

Using Building Systems in Certified Homes

Building systems have been used for residential construction since the Sears Catalog Homes were marketed in 1908. The Sears Homes were a complete package of the latest building materials and technology supplied per design and included all systems that would be considered for today's National Green Building Standard (NGBS), an ANSI-approved standard and an ICC document (ICC700). While those homes may not meet the energy conservation provisions of today's building codes, those homes advanced the latest in contemporary life safety standards.

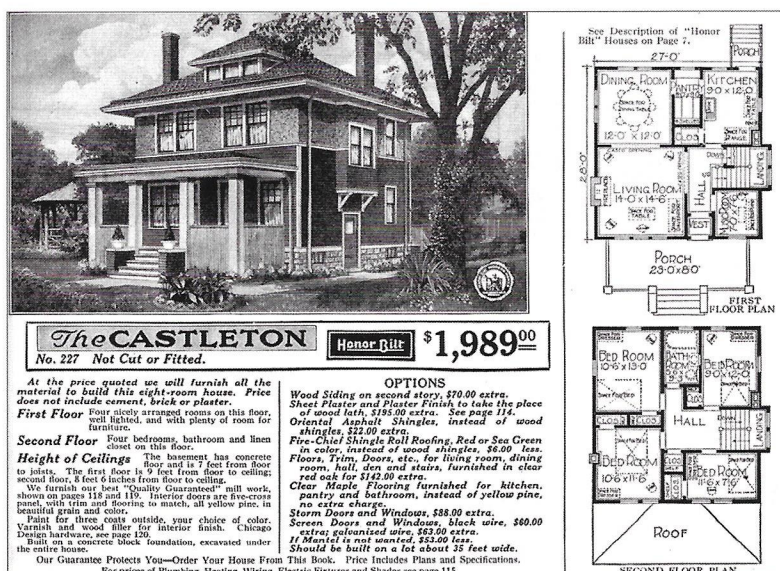
Today, building systems are engineered materials and methods of construction that meet or exceed NH building codes. Building systems have grown to include log homes, panelized homes, modular homes and concrete homes – each of which is represented by a Council in NAHB's Building Systems Council (BSC, buildingsystems.org). Each of these Councils has helped elevate the science, engineering and quality control for their respective building systems.

Delivering a package of materials to the building site comes with a range of benefits. Some packages are sold directly to the consumer while others are sold through independent representatives. In either case, they require some level of completion by on-site contractors. The simplest package, like the Sears Home, provides all the materials required to complete the home. The next step would be to provide those materials in pre-cut form, ready for installation. Next comes delivery of completed components (wall sections, roof panels, etc.), followed by delivery of completed assemblies. Some are delivered with supervision for assembly (e.g., handcrafted log homes) while others are assembled by the supplier to ensure structural components are properly set (e.g., some modular companies).

In terms of ICC700, building systems are recognized for their attention to planning prior to construction, and these areas gain points in the Resources requirements of the Standard. Material lists show where supplied materials are to be used and efficiency is gained by minimizing excess – this minimizes trips to supply yards, reducing environmental impacts from transportation. Complete material packages further benefit time and labor of construction when those materials are pre-cut for installation. They add the impact of reduced material waste to be handled on site. Framing layouts and other instructions for specific use of materials helps manage both site and material efficiencies. More points are achieved by adding prefabrication of assemblies for floors, walls and roof. Ultimately, the highest point count is assessed for modular home construction, as a high percentage of building materials are managed in a factory environment where quality and waste are closely managed.

Above Code Programs

While building systems offer green benefits through resource management (NGBS Ch. 6), it's always the contribution of the building contractors on site that make all the difference. For EPA's ENERGY STAR Homes Program, the focus is on energy performance. Add EPA's Indoor Air Plus and WaterSense programs and the project is approaching certification levels in three of the seven sections of the NGBS. The remaining sections of the NGBS still need to be addressed by the building contractor – lot design and land development (NGBS Ch. 5), and occupant education for ongoing maintenance.



The Castleton from the Sears Modern Homes Mail Order Catalog, circa 1921.

nance (NGBS Ch. 10). Homes completed through the NGBS benefit from two inspections and verifications by independent third-parties, regardless of the building system.

Because the builder is so important to the process, we have asked some NH builders and building system producers for their positive experiences in certifying their building systems projects to above code programs.

Building Alternatives

In Franconia, NH, Building Alternatives recently handed over the keys to a brand new, modular-built, high-efficiency home built in Franconia. President Bob Tortorice said this home received the best energy score since he built his own eight years ago.

For each home modeled in REM/RATE software an energy rating known as a HERS index is produced. This HERS index will typically be a number between 0-100 that represents energy usage as compared to a home of similar size and shape built to minimum New Hampshire energy code. A lower HERS index represents a



The Stewardstown Model by Coventry Log Homes is ENERGY STAR certified, using standard 6x8 log was along with normal components to achieve HERS ratings in the 50's.

better home energy performance. Buildings Alternatives took specific steps to ensure that the home would perform well. PSNH hired GDS Associates of Concord to analyze, test and verify the home for ENERGY STAR certification. The HERS index for this home was a 39. This means that even in extreme cold weather the homeowners can potentially reduce their heating and cooling needs by 61%, says Tortorice.

The design and selection of systems and materials – passive solar design, heat and air conditioning by Geothermal, insulated basement walls through a combination of ICF forms and close cell foam for the 2x6 walls – helped this new home achieve its high energy performance. This is the 15th Energy Star home built by Building Alternatives. Tortorice has dedicated his company to build 100% Energy Star Homes through an EPA program.

Epoch Teams with Abode

This ranch style home is approximately 1,600 sq. ft. and was designed and specified to attain the highest levels of certification under green building programs at the time of construction (LEED, NAHB Green Building Guidelines). It serves as Abode Builders model home on Tenney Mountain Highway in Plymouth, NH and can be toured there. It boasts unusual features such as 11 ft ceilings in the entryway and living room. With a focus on demonstrating sustainable, efficient methods and materials of construction, the management team succeeded in addressing all green options from lot development through documenting how the house functions.

Coventry Log Homes

Coventry Log Homes in Woodsville has seen many of its homes go through the ENERGY STAR Program. Explains Coventry's Mark Elliott: "We've been fortunate to work with several customers in New Hampshire that have chosen to go the ENERGY STAR path.

Our standard 6x8 log was used along with our normal components to achieve HERS ratings in the 50's on testing. As with any other type of construction, sealing around windows and door openings and at roof connections is key. Spray foam was used in the roof and dormer areas. We've seen by these tested homes that log homes are an energy efficient option for construction. Check out our website (coventryloghomes.com) to see a video of an actual blower door test on one of our homes."

Preferred Building Systems and New England Homes

We've had some of our builders achieve HERS scores as low as 42 on a regular 2x6 wall construction. In addition to this particular home, the builder on site helped ensure a better rating by making sure the air sealing of the joints between the foundation and the modular boxes was done well. Our best performing home to date achieved a HERS score of -6. To build to this degree, the design specifications included triple windows, a 12" thick exterior wall, and solar panels. This home produces more energy than it requires to operate. Since 2007 we've been leading the modular home industry by producing homes that help to become producers of energy rather than consumers of energy once alternative energy sources are added on site, such as solar panels. By building in a factory on an assembly line our ability to consistently deliver and rapidly produce a home capable of delivering high scoring HERS homes is taking modular construction to the next generation of home construction. ▲



This article was written jointly by Rob Pickett, Rob Pickett & Associates, LLC and contributors from the Building Systems Councils of NAHB for Build Green NH Council. For Build Green NH or the NGBB, please visit buildgreennh.com. Use the Contact Us link to ask how you can build above code!