# Foam Foundation Forms

by Steve Andrews

The makers of foam foundation forms want you to believe that the fourth little pig, had there been one, would have built his house out of polystyrene and concrete. Flip through any building magazine and you'll find that the manufacturers of rigid-foam concrete forms are spending a bundle on ads extolling the virtues of their products. Is it time for you to jump in and try one of them? Maybe. The 25 builders I interviewed for this story noted some quality advantages to foam forms and intend to keep on using them. But they also admitted that foundations and walls built with foam forms cost more, and that using these products involved a learning curve.

### Product Choices

Most foam forms fall into one of three categories: molded, stackable blocks; sheet-foam panels; and large- core molds.

***Stackable blocks*** typically have 2- or 3-inch-thick expanded polystyrene sidewalls held apart by molded foam cross-members, or plastic or metal braces. They interlock with teeth, grooves, or Lego-like knobs (see Figure 1, next page). Horizontal rebar is laid over the metal or plastic cross-members every one to three courses, depending on the product; vertical rebar spacing varies with the block design and the height of backfill. The finished assembly gets braced with 2x's and the concrete placed with a pump truck.

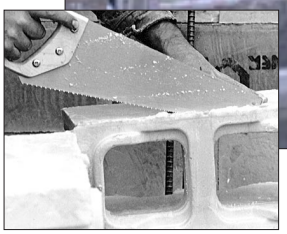
***Sheet foam systems*** resemble traditional concrete forms (Figure 2, next page). They consist of 8-inch-high by 4-foot-long strips or 4-foot by 8-foot sheets of expanded or extruded polystyrene foam connected by plastic or metal ties (some builders report that the expanded poly is more dimensionally accurate and easier to work with). Concrete is poured into the space between the foam walls just as with wooden forms. You can place concrete without a pump truck, and you only need rebar where building codes or good construction practice would require it for a conventional foundation. Sheet forms can be ordered assembled from some dealers, or you can assemble them on site. Large sections are "stitched together" quickly at butt joints by wrapping polypropylene bailing twine around plastic tie plates. Mechanical ties are also available.

***Large-core molds*** produce what is essentially a concrete post-and-beam structure (Figure 3, page 37). The long cores in the foam block are aligned, then filled with rebar and concrete. Some of these cores run horizontally, some vertically. Large-core molds use less concrete than the sheet forms or blocks.

***Above-grade use.*** Foam forms and blocks can be used above grade, too — a practice that's especially popular in the Southwest, where a growing number of builders are choosing foam forms as an alternative to wood framing. Says Bruce Bertram, a builder in Minden, Nev.: "With 2x10s varying by as much as 1/2-inch in width, people are taking the alternatives more seriously." Las Vegas builder Len Steinberg chose American ConForm SmartBlocks for some of the above-grade walls of the "New American Home" he built for the National Association of Home Builders' February 1994 convention. His reasons included decreased wood use, greater strength, higher insulating value, and lower sound transmission.

***Energy savings.*** One big advantage of foam-formed walls is their energy performance. Fountain Hills, Ariz., builder Tom Willis had peak cooling bills of $104 in July for his 2,700-square-foot Ice Block home — half the amount of the highest bill in an equally sized home he had lived in earlier. And in Phoenix's severe cooling climate, builder Ken Dannenbaum, who guarantees maximum annual heating and cooling bills, uses W.A.M. Inc.'s Ice Block foundations as part of his energy package.

AMERICAN CONFORM



ENER G CORP

***Though they don't save money,*** *stackable foam blocks form and insulate in one step. They are lightweight and cut with a handsaw (inset).*

One manufacturer, 3-10 Insulated Forms, actually warrants that homes built with their Polysteel system (including the foundation and above-grade walls) will consume at least 70% less energy for heating and cooling than an equally sized wood-framed home that's built to code and insulated with fiberglass.

### Bracing Requirements

Foam forming systems have simple but important rules that you'll need to follow for a successful job. These include:

- Securing wood guide plates to the footing
- Starting lay-up at a corner
- Staggering block joints
- Stacking cavities directly above one another
- Using adequate bracing

Bracing is one of the most critical elements of a good job. Requirements vary dramatically between manufacturers (Figure 4, page 37). At one extreme is U.C. Industries' R-Form, a sheet-form product that calls for horizontal wood bracing every 16 inches, inside and out. At the opposite extreme is The Greenblock Company's Argisol-Greenblock, which Sarsfield, Ont., concrete contractor Michel Philippe says he can pour using one plumb brace every 7 feet on the interior side of the walls. Other products fall somewhere between. Bill Cherry of Florence, Ore., and Jim Hart of Mountain View, Calif., both claim they need more bracing for above-grade walls than American ConForm recommends.

Some builders have found ways around the usual bracing requirements. After pouring 60 foundations with Polysteel and Ice Block during the last six years, Don Schmidt of Rochester, Minn., says that using glue on the blocks' tongue-and-groove joints reduces the amount of bracing needed. Schmidt uses about 48 tubes of a foam-compatible construction adhesive for a 1,500-square-foot basement.

***Bracing for wind.*** In windy areas, however, you may want to add extra bracing. Steve Casteel of Woodland Park, Colo., suffered

**Polystyrene forms simplify foundation work, but you have to brace carefully, watch the concrete mix, and be prepared for small blowouts**

**Figure 1.** ***Some stackable blocks,*** *like SmartBlocks (top), snap together like Legos; others, like the Ice Block (above), use a tongue and groove.*

**Figure 2.** ***Sheet forms****, like R-Forms (top) and Lite-Forms (above), assemble and fill like conventional plywood forms.*

wind problems on two jobs; in fact, the wind picked up a large section of one of his early Lite-Form foundations and destroyed it. Lehi, Utah, builder Craig Robinson once built a 60-foot-long by 9-foot-high wall with Lite-Forms that the wind bowed after the concrete was placed. These builders say that if there's any wind, you should check for plumb for several hours after the pour. Most forms are braced diagonally to kick-stakes driven into the ground, so fixing the bow is usually a matter of straightening up the stake.

Francis Stahl of Blomkest, Minn., used to rely on 2x6s for bracing the corners of his Lite-Form foundations, but switched to steel angle irons to save time. After 12 foundations, it now takes him about two days to set up the forms, install the rebar, and brace for the pour on an 1,800-square-foot house with 8 to 12 corners. Philippe says the 45- and 90-degree corner blocks he gets from Argisol eliminate the need for corner bracing, and that the Lego-like attachment knobs help keep his walls plumb.

## Pouring the Walls

Most pours into stackable blocks require 25% to 33% less concrete than a standard 8-inch wall, while the amount needed for sheet forms is about the same as for a standard wall. Pump trucks are nearly always used for blocks, though many builders use them on sheet forms as well — especially when pouring above grade. And though most builders pour their walls in 3- to 4-foot lifts (the manufacturer's typical recommendation), others have reached impressive heights. Gary Sillasen of Castle Rock, Colo., built a 22-foot-high wall in a 3,000-square-foot storage building using Polysteel forms.

***Preventing blowouts.*** Nearly all the builders I spoke with have had a few blowouts — often several times on the first few foundations — yet few of these mishaps have led to more than minor delays. "We keep a few 2x2-foot and 3x3-foot pieces of plywood and some threaded rod on hand," says Casteel (Figure 5, page 38). "If a piece of foam bulges or pops, we cut out the foam, scoop out some concrete, shove the foam back in, thread the rod and plywood, and tighten it up. It just takes a few minutes."

Blowouts can be prevented, however. One key, say most builders, is to develop a good understanding with your concrete supplier: If the mix is too soupy, the higher pressure created by the extra water can increase the number of leaks and blowouts. Most manufacturers recommend a 5-inch slump mix of 3,000-psi concrete. Some contractors have plasticizer added to the mix to make the concrete more slippery and help it flow around obstructions.

***Eliminating voids.*** Some products require you to vibrate the concrete to eliminate voids. Casteel uses a needle-shaped vibrator but others have learned to improvise. Builder Ron Christianson of Willmar, Minn., takes the blade off a reciprocating saw and hits the flat heads of his Lite-Form ties every 3 or 4 feet during the pour for 10 to 15 seconds. Roy Franklin, a remodeler in East Bedendorf, Iowa, takes a hammer to the corners of his Ice Block foundations, where extra wires can otherwise create voids.

***Size problems.*** A few builders have noted that the size of the blocks didn't measure up exactly as advertised. Although the heights of the ConForm blocks that Hart used to retrofit the foundation beneath his own home were okay, the lengths weren't. "The 40-inch blocks were a hair less than 40 inches long," he reports. In fact, the accumulated error ended up subtracting a full inch from a 40-foot-long wall. "It's a major weakness in the design," he adds.

***Curing.*** Since the insulating formwork is left in place after the pour, foam-formed walls cure at a slower rate than conventional ones. And slow curing means greater strength — manufacturers claim between 25% and 50% more strength than conventionally formed walls. Cold-climate builders like the fact that they can pour in weather down to 0°F.

## Electrical and Plumbing

All foam forms are compatible with plumbing and electrical wiring, but some presetting of vents, drains, and electrical conduit may be required. Nearly every builder agreed that running electrical wires is straightforward. A router or a shaped hot knife is used to make a 3/4-inch-wide groove in the face of the foam — small enough to jam Romex into and have it bind and stay in place (Figure 6, page 38). Space for shallow boxes is cut out and boxes either glued or screwed to the concrete. Casteel claims that using a hot knife to make the grooves is faster than drilling studs in standard wood framing. "We've had no complaints from our electricians and plumbers."

Foundation walls can be dampproofed with a variety of products, but builders caution against using solvents because they attack the foam. Hart spilled a few drops of ABS cement and watched it eat 3/4 inch into the foam. Similarly, drywall should only be glued to foam walls with nonsolvent-based adhesives.

## Speed and Scheduling

Most of the builders I interviewed said that the forms saved

them some time, though probably not much. After 26 Argisol-Greenblock foundations, Michel Philippe says he may save a couple of hours over a conventionally formed wall, while Bill Cherry reports that ConForm blocks cut a half day off his normal five-day foundation schedule. After 25 room additions and five full basements using Ice Block, Franklin claims that while foam-formed foundations take about as long as conventional ones, above-grade walls are faster than wood framing because they eliminate sheathing, insulating, and vapor sealing.

Eliminating the foundation sub was important to a number of small builders. Robinson's foundation contractors had five- and six-week backlogs. Now his own crew has learned to set ConForm blocks; in fact, he has used them on 80% of his last 60 homes, excluding only the lowest-end projects.

### Comparing Costs

Comparing different manufacturers' prices for the block alone is misleading. While the blocks cost anywhere from $2 to over $3 per square foot, there are a host of other variables. They include the size of the blocks, the amount of concrete used, as well as the engineering and labor required. The only meaningful price is the finished cost of the wall.

Along the Colorado Front Range, Sillasen's Polysteel basements cost $7.50 per square foot of wall area. If that sounds high, remember that the wall is ready for drywall as soon as it's cured. Back in Iowa, where forms are popular and there's a lot of competition, the price is closer to $5.50 or $6 per square foot. In western Nevada, Bertram bid a 30x50-foot ThermaBlock basement at $9,200 — $800 higher than his competitor's concrete block bid. "I got the job because of the insulation value of the blocks," he says.

Tracy Livingston of Portland, Ore., predicts that in his next home (5,200 square feet) built with EnerGBlock, the total building cost for foundation and walls will run 2% higher than conventional; that's down from 3% to 10% more with his previous, more complex designs. According to Joe Fry of Woodland Park, Colo., using Argisol blocks in the basement and above-grade walls adds at least $5,000 to a 3,000-square-foot, $160,000 home. That includes an engineering cost of around $1,000.

Where codes require basement insulation, finished costs are close to a conventional foundation's. "If I sub it out, the Lite-Form costs a couple grand more than if we do it in-house," says Christianson. "When we install it ourselves, it may still cost 7% to 10% more than a straight block wall, but after you insulate and finish that block wall, the costs are comparable but the quality is better."

### Codes and Inspections

Code acceptance isn't a problem with sheet forms like Lite-Form. Since sheet forms provide builders with a relatively conventional concrete wall — albeit sandwiched between two layers of foam — they seem to be consistently and readily accepted by inspectors.

Not so with stackable blocks, where acceptance varies by jurisdiction (rather than between products). Bill Cherry's head building inspector was interested, even enthusiastic, about foam block systems. "We had no trouble with the permit or inspections," he says. Contrast that to Phoenix's Ken Dannenbaum, who must pay up to $750 extra to have engineering done on Ice Block foundations on walkout basements. Fortunately, some builders say that the requirements for special engineering are beginning to drop away as block manufacturers gain wider code approvals. "Now that EnerGCorp has their ICBO number," reports Livingston, "you don't have to engineer every job."

### Technical Support

Most builders are happy with the factory support they receive. Argisol flew Michel Philippe from Ontario to Colorado to guide the installation of Joe Fry's first foundation. And Willis says that Ice Block gave him great support on his first home — in fact the company's staff provided a two-day on-site training session. Jim Hart reports that on his first job the local ConForm representative made himself readily available. "He visited my site half a dozen times and put in 40 to 50 hours with me." On the down side, says Hart, ConForm didn't have a very good installation manual. "There weren't many corner details on paper. What the rep showed me looked weak, and it was — I probably lost half a yard of concrete out of two corner leaks." Hart is also unhappy that ConForm markets their product as needing little bracing. "It needed to be braced like heck," he stresses. Hart still liked the blocks and believes that they have great potential, but thinks the manufacturer needs more feedback from the field.

### Curveballs from Manufacturers

Most forms are made from medium- to high-density expanded polystyrene (EPS), with an R-value of about 4.35 per inch. A wall with 4 or 5 inches of foam and 8 inches of concrete provides a continuous insulating value of R-18 to R-22. Unfortunately, when it comes to "effective" R-value claims, some manufacturers stretch the facts. A few go as far as to claim R-35. To

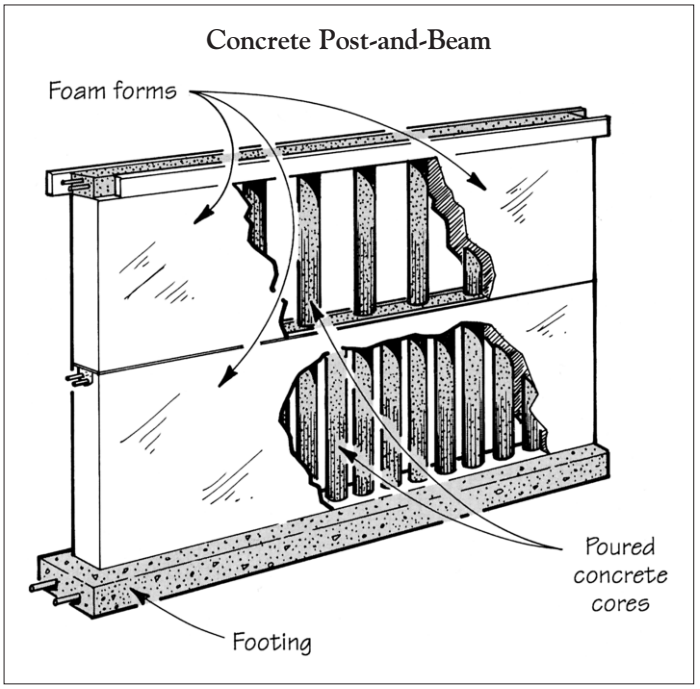



**Figure 3.** ***Large-core molds*** *use less concrete than block or sheet forms. Large horizontal and vertical cores, reinforced and filled, produce a post-and-beam structure.*

**Figure 4.** ***Bracing requirements for stackable blocks*** *vary from manufacturer to manufacturer. Argisol blocks use vertical braces spaced 7 feet apart (top), while R-Forms require verticals every 4 to 6 feet and horizontal braces every 16 inches (above).*

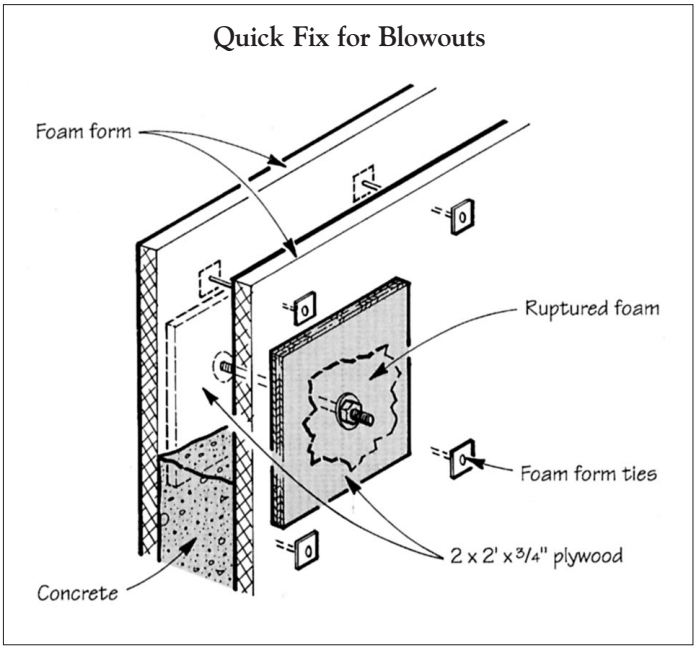



**Figure 5.** ***In case of bulges or blowouts*** *— not uncommon with foam forms — builder Steve Casteel of Woodland Park, Colo., keeps threaded rods and squares of plywood on hand. He cuts out the torn area, removes some concrete, puts the foam back, and supports the area with the plywood.*


**Figure 6.** ***Chasing electrical wires and installing boxes*** *in foam is easy with a router or a hot knife.*

support these inflated claims, some manufacturers cite test results from a heat-loss video camera, but these don't provide a sound basis for measuring R-value.

***Insect pests.*** A few manufacturers state in their literature that since foam isn't edible, it is "of no interest" to insects and pests. But foam makes a great nesting ground. There are a number of cases where foam in structural panels of different kinds has been turned into a carpenter ant freeway system. Precautions should be taken to treat against regional insects, either on site or by purchasing treated foam. AFM Corporation (P.O. Box 246, Excelsior, MN 55331; 800/255-0176) recently introduced *Perform Guard*, an EPS foam treated with Tim-Bor (a borate-based wood preservative effective against termites) to fend off bugs. It can be used with the Lite-Form ties.

## The Bottom Line

Despite the problems, most builders who have used foam forms swear by them. "After six months of working with the Argisol system, we believed so much in it that we decided to sell all our forms," said Philippe. "You don't have to put out the same physical effort as with conventional forms. We don't need a truck for heavy forms either, just a trailer to haul the blocks." Christianson reports that 25% to 30% of the new homes in his part of Minnesota are now going in with Lite-Form.

Polysteel builder/dealer Chuck Hotchkiss started using foam in 1977 and has built 50 foundations with it. Along the way, he's watched the field expand and evolve, mostly for the better. "In early times, there weren't many instructions and code officials were pretty lax," he notes. "The product is better now, and there are more of them to choose from, some of which have stood the test of time. But we're still just scratching the surface of the construction industry." ■

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## Manufacturers of Foam Forms

***Stackable Blocks***

American Conform Industries
1820 S. Santa Fe St.
Santa Ana, CA 92705
800/266-3676
Product: *SmartBlock*

Branch River Foam Plastics
15 Thurber Blvd.
Smithfield, RI 02917
401/232-0270
Product: *Fast Form*

EnerGCorp Inc.
5214 S. 30th St.
Phoenix, AZ 85040
602/470-0223
Product: *EnerGBlock*

The Greenblock Co.
P.O. Box 749
Woodland Park, CO 80866
719/687-0645
Product: *Argisol-Greenblock*

Reddi-Form Inc.
1415 Orchard Dr.
Chambersburg, PA 17201
800/334-4303
Product: *Reddi-Form*

Therma Manuf. Inc.
645 University Ave.
Los Gatos, CA 95030
408/395-8183
Product: *ThermaBlocks*

3-10 Insulated Forms
P.O. Box 46790
Omaha, NB 68128
800/468-6344
Product: *Polysteel (now called 3-10 Insulated Forms)*

W.A.M. Inc.
206 S. Main
Maquoketa, IA 52060
800/423-2557
Product: *Ice Block*

***Sheet Foam Forms***

Lite-Form Inc.
P.O. Box 774
Sioux City, Iowa 51102
712/252-3704
Product: *Lite-Form*

U.C. Industries
3 Century Dr.
Parsippany, NJ 07054
800/828-7155
Product: *R-Form Building System*

***Large-Core Molds***

Core-Form Industries
7245 W. 116th Pl., #4
Broomfield, CO 80020
800/793-0990
Product: *Core-Form*

Cubic Structures
4931 Meinders Rd.
McFarland, WI 53558
608/838-6607
Product: *Cubic Foam Walls*

Rastra Building System Inc.
6421 Box Springs Blvd.
Riverside, CA 92507
909/653-3346
Product: *Rastra Building System*