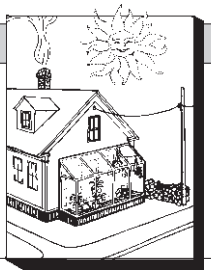
High-R Block Update



by Chuck Silver and Terry Brennan

Over the past few years, we have both had the opportunity to try Sparfil Block—the heavily insulated concrete block developed in Canada. Unlike other insulated block systems, Sparfil does not achieve its outstanding R-value simply by using foam inserts in a modified block. Foam inserts improve the R-value of block foundations, but the effectiveness of this approach is usually limited by two factors. One is that there is only so much of the block that can be removed to make room for the insulation before the block becomes too weak and fragile. The remaining block presents a significant thermal break. The second limitation is the mortar joints. Even if the R-value of the blocks is raised, the 3/8-inch mortar line around all the blocks is still under R-1 (for the total thickness of the mortar). The crates a large thermal short circuit in the system, lowering the overall R-value.

Sparfil addresses both these concerns. First, the concrete mix of the block itself is highly insulative, being made up of 60% expanded polystyrene (EPS) beads. Without any inserts, this makes an 8-inch block R-8, a 10-inch block R-10, and a 12-inch block R-12. For higher R-values, the block may be ordered with EPS inserts already installed in the cores. This brings the insulating value up to R-15 for the 8-inch block, R-18.5 for the 10-inch block, and R-24.5 for the 12-inch block. Furthermore, the system is "dry-stacked," meaning there are no mortar joints between blocks to lower the R-value. Dry-stacked walls typically derive their strength from a 1/8-inch-thick fiber-reinforced coating that is trowelled onto both sides of the wall. The system is strong, well-insulated, and fast, the cost is competitive when compared with other methods of achieving foundation walls with similar R-values.

Terry Brennan tried the system first, several years ago, with excellent results. It was easy and fast to lay up, the blocks were level and square, and the tested R-value was almost identical to the advertised R-value. His block came from Ontario, which had the only manufacturing facility at the time.

Recent History

I, myself, specified Sparfil block for two projects last year. One was a full basement, with the work performed by masons, the other a crawlspace with the work performed by carpenters. On both jobs, the block came from a U.S. manufacturing facility, Thermal Wall Systems (Roaring Spring, Pa.). Canadian block are metric, which may or may not be an inconvenience (the blocks are easy to cut), but the block made here are in full-inch dimensions. I noticed that the U.S.-made block appeared lighter in color than regular concrete block, even though the Canadian Sparfil block had appeared about the same. In fact, the Canadian block had to be carefully examined to see the tiny foam beads in the mix. In the block from Pennsylvania, the beads were quite apparent.

When the walls began to go up, it was easy to maintain level, since the blocks are quite true to height. (If you've ever tried to dry-stack conventional concrete block walls, the first problem you probably discovered was that the blocks were not true in height. Normally they don't have to be, since the 3/8-inch mortar bed will compensate for any irregularities.) Sparfil blocks go through a grinding machine to assure accuracy in this dimension. Unfortunately, the blocks were not true to thickness. Our 12-inch blocks varied almost 1/4-inch! Nor were they square, which caused some vertical gaps between blocks. The vertical gaps were rarely greater than 1/8-inch, so they were of little concern since the surface bonding easily bridges small gaps.

The variation in thickness, however, is cause for great concern. In terms of aesthetics, it becomes increasingly difficult to achieve a smooth, even surface. Moreover, whenever a high spot is troweled over, the thickness of the surface coating is diminished, and so thereby is its strength. In order to be sure of the required 1/8-inch thickness at the high points, a much greater thickness must be maintained throughout the job, adding costly materials and time. Even with perfect block, it is very difficult for even an expert to be sure there is a 1/8-inch coating. Therefore it is necessary to exceed this in most instances to be sure that the minimum is achieved.

Shortly after these projects, I met Jeff Sparling, the inventor of the Sparfil system. I related my experiences to him. He was very concerned about the inaccuracies of the block and he assured me that he would work to improve them. To address weaknesses in the surface coat, he showed me Sparfil's new method of bonding the wall. This method has a fail-safe way to indicate when the surface bond is thick enough. More on this later.

Current Events

One of the contractors who had done the Sparfil foundation last year took a large residential/commercial Sparfil project this past fall. We discussed the issue of block quality and he opted to order the block from Sparfil's newest manufacturing facility in Laconia, N.H. I was given to understand that the Laconia plant has state-of-the-art block-making equipment, and that we could expect close tolerances with this block.

The blocks that arrived, however, left much to be desired. Not only did they vary in width up to 1/4-inch, but they also varied enough in the more critical dimension of height to cause problems. After ten courses, it was necessary to (dare I say?) mortar a joint to re-level the wall. In addition, some blocks were tapered from top to bottom along their sides, which created little overhangs. With some care in block selection, it was possible to reverse tapers (place wide on wide and narrow on narrow) and eliminate these ledges. However, the time given to block selection eats into the speed, which is one of the advantages of the Sparfil approach.

A second, perhaps more critical problem emerged as well. It became apparent on the job that the consistency of the block varied greatly. Some blocks had a higher quantity of beads in the mix than did others. This was evidenced by both the varied weight of the blocks and the appearance. In the worst cases, enough beads were in the block to seriously affect its strength. With these blocks it was easy to abrade the surface merely by rubbing our thumb against it. By discarding these blocks and carefully placing the tapered block, it was possible to maintain quality on the job, but much time was lost and many blocks rejected.

The New Bonding System

The new system greatly reduces the chance that the surface coat will be too thin in spots. Instead of glass fibers in the parge coat, a fiberglass mesh is affixed to the wall and then coated with bonding cement. This gives uniform strength to the surface skin, and eliminates guesswork in the field about parging thickness. When you cannot see the mesh and it is totally embedded, the coating is thick enough.

The photos show the surface-coating sequence using the new system.

Sparfil's new parging system: *After nailing the fiberglass mesh to the block, a worker uses a heavy-nap roller (top) to thoroughly wet the wall. Next, a carpenter works the parging through the mesh (bottom) with a steel trowel. Later, he'll apply a second parging coat and smooth the finish with a rubber squeegee trowel.*

First, fiberglass mesh is nailed to the block (Sparfil block takes a nail about like Doug Fir). Next, the wall is thoroughly wet down using a paint roller and parging cement is applied with a trowel and hawk. The surface is then smoothed using a wet rubber grout trowel. Unfortunately, it is nearly impossible to totally embed the mesh in one coat, so a second parging is necessary.

Summary

When Sparfil was first introduced some years ago, it not only offered a way to achieve a highly insulated block wall, it was also very fast and easy. After the first course was laid in mortar on a footing, the walls went up as fast as you could stack them. Parging the wall on each side required somewhat more skill, but could be accomplished by carpenters without the services of a mason.

The system in its present form still offers a unique method of achieving a well-insulated masonry wall. As far as I know, the block shipped from Canada has remained true and square, and I fully expect that the American manufacturers will improve their quality.

Joe Burleigh, of Del R. Gilbert & Son Block Co., in Laconia, N.H., whose company provided the Sparfil block for the last project, has assured me that the problems with the mix are the result of inferior fly ash and have been corrected. As for the taper in the block, he says that all blocks have some taper to facilitate removal from the forms. To eliminate "sawtoothing" the blocks should be laid bottom to bottom and top to top. (Color coding the blocks would be a great help, since the bottoms and tops appear to be identical.) He also indicated that his company was switching to a "double-grind" system, taking a smaller shave off the block in two passes, rather than a larger cut in one. This should further improve accuracy.

The concrete mix of Sparfil block is made up of 60% expanded polystyrene (EPS) beads, so it is highly insulative.

The new bonding system offers a fail-safe method of determining adequate parging thickness, but does so at the expense of time. The added stops of securing the mesh and especially of parging twice, reduce the system's overall competitiveness. This can be particularly costly when scaffolding is involved, as on an above-grade wall.

The product still offers a low-skill method of achieving and R-24.5 foundation wall (12-block with inserts). Other methods frequently involve exposed foam on one or both sides of the wall which then needs to be protected. If a finished basement is desired, wiring can be run in the block, eliminating the need to stud up inside. Because of these unique advantages, I feel that this product still has its place in the energy-efficient building field. But get quality assurances about measurement tolerances and the mix consistency of the block before you try it. ■

Chuck Silver designs custom homes, and Terry Brennan consults on energy design. They currently run training seminars on energy-efficient construction for the New York Energy Office.