

SMARTWALL SYSTEMS





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

SmartWall is a mason-friendly, cost-effective wall system that provides speedy construction and excellent customer satisfaction.

Owner/Occupant

SmartWall provides low maintenance, aesthetically pleasing structures that save 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 de-

sign expression, durability, and economy. SmartWall gives you the confidence of knowing you are specifying the best product available. Your client will also benefit from earlier completion and life cycle cost savings. Your customer's satisfaction will be the hallmark of your portfolio for many decades to come.

Masonry Contractor

SmartWall's reduced weight and high strength shorten construction time, provide safer scaffolds, decrease the potential for chips, save wear and tear on your equipment, and make you more competitive with other wall systems.

The reduced weight also reduces work-related injuries resulting in fewer worker compensation claims and lower insurance rates, increases mason productivity, and extends the careers of your masons. SmartWall gives you a built-in advantage and a safer working environment.

Block Manufacturer

SmartWall maximizes concrete masonry's competitiveness. By manufacturing high-performance concrete masonry units, you help insure the masonry industry's future by providing a mason-friendly and owner-friendly product, which competes effectively with other wall systems.

What Makes SmartWall So Smart?

You may have heard the slogan, "It's what's inside that counts." It's the aggregate. 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 Technical Committee of the Expanded Shale, Clay and Slate Institute.

SmartWall Systems® is a registered trademark of the Expanded Shale, Clay and Slate Institute.

SmartWall Advantages

Owner/Occupant

- Earlier Occupancy
- Reduced Heating & Cooling Costs
- Exceptional Fire Resistance
- Passes UL E 119 Hose Stream Test
- Sound Absorbing
- Low Sound Transmission
- Nailable Surface
- Impact Resistant
- Low Maintenance
- Wind Resistant
- Termite Proof
- Long Term Durability
- Non-Toxic
- Easy To Paint
- Excellent Life Cycle Economy
- Excellent ROI

Architect-Engineer-Designer

- Greater Design Flexibility
- Less Dead Load
- Less Seismic Load
- High Strength
- High Strain Capacity
- Less Chipping
- Multiple Colors, Shapes & Textures
- Readily Available
- Cost Competitive
- Structural Stability
- Structure and Finish in One In
- Exceptional Freeze/Thaw Durability
- Aesthetically Pleasing
- Low Shrinkage
- Less Cracking
- Less Chipping
- Excellent Energy Performance: High R-values with Thermal Mass and Low Thermal Bridging



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 1,800° (1,000° C). The material selection and production are strictly controlled to ensure a uniform, high-quality product that is structurally strong, stable, durable, and inert, yet lightweight 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 is enhanced. Reduced weight means less dead and seismic loads. This benefit 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, walls built with SmartWall units have exceptional fire ratings. ESCS has a coefficient of thermal expansion significantly lower than most ordinary aggregates. SmartWall units can withstand extreme heat and the thermal shock of high-pressure fire-hose spray without cracking, caving in, or deforming. They remain intact, ready for reuse after a fire. Proven performance in real-world fires has substantiated the excellent fire endurance documented in laboratory test programs. SmartWall units have successfully withstood hose stream exposure after a four-hour fire

test. An eight-inch wall built with SmartWall units 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 cementitious materials, 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 the 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. Hence, 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.

SmartWall Advantages

Mason Contractor

- **Mason Friendly**
- **Up To 40% Less Weight Compared To Heavy Masonry Units**
- **Less Mason Fatigue**
- **Fewer Injuries**
- **Fewer Worker Compensation Claims**
- **Opportunity for Both Male & Female Masons**
- **Extends Masons' Careers**
- **Speedy Construction**
- **Rarely Collapses Bed Joints**
- **Reduced Wear On Equipment**
- **Less Weight On Scaffolds**
- **One Mason on a 12" Unit**
- **Reduced Job Overhead**
- **Lower Labor Cost**
- **Lower Over-All Wall Cost**
- **Built-in Advantages**

Block Manufacturer

- **Maximizes Concrete Masonry Competitiveness**
- **Less Chipping**
- **Expands Masonry Market**
- **Customer Satisfaction**

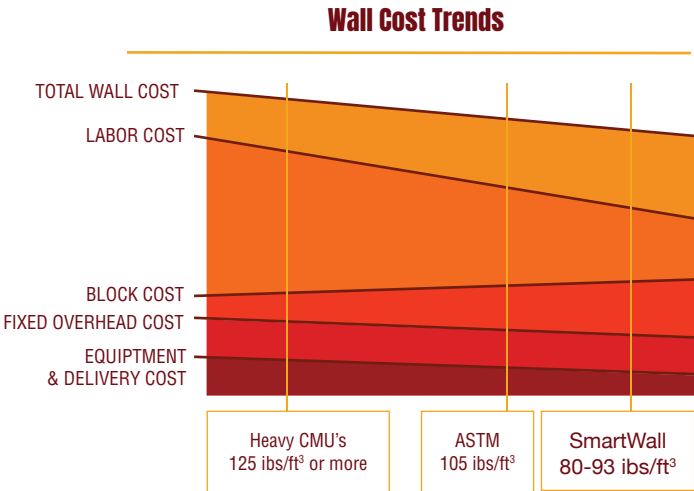


Is SmartWall Cost-Effective? YES!

The SmartWall system provides speedy construction that lowers contractors' overhead costs and affords earlier building occupation. Additionally, SmartWall's reduced weight reduces 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 ensure a healthy and productive work force. This advantage also helps minimize construction costs. 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,



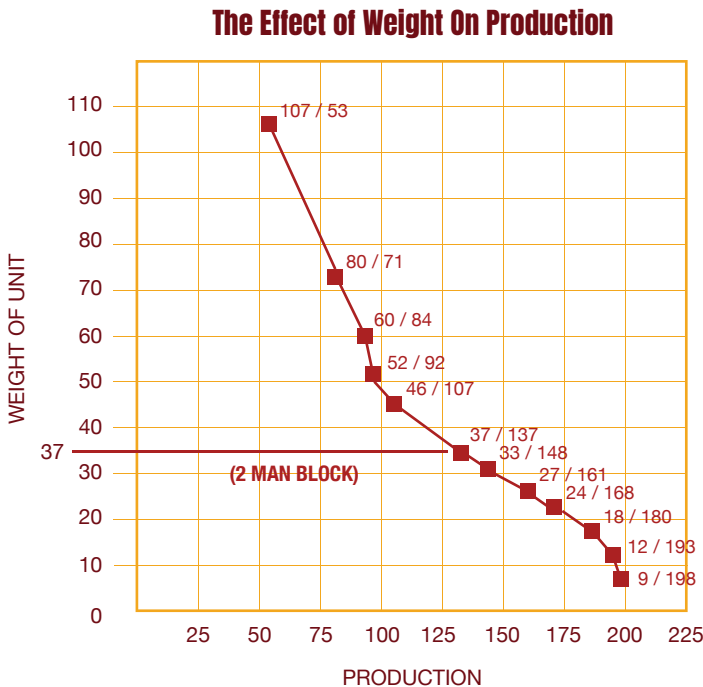
SmartWall units are very tightly compacted in the block machine. This mixture produces higher strengths, tighter textures, and fewer interstitial voids; all three contribute to reduced water absorption and permeability. These three qualities also enhance the effectiveness of water repellant coatings. Additionally, masons are able to lift and place SmartWall units more efficiently 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. Kolkosk, Masonry Estimating. The Aberdeen Group, Addison, IL

R-Values for Concrete Masonry Walls⁽¹⁾ (Exposed Both Sides)

Unit Size	Concrete Unit Weight lbs/ft ³	Cores Empty	Solid Grout	2" Rigid Insert	Grout w/1" Insert	Grout w/2" Insert	Foam Filled
8x8x16"	SmartWall ⁽²⁾	2.49	2.05	3.73	3.91	4.54	7.66
	Heavy CMU's ⁽³⁾	1.99	1.65	2.68	2.69	2.82	4.02
12x8x16"	SmartWall ⁽²⁾	2.57	2.52	3.80	4.87	5.21	11.57
	Heavy CMU's ⁽³⁾	2.11	2.07	2.81	3.50	3.40	5.76

(1) R-Values are mid-range per NCMA TEK 6.1 A & 6.2 A. R in. (h * ft² * °f) / BTU

(2) SmartWall at 90 lbs / ft³

(3) Heavy CMU's at 135 lbs / ft³

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 SmartWall. Even an un-insulated SmartWall performs as well as core-insulated heavy units! (See Table)

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 ASH RAE 90.1 energy code uses a computer program, ENVSTD*, to per-

form. 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.**



SmartWall Units - Weight:

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

Size	Not to Exceed
4" x 8" x 16"	18 lbs. (8.0 kg)
6" x 8" x 16"	23 lbs. (10.5 kg)
8" x 8" x 16"	26 lbs. (11.5 kg)
10" x 8" x 16"	33 lbs. (14.5 kg)
12" x 8" x 16"	36 lbs. (15.5 kg)
8" x 8" x 24"	38 lbs. (17.0 kg)

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

How Does it Look? What About Color?

Not only does SmartWall resist chipping and cracking, but its more uniform texture also 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.

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. 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:

Unit Size	Maximum Jobsite Weight lbs. ⁽¹⁾	Minimum Weight Savings Percent ⁽²⁾	Concrete Unit Weight Oven Dry lbs. /ft ³	Typical Percent Solid	Wall R-Value ⁽³⁾		Wall ⁽⁴⁾ HC Value
					No Insulation	UF Foam Insulation	
12 x 8 x 16	36	37	80-93	48.7	2.7	10.1	8.7
10x8x16	33	28	80-93	51.7	2.6	8.3	7.8
8x8x16	26	27	80-93	53.0	2.5	7.0	6.7
6x8x16	23	23	80-93	55.0	2.4	NA	5.6
4x8x16	18	31	80-93	73.8	2.1	NA	4.3
8x8x24	38	38	80-93	53.0	2.5	7.0	6.4

(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 Smart Wall units are being used. For maximum oven dry weights of Smart Wall units, contact your supplier.

(2) When compared to heavy concrete masonry at 135 lbs per cubic foot.

(3) R-Values are based on ASTM minimum required block dimensions and 90 lbs/cu ft concrete unit weight, using the series parallel calculation method with air films included. R is expressed as (hr x foot squared x degrees Fahrenheit) / BTU.

(4) Wall HC (Heat Capacity) is based on ASTM minimum required block dimensions, 90 lbs/cu ft concrete unit weight and includes mortar. HC expressed as BTU / (foot squared x degrees Fahrenheit).

- 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 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.

1. Oven dry weights will be less than Jobsite weights and depend on the unit shape and the concrete unit weight used. The maximum Jobsite weights are given just for field control to help ensure Smart Wall units are being used. For maximum oven-dry weights of Smart Wall units, contact your supplier.
2. When compared to heavy concrete masonry at 135 lbs per cubic foot.
3. R-Values are based on ASTM minimum required block dimensions and 90 lbs/cu ft concrete unit weight, using the series-parallel calculation method with air films included. R is expressed as (hr x foot squared x degrees Fahrenheit) / BTU.
4. Wall HC (Heat Capacity) is based on ASTM minimum required block dimensions, 90 lbs/cu ft concrete unit weight, and includes mortar. HC expressed as BTU / (foot squared x degrees Fahrenheit).

1. Oven dry weights will be less than Jobsite weights and depend on the unit shape and

SmartWall Comparison With Other Systems

	Wood Frame	Tilt Up 145 lbs./ft ³	Metal Stud	Heavy Concrete Masonry ⁽²⁾	SmartWall ⁽¹⁾
Mason Friendly					X
Opportunity for Female Masons					X
Low Thermal Bridging	X				X
Thermal Mass		X		X	X
Fire Resistant		X		X	X
Lower Fire Insurance Rates		X		X	X
Passes UL E119 Hose Stream Test		X		X	X
Quiet Comfort		X		X	X
High Sound Absorption					
Low Sound Transmission		X		X	X
Nailable	X				X
Impact Resistance		X		X	X
Termite Proof		X	X	X	X

(1) SmartWall at 90 lbs / ft³

(2) Heavy CMU's at 125 lbs / ft³ or more



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, visit smartwall-systems.com.

What is "HEAVY" Masonry?

Anyone who has lifted a concrete masonry unit made with ordinary aggregate knows the definition of heavy! A57-M defines masonry 125 lbs. per cf or more as "Normal Weight"

"Normal Weight" concrete masonry is HEAVY!

SmartWall Advantages

Energy Efficiency

- High R-Values
- Optimized Thermal Mass
- Low Thermal Bridging
- Reduced Heating and Cooling Costs
- Better Insulation
- Slow Energy Release



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