SmartWall Systems®

SmartWall Systems is a concrete masonry wall system that outperforms other masonry and non-masonry wall systems, especially in terms of weight, energy efficiency, maintenance, appearance, fire resistance, durability and strength.

SmartWall is a mason friendly, cost effective wall system that provides speedy construction and a very high degree of customer satisfaction.

What Will SmartWall Do For Me?

Owner/Occupant – SmartWall provides a low maintenance, aesthetically pleasing structure that saves you money on the front-end by speeding construction, and provides energy savings in lower heating and cooling costs year after year. SmartWall also gives you design flexibility, unparalleled safety features, and quiet comfort.

Architect, Engineer & Designer – Available in a wide variety of colors, shapes and textures (such as split-face, split-rib, ground-face, etc.), SmartWall maximizes all the benefits of traditional concrete masonry: flexibility for design expression, durability and economy. Stronger, lighter units make walls more structurally efficient. SmartWall gives you the confidence of knowing you are specifying the best product available.

What Makes SmartWall So Smart?

It’s the aggregate. You may have heard the slogan, "It’s what’s inside that counts." Inside all SmartWall units is high quality structural grade expanded shale, clay or slate (ESCS) aggregate, manufactured to optimum gradation for compaction, strength, shrinkage control and uniformity of texture. The ESCS aggregate blend is mixed with water, cementitious materials, and admixtures in a precise formulation that is compacted to optimum conditions. Mixture composition may vary according to the manufacturer; however, all SmartWall units must meet or exceed the quality and performance standards (See Page 5) established for SmartWall by the Expanded Shale, Clay and Slate Institute.

SmartWall Systems® is a registered trademark of the Expanded Shale, Clay and Slate Institute, Salt Lake City, Utah.
What Is ESCS?
ESCS (Expanded Shale, Clay or Slate) is a unique, structural grade ceramic aggregate manufactured by expanding select minerals in a rotary kiln at more than 1000°C. The material selection and production are strictly controlled to insure a uniform, high quality product that is structurally strong, stable, durable and inert, yet also light weight and insulative. ESCS aggregate is used in structural lightweight concrete for high-rise buildings, bridges and other exposed structures.

Why Is Reduced Weight A Benefit?
The ESCS structural grade aggregate in SmartWall units provides numerous benefits: Labor, handling and transportation costs are reduced; energy, acoustical and structural performance are enhanced. Reduced weight means less dead and seismic load. This allows greater design flexibility, and often provides significant economies.

What About SmartWall’s Structural Stability and Fire Resistance?
Because the ESCS aggregate in SmartWall units has been fired and expanded under extreme heat, the aggregate is insulative and thermally stable; thus, SmartWalls have exceptional fire ratings. ESCS has a coefficient of thermal expansion significantly lower than most ordinary aggregates. SmartWalls can withstand extreme heat and the thermal shock of high pressure fire-hose spray without cracking, caving in, or deforming. They remain intact, ready ‘or reuse after a fire. Proven performance in real world fires has substantiated the excellent fire endurance documented in laboratory test programs. SmartWalls have successfully stood up to the worst hose steam exposure after a four-hour fire test. An eight-inch SmartWall easily provides a minimum two-hour rating. Higher ratings can be specified. SmartWall gives you that extra margin of safety that can save lives and dollars.

ESCS aggregate, when combined with high temperature resistant cements, provides the refractory used in kilns, boilers, fire boxes, chimney linings, etc., for residential and industrial applications worldwide.

Two, three and four-hour fire ratings are available. Contact your local SmartWall supplier.

How Strong Is SmartWall?
By optimizing ESCS aggregate gradation and other mix proportions, a very high strength-to-weight ratio is obtained. All SmartWall units exceed ASTM minimum strength by more than 32%. While all SmartWall units must have a minimum net compressive strength of 2500 psi, higher strengths are easily achievable when required for structural reasons, a real benefit to design and economy.

Does SmartWall Reduce Noise? YES!
SmartWall’s high sound absorption and low sound transmission provide a quiet, peaceful living and working environment. With SmartWall a Noise Reduction Coefficient (NRC) of 0.50 is achievable. SmartWall provides the ideal balance of NRC and STC for excellent noise control.

What About Termites and Decay?
The materials in SmartWall are impervious to attack by termites and will not decay.
Is SmartWall Cost Effective? YES!
The SmartWall system provides speedy construction that lowers contractors' overhead costs, and affords earlier building occupation. Additionally, SmartWall's reduced weight lowers equipment and material delivery costs. It also reduces the cost of foundation and structural supports, and provides on-going energy savings. Mason friendly SmartWall units help insure a healthy and productive work force. This also helps reduce construction cost. SmartWall provides up-front savings as well as economic benefits that accrue over the useful life of the structure.

What About Water Penetration?
SmartWall can reduce water penetration in two ways: the concrete mixture and ease of placement. By optimizing the aggregate gradation, admixture use, and cementitious content, SmartWall units are very tightly compacted in the block machine. This produces higher strengths, tighter textures, and fewer interstitial voids – all three contribute to reduced water absorption and permeability. These three qualities also enhance the effectiveness of water repellent coatings. Additionally, masons are able to lift and place SmartWall units more easily and consistently, which also contributes to producing a more watertight wall.

What About Durability?
Freezing and thawing testing programs conducted at both the University of New Brunswick and the University of Nebraska at Lincoln show that properly designed mixtures using ESCS aggregate in high performance concrete masonry perform as well as, if not better than comparable mixtures containing ordinary aggregates. The high performance mixtures were tested in concrete masonry and segmental retaining wall units.

Why Does Mason Productivity Increase?
Mason productivity is primarily determined by the weight of the units being used. Since labor is usually 60% of the total finished wall cost, productivity is of critical importance.

Reference: Rynold V. Kolosk, Masonry Estimating, The Aberdeen Group, Addison, IL
Is SmartWall Energy Efficient? YES!

SmartWall provides superior energy conservation by combining high R-values with thermal mass and low thermal bridging. Wall heating and cooling costs may be reduced by as much as 60%! The concrete in SmartWall has up to 2.5 times the thermal resistance of the concrete in a typical heavy block. This significantly reduces thermal bridging, maximizes the effectiveness of core insulation, and results in the high R-value of SmartWall. Even an un-insulated SmartWall performs as well as core-insulated heavy units! (See Table Below)

In addition to thermal resistance, SmartWall also benefits from thermal mass – the *flywheel* effect that minimizes peaks and valleys in heat load as a wall responds to daily changes in ambient temperature. Walls with optimized thermal mass reduce overall energy use, compared to non-masonry walls. SmartWall has the proper balance of thermal mass and thermal resistance for optimum performance.

Calculating the overall effect of thermal mass and thermal resistance in a wall’s dynamic response to the environment is a complicated task, one that the ASHRAE 90.1 energy code uses a computer program, ENVSTD*, to perform. However, the results can be dramatic. For example, using ENVSTD to compare the energy performance of a 12" SmartWall with perlite core insulation to an R-19 batt insulated metal stud wall shows that SmartWall outperforms the metal stud system! ENVSTD factors many variables besides opaque wall properties, including glass area, shading overhangs, and building orientation. Using ENVSTD and SmartWall, energy efficient buildings can be designed that comply with energy codes without the need for *added-on* insulation. In many cases a single-wythe SmartWall does the job.

The energy performance of SmartWall is not just smart, it’s a money saver!

*Note: ENVSTD stands for EnVelope STanDard; refer to ESCSI Information Sheet #3201 for more information on ENVSTD and the energy comparison made in this example.

How Does It Look? What About Color?

Not only does SmartWall resist chipping and cracking, its more uniform texture produces sharp corners and surfaces that provide structure and finish. If desired, SmartWall is readily paintable. SmartWall is available in the same wide range of sizes, colors and textures as other concrete masonry units.

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### R-Values For Concrete Masonry Walls *(1) (Exposed Both Sides)*

<table>
<thead>
<tr>
<th>Unit Size</th>
<th>Concrete Unit Weight lbs/ft²</th>
<th>Cores Empty</th>
<th>With Core Inserts</th>
<th>Cores Filled With Perlite</th>
</tr>
</thead>
<tbody>
<tr>
<td>8x8x16&quot;</td>
<td>SmartWall *(2)</td>
<td>2.5</td>
<td>4.0</td>
<td>6.6</td>
</tr>
<tr>
<td></td>
<td>Heavy CMU's *(3)</td>
<td>1.9</td>
<td>2.6</td>
<td>3.2</td>
</tr>
<tr>
<td>12x8x16&quot;</td>
<td>SmartWall *(2)</td>
<td>2.7</td>
<td>4.4</td>
<td>9.5</td>
</tr>
<tr>
<td></td>
<td>Heavy CMU's *(3)</td>
<td>2.0</td>
<td>2.7</td>
<td>4.4</td>
</tr>
</tbody>
</table>

*(1) R-Values are mid-range per NCMA TEK 6.1A & 6.2A. R in (h*ft²°F)/BTU
(2) SmartWall at 90 lbs/ft²
(3) Heavy CMU's at 135 lbs/ft²*
SmartWall Systems® Guide Specifications

Guide Specification (Short Form): Sec 04810 - Unit Masonry Assemblies:

SmartWall Systems walls shall be constructed using high performance concrete masonry units manufactured by a SmartWall systems producer certified by the Expanded Shale Clay and Slate Institute, Salt Lake City, Utah. The concrete masonry units shall meet the requirements of ASTM C 90 Standard Specification for Load Bearing Concrete Masonry Units and the following additional requirements:

- The concrete masonry unit shall have a minimum net compressive strength of 2500 psi (17 Mpa) and a density not exceeding 93 lb/cu ft (1500 kg/m³), determined in accordance with ASTM C 140 Sampling and Testing Concrete Masonry Units.

- The lightweight aggregate used in the manufacture of the concrete masonry units shall be structural grade expanded shale, clay or slate manufactured by the rotary kiln process, and shall meet the requirements of ASTM C 331 Standard Specification for Lightweight Aggregate for Concrete Masonry Units.

### SmartWall Units, Maximum Jobsite Weight (Mass) of SmartWall Units (1)

<table>
<thead>
<tr>
<th>Size</th>
<th>Not To Exceed</th>
<th>Size</th>
<th>Not To Exceed</th>
</tr>
</thead>
<tbody>
<tr>
<td>4&quot; x 8&quot; x 16&quot;</td>
<td>18 lbs. (8.0 kg)</td>
<td>10&quot; x 8&quot; x 16&quot;</td>
<td>33 lbs. (14.5 kg)</td>
</tr>
<tr>
<td>6&quot; x 8&quot; x 16&quot;</td>
<td>23 lbs. (10.5 kg)</td>
<td>12&quot; x 8&quot; x 16&quot;</td>
<td>36 lbs. (15.5 kg)</td>
</tr>
<tr>
<td>8&quot; x 8&quot; x 16&quot;</td>
<td>26 lbs. (11.5 kg)</td>
<td>8&quot; x 8&quot; x 24&quot;</td>
<td>38 lbs. (17.0 kg)</td>
</tr>
</tbody>
</table>

The maximum job weight of SmartWall units is based on typical net volumes and may vary depending on the block mold configuration.

### What Are SmartWall Unit Details?

#### General Information on SmartWall high performance concrete masonry units:

The information below is for general use only. For exact shapes and physical properties, contact your supplier:

<table>
<thead>
<tr>
<th>Unit Size (inches)</th>
<th>Maximum Jobsite Weight lbs. (1)</th>
<th>Minimum Weight Savings Percent (2)</th>
<th>Concrete Unit Weight Oven Dry lbs/ft³ (93 Max)</th>
<th>Wall R-Value (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>No Insulation</td>
</tr>
<tr>
<td>12x8x16</td>
<td>36</td>
<td>37</td>
<td>80-93</td>
<td>2.7</td>
</tr>
<tr>
<td>10x8x16</td>
<td>33</td>
<td>28</td>
<td>80-93</td>
<td>2.6</td>
</tr>
<tr>
<td>8x8x16</td>
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<td>80-93</td>
<td>2.5</td>
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<td>4x8x16</td>
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<td>31</td>
<td>80-93</td>
<td>2.1</td>
</tr>
<tr>
<td>8x8x24</td>
<td>38</td>
<td>38</td>
<td>80-93</td>
<td>2.5</td>
</tr>
</tbody>
</table>

(1) Oven dry weights will be less than jobsite weights and will depend on unit shape and the concrete unit weight used. The maximum jobsite weights are given just for field control to help insure SmartWall units are being used. For maximum oven dry weights of SmartWall units, contact your supplier.

(2) When compared to heavy concrete masonry at 135 lbs/ft³.

(3) H-Values are based on ASTM minimum required block dimensions and 90 lbs/ft³ concrete unit weight using series parallel method (air film included). R in (h • ft² • °F)/BTU.)

(4) Wall HC (Heat Capacity) is based on ASTM minimum required block dimensions, 90 lbs/ft³ concrete unit weight and mortar. HC in BTU/(ft² • °F)

SmartWall Is The Answer!

5
Why Is SmartWall Just Now Being Introduced?

In recent years the rules have changed. The challenges of competing wall systems, the growing cost of construction, the high cost of worker compensation insurance, the heightened focus on energy and real world fire performance, and the opportunity for female masons have created a demand for high performance masonry materials. SmartWall meets the needs of today's market, and gives specifiers all the best reasons to choose concrete masonry over competing wall systems.

Where Can I See SmartWall? Can I Talk To Someone Who Has First-Hand Experience?

There are many SmartWall projects already in service. They include strip malls, office buildings, high-rises, and many other industrial, commercial, and residential structures. For more information, just give us a call.

Notes:

What is "HEAVY" Masonry?

Anyone who has lifted a concrete masonry unit made with ordinary aggregate knows it's heavy!

ASTM defines masonry at 125 lbs/ft³ or more as "Normal Weight."

Let's be realistic. "Normal Weight" concrete masonry is HEAVY!