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Initial Approval

March, 2016

Re-Approved

March, 2018

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Report Owner

United States Gypsum Company

700 North Highway 45
Libertyville, IL 60048

Product

USG Structural Panel Concrete Foundation Wall and Foundation Wall XD

Approved Manufacturing Locations

USG Structural Technologies, LLC

309 Hallberg Street
Delavan, WI 53115

For Evaluation Report Questions

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General Details

The manufacturing facility shown above has an approved Quality Control Manual to manufacture **USG Structural Panel Concrete Foundation Wall** and **Foundation Wall XD**. Quarterly audits are performed by *Progressive Engineering Inc. (Pei)*.

Product Description

USG Structural Panel Concrete Foundation Wall and **Foundation Wall XD** are noncombustible sheathing panels used in conjunction with cold-formed steel, wood, or hot-rolled steel framing to form a load bearing structural foundation wall system. Both panel strengths are manufactured as nominal 3/4" [19mm] thick x 4' [1220mm] wide x 8' [2440mm] long panels with square edges. The panels have a weight of 5.3psf [25.9 kg/m²] from the manufacturing plant. The panels are a composite material consisting of alkali-resistant fiberglass and a cementitious binder.

USG Structural Panel Concrete Foundation Wall and **Foundation Wall XD** are noncombustible per ASTM E136 (CAN CSA S114) and have a mold resistance value of no less than 10 per ASTM D3273 and a rating of 1 or less per ASTM G21. These panel products have also been shown to be termite resistant when tested in accordance with AWPAC Standard E1-13 exposure C, and comply with the VOC emission requirements of the California Department of Public Health CDPH/EHLB/Standard Method Version 1.1 (Emission testing method for CA Specification 01350).

Product Application

USG Structural Panel Concrete Foundation Wall and **Foundation Wall XD** is used in a foundation wall application in combination with cold-formed steel, wood, or hot-rolled steel framing designed to resist lateral soil pressure and axial loads by a registered design professional. The panels are also capable of resisting the wall-racking shear loads shown in Table 3. Waterproofing of the wall system is provided using code approved products and methods indicated in the manufacturer's installation instructions.

Wall Framing

Cold-formed steel wall framing shall comply with AISI and have a minimum yield strength of 50 ksi, minimum 16 ga. [54mil] or 0.0538" [1.366mm] thickness, and minimum G60 galvanized coating. Stud flanges must have a minimum width of 1-5/8" [41.27mm]. As an alternative, SPF lumber or 1/4" A36 steel framing may also be used in conjunction with the fasteners and edge distance listed in Table 2. Typical wall frame spacing is limited to 16" o.c.[406.4mm] or 12" o.c.[304.8mm]. See Table 3 for shear values.

Approved Waterproofing Membranes

A code approved waterproofing membrane shall be installed in accordance with the membrane manufacturer's installation instructions, **USG Structural Panel Concrete Foundation Wall General Product Installation**, and the guidelines outlined in this **PER**. Tested peel adhesion for six waterproofing membrane options are shown in Table 5. Waterproofing membrane code compliance shall be verified by the governing code official and/or designer of record in coordination with the membrane manufacturer. This **PER** covers the application of **USG Structural Panel Concrete Foundation Wall** and **Foundation Wall XD** panels only.

Building Code & Standard Compliance

- For Canadian applications suitability needs to be reviewed by Architect or Engineer of record prior to use.
- Meets or exceeds the requirements for materials having a structural base of noncombustible material when tested in accordance with ASTM E 136 [CAN CSA S114].
- Surface Burning Characteristics - Flame Spread Index of 0 / Smoke Development Index of 0 or less when tested in accordance with ASTM E 84.

General Product Installation

1. **USG Structural Panel Concrete Foundation Wall** and **Foundation Wall XD** is to be installed and maintained during construction following this report and the **USG** Installation Instructions. Installation instructions must be made easily available to the product installer.
2. The concrete foundation wall panels are only to be mounted in the vertical orientation, with square edges butting up against each other, and adjacent edges bearing a minimum on $\frac{3}{4}$ " [19mm] on each of the studs. Install the panels such that the printed logo and code information face the framing.
3. In all cases, each concrete foundation wall panel must be fully blocked at all panel edges. If blocking is used to connect two adjacent panels to create a wall taller than 8 feet [2438mm], a full 8 foot panel must always be located at the bottom of the wall with the blocking at the top connecting the additional panel section. Steel strap blocking must be a minimum 16 ga. [54mil] or 0.0538" [1.366mm] by 4" [102mm] width with a minimum 50-ksi yield strength. Lumber blocking shall be minimum 2x4 SPF lumber with the wider edge in-plane with the concrete foundation wall panel.
4. When cutting **USG Structural Panel Concrete Foundation Wall** and **Foundation Wall XD**, safety glasses and a NIOSH approved N-95 dust mask should be worn at all times due to dust produced by the cutting of this product.
5. The $\frac{3}{4}$ " [19mm] **USG Structural Panel Concrete Foundation Wall** and **Foundation Wall XD** shall be fastened to the applicable framing using the fasteners listed in Table 2 of this **PER**.
6. Fasteners shall be flush or slightly below the surface and care must be taken to not strip out in the steel framing. No fastener shall be installed within 2" [50.8mm] of the corner of a panel and shall not be closer than the minimum distance from panel edges indicated in Table 2 of this **PER**.
7. A code approved waterproofing membrane system shall be installed over the finished foundation wall in accordance with the membrane manufacturer's installation instructions. The concrete foundation wall panels must be protected from construction moisture, damage and impact during and after installation. Extreme caution should be maintained while backfilling the area around the concrete foundation wall panels, and backfilled material shall be lightly compacted in maximum lifts of one foot.
8. The minimum 16ga [54mil] or 0.0538" [1.366mm] steel stud, SPF lumber, or hot-rolled steel wall assembly shall be approved by a registered design professional to carry the code required design loads.
9. A registered design professional shall design the shear wall hold down and wall anchorage requirements in accordance with the applicable building code and design loading.

Product Storage

USG Structural Panel Concrete Foundation Wall and **Foundation Wall XD** shall be stored in a dry location. The panels shall be placed on pallets and must be stored on level firm ground or a floor capable of carrying the approximate 3,400 lbs.[1545kg] pallet weight. Pallets shall not be stacked more than three high and must be stacked with direct alignment on the pallet below it. If a dry location is unavailable, cover pallets with a waterproof tarp or covering. Sub-freezing temperature may cause the panels to freeze together. Should this happen, move the panels to a warmer location to thaw out. Tools or chemicals shall not be used to loosen the panels as this will cause damage to the panels and void the performance ratings described in this **PER**.

Table 1 - Physical and Mechanical Properties
USG Structural Panel Foundation Wall and Foundation Wall XD

	Test Standard	Concrete Foundation Wall Values	Concrete Foundation Wall XD Values
Fastener Lateral Resistance ¹	ASTM D1761	DRY >210 lbs [0.93 kN]	DRY >210 lbs [0.93 kN]
		WET >160 lbs [0.71 kN]	WET >160 lbs [0.71 kN]
Density - Oven Dried ²	ASTM C1185	75 lb/ft ³ [1200 kg/m ³]	75 lb/ft ³ [1200 kg/m ³]
Weight, 3/4" Thickness Delivered	ASTM D1037	5.3 lbs/ft ² [25.9 kg/m ²]	5.3 lbs/ft ² [25.9 kg/m ²]
pH Value	ASTM D1293	10.5	10.5
Linear Variation with Change in Moisture 25% to 90% Relative Humidity	ASTM C1185	<0.10%	<0.10%
Thickness Swell	ASTM D1037	max. 3.0%	max. 3.0%
Freeze/Thaw resistance	ASTM C1185	Passed 50 cycles	Passed 50 cycles
Mold Resistance	ASTM D3273	10	10
	ASTM G21	0	0
Water Absorption ³	ASTM C1185	<15.0%	<15.0%
Noncombustibility	ASTM E136	Passed	Passed
Surface burning Characteristics	ASTM E84	0 Flame Spread / Smoke Developed Index 0	0 Flame Spread / Smoke Developed Index 0
Long Term Durability	ASTM C1185	min. 75% retention of physical properties	100% retention of physical properties
Water Durability	ASTM C1185	min. 70% retention of physical properties	91% retention of physical properties
Water Vapor Transmission (Method B)	ASTM E96	Permeance < 2 Perm	Permeance < 2 Perm

Notes:

1. Fastener Lateral Resistance measured with applicable fasteners in Table 2.
2. Density Measured at Equilibrium Conditioning per Section 5.2.3.1-Tested 28 days after manufacturing
3. Absorption Measured from Equilibrium Conditioning followed by immersion in Water for 48hours

Table 2: Acceptable Fasteners¹
USG Structural Panel Concrete Foundation Wall and Foundation Wall XD

Framing Type	Minimum Edge Distance	Manufacturer	Part No.	Type
16ga Cold-Formed Steel	1/2" [13mm]	Grabber Construction Products, Inc.	CGH8158LG	#8 x 1-5/8" winged self-drilling screw
		Simpson Strong-Tie Company, Inc.	CBSDQ158S	#8 x 1-5/8" winged self-drilling screw
SPF Lumber (Min. S.G. = 0.42)	5/8" [16mm]	Grabber Construction Products, Inc.	C8200L2M	#8 x 2", Flat Head, Type 17, Nibs, GrabberGard,
		Simpson Strong-Tie Company, Inc.	WSNTLG2S	#8 x 2", Flat Head, Twin threads, Nibs
	1/2" [13mm]	Senco ²	GL24AABF	8d Ring Shank Nails
1/4" A36 Hot Rolled Steel	3/4" [19mm]	Simpson Strong-Tie Company, Inc.	TBG1260S	#12 x 2-3/8", Flat Head, Strong-Drive® TB WOOD-TO-STEEL Screw

Note:

1. Fastener pull-through capacity of 581-lbs [2584 N] may be applied to all listed fasteners. Capacity is based upon the minimum average **ultimate tested capacity** for all tabulated fasteners. The engineer or designer of record shall apply an appropriate safety factor (ASD) or resistance factor (LRFD).

2. Senco 8d ring shank nails are manufactured with a length of 2-3/8" [60mm], a head diameter of 0.266" [6.8mm], and a shank diameter of 0.113" [2.9mm]. Equivalent 8d ring shank nails meeting these dimensional requirements may be utilized when approved by the engineer or designer of record.

Foundation Wall Usage

Table 3 - Wall Shear Values using 16ga. Steel Studs²

Sides Sheathed	Strap at beam	Sheathing Orientation	Fastener Spacing		¹ Ultimate Load (plf)	G' Lbs./in	¹ Ultimate Load (kN/m)	G' (N/m)
			Perimeter	Field				
Single	no	Vertical	8" [203mm]	12" [305mm]	914	6185	13.3	1083
Single	no	Vertical	6" [152mm]	12" [305mm]	1320	7416	19.2	1299
Single	no	Vertical	4" [102mm]	12" [305mm]	1726	8647	25.1	1514

Notes:

1. **The Ultimate Load does not include a safety factor**

2. Table values are applicable to both **USG Structural Panel Concrete Foundation Wall** and **Foundation Wall XD**.

Deflection Equation for Shear Wall

$$\Delta = \frac{P}{G'} \left(\frac{H}{L} \right)$$

Where: P = Total Shear Load Applied to Wall Panel

G' = Wall Panel "Apparent" Stiffness

H = Wall Panel Height

L = Wall Panel horizontal Width

Table 4: Uniform Load Performance^{1,2}
USG Structural Panel Foundation Wall and Foundation Wall XD

Span Rating	Ultimate Load ³ (PSF)	
	Foundation Wall	Foundation Wall XD
12"	1500	2083
[304.8mm]	[71.82 kPa]	[99.7 kPa]
16"	844	1172
[406.4mm]	[40.4 kPa]	[56.1 kPa]

Notes:

1. **Ultimate Load Values have no safety factor included**

2. **Three framing spans minimum per panel piece.**

3. Ultimate Load values are by engineering analysis.

Foundation Wall Usage

Table 5 - Tested Peel Adhesion of Various Waterproofing Membranes¹

Membrane ²	Coating/Adhesive	Average Peel Adhesion (lb/in)	Average Peel Adhesion (N/m)
Delta® Thene 40	Delta Primer	12.9	2259
	--	7.8	1366
Blueskin® WB25	Henry Blueskin Adhesive	8.0	1401
	--	3.5	613
Grace VYCOR® Plus	Valspar Concrete Bonding Primer	6.1	1068
	--	5.3	928

Notes:

1. Peel adhesion tested in accordance with ASTM D3330 Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape.
2. Peel adhesion values for the various membrane products have been provided only. Membrane specific code approval is outside the scope of this **PER** and shall be verified on a case-by-case basis by the governing code official.
3. Coatings and adhesives are intended to enhance the adhesion of the various membrane products to the USG Structural Panel Foundation Wall substrate.

Product Labeling

Each bundle shipped of **USG Structural Panel Concrete Foundation Wall** and **Foundation Wall XD** that are covered by this **PER**, must have a label attached with at least the following information:

1. **USG** Name and Location / Plant Number
2. Date of manufacture
3. This **PER** Number & **Pei ES** Logo

Acceptable Evaluation Marks



Product Documentation

- A Product Evaluation Service Agreement between **Pei Evaluation Service®** and **United States Gypsum Company**
- A Follow-up Inspection Service Agreement between **Progressive Engineering Inc.** and **United States Gypsum Company**
- A Quality Control Manual for **USG Structural Panels** Dated: 6/14/2017
- USG Structural Panel Concrete Foundation Wall** General Product Installation
- A Safety Data Sheet for **USG Structural Panels** Dated: 6/5/2015
- Various Test Reports for Physical Properties, Shear Wall Capacities, Uniform Load Capacities, and Membrane Peel Adhesion.

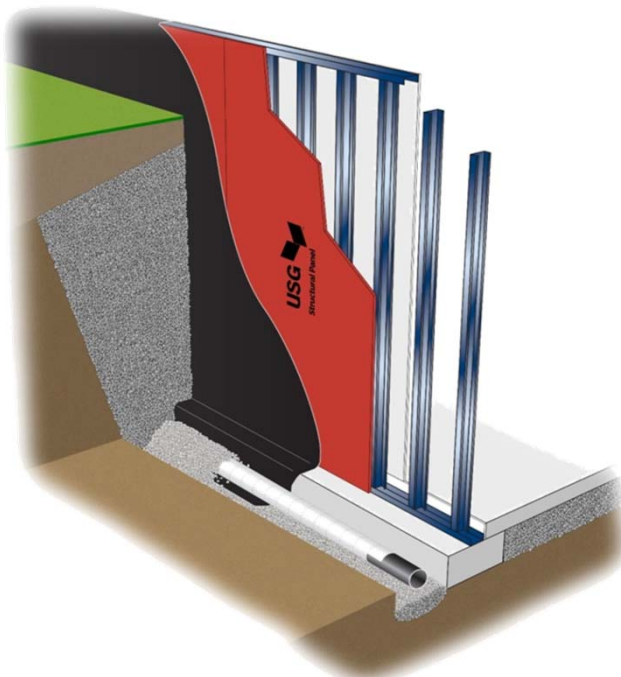


Figure 1 - USG Structural Panel Concrete Foundation Wall Typical Installation