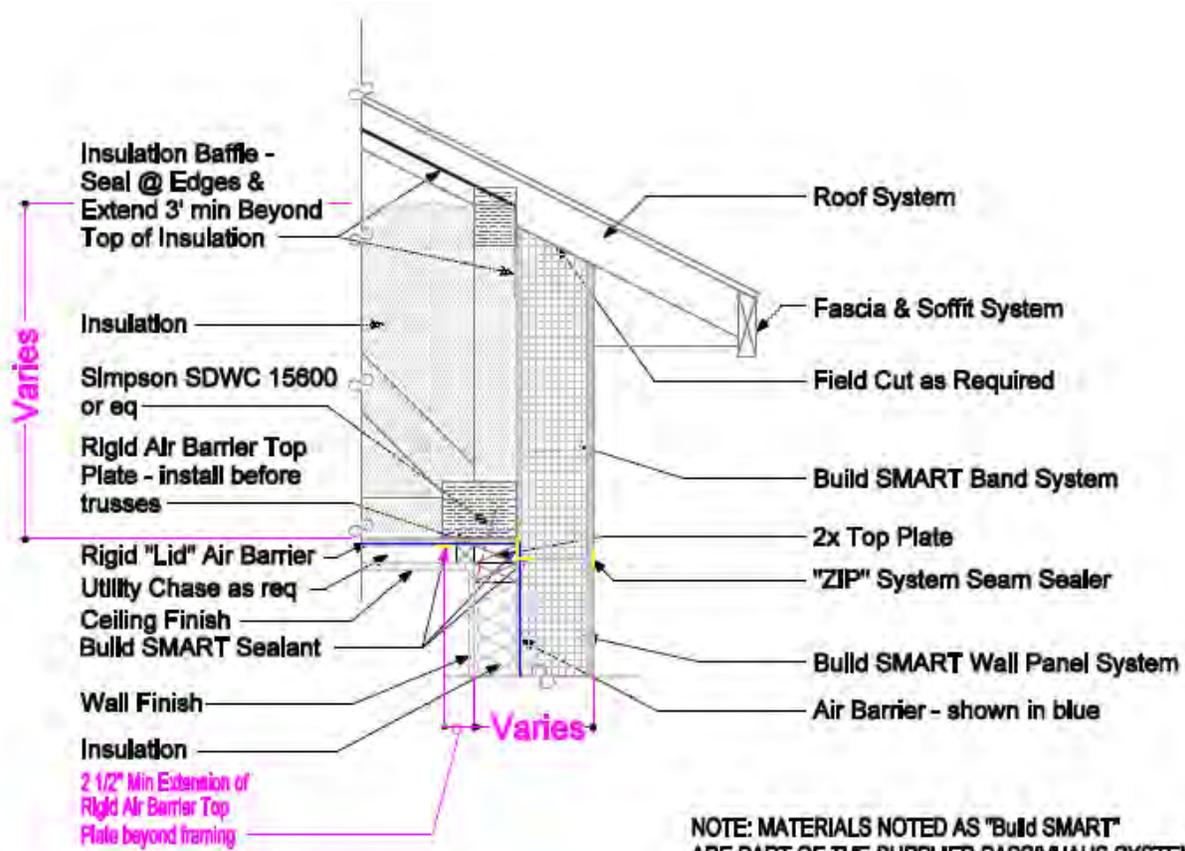
Detail #3: Slab



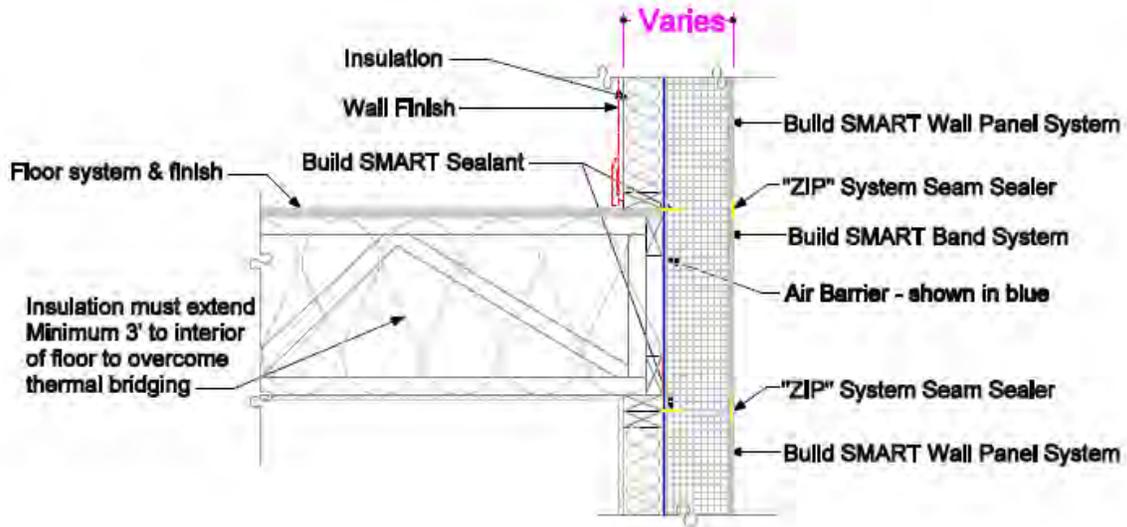
NOTE: MATERIALS NOTED AS "Build SMART" ARE PART OF THE SUPPLIED PASSIVHAUS SYSTEM. ALL OTHER MATERIALS ARE BY OTHERS.



Detail #4: Wall to Roof



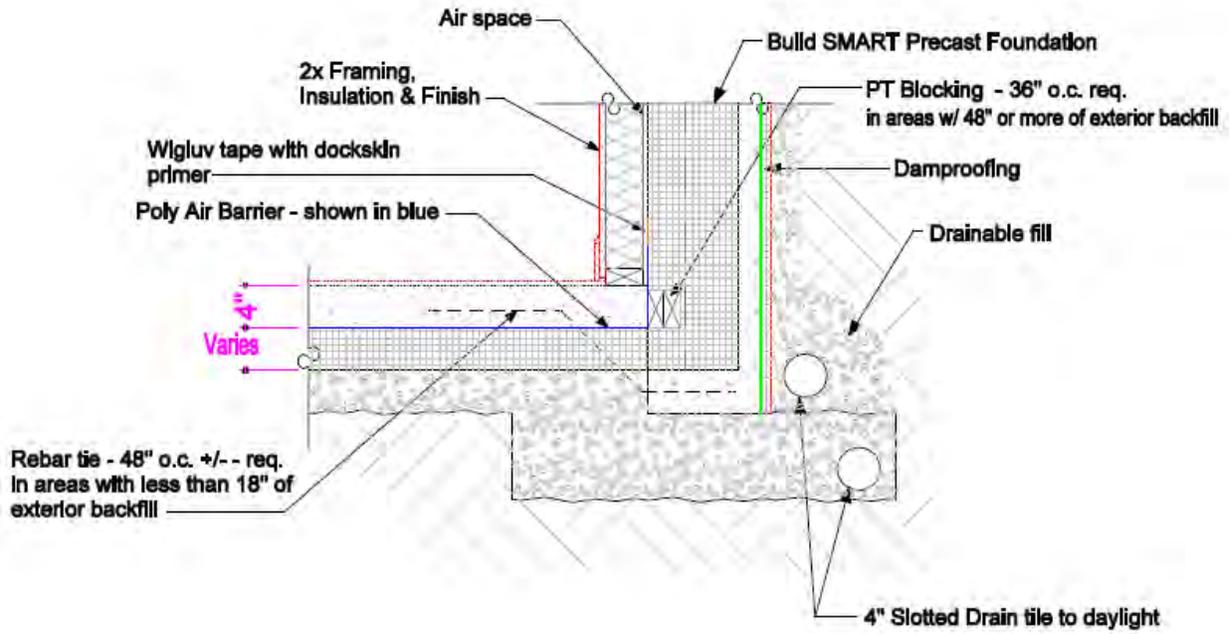
Detail #5: Walls to Wood Floor System



NOTE: MATERIALS NOTED AS "Build SMART" ARE PART OF THE SUPPLIED PASSIVHAUS SYSTEM. ALL OTHER MATERIALS ARE BY OTHERS.



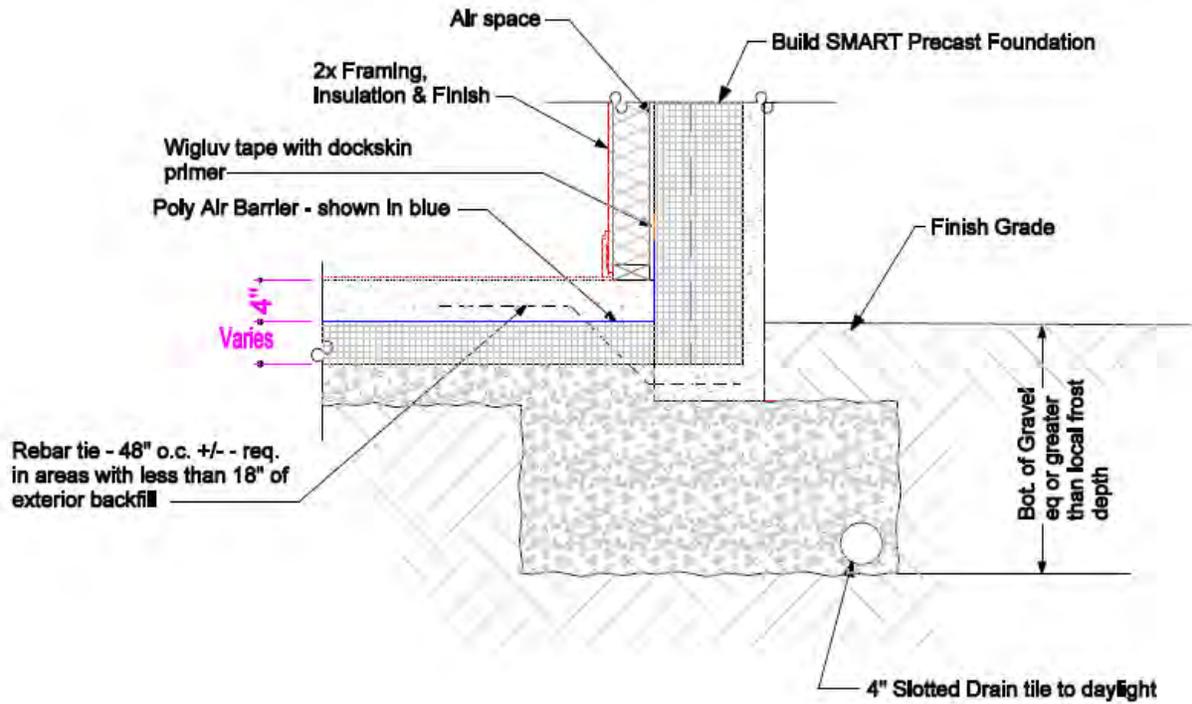
Detail #6: Passiv Basement to Slab



NOTE: MATERIALS NOTED AS "Build SMART" ARE PART OF THE SUPPLIED PASSMHAUS SYSTEM. ALL OTHER MATERIALS ARE BY OTHERS.



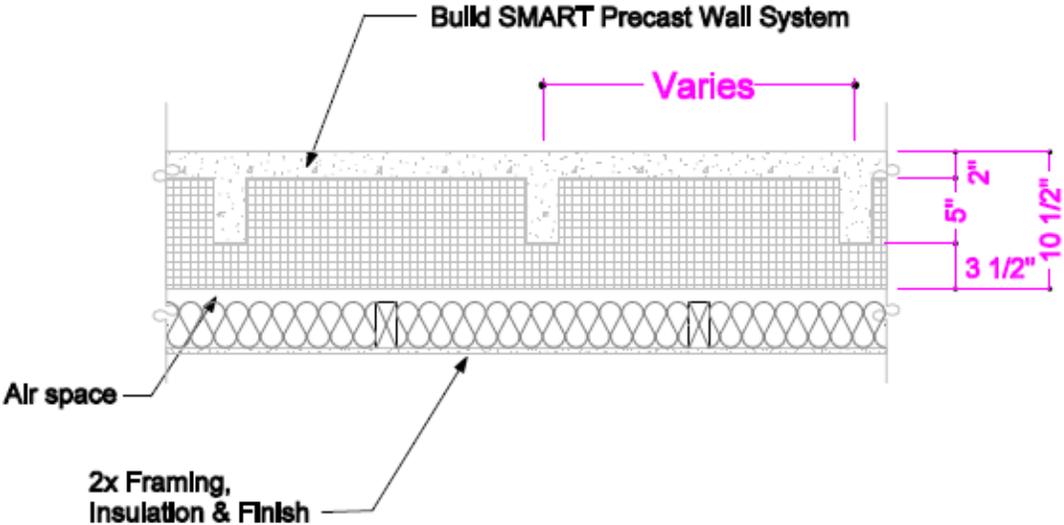
Detail #7: Passiv Walkout Basement to Slab



NOTE: MATERIALS NOTED AS "Build SMART" ARE PART OF THE SUPPLIED PASSIVHAUS SYSTEM. ALL OTHER MATERIALS ARE BY OTHERS.



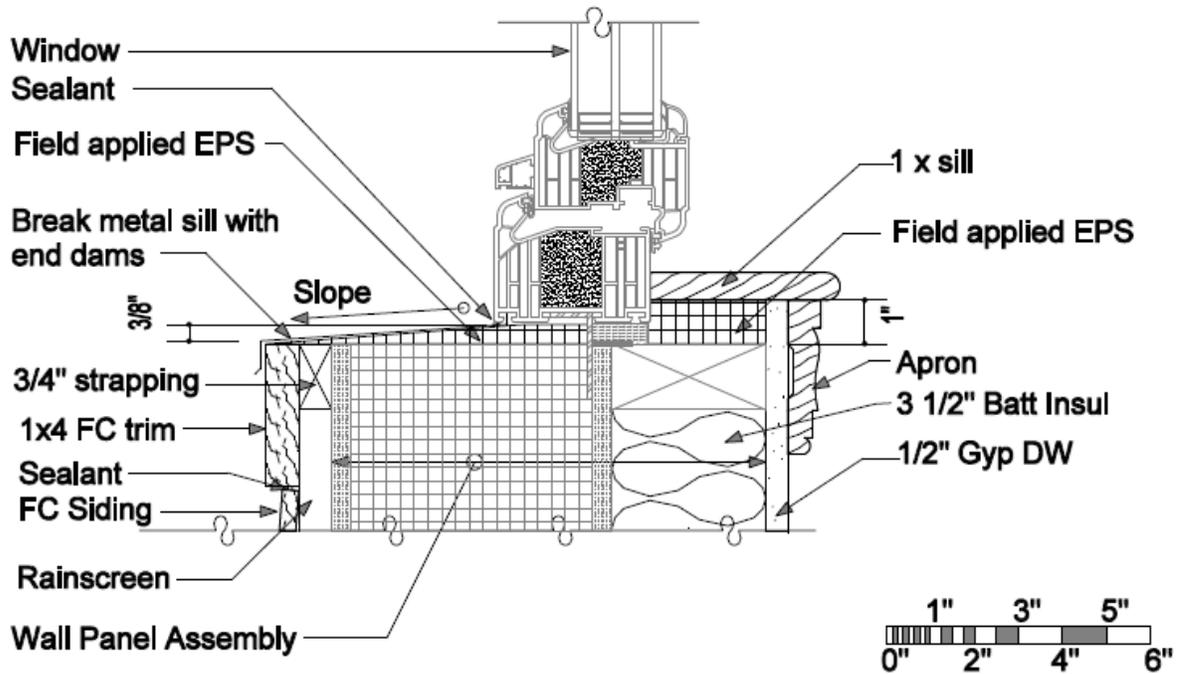
Detail #8: Passiv Basement Wall (Plan View)



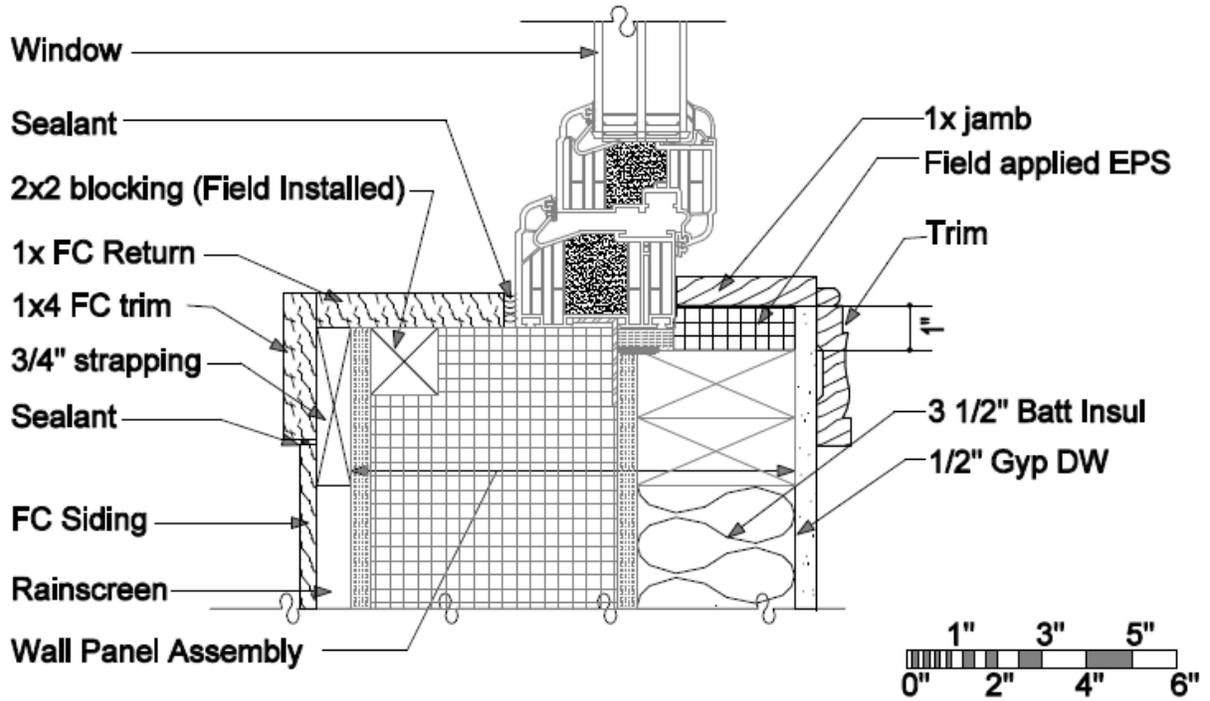
NOTE: MATERIALS NOTED AS "Build SMART" ARE PART OF THE SUPPLIED PASSIVHAUS SYSTEM. ALL OTHER MATERIALS ARE BY OTHERS.



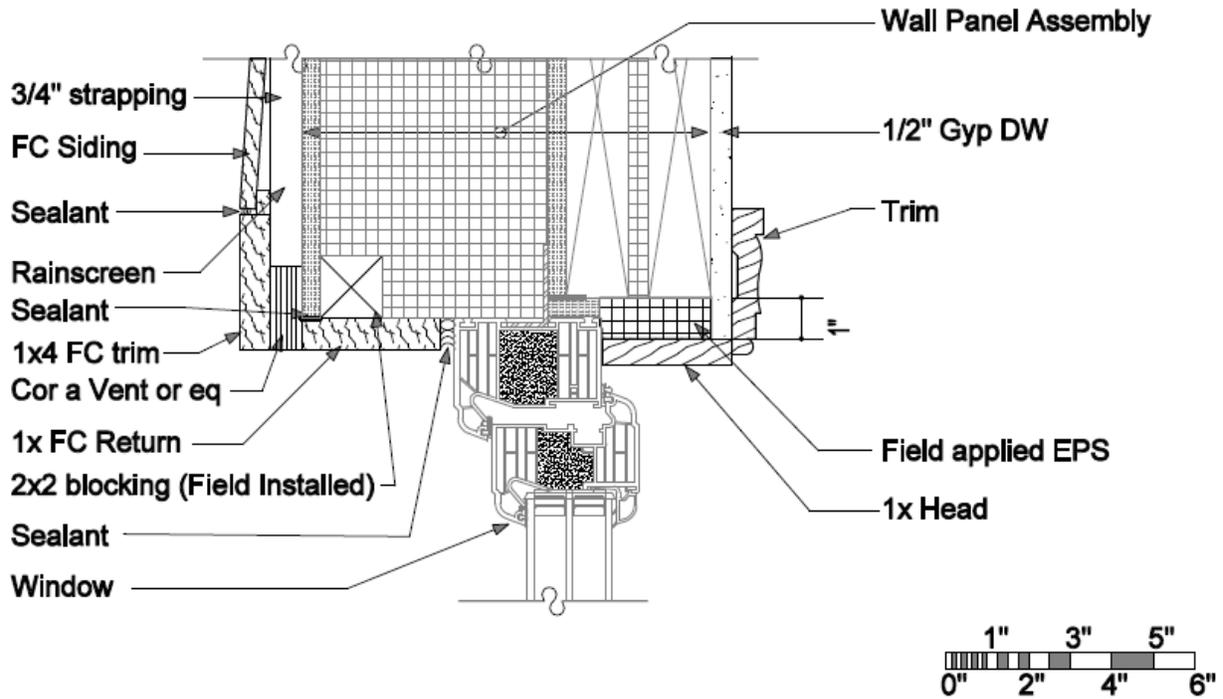
Detail #9a: Window Sill Install Detail – Fibercement



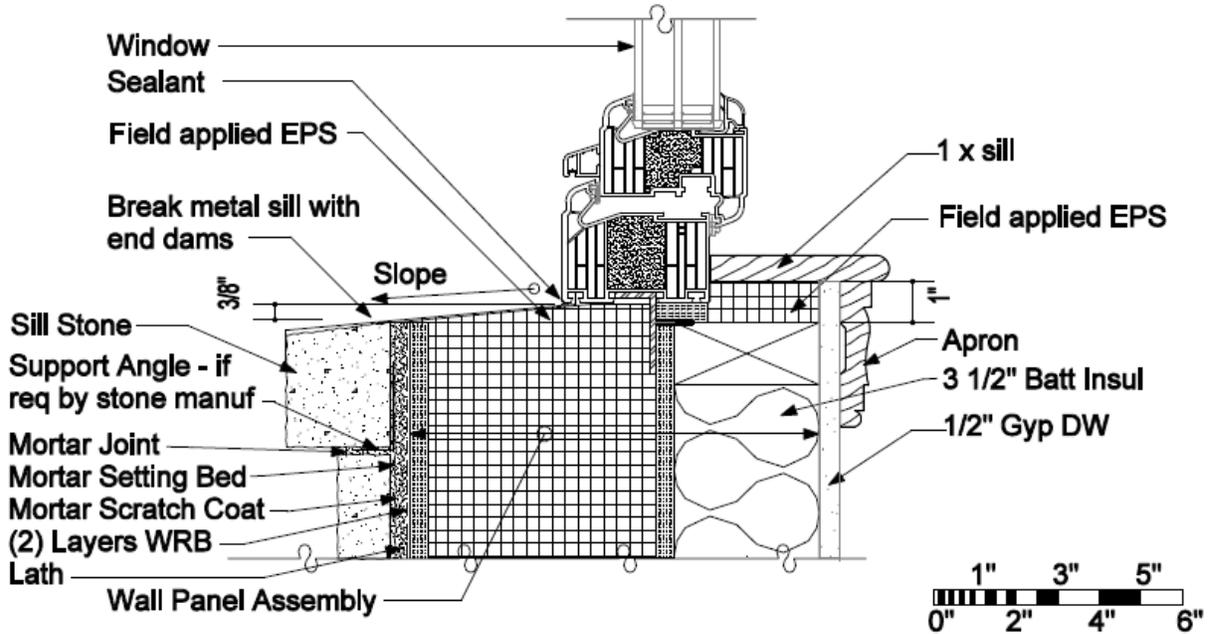
Detail #9b: Window Jamb Install Detail – Fibercement



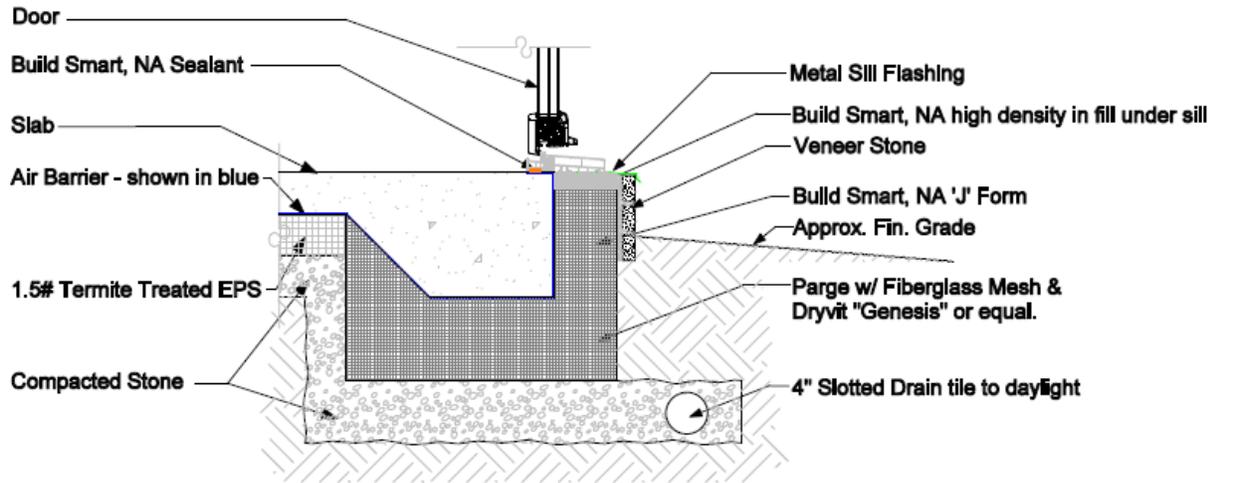
Detail #9c: Window Head Install Detail – Fibercement



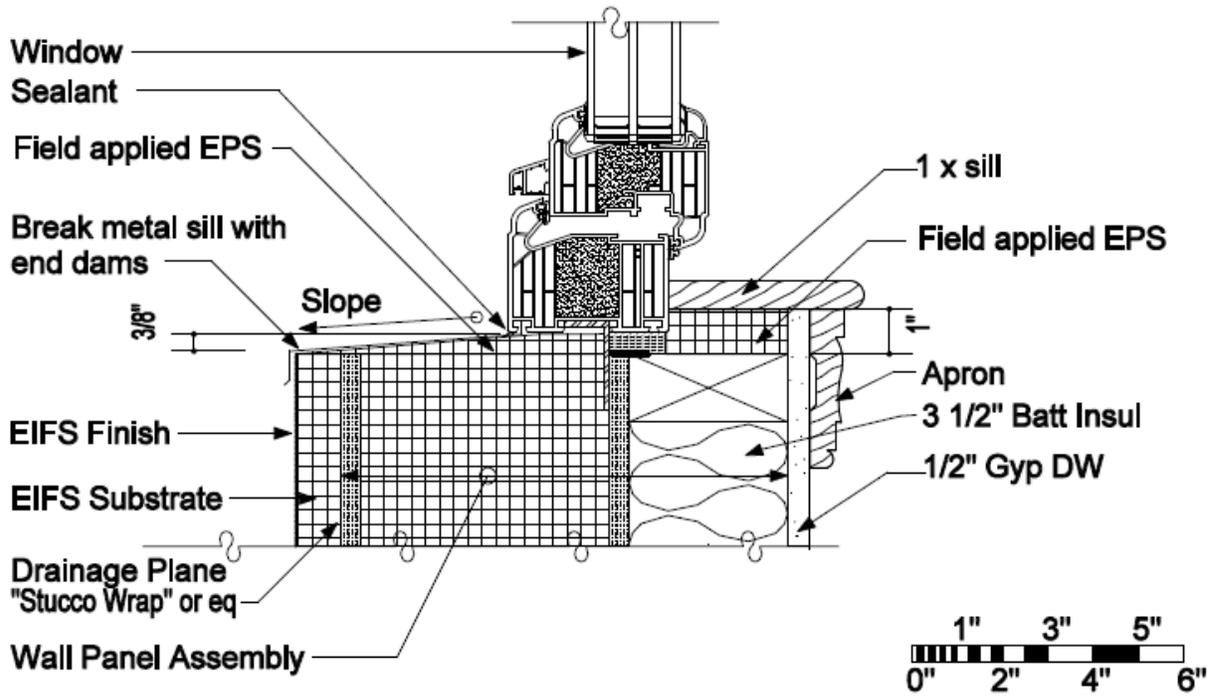
Detail #10a: Window Sill Install Detail – Veneer Stone



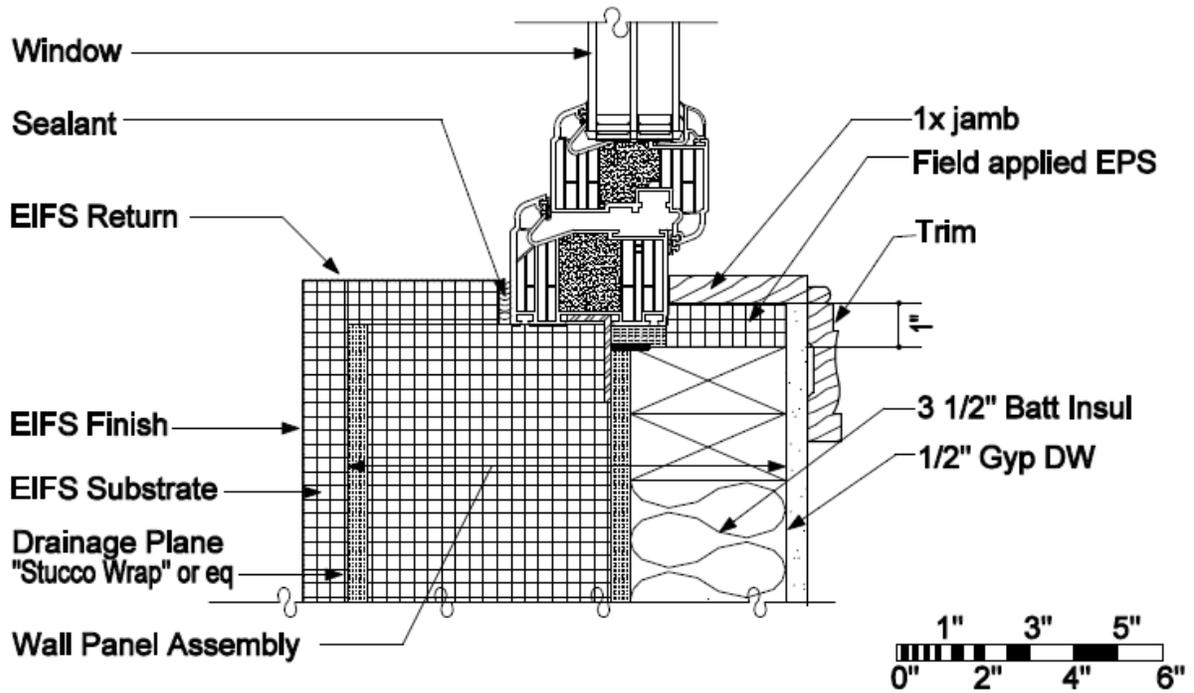
Detail #11a: Door Installation Detail – Veneer Stone on Slab



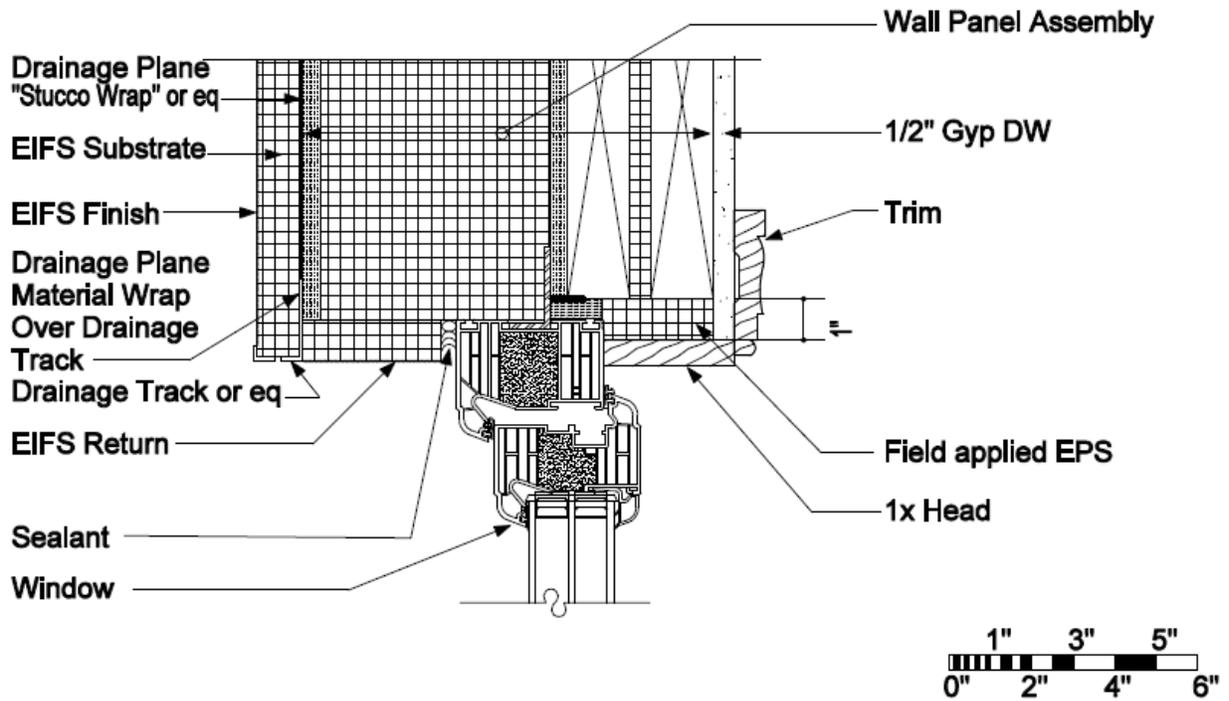
Detail #12a: Window Sill Install Detail – EIFS



Detail #12b: Window Jamb Install Detail – EIFS



Detail #12c: Window Head Install Detail – EIFS



d. Product Data Sheets and Material Safety Data Sheets



PROSOCO R-Guard® FastFlash® is a gun-grade waterproofing, adhesive and detailing compound combining the best of silicone and polyurethane properties. This single-component, Silyl-Terminated-Poly-Ether (STPE) is easy to gun, spread and tool to produce a highly durable, seamless, elastomeric flashing membrane. Allows for same day installation of windows, doors and other wall assembly, waterproofing or air barrier components.

Suitable for all climates, FastFlash® bonds directly to damp or dry surfaces and cures under a variety of weather conditions. It dramatically reduces surface preparation time by eliminating the need for reinforcing tapes at sheathing joints, inside and outside corners. It simplifies the process of producing watertight details in new or existing construction.

Use FastFlash® as part of a continuous, building-wide air barrier system, or to complement conventional waterproofing or air barrier components. Use FastFlash® to adhere, transition and counter-flash R-Guard SS ThruWall or other through-wall sheet flashing.

ADVANTAGES

- Streamlines preparation by eliminating the need for joint reinforcing tapes.
- Silane functional polymer provides superior long term adhesion, crack bridging and weathering characteristics.
- Produces an opaque membrane when installed at the recommended 12–15 wet mils to simplify inspection and quality control.
- Bonds to most common building materials without priming.
- Single component saves time – no mixing.
- Produces a durable, weather-tight seal. Bonds and cures in wet weather, on damp substrates.
- Will not tear or lose effectiveness when exposed to weather during construction.
- May be fully exposed to UV and weather for up to 12 months. If longer, contact for inspection.

- Compatible with most sealants and waterproofing or air barrier components.
- Solvent free. Isocyanate free. Phthalate free.
- No shrinkage. No staining. No yellowing.
- Breathable – allows damp surface to dry.
- Will not support mold growth.
- Service temperatures: –75°F to 300°F (–59°C to 149°C).
- Illustration depicting the use of PROSOCO R-Guard® products are available at www.prosoco.com by downloading the R-Guard Installation Guidelines.

Limitations

- Not for use as a structural sealant.
- Not for use in place of appropriate through-wall flashing. See R-Guard SS ThruWall product literature.
- Not for use below grade or in locations designed to be continuously immersed in water.

REGULATORY COMPLIANCE

VOC Compliance

R-Guard FastFlash® is compliant with the following national, state and district VOC regulations:

- US Environmental Protection Agency
- California Air Resources Board SCM Districts
- South Coast Air Quality Management District
- Maricopa County, AZ
- Northeast Ozone Transport Commission

SAFETY INFORMATION

Always read full label and SDS for precautionary instructions before use. Use appropriate safety equipment and job site controls during application and handling.

24-Hour Emergency Information:
INFOTRAC at 800-535-5053



Product Data Sheet R-Guard FastFlash®

TYPICAL TECHNICAL DATA

FORM	viscous paste, mild odor
SPECIFIC GRAVITY	1.45-1.55
pH	not applicable
WT/GAL	12.5 lbs
TOTAL SOLIDS	99%
VOC CONTENT	30 g/L maximum
FLASH POINT	>200° F (>93° C)
FREEZE POINT	not applicable
SHELF LIFE	1 year in tightly sealed, unopened container

Cured Properties

Hardness, Shore A	35-45
Tensile Strength	>150 psi
Elongation at Break	>350%
Water Vapor Transmission	21 perms ASTM E 96
Corrosive Properties	Non-corrosive
Transfer Free Time	20-40 minutes

Refer to the R-Guard FastFlash® Product Test Results document for a complete list of performance test results.

PREPARATION

To ensure best results, apply to clean surfaces free of contaminants. Chemical residues, surface coatings or films may adversely affect adhesion. Pressure-treated wood and other contaminated surfaces should be cleaned with a solvent wipe before application.

Protect people, vehicles, property, plants and all other surfaces not intended to receive FastFlash®.

Remove and replace damaged sheathing.

In rough openings, prime all raw gypsum board edges with R-Guard PorousPrep.

Any gaps or joints greater than 1 inch should be structurally repaired or readied for an appropriate transition membrane.

Ensure positive drainage at all rough openings.

Surface & Air Temperatures

Surface and ambient temperatures should be 40°F (4°C) and rising and below 110°F (43°C) during application and drying. Wind and high temperatures will accelerate drying.

Hot Weather Precautions: If air or surface temperatures exceed 95°F (35°C), apply to shaded surfaces and before daytime air and surface temperatures reach their peak. Hot surfaces may be cooled with a mist of fresh water. Keep containers closed and out of direct sunlight when not in use.

Cold Weather Conditions: May be applied to frost-free substrates at temperatures below 32°F (0°C). Product will not start curing and drying until temperature rises to and remains above 32°F (0°C).

Low Humidity Conditions: Curing may take longer than 12 hours. Lightly misting treated surfaces with fresh water will accelerate curing. Uncured material may delay construction.

Though FastFlash® may be applied to damp surfaces and tolerates rain immediately after application, do not apply to surfaces with standing water or frost.

Equipment

Apply using a professional caulking gun. Use a DRY joint knife, trowel, or spatula to spread the product. Do not use soapy water when tooling or spreading.

Storage & Handling

Store in a cool, dry place. Keep container tightly closed when not dispensing. Do not open container until preparation work has been completed. Do not alter or mix with other chemicals. When stored at or below 80°F (27°C) R-Guard FastFlash® has a shelf life of 12 months after the date of manufacture. This shelf life assumes upright storage of factory-sealed containers. Do not double stack pallets. Dispose of unused product and container in accordance with local, state and federal regulations.

Product Data Sheet R-Guard FastFlash®

APPLICATION

Read "Preparation" and the Safety Data Sheet before use.

Dilution & Mixing

Apply as packaged. Do not dilute or alter, or use for applications other than specified. No mixing required.

Typical Coverage Rates

Coverage varies based on surface texture and irregularities. R-Guard FastFlash® is sold in 29 oz tubes and 20 oz sausages.

- 22–28 sq.ft. per 29-oz tube applied at 12–15 mils
- 15–17 sq.ft. per 20-oz sausage applied at 12–15 mils

Application Instructions

PREPARE

Prepare all surfaces as described above under "Preparation." Once preparation is complete, cut open tip of threaded fitting, install nozzle and cut nozzle to desired opening.

Filling Joints, Seams and Cracks

1. Apply a thick bead of FastFlash® to all sheathing joints, seams and cracks. Treat joints ranging from ¼ to ½ inch with backer rod before applying FastFlash®. Alternatively, R-Guard Joint & Seam Filler may be used in place of backer rod. Joints ranging from ½ to 1 inch require backer rod and R-Guard Joint & Seam Filler. Joints greater than 1 inch must be structurally improved or addressed with an appropriate transition membrane. On plywood, spot wood knots, deep cracks or surface irregularities.
2. Use a DRY joint knife, trowel or spatula to tool and spread the product. Spread 1-inch beyond seam at each side to a thickness of 12–15 mils.
3. Allow to skin before installing other waterproofing or air barrier components.

Waterproofing Rough Openings

1. Apply a bead of product in each corner of the rough opening. Apply additional product in a zigzag pattern over the exterior framing inside the rough opening. Spread the wet product to create an opaque, monolithic flashing membrane.
2. Apply a thick bead of FastFlash® in a zigzag pattern to the exterior wall surrounding the rough opening. Spread the product to create an opaque, monolithic flashing membrane at 12–15

mils which surrounds the rough opening and extends 4 to 6 inches (100–152 mm) over the face of exterior wall.

NOTE: When using with existing sheet weather resistive barriers, extend FastFlash® 8-10 inches over the face of the exterior wall to ensure positive drainage.

3. Allow treated surfaces to skin before installing windows, doors and other wall assembly, waterproofing or air barrier components.

PROTECT

Apply PROSOCO R-Guard® Spray Wrap MVP, VB, Cat 5®, Cat 5® Rain Screen or other waterproofing or air barrier component pursuant to manufacturer instructions.

TRANSITION

Flashing Transitions

1. Apply a generous bead of FastFlash® to the top edge of R-Guard SS ThruWall or other flashing leg.
2. Spread the wet product to create a monolithic "cap flash" flashing membrane that extends 2 inches (51 mm) up the vertical face of the exterior wall and down over the fastener heads of the SS ThruWall Termination Bar. This "liquid termination bar" helps secure the flashing and ensures positive drainage from the wall surface to the flashing.

REPAIR

After applying R-Guard Spray Wrap MVP, Cat 5®, Cat 5® Rain Screen, VB or other waterproofing or air barrier component, FastFlash® may be used to fill any cracks or voids to achieve a seamless, pinhole and void free coating.

Curing & Drying

At 70°F (21°C) and 50% relative humidity, product skins within 30 minutes and dries in 4 hours.

FastFlash® is moisture curing. Low temperatures and low relative humidity slow dry time. High temperatures and high relative humidity accelerates dry time.

Cleanup

Clean tools and equipment with mineral spirits or similar solvent immediately after use. Follow all safety precautions. Remove cured FastFlash® mechanically using a sharp-edged tool.

Product Data Sheet R-Guard FastFlash®

WARRANTY

The information and recommendations made are based on our own research and the research of others, and are believed to be accurate. However, no guarantee of their accuracy is made because we cannot cover every possible application of our products, nor anticipate every variation encountered in masonry surfaces, job conditions and methods used. The purchasers shall make their own tests to determine the suitability of such products for a particular purpose.

PROSOCO, Inc. warrants this product to be free from defects. **Where permitted by law, PROSOCO makes no other warranties with respect to this product, express or implied, including without limitation the implied warranties of merchantability or fitness for particular purpose.** The purchaser shall be responsible to make his own tests to determine the suitability of this product for his particular purpose. PROSOCO's liability shall be limited in all events to supplying sufficient product to re-treat the specific areas to which defective product has been applied. Acceptance and use of this product absolves PROSOCO from any other liability, from whatever source, including liability for incidental, consequential or resultant damages whether due to breach of warranty, negligence or strict liability. This warranty may not be modified or extended by representatives of PROSOCO, its distributors or dealers.

CUSTOMER CARE

Factory personnel are available for product, environment and job-safety assistance with no obligation. Call 800-255-4255 and ask for Customer Care - technical support.

Factory-trained representatives are established in principal cities throughout the continental United States. Call Customer Care at 800-255-4255, or visit our web site at www.prosoco.com, for the name of the PROSOCO representative in your area.

BEST PRACTICES

Surfaces should be clean, free of standing water and in good repair before application. Most building surfaces can be cleaned using Enviro Klean® 2010 All Surface Cleaner. Information is available by calling Customer Care at 800-255-4255.

In rough openings, prime raw gypsum board edges with R-Guard PorousPrep.

For best results, spread/tool FastFlash® while still wet, within 2-3 minutes of gun application.

Hot Weather Precautions: If air or surface temperatures exceed 95°F (35°C), apply to shaded surfaces and before daytime air and surface temperatures reach their peak. Hot surfaces may be cooled with a mist of fresh water. Keep containers closed and out of direct sunlight when not in use. **Cold Weather Conditions:** May be applied to frost-free substrates at temperatures below 32°F (0°C). Product will not start curing and drying until temperature rises to and remains above 32°F (0°C). **Low Humidity Conditions:** Curing may take longer than 12 hours. Lightly misting treated surfaces with fresh water will accelerate curing. Uncured material may delay construction.

FastFlash® may be used to adhere and gasket mechanically fastened building components.

When using FastFlash® as a flashing membrane, apply 12-15 wet mils. FastFlash® produces an opaque flashing membrane when installed at the recommended 12-15 wet mils to simplify inspection and quality control.

PROSOCO R-Guard® Joint & Seam Filler, FastFlash® and AirDam® are recommended for improved performance of all R-Guard air- and water-resistive barrier coatings.

Allow FastFlash® to skin over before installing the selected PROSOCO R-Guard® Primary Air & Water-Resistive Barrier.

Use FastFlash® after the primary R-Guard air barrier has been applied to repair cracks or fill voids.

Illustration depicting the use of PROSOCO R-Guard® products are available at www.prosoco.com by downloading the R-Guard Installation Guidelines.

To schedule field technical support, contact your PROSOCO Technical Customer Care toll-free at 800-255-4255. Field visits by PROSOCO personnel are for the purpose of making technical recommendations only. PROSOCO is not responsible for providing job site supervision or quality control. Proper application is the responsibility of the applicator.



PRODUCT TEST RESULTS
R-Guard FastFlash®



AAMA 714-12: VOLUNTARY SPECIFICATION FOR LIQUID-APPLIED FLASHING USED TO CREATE A WATER-RESISTIVE SEAL AROUND EXTERIOR WALL OPENINGS IN BUILDINGS

TEST	METHOD	CRITERIA	RESULTS
Adhesive Strength to Substrates	ASTM C 794	≥ 5 pli	Pass
Water Penetration Around Nails	Modified ASTM D 1870 AAMA 711 Section 5.3	Shall pass 31 mm (1.2 in) of water	Pass
Accelerated UV Aging Peel Adhesion Appearance	ASTM G 154, UVA cycle 1 ASTM C 794, Visual	≥ 5 pli	Pass
Elevated Temperature Exposure, Level 3=176° F for 7 days	AAMA 711 ASTM C 794	≥ 5 pli	Pass
Thermal Cycling (10 cycles) Peel Adhesion	AAMA 711 ASTM C 794	≥ 5 pli	Pass
Crack Bridging	ASTM C 1305	Water holdout of 550 millimeters for 24 hours with 1/8-inch crack after cycling per ATM C 1305 for 10 cycles.	Pass
Water Immersion	AAMA 711 ASTM C 794	≥ 5 pli	Pass
Water Vapor Permeability	ASTM E 96 Wet Cup	Minimum of 10 perms at manufacturer's recommended application thickness	Pass - 21 perms
Damp Surfaces	ASTM C 794	≥ 5 pli	Pass

ICC-ES AC212¹: ACCEPTANCE CRITERIA FOR WATER-RESISTIVE COATINGS USED AS WATER-RESISTIVE BARRIERS OVER EXTERIOR SHEATHING (*FASTFLASH TESTED AS PART OF AN ASSEMBLY)

*Tensile Bond	ASTM C 297	Minimum 15 psi (105 kPa)	Pass
*Freeze-Thaw	ICC-ES AC212	No cracking, checking, crazing, erosion, delamination or other deleterious effects	Pass
*Water Resistance	ASTM D 2247	No cracking, checking, crazing, erosion, delamination or other deleterious effects	Pass
*Water Penetration	ASTM E 331	No visible water penetration at sheathing joints as viewed from back of the panel.	Pass
*Weathering	ICC-ES AC212 AATCC ² 127	No cracking of the coating; no water penetration.	Pass

ABAA: AIR BARRIER ASSOCIATION OF AMERICA ACCEPTANCE CRITERIA FOR LIQUID APPLIED MEMBRANES (*FASTFLASH TESTED AS PART OF AN ASSEMBLY)

*Air Leakage of Air Barrier Assemblies	ASTM E 2357	≤ 0.2 L / s·m ² at 75 Pa (≤ 0.04 cfm / ft ² at 1.57 psf)	Pass: 0.0105 L / s·m ² at 75 Pa (0.0021 cfm / ft ² at 1.57 psf)
--	-------------	---	--

FIRE TESTING

Surface Burning Characteristics	ASTM E 84	Criteria for ICC and NFPA Class A Building Material: Flame Spread ≤ 25 Smoke Developed ≤ 450	Meets Class A Building Material Flame Spread: 15 Smoke Developed: 10
---------------------------------	-----------	--	--

All testing was completed by independent, accredited laboratories.

NOTES:

1. International Code Council Evaluation Service Acceptance Criteria 212
2. American Association of Textile Chemists and Colorists



SAFETY DATA SHEET

PROSOCO, Inc.



Issue Date 26-Aug-2014

Revision Date 28-Jan-2016

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Product Name PROSOCO R-Guard® FastFlash®

Other means of identification

Product Code 70400

Recommended use of the chemical and restrictions on use

Recommended Use Restricted to professional users.

Uses advised against No information available

Details of the supplier of the safety data sheet

Manufacturer Address

PROSOCO, Inc.
3741 Greenway Circle
Lawrence, Kansas 66046

Emergency telephone number

8:00 AM – 5:00 PM CST Monday-Friday 785-865-4200

NON-BUSINESS HOURS (INFOTRAC) 800-535-5053

2. HAZARDS IDENTIFICATION

Classification

Reproductive toxicity Category 1B

Label elements

Emergency Overview

Danger

Hazard statements

May damage fertility or the unborn child



Appearance paste

Physical state Paste/Gel Liquid

Odor Mild

Precautionary Statements - Prevention

Obtain special instructions before use

Do not handle until all safety precautions have been read and understood

Use personal protective equipment as required

Precautionary Statements - Response

IF exposed or concerned: Get medical advice/attention

Precautionary Statements - Storage

Store locked up

Precautionary Statements - Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)**Other Information**

No information available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No	Weight-%	Trade Secret
Proprietary - Silyl Terminated Polyether	Undisclosed	10 - 30	*
Limestone	1317-65-3	10 - 30	*
Precipitated Calcium Carbonate	471-34-1	10 - 30	*
Polypropylene glycol	25322-69-4	10 - 30	*
Stearic acid	57-11-4	1 - 5	*
Aminoethyl aminopropyl trimethoxy silane	1760-24-3	1 - 5	*
Hydrophobic Silica	67762-90-7	1 - 5	*
Dibutyltin Diacetyldiacetonate	22673-19-4	0.1 - 1	*

* The exact percentage (concentration) of composition has been withheld as a trade secret.

4. FIRST AID MEASURES**First aid measures****General advice**

If symptoms persist, call a physician. Do not get in eyes, on skin, or on clothing.

Eye contact

Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. If symptoms persist, call a physician.

Skin Contact

Wipe off material with a dry cloth. Wash with soap and water. Consult a physician if necessary.

Inhalation

Remove to fresh air. If symptoms persist, call a physician.

Ingestion

Do NOT induce vomiting. Drink plenty of water. Rinse mouth. If symptoms persist, call a physician.

Self-protection of the first aider

Use personal protective equipment as required.

Most important symptoms and effects, both acute and delayed**Symptoms**

May cause irritation. May be harmful if swallowed.

Indication of any immediate medical attention and special treatment needed**Note to physicians**

Treat symptomatically.

5. FIRE-FIGHTING MEASURES**Suitable Extinguishing Media**

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Small Fire Dry chemical or CO2. Foam.

Large Fire Water spray or fog. Foam.

Unsuitable Extinguishing Media Caution: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical

No information available.

Protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Avoid contact with skin, eyes or clothing. Avoid breathing vapors or mists.

Environmental precautions

Environmental precautions Do not flush into surface water or sanitary sewer system. Prevent entry into waterways, sewers, basements or confined areas. See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Pick up and transfer to properly labeled containers. Clean contaminated surface thoroughly.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Avoid contact with skin, eyes or clothing. Use personal protective equipment as required. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep container tightly closed in a dry and well-ventilated place. Keep out of the reach of children.

Incompatible materials Acids. Strong oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Limestone 1317-65-3	-	TWA: 15 mg/m ³ total dust TWA: 5 mg/m ³ respirable fraction (vacated) TWA: 15 mg/m ³ total dust (vacated) TWA: 5 mg/m ³ respirable fraction	TWA: 10 mg/m ³ total dust TWA: 5 mg/m ³ respirable dust
Precipitated Calcium Carbonate 471-34-1	-	-	TWA: 10 mg/m ³ total dust TWA: 5 mg/m ³ respirable dust
Dibutyltin Diacetyl/acetonate 22673-19-4	STEL: 0.2 mg/m ³ Sn TWA: 0.1 mg/m ³ Sn	TWA: 0.1 mg/m ³ Sn (vacated) TWA: 0.1 mg/m ³ Sn	IDLH: 25 mg/m ³ Sn TWA: 0.1 mg/m ³ except

	S*	(vacated) S*	Cyhexatin Sn
--	----	--------------	--------------

NIOSH IDLH *Immediately Dangerous to Life or Health*

Other Information Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Appropriate engineering controls

Engineering Controls None under normal use conditions.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin and body protection Wear protective gloves and protective clothing.

Respiratory protection If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations Avoid contact with eyes, skin and clothing. Wash contaminated clothing before reuse. Use personal protective equipment as required.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Paste/Gel Liquid		
Appearance	paste	Odor	Mild
Color	red	Odor threshold	No information available
Property	Values	Remarks • Method	
pH	Not Applicable		
Melting point/freezing point	No information available		
Boiling point/boiling range	No information available		
Flash point	> 100 °C / > 212 °F		
Evaporation rate	No information available		
Flammability (solid, gas)	No information available		
Flammability Limits in Air			
Upper flammability limits	No information available		
Lower flammability limit	No information available		
Vapor pressure	No information available		
Vapor density	No information available		
Specific Gravity	1.45 - 1.60		
Water solubility	insoluble		
Solubility in other solvents	No information available		
Partition coefficient	No information available		
Autoignition temperature	No information available		
Decomposition temperature	No information available		
Kinematic viscosity	No information available		
Dynamic viscosity	No information available		

10. STABILITY AND REACTIVITY

Reactivity

No data available

Chemical stability

Stable under recommended storage conditions.

Possibility of Hazardous Reactions

None under normal processing.

Conditions to avoid

Extremes of temperature and direct sunlight.

Incompatible materials

Acids. Strong oxidizing agents.

Hazardous Decomposition Products

Carbon oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information	May be harmful by inhalation, ingestion, or skin absorption
Inhalation	Avoid breathing vapors or mists.
Eye contact	Avoid contact with eyes.
Skin Contact	Avoid contact with skin.
Ingestion	Do not taste or swallow.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Precipitated Calcium Carbonate 471-34-1	= 6450 mg/kg (Rat)	-	-
Polypropylene glycol 25322-69-4	> 2 g/kg (Rat)	-	-
Stearic acid 57-11-4	-	> 5 g/kg (Rabbit)	-
Aminoethyl aminopropyl trimethoxy silane 1760-24-3	= 7460 µL/kg (Rat)	-	-

Information on toxicological effects

Symptoms May cause irritation. May be harmful if swallowed.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization	No information available.
Germ cell mutagenicity	No information available.
Carcinogenicity	This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP.
Reproductive toxicity	May damage fertility or the unborn child.
STOT - single exposure	No information available.
STOT - repeated exposure	No information available.
Aspiration hazard	No information available.

Numerical measures of toxicity - Product Information

The following values are calculated based on chapter 3.1 of the GHS document .

ATEmix (oral)	5815 mg/kg
ATEmix (dermal)	19017 mg/kg mg/l

12. ECOLOGICAL INFORMATION

Ecotoxicity

Persistence and degradability

No information available.

Bioaccumulation

No information available.

Other adverse effects

No information available

13. DISPOSAL CONSIDERATIONS**Waste treatment methods****Disposal of wastes**

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging

Do not reuse container.

This product contains one or more substances that are listed with the State of California as a hazardous waste.

14. TRANSPORT INFORMATION**DOT**

Not Regulated for all modes of transportation.

15. REGULATORY INFORMATION**International Inventories****TSCA**

Complies

DSL/NDSL

Complies

Legend:*TSCA - United States Toxic Substances Control Act Section 8(b) Inventory Complies**DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List***US Federal Regulations****SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations**California Proposition 65**

This product contains the following Proposition 65 chemicals

Chemical Name	California Proposition 65
Quartz - 14808-60-7	Carcinogen
Methanol - 67-56-1	Developmental

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Limestone 1317-65-3	X	X	X
Quartz 14808-60-7	X	X	X
Bis (2-ethylhexyl) adipate 103-23-1	X	X	X

16. OTHER INFORMATION

NFPA	Health hazards 2	Flammability 0	Instability 0	Physical and Chemical Properties -
HMIS	Health hazards 2	Flammability 0	Physical hazards 0	Personal protection X

Prepared By Regulatory Department
Issue Date 26-Aug-2014
Revision Date 28-Jan-2016

Revision Note

SDS sections updated

2 4 6 8 11

For product produced after February 10, 2016

Disclaimer

The information contained on the Safety Data Sheet has been compiled from data considered accurate. This data is believed to be reliable, but it must be pointed out that values for certain properties are known to vary from source to source. PROSOCO, Inc. expressly disclaims any warranty express or implied as well as any liability for any injury or loss arising from the use of this information or the materials described. This data is not to be construed as absolutely complete since additional data may be desirable when particular conditions or circumstances exist. It is the responsibility of the user to determine the best precautions necessary for the safe handling and use of this product for his unique application. This data relates only to the specific material designated and is not to be used in combination with any other material. Many federal and state regulations pertain directly or indirectly to the product's end use and disposal of containers and unused material. It is the purchaser's responsibility to familiarize himself with all applicable regulations.

End of Safety Data Sheet



Joint & Seam Filler

PROSOCO R-Guard® Joint & Seam Filler is a gun-grade, crack and joint filler, adhesive and detailing compound that combines the best of silicone and polyurethane properties. This single-component, fiber-reinforced, Silyl-Terminated-Poly-Ether (STPE) is easy to gun, spread and tool.

Use Joint & Seam Filler to fill openings and create transitions where flexible reinforcement is required to bridge larger gaps and provide continuous support of fluid-applied flashing membranes, waterproofing or air barrier components.

Suitable for all climates, Joint & Seam Filler bonds directly to damp or dry surfaces and cures under a variety of weather conditions. It dramatically reduces surface preparation time by eliminating the need for reinforcing tapes at sheathing joints, inside and outside corners.

Use Joint & Seam Filler as part of a continuous, building-wide air barrier system, or to prepare surfaces for conventional waterproofing or air barrier components. Joint & Seam Filler may also be used to repair cracks or fill voids after the primary R-Guard air barrier has been applied.

ADVANTAGES

- Streamlines preparation by eliminating the need for joint reinforcing tapes.
- Silane functional polymer provides superior long term adhesion, crack filling and weathering characteristics.
- Bonds to most common building materials without priming.
- Single component saves time - no mixing.
- Fills open joints and seams up to 1 inch in width.
- Bonds and cures in wet weather and on damp substrates. Tolerates rain immediately after application.
- May be fully exposed to UV and weather for up to 12 months. If longer, contact for inspection.
- Compatible with most sealants and waterproofing or air barrier components.
- Solvent free. Isocyanate free. Phthalate free.

- No shrinkage. No staining. No yellowing.
- Breathable - allows damp surfaces to dry.
- Will not support mold growth.
- Service temperatures from -75°F to 300°F (-59°C to 149°C).
- Passes ASTM E84, Standard Test Method for Surface Burning Characteristics of Building Materials.
- Illustration depicting the use of PROSOCO R-Guard® products are available at www.prosoco.com by downloading the R-Guard Installation Guidelines.

Limitations

- Not for use as a liquid flashing membrane. Use R-Guard FastFlash®.
- Not for use in place of appropriate through-wall flashing. See R-Guard SS ThruWall product literature.
- Not for use below grade or in locations which are continuously immersed in water.

REGULATORY COMPLIANCE

VOC Compliance

R-Guard Joint & Seam Filler is compliant with the following national, state and district VOC regulations:

- US Environmental Protection Agency
- California Air Resources Board SCM Districts
- South Coast Air Quality Management District
- Maricopa County, AZ
- Northeast Ozone Transport Commission

SAFETY INFORMATION

Always read full label and SDS for precautionary instructions before use. Use appropriate safety equipment and job site controls during application and handling.

24-Hour Emergency Information:
INFOTRAC at 800-535-5053



Product Data Sheet R-Guard Joint & Seam Filler

TYPICAL TECHNICAL DATA

FORM	viscous paste, mild odor pale red color
SPECIFIC GRAVITY	1.40 – 1.50
pH	not applicable
WT/GAL	11.8 lbs
TOTAL SOLIDS	99%
VOC CONTENT	30 g/L maximum
FLASH POINT	no data
FREEZE POINT	no data
SHELF LIFE	1 year in tightly sealed, unopened container

Cured Properties

Hardness, Shore A	40–50
Tensile Strength	70 psi
Elongation at Break	180%
Water Vapor Transmission	19 perms @ 20 mils
Peel Strength	>25 pli
Accelerated Weathering	Pass
Shrinkage	None
Corrosive Properties	Non-corrosive

Uncured Properties

Cure Rate	1/8 inch thickness/24 hours
Tack-Free Time	20–40 minutes

Refer to the R-Guard Joint & Seam Filler Product Test Results document for a complete list of performance test results.

PREPARATION

To ensure best results, apply to clean surfaces free of contaminants. Chemical residues, surface coatings or films may adversely affect adhesion. Pressure-treated wood and other contaminated surfaces should be cleaned with a solvent wipe before application.

Protect people, vehicles, property, plants and all other surfaces not intended to receive Joint & Seam Filler.

Remove and replace damaged sheathing.

Any gaps or joints greater than 1 inch should be structurally repaired or readied for an appropriate transition membrane.

In rough openings, prime all raw gypsum board edges with R-Guard PorousPrep.

Surface & Air Temperatures

Surface and ambient temperatures should be 40°F (4°C) and rising and below 110°F (43°C) during application and drying. Wind and high temperatures will accelerate drying.

Hot Weather Precautions: If air or surface temperatures exceed 95°F (35°C), apply to shaded surfaces and before daytime air and surface temperatures reach their peak. Hot surfaces may be cooled with a mist of fresh water. Keep containers closed and out of direct sunlight when not in use.

Cold Weather Conditions: May be applied to frost-free substrates at temperatures below 32°F (0°C). Product will not start curing and drying until temperature rises to and remains above 32°F (0°C).

Low Humidity Conditions: Curing may take longer than 12 hours. Lightly misting treated surfaces with fresh water will accelerate curing. Uncured material may delay construction.

Though Joint & Seam Filler may be applied to damp surfaces and tolerates rain immediately after application, do not apply to surfaces with standing water or frost.

Equipment

Apply using a professional caulking gun. Use a DRY joint knife, trowel or spatula to tool and spread the product. Do not use soapy water when tooling or spreading.

Storage & Handling

Store in a cool, dry place. Keep container tightly closed when not dispensing. Do not open container until preparation work has been completed. Do not alter or mix with other chemicals. When stored at or below 80°F (27°C) R-Guard Joint & Seam Filler has a shelf life of 12 months after the date of manufacture. This shelf life assumes upright storage of factory-sealed containers. Do not double stack pallets. Dispose of unused product and container in accordance with local, state and federal regulations.

Product Data Sheet R-Guard Joint & Seam Filler

APPLICATION

Read "Preparation" and the Safety Data Sheet before use.

Dilution & Mixing

Apply as packaged. Do not dilute or alter, or use for applications other than specified. No mixing required.

Typical Coverage Rates

Coverage varies based on surface texture and irregularities. R-Guard Joint & Seam Filler is sold in 29-oz tubes and 20-oz sausages.

Estimated coverage includes overlapping 1-inch on each side of the sheathing joint. Joint width varies from 0 to 0.25 inches.

- 60.5–93.5 lineal feet per 29-oz tube
- 38.5–60.5 lineal feet per 20-oz sausage

Application Instructions

PREPARE

Prepare all surfaces as described above under "Preparation." Once preparation is complete, cut open tip of threaded fitting, install nozzle and cut nozzle to desired opening.

Filling Joints, Seams and Cracks

1. Apply a thick bead of Joint & Seam Filler to all sheathing joints, seams and cracks. Joints up to ½ inch in width can be treated without backer rod. Treat joints ranging from ½ to 1 inch with backer rod before applying Joint & Seam Filler. Joints larger than 1 inch must be structurally improved or addressed with an appropriate transition membrane. On plywood, spot wood knots, deep cracks or surface irregularities.
2. Use a DRY joint knife, trowel or spatula to tool and spread the product. Spread 1 inch beyond seam at each side to a thickness of 20–30 mils.
3. Allow to skin before installing other waterproofing or air barrier components.

Waterproofing Fastener Penetrations

1. Spot fastener penetrations with Joint & Seam Filler, as necessary. On plywood, spot wood knots, deep cracks or surface irregularities.
2. Allow to skin before installing other waterproofing or air barrier components.

Detailing Rough Openings

1. Prime all raw gypsum board edges with R-Guard PorousPrep.

2. Apply a thick bead of Joint & Seam Filler to all inside corners, cracks, joints and seams within the rough opening.
3. Use a DRY joint knife, trowel or spatula to tool and spread the product. Spread 1 inch beyond seam on each side to a thickness of 20–30 mils.
4. Allow to skin before installing R-Guard FastFlash®.

PROTECT

Apply R-Guard Spray Wrap, MVP, Cat 5®, Cat 5® Rain Screen or other waterproofing or air barrier component pursuant to manufacturer instructions.

TRANSITION

Flashing Transitions

1. Fasten R-Guard SS ThruWall or other flashing leg to the vertical wall surface using a bead of Joint & Seam Filler or conventional methods. Fill any voids between the flashing leg and the vertical wall with Joint & Seam Filler.
2. Apply and tool Joint & Seam Filler as needed to direct water from the vertical wall to the face of SS ThruWall or other flashing.
3. Apply and tool Joint & Seam Filler at inside corners to ensure positive drainage.
4. Allow treated surfaces to skin before installing R-Guard FastFlash®.
5. Use Joint & Seam Filler to fill any remaining surface imperfections to provide positive drainage and continuous support of fluid-applied flashing membranes.

REPAIR

After applying R-Guard Spray Wrap MVP, Cat 5®, Cat 5® Rain Screen, VB or other waterproofing or air barrier component, Joint & Seam Filler may be used to fill any cracks or voids to achieve a seamless, pinhole and void free coating.

Curing and Drying

At 70°F (21°C) and 50% relative humidity, product skins within 30 minutes and dries in 4 hours. Paintable with most paints after 2 hours.

Joint & Seam Filler is moisture curing. Low temperatures and low relative humidity slow dry time. High temperatures and high relative humidity accelerate dry time.

Cleanup

Clean tools and equipment with mineral spirits or similar solvent immediately after use. Follow all safety precautions. Remove cured Joint & Seam Filler mechanically using a sharp-edged tool.

Product Data Sheet R-Guard Joint & Seam Filler

WARRANTY

The information and recommendations made are based on our own research and the research of others, and are believed to be accurate. However, no guarantee of their accuracy is made because we cannot cover every possible application of our products, nor anticipate every variation encountered in masonry surfaces, job conditions and methods used. The purchasers shall make their own tests to determine the suitability of such products for a particular purpose.

PROSOCO, Inc. warrants this product to be free from defects. **Where permitted by law, PROSOCO makes no other warranties with respect to this product, express or implied, including without limitation the implied warranties of merchantability or fitness for particular purpose.** The purchaser shall be responsible to make his own tests to determine the suitability of this product for his particular purpose. PROSOCO's liability shall be limited in all events to supplying sufficient product to re-treat the specific areas to which defective product has been applied. Acceptance and use of this product absolves PROSOCO from any other liability, from whatever source, including liability for incidental, consequential or resultant damages whether due to breach of warranty, negligence or strict liability. This warranty may not be modified or extended by representatives of PROSOCO, its distributors or dealers.

CUSTOMER CARE

Factory personnel are available for product, environment and job-safety assistance with no obligation. Call 800-255-4255 and ask for Customer Care – technical support.

Factory-trained representatives are established in principal cities throughout the continental United States. Call Customer Care at 800-255-4255, or visit our web site at www.prosoco.com, for the name of the PROSOCO representative in your area.

BEST PRACTICES

Surfaces should be clean, free of standing water and in good repair before application. Most building surfaces can be cleaned using Enviro Klean® 2010 All Surface Cleaner. Information is available by calling Technical Customer Care at 800-255-4255.

In rough openings, prime raw gypsum board edges with R-Guard PorousPrep.

For best results, spread and tool Joint & Seam Filler while still wet, within 2–3 minutes of gun application.

Hot Weather Precautions: If air or surface temperatures exceed 95°F (35°C), apply to shaded surfaces and before daytime air and surface temperatures reach their peak. Hot surfaces may be cooled with a mist of fresh water. Surfaces may be damp but must be free of standing water before application. Keep containers closed and out of direct sunlight when not in use. **Cold Weather Conditions:** May be applied to frost-free substrates at temperatures below 32°F (0°C). Product will not start curing and drying until temperature rises to and remains above 32°F (0°C). **Low Humidity Conditions:** Curing may take longer than 12 hours. Lightly mist treated surfaces with fresh water to accelerate cure. Uncured material may delay construction.

Use Joint & Seam Filler to adhere and gasket mechanically fastened building components. Use FastFlash® to counter flash.

Use Joint & Seam Filler after the primary R-Guard air barrier has been applied to repair cracks or fill voids.

PROSOCO R-Guard® Joint & Seam Filler, FastFlash® and AirDam® are recommended for improved performance of R-Guard Spray Wrap MVP, VB, Cat 5® and Cat 5® Rain Screen water-resistive barrier coatings.

Illustrations depicting the use of PROSOCO R-Guard® products are available at www.prosoco.com by downloading the R-Guard Installation Guidelines.

To schedule field technical support, contact your PROSOCO Technical Customer Care toll-free at 800-255-4255. Field visits by PROSOCO personnel are for the purpose of making technical recommendations only. PROSOCO is not responsible for providing job site supervision or quality control. Proper application is the responsibility of the applicator.



PRODUCT TEST RESULTS
R-Guard Joint & Seam Filler



ICC-ES AC212¹: ACCEPTANCE CRITERIA FOR WATER-RESISTIVE COATINGS USED AS WATER-RESISTIVE BARRIERS OVER EXTERIOR SHEATHING (*JOINT & SEAM FILLER TESTED AS PART OF AN ASSEMBLY)			
TEST	METHOD	CRITERIA	RESULTS
*Tensile Bond	ASTM C 297	Minimum 15 psi (105 kPa)	Pass
*Freeze-Thaw	ICC-ES AC212	No cracking, checking, crazing, erosion, delamination or other deleterious effects	Pass
*Water Resistance	ASTM D 2247	No cracking, checking, crazing, erosion, delamination, or other deleterious effects	Pass
*Water Penetration	ASTM E 931	No visible water penetration at sheathing joints as viewed from back of the panel	Pass
*Structural, Racking, Restrained Environmental Conditioning & Water Penetration	ASTM E 1233A ASTM E 72 ICC-ES AC212 ASTM E 931	No cracking of the coating	Pass
*Weathering	ICC-ES AC212 AATCC ² 127	No cracking of the coating; no water penetration	Pass
ABAA: AIR BARRIER ASSOCIATION OF AMERICAN ACCEPTANCE CRITERIA FOR LIQUID APPLIED MEMBRANES (*JOINT & SEAM FILLER TESTED AS PART OF AN ASSEMBLY)			
*Air Leakage of Air Barrier Assemblies	ASTM E 2347	≤ 0.2 L / s·m ² at 75 Pa (≤ 0.04 cfm / ft ² at 1.57 psf)	Pass 0.0105 / s·m ² at 75 Pa (0.0021 cfm / ft ² at 1.57 psf)
FIRE TESTING (*JOINT & SEAM FILLER TESTED AS PART OF AN ASSEMBLY)			
*Fire Propagation Characteristics of Exterior Non-load-bearing Wall Assemblies	NFPA ³ 285	Must resist flame propagation and flame spread	Pass ⁴
Surface Burning Characteristics	ASTM E 84	Criteria for ICC and NFPA Class A Building Material Flame Spread ≤ 25 Smoke Developed ≤ 450	Meets Class A Building Material Flame Spread: 15 Smoke Developed: 5

All testing was completed by independent, accredited laboratories.

NOTES:

1. International Code Council Evaluation Service Acceptance Criteria 212
2. American Association of Textile Chemists and Colorists
3. National Fire Protection Association
4. Southwest Research Institute Report No. 01.17421.01.001



SAFETY DATA SHEET

PROSOCO, Inc.



Issue Date 11-Aug-2014

Revision Date 26-Jan-2016

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Product identifier

Product Name PROSOCO R-Guard® Joint & Seam Filler

Other means of identification

Product Code 70410

Recommended use of the chemical and restrictions on use

Recommended Use Restricted to professional users.

Uses advised against No information available

Details of the supplier of the safety data sheet

Manufacturer Address

PROSOCO, Inc.
3741 Greenway Circle
Lawrence, Kansas 66046

Emergency telephone number

8:00 AM – 5:00 PM CST Monday-Friday 785-865-4200
NON-BUSINESS HOURS (INFOTRAC) 800-535-5053

2. HAZARDS IDENTIFICATION

Classification

Reproductive toxicity Category 1B

Label elements

Emergency Overview

Danger

Hazard statements

May damage fertility or the unborn child



Appearance viscous

Physical state Paste/Gel Liquid

Odor Mild

Precautionary Statements - Prevention

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required

Precautionary Statements - Response

IF exposed or concerned: Get medical advice/attention



Precautionary Statements - Storage

Store locked up

Precautionary Statements - Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)**Other Information**

No information available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No	Weight-%	Trade Secret
Proprietary - Silyl Terminated Polyether	Undisclosed	10 - 30	*
Limestone	1317-65-3	10 - 30	*
Polypropylene glycol	25322-69-4	10 - 30	*
Precipitated Calcium Carbonate	471-34-1	10 - 30	*
Stearic acid	57-11-4	1 - 5	*
Aminoethyl aminopropyl trimethoxy silane	1760-24-3	1 - 5	*
Titanium dioxide	13463-67-7	1 - 5	*
Polyethylene Terephthalate	25038-59-9	1 - 5	*
Dibutyltin Diacetyldiacetate	22673-19-4	0.1 - 1	*

* The exact percentage (concentration) of composition has been withheld as a trade secret.

4. FIRST AID MEASURES**First aid measures**

General advice	Do not get in eyes, on skin, or on clothing. If symptoms persist, call a physician.
Eye contact	Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. If symptoms persist, call a physician.
Skin Contact	Wipe off material with a dry cloth. Wash with soap and water. Consult a physician if necessary.
Inhalation	Remove to fresh air. If breathing is irregular or stopped, administer artificial respiration. Avoid direct contact with skin. Use barrier to give mouth-to-mouth resuscitation. Call a physician.
Ingestion	Do NOT induce vomiting. Rinse mouth. Drink plenty of water. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician.
Self-protection of the first aider	Use personal protective equipment as required.

Most important symptoms and effects, both acute and delayed

Symptoms	May be harmful if swallowed. May cause irritation.
-----------------	--

Indication of any immediate medical attention and special treatment needed

Note to physicians	Treat symptomatically.
---------------------------	------------------------

5. FIRE-FIGHTING MEASURES

Suitable Extinguishing Media

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Small Fire Dry chemical or CO2. Foam.

Large Fire Water spray or fog. Foam.

Unsuitable Extinguishing Media Caution: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical

No information available.

Hazardous combustion products Carbon oxides.

Protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Ensure adequate ventilation, especially in confined areas.

Environmental precautions

Environmental precautions Do not flush into surface water or sanitary sewer system. Prevent entry into waterways, sewers, basements or confined areas. See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Pick up and transfer to properly labeled containers. Clean contaminated surface thoroughly.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Avoid contact with skin, eyes or clothing. Use personal protective equipment as required. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep out of the reach of children. Keep container tightly closed in a dry and well-ventilated place.

Incompatible materials Acids. Incompatible with oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters**Exposure Guidelines**

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Limestone 1317-65-3	-	TWA: 15 mg/m ³ total dust TWA: 5 mg/m ³ respirable fraction (vacated) TWA: 15 mg/m ³ total dust (vacated) TWA: 5 mg/m ³	TWA: 10 mg/m ³ total dust TWA: 5 mg/m ³ respirable dust

		respirable fraction	
Precipitated Calcium Carbonate 471-34-1	-	-	TWA: 10 mg/m ³ total dust TWA: 5 mg/m ³ respirable dust
Titanium dioxide 13463-67-7	TWA: 10 mg/m ³	TWA: 15 mg/m ³ total dust (vacated) TWA: 10 mg/m ³ total dust	IDLH: 5000 mg/m ³
Dibutyltin Diacetyldiacetonate 22673-19-4	STEL: 0.2 mg/m ³ Sn TWA: 0.1 mg/m ³ Sn S*	TWA: 0.1 mg/m ³ Sn (vacated) TWA: 0.1 mg/m ³ Sn (vacated) S*	IDLH: 25 mg/m ³ Sn TWA: 0.1 mg/m ³ except Cyhexatin Sn

NIOSH IDLH Immediately Dangerous to Life or Health

Other Information Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Appropriate engineering controls

Engineering Controls None under normal use conditions.

Individual protection measures, such as personal protective equipment

Eye/face protection	Wear safety glasses with side shields (or goggles).
Skin and body protection	Wear protective gloves and protective clothing.
Respiratory protection	If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations Do not eat, drink or smoke when using this product. Take off all contaminated clothing and wash it before reuse. Handle in accordance with good industrial hygiene and safety practice.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	Paste/Gel Liquid	Odor	Mild
Appearance	viscous	Odor threshold	No information available
Color	light red		
Property	Values	Remarks • Method	
pH	Not Applicable		
Melting point/freezing point	No information available		
Boiling point/boiling range	No information available		
Flash point	> 100 °C / > 212 °F		
Evaporation rate	No information available		
Flammability (solid, gas)	No information available		
Flammability Limits in Air			
Upper flammability limits	No information available		
Lower flammability limit	No information available		
Vapor pressure	No information available		
Vapor density	No information available		
Specific Gravity	1.4 - 1.5		
Water solubility	Insoluble in water		
Solubility in other solvents	No information available		
Partition coefficient	No information available		
Autoignition temperature	No information available		
Decomposition temperature	No information available		
Kinematic viscosity	No information available		
Dynamic viscosity	No information available		

Explosive properties Not an explosive
Oxidizing properties Not Applicable

10. STABILITY AND REACTIVITY

Reactivity

No data available

Chemical stability

Stable under recommended storage conditions.

Possibility of Hazardous Reactions

None under normal processing.

Conditions to avoid

Extremes of temperature and direct sunlight.

Incompatible materials

Acids. Incompatible with oxidizing agents.

Hazardous Decomposition Products

Carbon oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information	May be harmful by inhalation, ingestion, or skin absorption
Inhalation	Avoid breathing vapors or mists.
Eye contact	Avoid contact with eyes.
Skin Contact	Avoid contact with skin.
Ingestion	Do not taste or swallow.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Polypropylene glycol 25322-69-4	> 2 g/kg (Rat)	-	-
Precipitated Calcium Carbonate 471-34-1	= 6450 mg/kg (Rat)	-	-
Stearic acid 57-11-4	-	> 5 g/kg (Rabbit)	-
Aminoethyl aminopropyl trimethoxy silane 1760-24-3	= 7460 µL/kg (Rat)	-	-
Titanium dioxide 13463-67-7	> 10000 mg/kg (Rat)	-	-

Information on toxicological effects

Symptoms May be harmful if swallowed. May cause irritation.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization	No information available.
Germ cell mutagenicity	No information available.
Carcinogenicity	This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP.
Reproductive toxicity	May damage fertility or the unborn child.
STOT - single exposure	No information available.
STOT - repeated exposure	No information available.
Aspiration hazard	No information available.

Numerical measures of toxicity - Product Information

The following values are calculated based on chapter 3.1 of the GHS document .

ATEmix (oral)	5413 mg/kg
ATEmix (dermal)	21527 mg/kg mg/l

12. ECOLOGICAL INFORMATION

Ecotoxicity**Persistence and degradability**

No information available.

Bioaccumulation

No information available.

Other adverse effects

No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods**Disposal of wastes**

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging

Do not reuse container.

This product contains one or more substances that are listed with the State of California as a hazardous waste.

14. TRANSPORT INFORMATION

DOT

Not Regulated for all modes of transportation.

15. REGULATORY INFORMATION

International Inventories

TSCA	Complies
DSL/NDSL	Non-controlled

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

US Federal Regulations**SARA 313**

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any

chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations**California Proposition 65**

This product contains the following Proposition 65 chemicals

Chemical Name	California Proposition 65
Titanium dioxide - 13463-67-7	Carcinogen
Quartz - 14808-60-7	Carcinogen
Methanol - 67-56-1	Developmental

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Limestone 1317-65-3	X	X	X
Titanium dioxide 13463-67-7	X	X	X
Quartz 14808-60-7	X	X	X

16. OTHER INFORMATION

NFPA	Health hazards 2	Flammability 0	Instability 0	Physical and Chemical Properties - Personal protection X
HMIS	Health hazards 2*	Flammability 0	Physical hazards 0	

Issue Date 11-Aug-2014

Revision Date 26-Jan-2016

Revision Note

SDS sections updated

2 6

For product produced after February 2, 2016

Disclaimer

The information contained on the Safety Data Sheet has been compiled from data considered accurate. This data is believed to be reliable, but it must be pointed out that values for certain properties are known to vary from source to source. PROSOCO, Inc. expressly disclaims any warranty express or implied as well as any liability for any injury or loss arising from the use of this information or the materials described. This data is not to be construed as absolutely complete since additional data may be desirable when particular conditions or circumstances exist. It is the responsibility of the user to determine the best precautions necessary for the safe handling and use of this product for his unique application. This data relates only to the specific material designated and is not to be used in combination with any other material. Many federal and state regulations pertain directly or indirectly to the product's end use and disposal of containers and unused material. It is the purchaser's responsibility to familiarize himself with all applicable regulations.



End of Safety Data Sheet





AirDam[®]

PROSOCO R-Guard[®] AirDam[®] is a gun-grade waterproofing sealant combining the best of silicone and polyurethane properties. Installed as the interior air sealant, AirDam[®] creates a long lasting, weather-tight seal that prevents moist outside air from entering, and conditioned indoor air from escaping around window and door assemblies. This ensures wind driven rain and condensed water are diverted to the flashing membrane and water resistive barrier before it can enter the living space.

This single component, Silyl-Terminated-Poly-Ether (STPE) is easy to gun and tool in all weather conditions. AirDam[®] is immediately waterproof and can be applied in unfavorable weather conditions to dry or damp substrates, eliminating many weather-related construction delays and accelerating the “drying in” of new buildings.

AirDam[®] cures quickly to produce a durable, high performance, high movement elastomeric sealant. Appropriate for exterior or interior use, AirDam[®] is easily applied with standard caulking tools. AirDam[®] bonds tenaciously and can be used with all types of window and door frame material – vinyl, wood or metal, including painted metal. As a properly applied interior window sealant, AirDam[®] can substantially reduce a building’s heating and cooling costs.

SEALANT · WATERPROOFING & RESTORATION INSTITUTE

Issued to: PROSOCO, Inc.
Product: PROSOCO R-GUARD[®] AirDam[®]

C719: Pass Ext:+25% Comp:-25%

Substrate: Vinyl, Anodized Aluminum, Wood
[all substrates were unprimed]

Validation Date: 9/11/13 – 9/10/18

No. 913-PR0918 Copyright © 2013

SEALANT VALIDATION
www.swrionline.org

ADVANTAGES

- Solvent free. Isocyanate free. Complies with all AIM VOC regulations.
- Silane functional polymer provides superior long term adhesion, crack bridging and weathering characteristics.
- Bonds to most common building materials without priming.
- Produces a durable, weather-tight seal.
- Suitable for exterior or interior use.
- Stops penetration of air and water under normal and extreme weather conditions.
- Single component formulation saves time and requires no mixing.
- Easy to gun and tool in all climates.
- Bonds and cures in wet weather and on damp substrates.
- Compatible with most sealants and waterproofing or air barrier components.
- No shrinkage. No staining. Non-yellowing.
- Breathable – allows damp surfaces to dry.
- Will not support mold growth.
- Cured service temperatures: -75°F to 300°F. (-59°C to 149°C).

Limitations

- Not for use bridging gaps more than 2 inches wide.
- Not for underwater applications.
- Not for applications in direct contact with strong acids or solvents.

REGULATORY COMPLIANCE

VOC Compliance

R-Guard AirDam[®] is compliant with the following national, state and district AIM VOC regulations:

- US Environmental Protection Agency
- California Air Resources Board SCM Districts
- South Coast Air Quality Management District
- Maricopa County, AZ
- Northeast Ozone Transport Commission



Product Data Sheet R-Guard AirDam®

TYPICAL TECHNICAL DATA

FORM	viscous white paste, mild odor
SPECIFIC GRAVITY	1.3-1.4
pH	not applicable
WT/GAL	11.24 lbs
TOTAL SOLIDS	98%
VOC CONTENT	30 g/L maximum
FLASH POINT	>200 ° F (>93° C)
FREEZE POINT	not applicable
SHELF LIFE	1 year in tightly sealed, unopened container

Cured Properties

Hardness, Shore A	15-25
Tensile Strength	85 psi
Elongation at Break	1000%
Peel Strength	25 pli

SAFETY INFORMATION

Always read full label and SDS for precautionary instructions before use. Use appropriate safety equipment and job site controls during application and handling.

24-Hour Emergency Information:
INFOTRAC at 800-535-5053

PREPARATION

Protect people, vehicles, property, plants, and all other surfaces not intended to receive AirDam®. Surfaces must be structurally sound and free of any surface contaminants, chemical residues, surface coatings or films that may adversely affect adhesion. Pressure-treated wood and other contaminated surfaces should be cleaned with a solvent wipe before application.

Joint Preparation

For joints less than one-half (1/2) inch wide, sealant depth should be equal to the width of the joint.

For joints ranging from one-half (1/2) to one (1) inch wide, sealant depth should be approximately one-half (1/2) the joint width.

In deep joints, control sealant depth by installing closed cell backer rod. The diameter of soft backer rod should be 25% greater than the joint width. Do not puncture backer rod.

Where joint depth does not permit use of a backer rod, install bond breaker tape to prevent three point bonding.

Surface and Air Temperatures

Surface and ambient temperatures should be 35°F (2°C) and rising and below 110°F (43°C) during application and drying. If air or surface temperatures exceed 95°F (35°C), apply to shaded surfaces and before daytime air and surface temperatures reach their peak. See Best Practices for hot weather installation instructions.

Though AirDam® may be applied to damp surfaces and tolerates rain immediately after application, do not apply to surfaces with standing water or frost.

Equipment

Apply using standard caulking tools.

To tool the product, use a DRY joint knife slightly wider than the gap or joint opening. Do not use soapy water when tooling or spreading.

Storage & Handling

Store in a cool, dry place. Keep container tightly closed when not in use. Do not open cartridges or sausages until preparation work has been completed. Do not alter or mix with other chemicals. When stored at or below 80°F (27°C), AirDam® has a shelf life of 12 months after the date of manufacture. This shelf life assumes upright storage of factory-sealed containers. Do not double-stack pallets. Keep out of the reach of children. Dispose of in accordance with local, state and national regulations.

APPLICATION

Before use, read "Preparation" and the Safety Data Sheet. ALWAYS TEST each surface for suitability and desired results before overall application. Use the following application instructions. Let the surface dry thoroughly before inspection and approval.

Dilution & Mixing

Apply as packaged. Do not dilute or alter, or use for applications other than specified. AirDam® is ready to use. No mixing is required.

Product Data Sheet R-Guard AirDam®

Coverage Rates

Coverage varies depending on the width and depth of joints. When overlapping onto adjacent surfaces, rough surface irregularities will reduce coverage. Use the table below as a guideline when estimating sealant requirements.

JOINT SIZE (D x W)	Linear Feet Sealed	
	20-oz Sausage	10.3-oz Cartridge
3/16 x 1/4 inches	64	33
3/16 x 1/2 inches	32	16
1/4 x 1/4 inches	48	25
1/4 x 1/2 inches	24	12
3/8 x 3/8 inches	21	11
3/8 x 5/8 inches	13	6.6
1/2 x 1/2 inches	12	6.2
1/2 x 3/4 inches	8	4.1

Application Instructions

1. Using a professional grade caulking gun, install sealant in a continuous bead without gaps or air pockets.
2. Tool sealant immediately to ensure complete wetting of joint bond surface and to produce a smooth, concave joint profile flush with the edges of adjacent surfaces. DO NOT use water, soapy water or solvent to tool. Avoid over tooling. Where horizontal and vertical surfaces meet, tool sealant to create a slight cove which will not trap moisture or debris.

Curing and Drying

AirDam® cures at the rate of 1/8 inch of depth per day. High humidity accelerates curing and drying time.

Cleanup

Clean tools and equipment immediately with mineral spirits or similar solvent.

BEST PRACTICES

AirDam® bonds tenaciously. Carefully protect all nearby surfaces not intended to be treated. Immediately clean up incidental contact using mineral spirits or similar solvent.

Use as is. Do not thin or alter in any way.

Apply using a professional caulking gun. To tool the product, use a DRY joint knife slightly wider than the gap or joint opening. Do not use water, soapy water or solvent when tooling or spreading. Avoid over tooling.

Allow for drying time based on temperature and humidity. AirDam® cures at the rate of 1/8 inch of depth per day. High humidity decreases dry-time. Low temperatures and low relative humidity will extend cure time.

Hot Weather Installations: when practical install AirDam® to shaded surfaces. When conditions are hot and dry, cool and dampen the surface with a fresh water mist. Allow standing water to dry before installation.

PROSOCO R-Guard® Joint & Seam Filler, FastFlash® and AirDam® are recommended for improved performance of R-Guard Cat 5®, Cat 5® Rain Screen, Spray Wrap MVP and VB water-resistive barrier coatings.

Illustrations depicting the use of R-Guard products are available at www.prosoco.com by downloading the R-Guard Installation Guidelines.

To schedule field technical support, contact your PROSOCO Technical Customer Care toll-free at 800-255-4255. Field visits by PROSOCO personnel are for the purpose of making technical recommendations only. PROSOCO is not responsible for providing job site supervision or quality control. Proper application is the responsibility of the applicator.

Product Data Sheet R-Guard AirDam®

WARRANTY

The information and recommendations made are based on our own research and the research of others, and are believed to be accurate. However, no guarantee of their accuracy is made because we cannot cover every possible application of our products, nor anticipate every variation encountered in masonry surfaces, job conditions and methods used. The purchasers shall make their own tests to determine the suitability of such products for a particular purpose.

PROSOCO, Inc. warrants this product to be free from defects. **Where permitted by law, PROSOCO makes no other warranties with respect to this product, express or implied, including without limitation the implied warranties of merchantability or fitness for particular purpose.** The purchaser shall be responsible to make his own tests to determine the suitability of this product for his particular purpose. PROSOCO's liability shall be limited in all events to supplying sufficient product to re-treat the specific areas to which defective

product has been applied. Acceptance and use of this product absolves PROSOCO from any other liability, from whatever source, including liability for incidental, consequential or resultant damages whether due to breach of warranty, negligence or strict liability. This warranty may not be modified or extended by representatives of PROSOCO, its distributors or dealers.

CUSTOMER CARE

Factory personnel are available for product, environment and job-safety assistance with no obligation. Call 800-255-4255 and ask for Customer Care - technical support.

Factory-trained representatives are established in principal cities throughout the continental United States. Call Customer Care at 800-255-4255, or visit our web site at www.prosoco.com, for the name of the PROSOCO representative in your area.



PRODUCT TEST RESULTS
R-Guard AirDam



ASTM C 920: STANDARD SPECIFICATION FOR ELASTOMERIC JOINT SEALANTS			
TEST	METHOD	CRITERIA	RESULTS
Rheological Properties	ASTM C 639	Vertical Slump at 40± 3.6° F must be ≤ 3/16" Vertical Slump at 122± 3.6° F must be ≤ 3/16" Horizontal Slump at 40± 3.6° F, no deformation Horizontal Slump at 122± 3.6° F, no deformation	Pass: 0 Pass: 0 Pass: no deformation Pass: no deformation
Extrusion Rate	ASTM C 1183 Procedure A	Report Specific Gravity Extrusion Rate ≥ 10.0 mL/min	1.4 96.9 mL/min
Application Life: Type M, Grade P Only	ASTM C 1183 Procedure A	Not applicable for Type S, Grade NS	Not applicable
Hardness	ASTM C 661	Indentation Hardness <60	Pass: 18
Effects of Heat Aging	ASTM C 1246	Percent Weight Loss ≤7% Visual Examination for presence of cracks or chalking	Pass: 0.96% Pass: no cracking or chalking
Tack-Free Time	ASTM C 679	< 72 hours	Pass: 1.7 hours
Stain and Color Change	ASTM C 510	No visible stain or color change	Pass
Adhesion and Cohesion Under Cyclic Movement	ASTM C 719	Aggregate loss in bond and cohesion ≤1/2 in ²	Pass 0 on vinyl 0 on aluminum 0 on wood
Adhesion-in-Peel	ASTM C 794	Aggregate loss in bond and cohesion ≥5 lbf	Pass 10.4 lbf on vinyl 13.7 on aluminum 10.5 on wood
Adhesion-in-Peel exposed to UV through glass	ASTM C 794 ASTM C 1442	Aggregate loss in bond and cohesion ≥5 lbf	≥5 lbf
Effects of Accelerated Weathering	ASTM C 793 ASTM C 1442	Visual inspection for cracking after accelerated weathering and after cold exposure and low temperature bend ≤ Example #2 in ASTM C 793	Pass: no cracking
SEALANT, WATERPROOFING AND RESTORATION INSTITUTE'S PRODUCT VALIDATION PROGRAM			
Adhesion and Cohesion Under Cyclic Movement (±25%)	ASTM C 719	Aggregate loss in bond and cohesion ≤1/2 in ²	Pass 0 on vinyl 0 on aluminum 0 on wood
OTHER (R-GUARD AIRDAM® TESTED AS PART OF AN ASSEMBLY)			
Air Leakage of Air Barrier Assemblies	ASTM E 2357	≤ 0.2 L / s·m ² at 75 Pa. (≤ 0.04 cfm / ft ² at 1.57 psf)	Pass: <0.001 L / s·m ² at 75 Pa (0.0002 cfm / ft ² at 1.57 psf)

All testing was completed by independent, accredited laboratories.



SAFETY DATA SHEET

PROSOCO, Inc.



PROSOCO
Version 2

Issue Date 27-Aug-2014

Revision Date 28-Jan-2016

1. IDENTIFICATION OF THE SUBSTANCE/Preparation AND OF THE COMPANY/Undertaking

Product identifier

Product Name PROSOCO R-Guard® AirDam®

Other means of identification

Product Code 70440

Recommended use of the chemical and restrictions on use

Recommended Use Restricted to professional users.

Uses advised against No information available

Details of the supplier of the safety data sheet

Manufacturer Address

PROSOCO, Inc.
3741 Greenway Circle
Lawrence, Kansas 66046

Emergency telephone number

8:00 AM – 5:00 PM CST Monday-Friday 785-865-4200
NON-BUSINESS HOURS (INFOTRAC) 800-535-5053

2. HAZARDS IDENTIFICATION

Classification

Reproductive toxicity Category 1B

Label elements

Emergency Overview

Danger

Hazard statements

May damage fertility or the unborn child



Appearance viscous

Physical state paste

Odor Mild

Precautionary Statements - Prevention

Obtain special instructions before use
Do not handle until all safety precautions have been read and understood
Use personal protective equipment as required

Precautionary Statements - Response

IF exposed or concerned: Get medical advice/attention

Precautionary Statements - Storage

Store locked up

Precautionary Statements - Disposal

Dispose of contents/container to an approved waste disposal plant

Hazards not otherwise classified (HNOC)**Other Information**

No information available

3. COMPOSITION/INFORMATION ON INGREDIENTS

Chemical Name	CAS No	Weight-%	Trade Secret
Precipitated Calcium Carbonate	471-34-1	15 - 40	*
Proprietary - Silyl Terminated Polyether	Undisclosed	15 - 40	*
Polypropylene glycol	25322-69-4	10 - 30	*
Stearic acid	57-11-4	1 - 5	*
Limestone	1317-65-3	1 - 5	*
Titanium dioxide	13463-67-7	1 - 5	*
Aminoethyl aminopropyl trimethoxy silane	1760-24-3	1 - 5	*
Dibutyltin Diacetyldiacetonate	22673-19-4	0.1 - 1	*

* The exact percentage (concentration) of composition has been withheld as a trade secret.

4. FIRST AID MEASURES**First aid measures****General advice**

If symptoms persist, call a physician. Do not get in eyes, on skin, or on clothing.

Eye contact

Immediately flush with plenty of water. After initial flushing, remove any contact lenses and continue flushing for at least 15 minutes. Keep eye wide open while rinsing. If symptoms persist, call a physician.

Skin Contact

Wipe off material with a dry cloth. Wash with soap and water. Consult a physician if necessary.

Inhalation

Remove to fresh air. If symptoms persist, call a physician.

Ingestion

Do NOT induce vomiting. Rinse mouth. Drink plenty of water. Never give anything by mouth to an unconscious person. If symptoms persist, call a physician.

Self-protection of the first aider

Use personal protective equipment as required.

Most important symptoms and effects, both acute and delayed**Symptoms**

May be harmful if swallowed. May cause irritation.

Indication of any immediate medical attention and special treatment needed**Note to physicians**

Treat symptomatically.

5. FIRE-FIGHTING MEASURES**Suitable Extinguishing Media**

Use extinguishing measures that are appropriate to local circumstances and the surrounding environment.

Small Fire Dry chemical or CO2. Foam.

Large Fire Water spray or fog. Foam.

Unsuitable Extinguishing Media Caution: Use of water spray when fighting fire may be inefficient.

Specific hazards arising from the chemical

None known.

Protective equipment and precautions for firefighters

As in any fire, wear self-contained breathing apparatus pressure-demand, MSHA/NIOSH (approved or equivalent) and full protective gear.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions, protective equipment and emergency procedures

Personal precautions Use personal protective equipment as required.

Environmental precautions

Environmental precautions Do not flush into surface water or sanitary sewer system. Prevent entry into waterways, sewers, basements or confined areas. See Section 12 for additional ecological information.

Methods and material for containment and cleaning up

Methods for containment Prevent further leakage or spillage if safe to do so.

Methods for cleaning up Pick up and transfer to properly labeled containers. Clean contaminated surface thoroughly.

7. HANDLING AND STORAGE

Precautions for safe handling

Advice on safe handling Avoid contact with skin, eyes or clothing. Use personal protective equipment as required. Wash contaminated clothing before reuse. Do not eat, drink or smoke when using this product.

Conditions for safe storage, including any incompatibilities

Storage Conditions Keep container tightly closed in a dry and well-ventilated place. Keep out of the reach of children.

Incompatible materials Acids. Incompatible with oxidizing agents.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Control parameters

Exposure Guidelines

Chemical Name	ACGIH TLV	OSHA PEL	NIOSH IDLH
Precipitated Calcium Carbonate 471-34-1	-	-	TWA: 10 mg/m ³ total dust TWA: 5 mg/m ³ respirable dust
Limestone 1317-65-3	-	TWA: 15 mg/m ³ total dust TWA: 5 mg/m ³ respirable fraction (vacated) TWA: 15 mg/m ³ total dust (vacated) TWA: 5 mg/m ³ respirable fraction	TWA: 10 mg/m ³ total dust TWA: 5 mg/m ³ respirable dust
Titanium dioxide 13463-67-7	TWA: 10 mg/m ³	TWA: 15 mg/m ³ total dust (vacated) TWA: 10 mg/m ³ total	IDLH: 5000 mg/m ³

Dibutyltin Diacetyldiacetonate 22673-19-4	STEL: 0.2 mg/m ³ Sn	dust	IDLH: 25 mg/m ³ Sn
	TWA: 0.1 mg/m ³ Sn S*	TWA: 0.1 mg/m ³ Sn (vacated) TWA: 0.1 mg/m ³ Sn (vacated) S*	TWA: 0.1 mg/m ³ except Cyhexatin Sn

NIOSH IDLH *Immediately Dangerous to Life or Health*

Other Information Vacated limits revoked by the Court of Appeals decision in AFL-CIO v. OSHA, 965 F.2d 962 (11th Cir., 1992).

Appropriate engineering controls

Engineering Controls None under normal use conditions.

Individual protection measures, such as personal protective equipment

Eye/face protection Wear safety glasses with side shields (or goggles).

Skin and body protection Wear protective gloves and protective clothing.

Respiratory protection If exposure limits are exceeded or irritation is experienced, NIOSH/MSHA approved respiratory protection should be worn. Positive-pressure supplied air respirators may be required for high airborne contaminant concentrations. Respiratory protection must be provided in accordance with current local regulations.

General Hygiene Considerations Do not eat, drink or smoke when using this product. Avoid contact with skin, eyes or clothing. Take off all contaminated clothing and wash it before reuse.

9. PHYSICAL AND CHEMICAL PROPERTIES

Information on basic physical and chemical properties

Physical state	paste	Odor	Mild
Appearance	viscous	Odor threshold	No information available
Color	white		
Property	Values	Remarks • Method	
pH	Not Applicable	Not Applicable	
Melting point/freezing point	No information available		
Boiling point/boiling range	No information available		
Flash point	> 100 °C / > 212 °F		
Evaporation rate	No information available		
Flammability (solid, gas)	No information available		
Flammability Limits in Air			
Upper flammability limits	No information available		
Lower flammability limit	No information available		
Vapor pressure	No information available		
Vapor density	No information available		
Specific Gravity	1.3 - 1.4		
Water solubility	insoluble		
Solubility in other solvents	No information available		
Partition coefficient	No information available		
Autoignition temperature	No information available		
Decomposition temperature	No information available		
Kinematic viscosity	No information available		
Dynamic viscosity	No information available		
Explosive properties	Not Applicable		
Oxidizing properties	Not Applicable		

10. STABILITY AND REACTIVITY

Reactivity

No data available

Chemical stability

Stable under recommended storage conditions.

Possibility of Hazardous Reactions

None under normal processing.

Conditions to avoid

Extremes of temperature and direct sunlight.

Incompatible materials

Acids. Incompatible with oxidizing agents.

Hazardous Decomposition Products

Carbon oxides.

11. TOXICOLOGICAL INFORMATION

Information on likely routes of exposure

Product Information	May be harmful by inhalation, ingestion, or skin absorption
Inhalation	Avoid breathing vapors or mists.
Eye contact	Avoid contact with eyes.
Skin Contact	Avoid contact with skin.
Ingestion	Do not taste or swallow.

Component Information

Chemical Name	Oral LD50	Dermal LD50	Inhalation LC50
Precipitated Calcium Carbonate 471-34-1	= 6450 mg/kg (Rat)	-	-
Polypropylene glycol 25322-69-4	> 2 g/kg (Rat)	-	-
Stearic acid 57-11-4	-	> 5 g/kg (Rabbit)	-
Titanium dioxide 13463-67-7	> 10000 mg/kg (Rat)	-	-
Aminoethyl aminopropyl trimethoxy silane 1760-24-3	= 7460 µL/kg (Rat)	-	-

Information on toxicological effects

Symptoms May cause irritation. May be harmful if swallowed.

Delayed and immediate effects as well as chronic effects from short and long-term exposure

Sensitization	No information available.
Germ cell mutagenicity	No information available.
Carcinogenicity	This product does not contain any carcinogens or potential carcinogens as listed by OSHA, IARC or NTP.
Reproductive toxicity	May damage fertility or the unborn child.
STOT - single exposure	No information available.
STOT - repeated exposure	No information available.
Aspiration hazard	No information available.

Numerical measures of toxicity - Product Information

The following values are calculated based on chapter 3.1 of the GHS document .
ATEmix (oral) 5305 mg/kg

ATEmix (dermal)	64430 mg/kg mg/l
ATEmix (inhalation-dust/mist)	491 mg/l

12. ECOLOGICAL INFORMATION

Ecotoxicity

Persistence and degradability

No information available.

Bioaccumulation

No information available.

Other adverse effects

No information available

13. DISPOSAL CONSIDERATIONS

Waste treatment methods

Disposal of wastes

This material, as supplied, is not a hazardous waste according to Federal regulations (40 CFR 261). Disposal should be in accordance with applicable regional, national and local laws and regulations.

Contaminated packaging

Do not reuse container.

This product contains one or more substances that are listed with the State of California as a hazardous waste.

14. TRANSPORT INFORMATION

DOT

Not Regulated for all modes of transportation.

15. REGULATORY INFORMATION

International Inventories

TSCA Complies

DSL/NDSL Complies

Legend:

TSCA - United States Toxic Substances Control Act Section 8(b) Inventory

DSL/NDSL - Canadian Domestic Substances List/Non-Domestic Substances List

US Federal Regulations

SARA 313

Section 313 of Title III of the Superfund Amendments and Reauthorization Act of 1986 (SARA). This product does not contain any chemicals which are subject to the reporting requirements of the Act and Title 40 of the Code of Federal Regulations, Part 372

SARA 311/312 Hazard Categories

Acute health hazard	Yes
Chronic Health Hazard	No
Fire hazard	No
Sudden release of pressure hazard	No
Reactive Hazard	No

CWA (Clean Water Act)

This product does not contain any substances regulated as pollutants pursuant to the Clean Water Act (40 CFR 122.21 and 40 CFR 122.42)

CERCLA

This material, as supplied, does not contain any substances regulated as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) (40 CFR 302) or the Superfund Amendments and Reauthorization Act (SARA) (40 CFR 355). There may be specific reporting requirements at the local, regional, or state level pertaining to releases of this material

US State Regulations**California Proposition 65**

This product contains the following Proposition 65 chemicals

Chemical Name	California Proposition 65
Titanium dioxide - 13463-67-7	Carcinogen
Methanol - 67-56-1	Developmental
Quartz - 14808-60-7	Carcinogen

U.S. State Right-to-Know Regulations

Chemical Name	New Jersey	Massachusetts	Pennsylvania
Limestone 1317-65-3	X	X	X
Titanium dioxide 13463-67-7	X	X	X
Methanol 67-56-1	X	X	X

16. OTHER INFORMATION

NFPA	Health hazards 2	Flammability 0	Instability 0	Physical and Chemical Properties - Personal protection X
HMIS	Health hazards 2*	Flammability 0	Physical hazards 0	

Prepared By Regulatory Department
Issue Date 27-Aug-2014
Revision Date 28-Jan-2016

Revision Note
SDS sections updated
2 3 4 6 11

For product produced after February 22, 2016

Disclaimer

The information contained on the Safety Data Sheet has been compiled from data considered accurate. This data is believed to be reliable, but it must be pointed out that values for certain properties are known to vary from source to source. PROSOCO, Inc. expressly disclaims any warranty express or implied as well as any liability for any injury or loss arising from the use of this information or the materials described. This data is not to be construed as absolutely complete since additional data may be desirable when particular conditions or circumstances exist. It is the responsibility of the user to determine the best precautions necessary for the safe handling and use of this product for his unique application. This data relates only to the specific material designated and is not to be used in combination with any other material. Many federal and state regulations pertain directly or indirectly to the product's end use and disposal of containers and unused material. It is the purchaser's responsibility to familiarize himself with all applicable regulations.

End of Safety Data Sheet

e. Engineering Documents

1. Review of Build SMART J-Form Foundation System



18 August 2015

BUILD SMART, LLC
3741 Greenway Circle
Lawrence, KS 66046

Attn: Adam Cohen

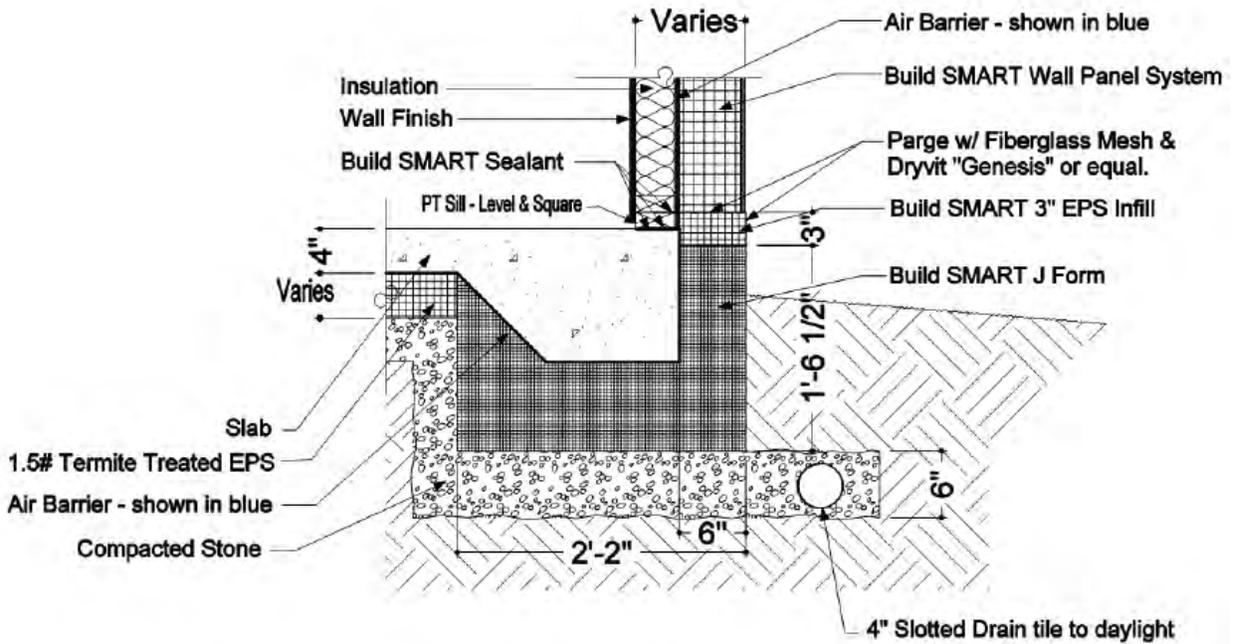
Review of Build SMART J Form Foundation System

We have reviewed the Build SMART J Form foundation, part of the Build SMART energy efficient building system for its appropriateness for use in residential and non-residential construction.

Abstract

The Build SMART house building system is a system of building construction techniques formulated to achieve a highly efficient residential or non-residential building. The Build SMART J Form Passivhaus Foundation comprises the slab foundation component of the Build SMART system. Its primary distinguishing feature is the placement of rigid insulation, of expanded polystyrene material (EPS), between the edge of a stiffened concrete slab-on-grade and the receiving foundation material. This review focuses on the applicability of the Build SMART J Form Passivhaus Foundation as it is formulated for residential construction without basements and utilizing light wood or metal framing with no masonry veneer or masonry components above the foundation structure. This foundation system is shown in Figure 1 below.





Allowable Superimposed Load on Concrete Slab Turn-Down

Soil Bearing Pressure Psf	1500	2000	2500	3000	3500	4000
Turn-Down Load Lb/ft	3000	4100	5200	6300	6400	6400

Figure 1

Analysis

Soil Bearing Pressure

The International Residential Code 2012 (IRC), chapter 4, and the International Building Code 2012 (IBC), chapter 18, contain prescriptive requirements for foundation design. Prescriptive requirements are those code requirements for which no onsite material determinations are required – no investigation is required to determine allowable soil bearing capacity. Table R401.4.1 in IRC and Table 1806.2 in IBC list presumptive soil bearing capacities for various soil classes. These range from 1500 pounds per square foot (psf) for soils of clay and silt makeup to 4000 psf for sedimentary rock.



Footing Width

IRC, in Table R403.1, and IBC, in Table 1809.7, give minimum footing widths for light frame construction. The most restrictive of these, 23" for a three story structure on soil with a bearing capacity of 1500 psf in Table R403.1, is less than the 26" footing width of the Build SMART J Form. Accordingly, the Build SMART Foundation complies with both building codes with regard to footing width.

Design Considerations Regarding the EPS Rigid Foam Component

The use of EPS rigid foam as part of the load-bearing component of a foundation structure carries with it a limitation on the bearing pressure between it and the concrete element of the foundation structure. It has been recognized by the industry and design community that EPS, under constant load, undergoes a physical compression, or shrinkage, over a period of time. This compression is directly related to the intensity of the compression stress within it and to the duration of time over which it is under load.

The most common way this characteristic of EPS is expressed is in terms of the compressive stress at which a certain magnitude of compressive strain, or shrinkage, may be expected. The compressive stresses are commonly listed at shrinkage levels of 5% and 10%. The thickness of the EPS between the perimeter stiffener, or "turn-down" of the concrete slab-on-grade is 8 inches. 5% of this thickness is 0.4", or about 3/8". For the purposes of this review, 5% EPS strain is taken to be the criterion for EPS loading. Light frame construction resting on the Build Smart J Form Foundation can easily sustain this level of downward movement due to compressive strain, or shrinkage of the EPS.

EPS used in the Build SMART J Form is "EPS Geofoam" manufactured by Cellofoam North America, Inc. American Society for Testing and Materials (ASTM) has published a specification for EPS foam material, ASTM D6817, in which EPS material was assigned designations for various foam densities, EPS12, EPS15, EPS19, etc. The two digit numerical part of the designation relates to the density of the material. The greater the density, the higher the level of compressive stress the material can sustain for an expected strain – 5%, 10%, etc. The foam material used in the Build SMART J Form is EPS46 which possess a density of 2.85 pounds per cubic foot (pcf).

The 5% compressive strength, per ASTM D6817, published by Cellofoam North America for EPS Geofoam, EPS46 is 46 psi or 6620 psf.

Thus the EPS used in the Build SMART J Form is appropriate for use on soils with allowable bearing pressures certainly as high as 4000 psf.

Interaction of J Form With Concrete Bearing Element

Figure 1 illustrates that the J Form serves to spread the compressive load from the bottom of the 12" wide concrete "turn-down" to the soil, transverse to the length of the slab edge. Consequently, for a given foundation load the compressive stress in the EPS at the interface between the concrete turn-down is higher than at the bearing of the foam on the soil. For low values of allowable soil bearing pressure the soil strength governs the allowable load that can be superimposed on the concrete turn-down. For higher values of allowable soil bearing the limitation on the compressive stress at the concrete turn-down / EPS interface govern. This is shown in Table 1, below:



Table 1

Soil Bearing Pressure psf	Pressure at Bottom of Turn-Down psf	EPS Compressive Load lb/ft	Allowable Net Foundation Load lb/ft
1500	3250	3250	3000
2000	4330	4330	4100
2500	5420	5420	5200
3000	6500	6500	6300
3500	7580	6620	6400
4000	8670	6620	6400

The table reveals that, if the foundation material possesses an allowable bearing capacity of more than 3500 psf, the maximum foundation load that can be placed on the concrete turn-down is limited to 6400 lbs/ft. This is not, practically, a limitation on the use of the Build SMART J Form foundation since it is quite rare that the soil at a project possesses a bearing strength higher than 3500 psf.

Summary

The use of EPS rigid foam in the construction of the Build SMART J Form foundation for light framed construction is quite appropriate, structurally, and the Allowable Superimposed Foundation Loads table in Figure 1 can be safely and confidently used to assure compliance with both the International Residential Code 2012 and the International Building Code 2012, and with conservative structural design practice.

Sincerely,

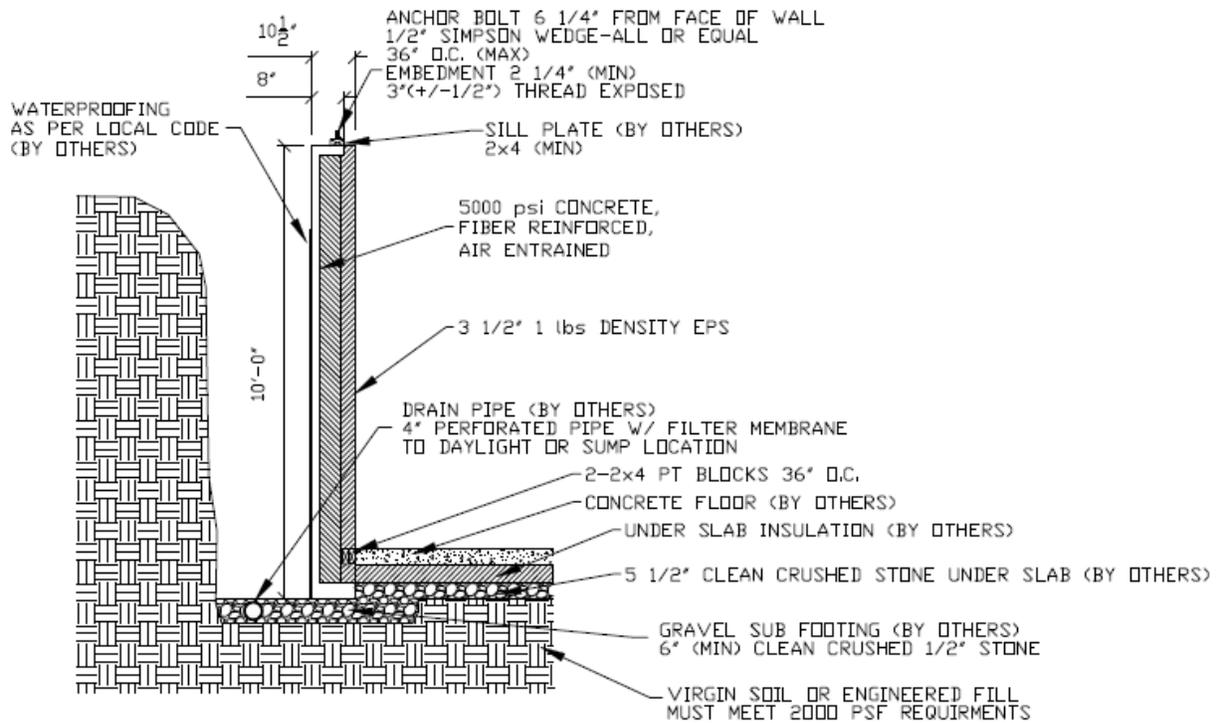


Ron Shiflett, PE



2. Foundation Sections

CROSS SECTION OF IDEAL PRECAST FOUNDATION WALL AREAS WHERE THERE IS 12" OR MORE OF BACKFILL 4000 PLF MAXIMUM UNIFORM LOAD

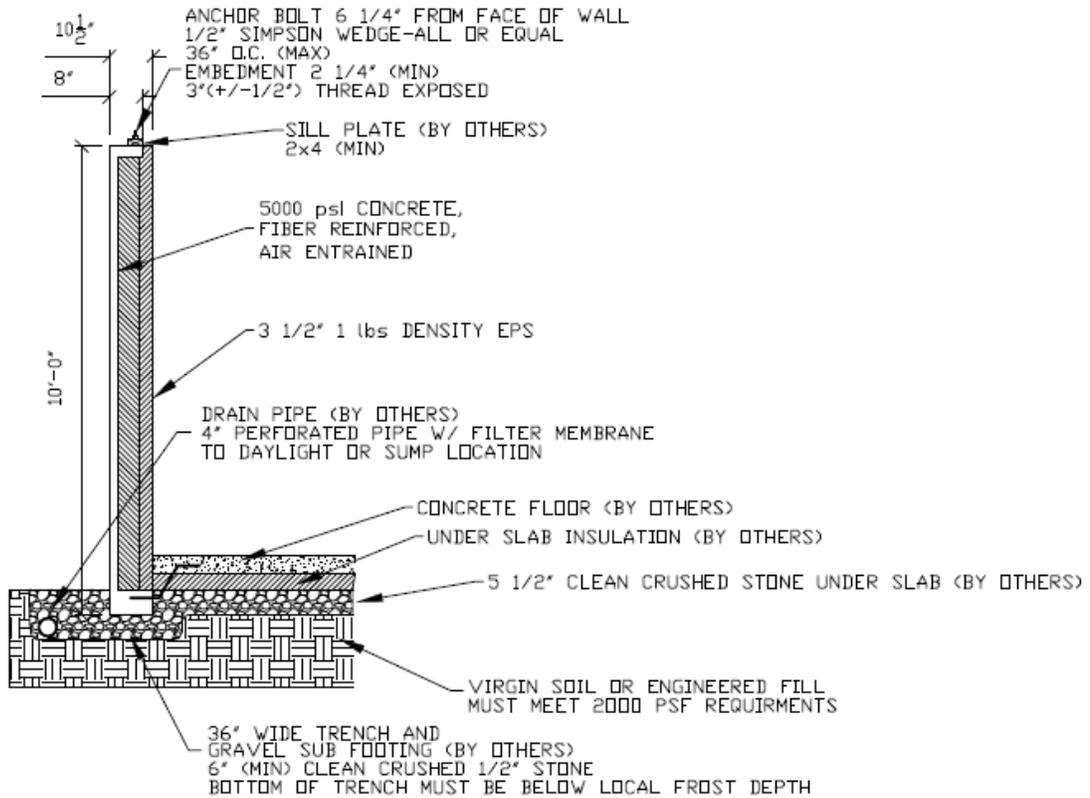


NOTE:

CONCRETE COMPRESSIVE STRENGTH:	5000 psi (FIBER REINFORCED, AIR ENTRAINED)
AIR ENTRAINED RANGE:	4% - 7%
MAX LATERAL PRESSURE:	45 psf/ft of depth
ASSUMED SOIL BEARING PRESSURE:	2500 psf
STEEL YIELD STRENGTH:	60000psi



CROSS SECTION OF IDEAL PRECAST FOUNDATION WALL
 AREAS WHERE THERE IS 12" OR LESS OF BACKFILL
 4000 PLF MAXIMUM UNIFORM LOAD



NOTE:

CONCRETE COMPRESSIVE STRENGTH:	5000 psi (FIBER REINFORCED, AIR ENTRAINED)
AIR ENTRAINED RANGE:	4% - 7%
MAX LATERAL PRESSURE:	45 psf/ft of depth
ASSUMED SOIL BEARING PRESSURE:	2500 psf
STEEL YIELD STRENGTH:	60000psi



3. Wall Panel Engineering Report



June 1, 2015

Build Smart LLC
3741 Greenway Circle
Lawrence, KS 66046

Attn: Adam Cohen

Re: Building Code Compliance of Build Smart Exterior Wall Panel

Dear Adam:

We have examined the construction of the prototype Build Smart exterior wall panel with regard to compliance with building code requirements.

Discussion

There are two building codes under which buildings can be designed and built using Build Smart construction prototypes and techniques, the International Building Code (IBC) and the International Residential Code (IRC). IBC is a performance based building code which gives required design parameters such as live loads, wind pressures, seismic loads, etc., for which a building must be designed. It prescribes very few specific physical requirements such as floor joist sizes or basement wall thicknesses and reinforcement.

IRC, on the other hand, gives performance based design criteria as well but also prescribes the specific physical requirements of some elements such as rafters, floor joists, and basement walls, etc. Those elements not prescribed are designed according to the design specifications referred to by IRC and IBC.

Both codes, in their 2012 versions, contain a table which give minimum stud sizes and maximum stud spacings for various loading conditions. This table is Table R602.3(5) in IRC and Table 2308.9.1 in IBC.

Observations

The most common exterior wall construction used in this country utilizes vertical wood studs spaced at an uniform spacing, installed between a horizontal wood sill and a horizontal wood top plate. Sheathing of oriented strand board (OSB) is commonly used cover the outside of the stud/sill/plate assembly to complete the structurally performing part of the exterior wall element. The wall supports gravity loads from roof and floor construction above and transmits wind and seismic loading to receiving transverse elements of the building.



The most heavily loaded combination in Tables R602.3(5) and 2308.9.1 is that of two floors and a roof. We have chosen this combination for comparison purposes herein. Examination of the table reveals that it does not allow 2x4 studs for the “two floors & roof” combination but does list 2x6 studs spaced at 16 inches.

The Build Smart exterior wall prototype utilizes 2x4 engineered lumber studs at a 24 inch spacing to which is applied 7/16 inch OSB. The engineered lumber is “Lamco LFL” by Lamco Forest Products. However, also part of the assembly is a 5 1/2 inch thickness of expanded polystyrene (EPS) applied to the outside of the sheathing attached to the studs. A thickness of 7/16 inch OSB is then applied to the layer of EPS. So, at first, it appears that the Build Smart exterior wall assembly does not comply with Table R602.3(5) because it utilizes 2x4 studs, and at 24” spacing, for the “two floor & roof” load combination.

We have assessed the strength of the wall assembly expressed in the Tables for the following:

- Placement of two floors and a roof of a 50 foot wide building on the wall
- 110 mph wind speed
- 10' wall height
- Floor live load of 40 psf
- The use of Stud grade S-P-F stud and plate material (common practice)

Strength of dimension lumber wood components was assessed using the allowable stresses prescribed in the “National Design Specification for Wood Construction”, 2005, American Forest and Paper Association, which is referred to by both IBC and IRC.

We find that the wall assembly given in the Tables utilizing 2x6 studs of dimension lumber spaced at 16”, is valid. For the criteria given above this wall construction possesses a factor of safety of about 1.25.

We have also assessed the strength of the Build Smart exterior wall assembly, utilizing 2x4 engineered lumber studs spaced at 24”, recognizing the presence of the thickness of EPS and second layer of OSB. Strength of the Lamco studs is given in a Technical Evaluation Report 1401-01 by DrJ Engineering. We find that it is also structurally adequate, possessing a much larger factor of safety relative to the performance requirements of the IBC and IRC. Its factor of safety is about 4.8, considerably more than the IRC assembly.

We have also assessed the Build Smart assembly utilizing 2x6 engineered studs spaced at 24”. Its factor of safety is 5.5.

Conclusions

We find that both exterior wall assemblies, the conventional wood stud framed wall with 2x6 studs at 16 inch spacing, listed in the Tables, and the Build Smart assembly with 2x4 studs at 24 inch spacing, meet the requirements of both building codes.

Moreover, we find that the strength performance of the Build Smart wall assembly, with 2x4 engineered lumber studs at 24 inch spacing, significantly exceeds that of the conventional assembly with 2x6 studs spaced at 16” spacing when assessed for the combination of two floors and a roof.



IBC, in Paragraph 104.1, and IRC, in Paragraph R104.11, provide for the Building Official to recognize the adequacy of "materials and equipment" when building systems that, at first, appear to be non-compliant, are shown to equal or exceed systems prescribed in the building code when analyzed with rational analysis. Our structural analysis uses loads and material strengths prescribed by both building codes, using long established methods of structural mechanics; it should be considered "rational analysis". Consequently, the Build Smart exterior wall construction should be considered an acceptable alternative to the prescriptions of IRC Table R602.3(5) and IBC 2308.9.1.

Summarizing, the Build Smart exterior wall prototype construction, utilizing 2x4 or 2x6 studs of the Lamco engineered lumber material should be considered to be compliant with the International Building Code 2012 and the International Residential Code 2012.

Sincerely,



Ron Shiflett, PE



4. Load Path Engineering Letter



January 16, 2015

Build Smart
3741 Greenway Circle
Lawrence, KS 66046

Attn: Adam Cohen

Re: Build Smart Construction Questions

Dear Adam:

I understand that designers interested in utilizing your PassivHaus building systems have generated some questions regarding fastenings and load path through the structure. Consider the following:

In-Plane Lateral Load Transfer Within Wall Panels

Lateral loading is transferred within exterior wall panels by way of composite behavior between the OSB sheathing and the expanded plastic foam of the Passive Structures wall panels. Integral to the overall performance, of course, is the transfer of forces out of the sheathing into wood studs and top and bottom plates. To ensure this in areas for which the International Residential Code 2009 or 2012 establishes the design wind speed to be 100 mph or less, use this nailing schedule for 8d or 6d nails:

OSB Panel Edges
6"

At Intermediate Studs
12"

In-Plane Lateral Load Transfer Between Wall Panels and Floor Framing

Exterior walls utilize edges of floor sheathing and ends of floor framing as part of the load path for transmitting lateral loads to the foundation. For areas listed in the International Residential Code to be associated with a design wind speed of 100 mph or less, transfer of these loads is assured by placement of 16d nails through bottom and top plates of wall panels, through floor sheathing, and into the ends of floor trusses. We have revised standard details 2 and 3 to show these nails.



In-Plane Lateral Load Transfer Between Wall Panels and Concrete Slab

Similarly, lateral loads are transferred to concrete slabs by way of 1/2" diameter expansion anchors placed through the bottom plates of wall panels into the concrete. This is shown in a revised detail 7.

In-Plane Uplift Load Transfer Between Wall Panels and Floor Framing

Transmission of uplift forces from roof trusses to the top plate of exterior wall panels, for design wind speeds of 100 mph or less, is accomplished by the placement of Simpson SDWC screws as shown in your standard detail.

For wind speeds of 100 mph or less there is negligible net uplift force between exterior wall panels and floor framing or concrete slabs due to the contribution of construction weight. The 16d nails between wall panels and floor framing and the expansion anchors between panel bottoms and concrete slabs will suffice.

Design Wind Speed Greater than 100 Mph

Where the design wind speed in an area exceeds 100 mph the connections discussed herein must be examined on a case-by-case basis.

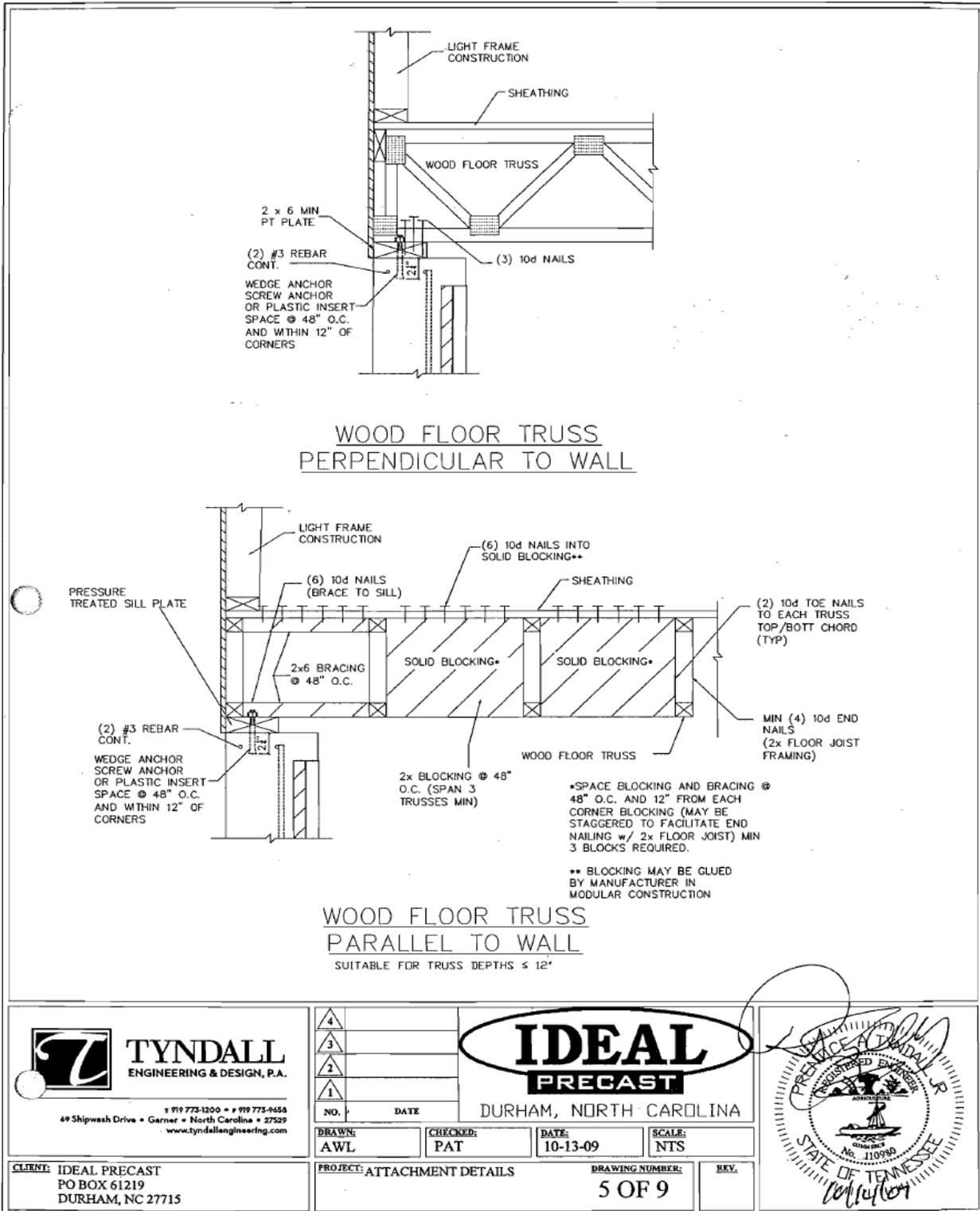
Sincerely,



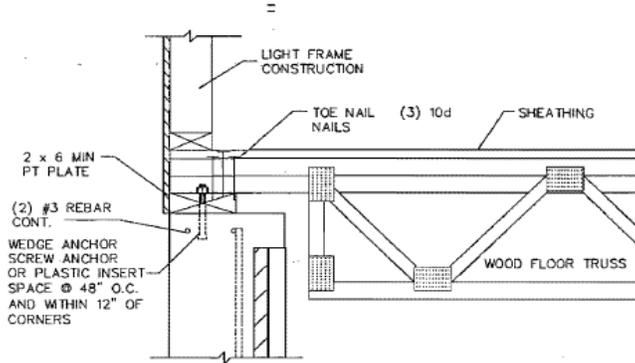
Ron Shiflett, PE



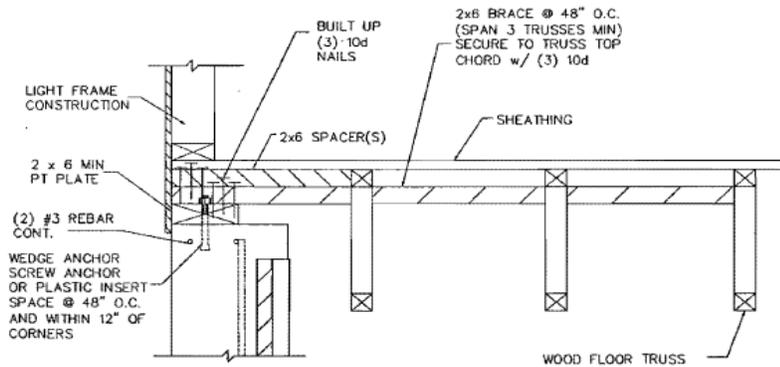
5. Bottom Chord Bearing Floor Truss to Wall



6. Top Chord Bearing Floor Truss to Wall



TOP CHORD BEARING WOOD FLOOR TRUSS
PERPENDICULAR TO WALL

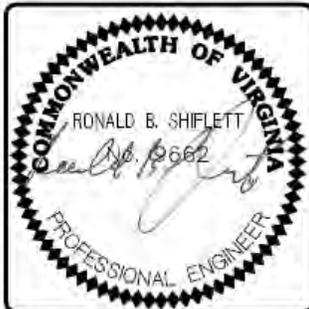
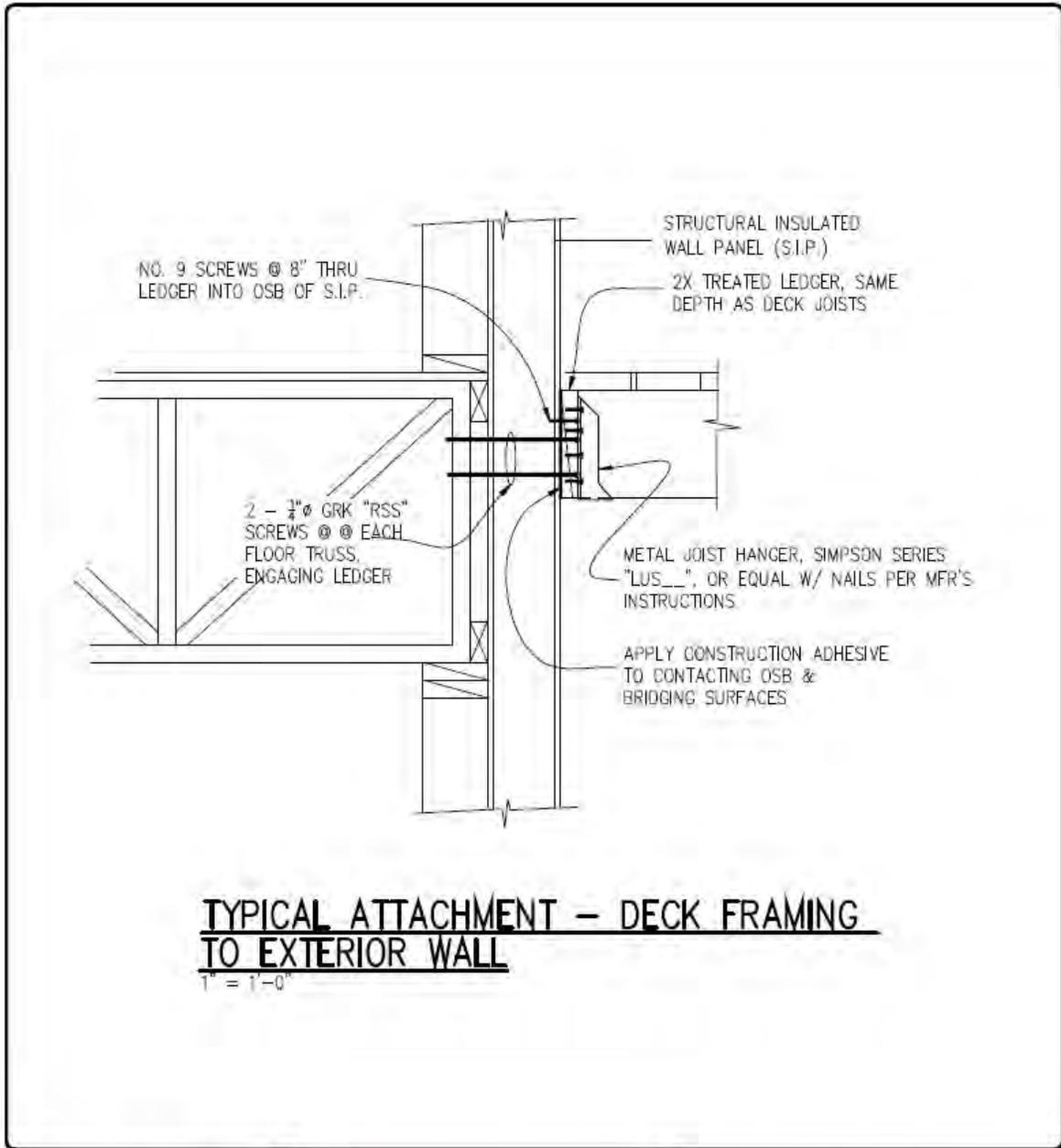


TOP CHORD BEARING WOOD FLOOR TRUSS
PARALLEL TO WALL

 <p>TYNDALL ENGINEERING & DESIGN, P.A.</p> <p>☎ 919 775-1200 • ☎ 919 775-9458 69 Shipwash Drive • Garner • North Carolina • 27529 www.tyndallengineering.com</p>	<p>▲</p> <p>▲</p> <p>▲</p> <p>▲</p> <p>NO. DATE</p>	 <p>IDEAL PRECAST</p> <p>DURHAM, NORTH CAROLINA</p>	
	<p>DRAWN: CHECKED: DATE: SCALE:</p> <p>AWL PAT 10-13-09 NTS</p>		
<p>CLIENT: IDEAL PRECAST PO BOX 61219 DURHAM, NC 27715</p>	<p>PROJECT: ATTACHMENT DETAILS</p>	<p>DRAWING NUMBER: 3 OF 9</p>	<p>REV.</p>



7. Deck Framing to Exterior Wall



COVENANT
ENGINEERING, INC.

P.O. Box 12082
Roanoke, VA 24022
(540) 345-5555
Email: info@covenanteng.com

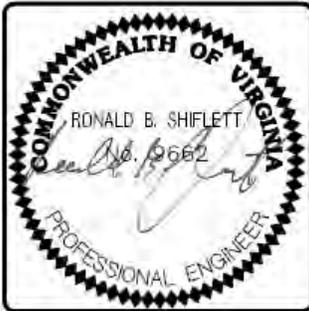
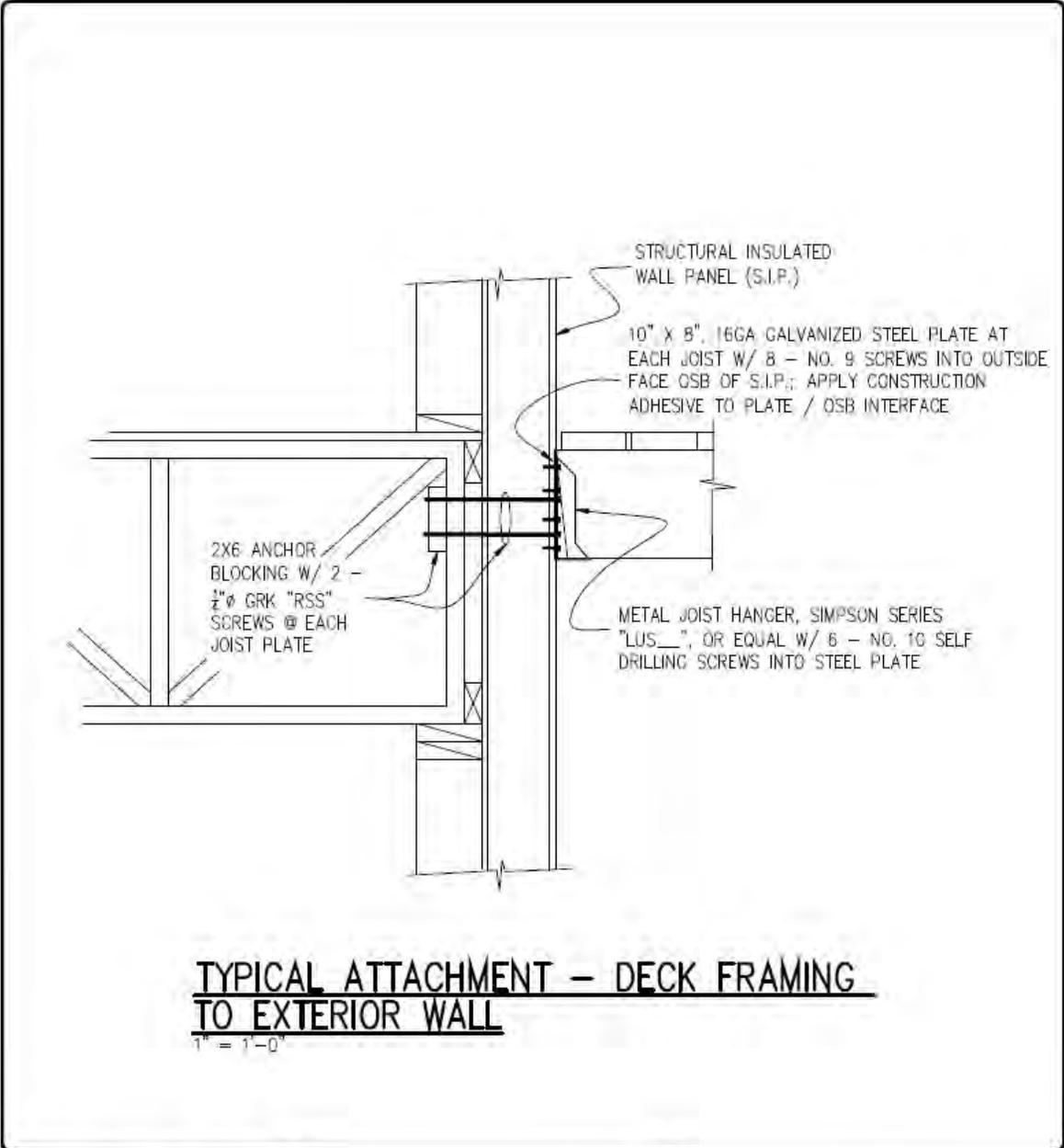
PASSIV STRUCTURES
Build Smart

Deck Attachment

Prepared: R. Shiflett
Date: August 11, 2014

Figure 5





COVENANT
ENGINEERING, INC.

P.O. Box 12082
Roanoke, VA 24022
(540) 345-5555
Email: info@covenanteng.com

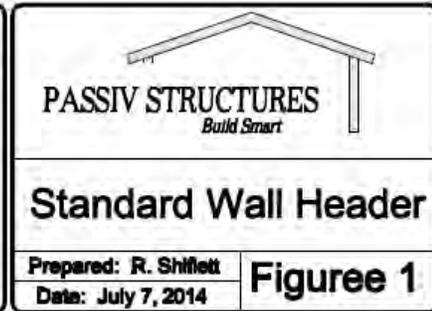
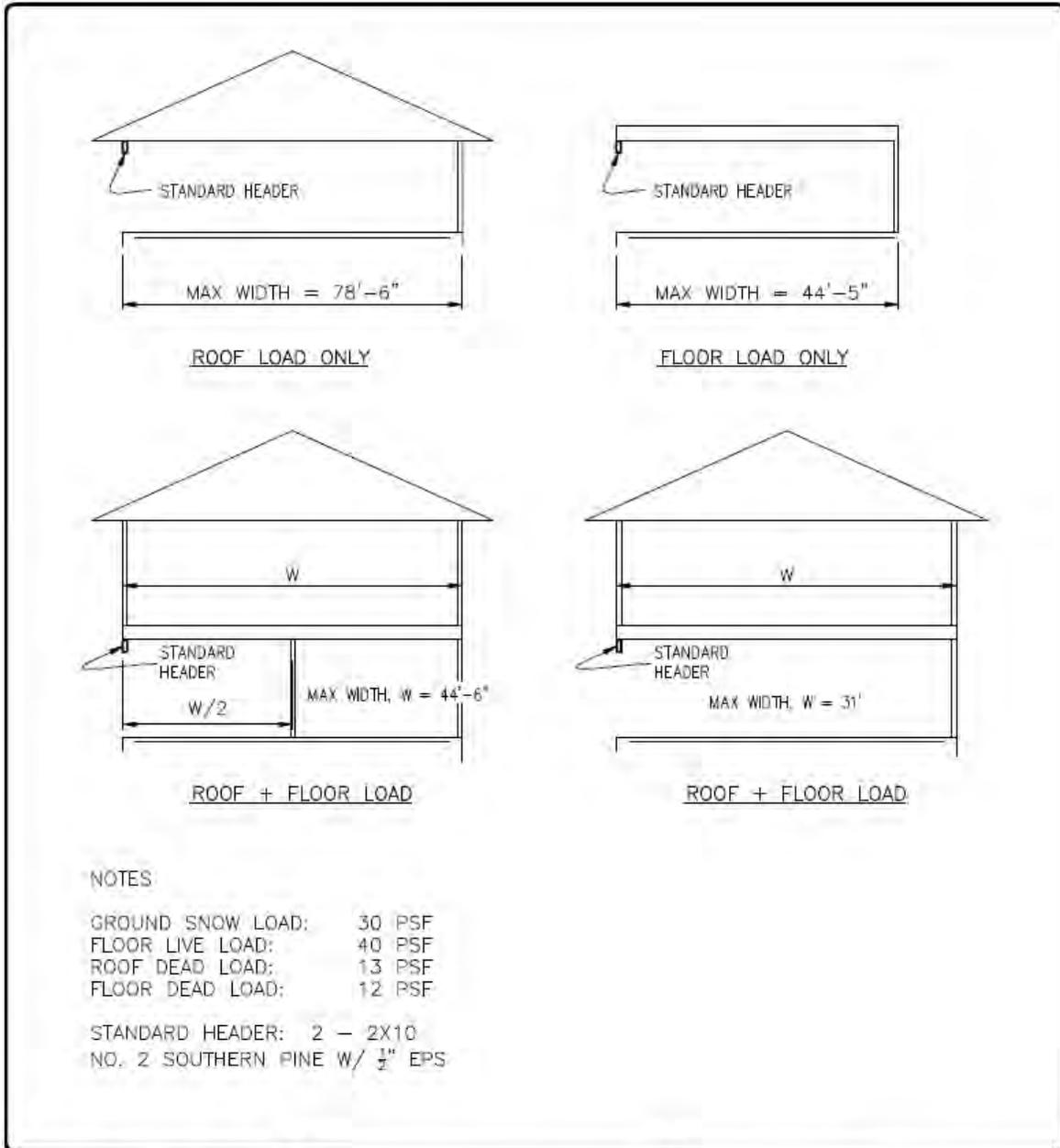
PASSIV STRUCTURES
Build Smart

Deck Attachment

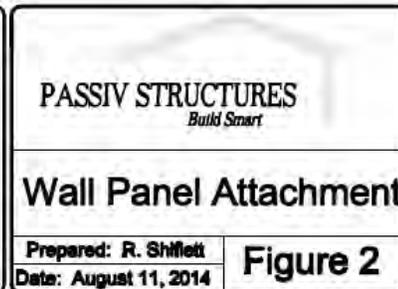
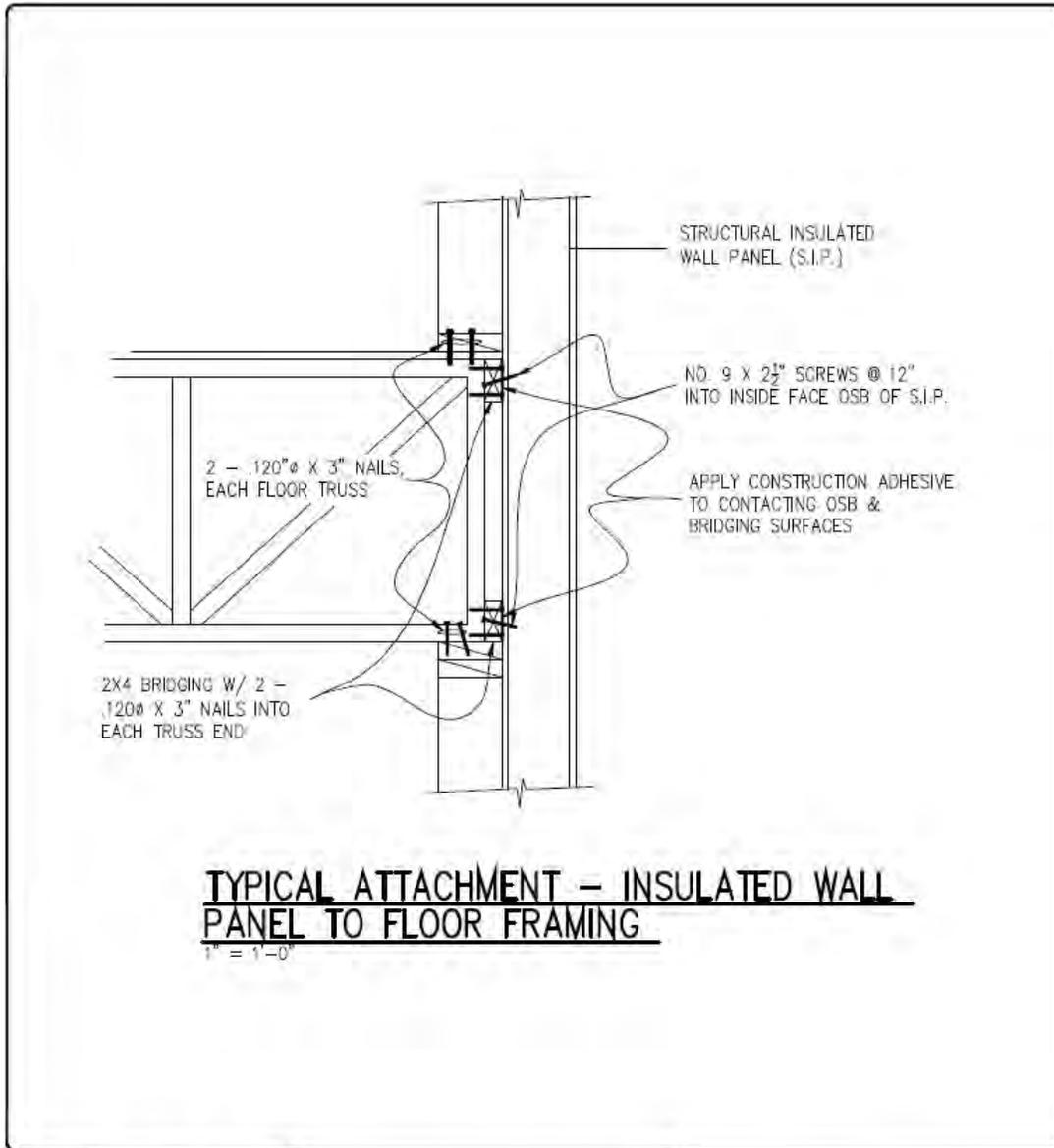
Prepared: R. Shiflett	Figure 6
Date: August 11, 2014	

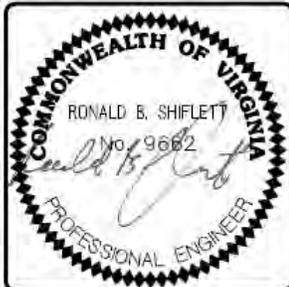
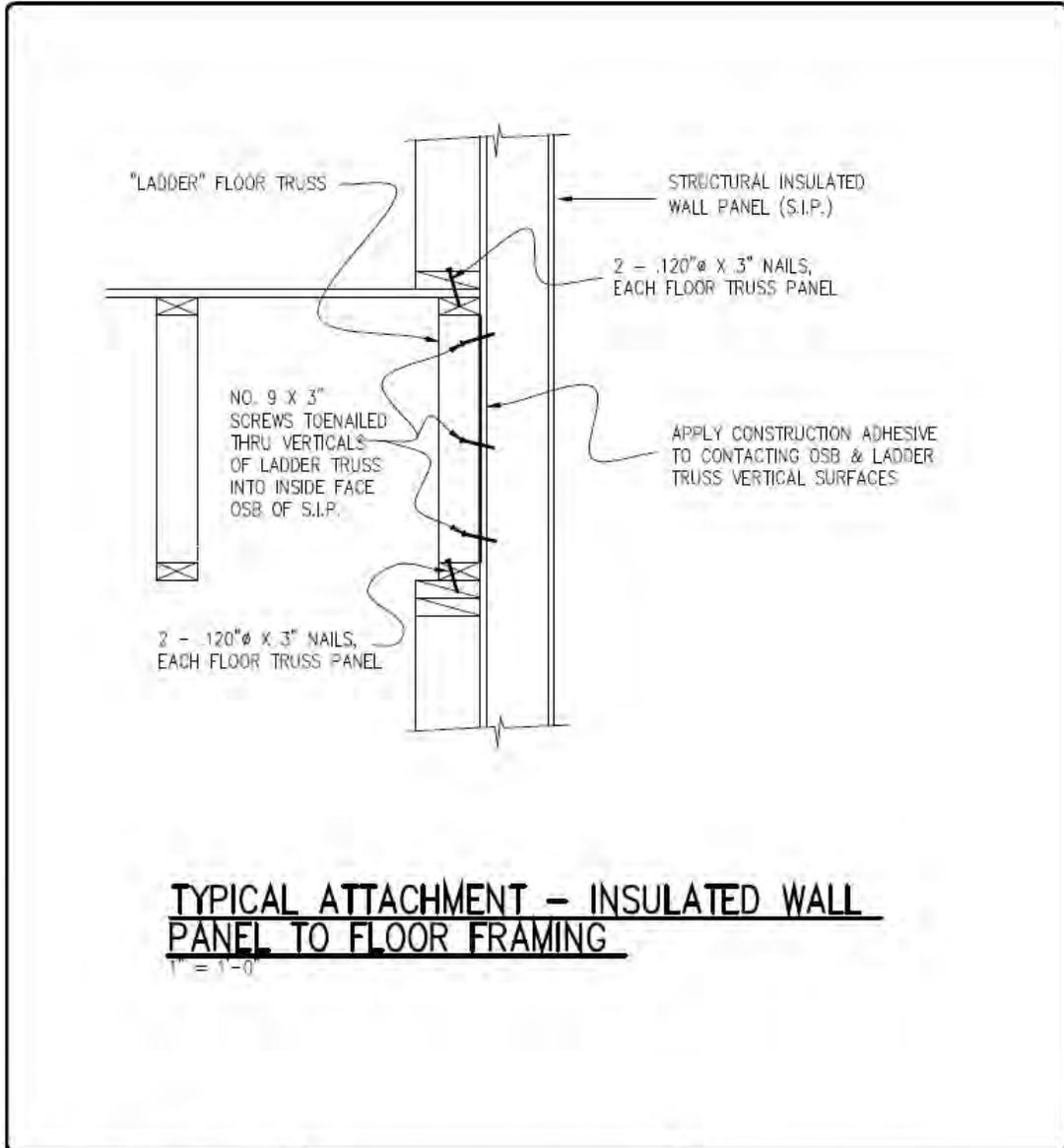


8. Standard Wall Header



9. Insulated Wall Panel to Floor Framing Attachment





COVENANT
ENGINEERING & ARCHITECTURE

P.O. Box 12062
 Roanoke, VA 24022
 (540) 345-6565
 Email: info@covenanteng.com

PASSIV STRUCTURES
Build Smart

Wall Panel Attachment

Prepared: R. Shiflett	Figure 3
Date: August 11, 2014	



f. Technical Bulletins



3741 Greenway Circle • Lawrence KS 66046 • 888-376-3424

Technical Bulletin

Design and Construction of Frost-Protected Shallow Foundations (American Society of Civil Engineers Standard 32-01)

Executive Summary

Both the International Residential Code and the International Building Code provide that the foundation frost protection requirement may be met by construction in accordance with ASCE 32. The Standard addresses the design and construction of frost-protected shallow foundations in areas subject to seasonal ground freezing. Foundation insulation requirements to protect heated and unheated buildings from frost heave are presented in easy-to-follow steps with reference to design tables, climate maps, and other necessary data to furnish a complete frost-protection design. The advantages of this technology include improved construction efficiency over conventional practices, increased energy efficiency, minimized site disturbance, and enhanced frost protection. A commentary is included to provide background information and important technical insights. Many articles have been written supporting its use. Here is the Table of Contents:

Chapter 1 Scope and Limitations
Chapter 2 References
Chapter 3 Symbols, Units, and Definitions
Chapter 4 Design Principles
Chapter 5 Simplified FPSF Design Method for Heated Buildings with Slab-On-Ground Foundations
Chapter 6 FPSF Design Method for Heated Buildings
Chapter 7 FPSF Design Method for Unheated Buildings
Chapter 8 Special Design Conditions for FPSF
Appendix A Design Data
Commentary

The index is here: <http://ascelibrary.org/doi/pdf/10.1061/9780784405642.in>

Here is the purchasing link: <http://www.asce.org/templates/publications-book-detail.aspx?id=7997>



Code Provisions

International Residential Code

R403.1.4.1 Frost protection. Except where otherwise protected from frost, foundation walls, piers and other permanent supports of buildings and structures shall be protected from frost by one or more of the following methods:

1. Extended below the frost line specified in Table R301.2. (1).
2. Constructed in accordance with Section R403.3.
3. Constructed in accordance with ASCE 32.
4. Erected on solid rock.

International Building Code

1809.5 Frost protection.

Except where otherwise protected from frost, foundations and other permanent supports of buildings and

structures shall be protected from frost by one or more of the following methods:

1. Extending below the frost line of the locality; locality.
2. Constructing in accordance with ASCE 32.
3. Erecting on solid rock.

List of Articles

www.structuremag.org/wp-content/uploads/2014/10/codesstandards1.pdf

www.homeinnovation.com/~media/Files/Reports/Revised-Builders-Guide-to-Frost-Protected-Shallow-Foundations.pdf

www.greenbuildingsolutions.org/Main-Menu/Home/Modern-Materials-Archive/Answering-the-Challenge/Frost-Protected-Shallow-Foundations.pdf

www.ncdc.noaa.gov/climate-information/statistical-weather-and-climate-information/frost-protected-shallow-foundations

www.concreteconstruction.net/foundation/frost-protected-shallow-foundations-reduce-costs-save-energy_o.aspx

<http://marlettehomes.com/docs/Frost%20Free%20Foundation%20-%20Marlette.pdf>

<http://marlettehomes.com/docs/Frost%20Free%20Foundation%20-%20Marlette.pdf>

www.khhpc.com/portals/0/pdfs/news%20publications/bottom%20of%20the%20envelope.pdf

www.greenbuildingadvisor.com/sites/default/files/Frost-Protected%20Shallow%20Foundations.pdf

www.nbnnews.com/NBN/issues/2003-12-15/Builders'+Show/4.html

Cost savings: www.roughdesigns.com/images/Housing_-_GC_Report_Military_Housing.pdf

