

Evaluation Report

Issued November 1, 2017

This report is subject to re-examination in 3 years.

DIVISION: 03-CONCRETE
Section 031510-Concrete Anchoring

DIVISION: 04-MASONRY
Section 04081-Masonry Anchoring

DIVISION: 06-WOOD AND PLASTICS
Section 06093-Adhesives

DIVISION: 07-THERMAL AND MOISTURE PROTECTION
Section 07210-Building Insulation

BSW, BW, TR, AND STR WALL ANCHORAGE SYSTEMS

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1.0 SUBJECT

BSW, BW, TR, and STR wall Anchorage Systems

2.0 DESCRIPTION

2.1 General:

BSW, BW, TR, and STR wall anchorage systems described in this report are masonry or concrete wall reinforcement techniques. These wall systems are constructed with two component SR Foam poured in place against an existing masonry material, a structural sheathing, and metal or wood wall studs see figure 1.

The BSW and the BW wall systems consists of a wood or metal stud wall spaced at no more than 24" o.c. constructed on the inside face of an unreinforced masonry or concrete wall with structural sheathing fastened to the wall stud assembly with screws on the side of the studs nearest the masonry or concrete. A 2" minimum average gap is left between the sheathing and the masonry or concrete wall. The gap can narrow as small as 1" in small areas. This gap is filled with SR Foam.

For TR and STR walls the stud assembly is placed against the masonry or concrete wall with a structural sheathing installed on the opposite face. The foam material is installed to fill the stud cavities. For the TR system every cavity is filled with SR Foam. For the STR system alternating stud cavities are filled.

For BSW, BW, and TR wall systems the thermal properties of the SR Foam has a thermal resistance R-value of 7.0 per inch thickness. The STR wall system is not intended for use in providing thermal resistance.

2.2 Materials:

The SR Foam material is a specialty insulating structural foam adhesive. SR Foam is a two component cellular plastic with a density of approximately 2 lbs per cubic foot. Metal wall studs and tracks are to be composed of steel complying with ASTM A653. Structural properties to be calculated based on the 2007 North American Specification for the Design of Cold-Formed Steel Structural Members(AISI). Wood wall studs shall be in compliance with American Forest & Paper Association "Manual for wood construction, 2005 National Design Specification" (2005 NDS). Wood wall studs specified in the catalog are specified as D.F #1 or better grade. Sheathing material shall be APA rated wood structural sheathing. Other grades of materials can be used if they can be shown to work by a licensed professional engineer.

2.3 Design:

Allowable compression, tension, and shear loading for SR Foam are set forth in Table 1. Wood wall stud and sheathing are to be designed based on the 2005 NDS. Metal studs and all associated connections shall be designed based on the AISI. For masonry walls or concrete walls without a clean substrate as defined in section 2.4, applicable reduction factors are set forth in Table 2. The components of the system including the wall sheathing, studs, and associated anchorage must be designed based on the generally accepted engineering principals based on the 2012 *International Building Code* by a qualified design professional. At locations where the wall is covered by paint or other latent material, a determination of the amount of area by percentage on any 4 sq. ft. area must be determined. At locations where the loose or latent materials present on the wall exceed 5% of any 4 sq. ft. area, the shear and tension values of the foam must be reduced based on Table 2.

2.4 Installation:

The existing surface(s) of unreinforced masonry, unreinforced brick, or concrete walls must be free of all coatings to the existing substrate and oils and debris, contaminates or paint that adheres to the existing surface that is to provide for the SR Foam bond. Surface areas free of coatings, oils and loose latent materials are to be cleaned with a light brushing. Areas that are not satisfactorily cleaned must be inspected and a determination of the percentage of area reduction for any 4 square feet area must be determined. The adhesive properties in the area of question must be reduced in accordance with section 2.3.

The stud walls are installed and sheathed. All associated fasteners and anchorage are installed. Wall cavity corners, edges, electrical service boxes, and conduit are to be sealed to minimize leakage during the fill process. TR walls are to have fill ports between each stud bay to be filled spaced at 4' o.c. vertically. BSW and BW wall ports are to be spaced no greater than 4' o.c. each way. SR Foam is not to be installed into wall

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cavities with standing water or placed in wall cavities with knob and tube wiring.

SR Foam is placed in wall cavities and allowed to expand, such that it does not exert a pressure on cavity walls in excess of 10 psf, in lifts not exceeding 48" in height. Prior to filling wall cavity, SR Foam is applied to an open container to verify equal mixing of components.

Once the material is placed, the material is to remain undisturbed for at least 4 hours. Clean up of all cavity wall leaks is recommended within the first ½ hour of placement.

2.5 Inspection:

A periodic structural observation of the SR Foam installation by a certified SR Contractors inspector shall be conducted at prior to the start of filling the wall. The observation shall include verifying the component materials, the color and consistency of the mixed material coming out of the gun, and the initial set cell structure prior to injecting any material into the wall. Prior to installation, inspector shall verify the material is not beyond the expiration date. The observation shall verify the initial fill procedures are being followed.

2.6 Miscellaneous:

The SR Foam wall material is available in 55 gallon drums. The product has a shelf life of 1 year. Storage temperatures for containers are between 65 degrees F, and 75 degrees F. Containers shall be stored indoors, protected from any water contact.

The SR Foam material has a flame spread rating per ASTM E84 of less than 20. The smoke density is less than 350. The fuel contribution is zero, and an oxygen index of 23. SR Foam may be used in within fire-resistive construction provided it is being used to resist only lateral loading.

2.7 Identification:

The SR Foam is identified by labels on the packaging indicating the manufacturer's name and product name (SR Foam) are placed on the containers. Each component shall be labeled as part "A" or part "B" respectively.

3.0 EVIDENCE SUBMITTED

Test data reports provided by Professional Service Industries (PSI), an independent testing lab. PSI Test report include the following SR Foam and plywood tensile testing dated May 2004 Report number 689-363436-002; SR Foam and Brick testing dated January 2004, Report number 689-36436-001; and Adhesive bond strength testing and PSI Test 1 dated January 2002 project number 689-16537-1. Testing was observed by representatives from the City of Portland, and Miller Consulting Engineers, Inc. Data includes shear and tension testing under aging conditions using full scale masonry wall cavity. The test

included a sample of each masonry type as well as wood and steel.

4.0 FINDINGS:

That the SR Contractors, LLC wall anchorage and strengthening systems described in this report comply with the 2012 International Building Code, subject to the following conditions:

- 4.1 **The SR Foam is identified and installed in accordance with the manufacturer's instructions, and this report.**
- 4.2 **Allowable shear, compression, and tension values for SR Foam are as noted in Table 1. Reduction of loading as a result of loose or latent material to be determined in accordance with Section 2.3 of this report.**
- 4.3 **Calculations justifying that the applied loads comply with this report are submitted to the building official for approval.**
- 4.4 **SR Foam is not permitted for use in conjunction with fire-resistive construction. Exceptions would be:**
 - **SR Foam resists lateral loading only.**
 - **For other than lateral loading, special consideration is given to fire exposure conditions.**
- 4.5 **SR Foam is limited to installation in cavities without standing water**

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TABLE 1- ALLOWABLE SHEAR AND TENSILE STRESSES FOR SR FOAM (psf)^{1,2,3,4,5,6,7}

Wall Component	Allowable Shear Masonry/Concrete	Allowable Tension Masonry/Concrete	Allowable Compressive	Allow Tension Wood
SR Foam	245	472	1800	822

For SI: 1 inch =25.4 mm, 1lbf=4.48 N, 1 psf = 992.16 kPa

¹Tabulated values are based on the adhesive contact area to wall face and sheathing. For a reduction in contact area as a result of contaminates, lose or latent materials, refer to Table 2.

²Bond strengths are based on a factor of Safety of 5.0; compression factor of safety 2.0

³Tabulated values are for adhesive directly to sound CMU, brick, clay tile, concrete, wood, or steel

⁴Displacement of SR Foam for tabulated allowable tension values is 0.032” per 1” thickness of foam. For other foam thicknesses multiply displacement by depth.

⁵Displacement of SR Foam for tabulated allowable shear values is 0.0379” per 1” thickness of foam. For other foam thicknesses multiply displacement by foam depth.

⁶Sections 2.3 through 2.6 contain special design considerations.

TABLE 2- REDUCTION IN SR FOAM ADHESION AS A RESULT OF LOOSE, LATENT SURFACE MATERIALS, OR CONTAMINATES ON ADHESION SURFACE

Amount Area Reduction of Adhesive Bond Area	Reduction Factor for Shear Adhesion	Reduction Factor for Tension Adhesion
LESS THAN 5%	1.0	1.0
10%	0.9	0.9
20%	0.8	0.8
30%	0.7	0.7
40%	0.6	0.6
50%	0.5	0.5
60%	0.4	0.4
70%	0.3	0.3

¹Tabulated reduction factors apply to any 4 sq. ft. area of the adhesive bond surface.

²Area reduction of adhesive bond surface in excess of 70% will require cleaning of adhesive surface prior to filling SR Foam.

³In lieu of the reduction factors in this table, a pull test of the adhesive may be performed for every 750 sq. ft. of wall surface area to justify loading capacity to local building official.

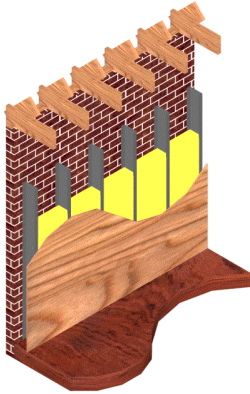
⁴Tabulated values in this table do not apply to walls with a lightly brushed clean finish without contaminates or loose materials.

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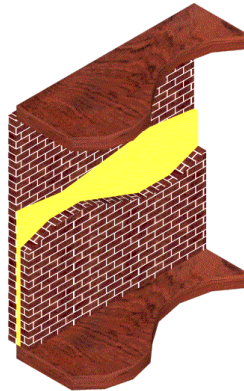


FIGURE 1-SR WALL SYSTEMS

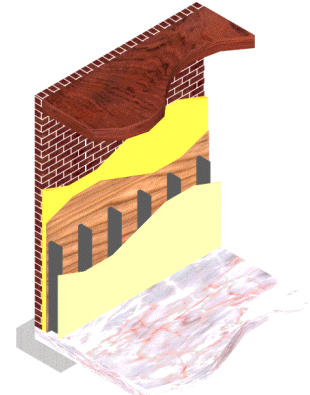
The SR Wall Systems insulate, reinforce, and strengthen new and existing construction against drafty environments creating a more comfortable environment.



Thermally Reinforced Wall
(TR Wall System)



Masonry Composite Earthquake
(MCE Wall System)



Basement Wall (BSW Wall System)
Bonded Wall (BW Wall System)

TR SYSTEMS

- Studs are installed against the wall being reinforced and tied into the diaphragm. (See illustration above)
- Sheathing is installed over the studs creating a cavity.
- SR Foam is installed in the cavity to adhere the cavity to the existing wall.

MCE SYSTEMS

- Fill between existing walls with SR foam creates a bond and composite action between the existing walls strengthening the existing walls out-of-plane capacity.

BW SYSTEMS

- Similar to TR with studs outside of sheathing

BSW SYSTEMS

- Same as the BW system except used in basement applications so the SR foam is used mostly in compression.

The ingredient that ties all the patented wall systems together is SR Foam

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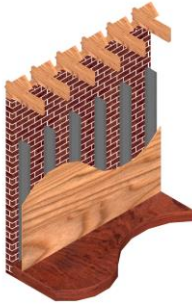
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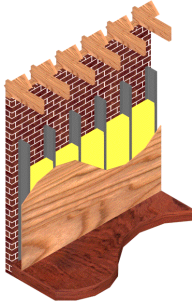
New or existing masonry or concrete wall



1. Attach metal studs to ceiling and floor in front of wall



2. Attach sheathing to studs



3. Inject SR Foam into wall cavity

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