The mettle of the steel framing trend in homebuilding is being tested by the California’s new energy efficiency standards, among the toughest in the nation.

Lumber price fluctuations that peaked at $500 per 1,000 board feet in the first quarter of 1993, and natural disasters such as Hurricanes Andrew and Iniki, have helped establish steel framing as a viable homebuilding method.

“We’ve been told by purchasing agents that lumber prices are a spot check on the hour ... 60 percent to 70 percent have discussed steel framing with us,” said Michael G. Hodgson, president of ConSol, Inc. of Stockton, Calif.

Laws for Steel

Homebuilders such as Del Webb Corp., Pulte Home Corporation and U.S. Home Corp. seek advice about steel framing from ConSol, an energy consultant, because steel, unlike wood, has no insulation value and conducts heat. So steel framing poses a special challenge in California, which enacted the nation’s most comprehensive energy conservation regulations in 1993.

The regulations, known as Title 24, divide California into 16 climate zones. Regardless of size, new buildings within each zone cannot exceed the annual energy use of a comparable building constructed with components.
An employee of Kenyon Construction, a division of Pacific Coast Building Products, uses steel screws provided by Grabber Construction Products to apply Celotex Tuff-R® Blackore™ Insulating Sheathing to the metal frame prototype at Larchmont Homes Antelope Hills community.

that met certain minimum performance criteria.

For example, a slab home built in the Sacramento climate zone can use no more energy in a year than a slab home built in the same zone with a R-38 ceiling, R-19 wall, U-.65 windows comprising 16 percent of wall space, shading for east and west windows, an average shading coefficient of 0.53, 20 percent exposed slab, a 78 percent AFUE gas furnace and a SERE 10.0 air conditioner.

But because so many variables are involved, a slab home in Sacramento can have an R-13 wall if the efficiency of the other components exceed the minimum values to such an extent that the annual energy use by the home would remain the same. However, upgraded components are not enough to make up for lower than minimally required wall R-values if steel frames are used.

“You need to stop the conduit effect of steel by using sheathing ... . You’re going to pay a price in the design of the home for using a sheathing with low R-value,” said Robert W. Hammon, Ph.D., a ConSol principal. “You have to do something to make it up ... . There is a larger spread in effective (wall) R-values when you go from wood to metal.”

**Improved R-Value**

Such was the challenge facing Larchmont Homes, a Ryland company, in 1993 when it began a joint effort with Pacific Coast Building Products to construct a
prototype steel frame home at Larchmont’s Antelope Hills community in Sacramento.

Larchmont selected Celotex Tuff-R Blackore™ Insulating Sheathing for the 1,390-square foot, three-bedroom home. Approximately 2,500 square feet of the product was applied to the two-bathroom home. A Kuikote one-tote stucco finish was also applied to the exterior.

The product was applied over the 3M-inch steel studs 24 inches on center. Unfaced R-11 glass fiber batts were applied in the cavity and ½-inch gypsum wallboard on the interior.

Tuff-R Blackore features an 8.7 R-value per inch, the highest of any polyisocyanurate insulation. This characteristic means that a thinner profile insulation provides the same R-value as thicker insulations. It works by uniformly dispersing carbon black during product formation, thereby blocking infra-red radiant heat flow and improving the insulation’s R-value by as much as 23 percent. It has a patented, rigid modified polyisocyanurate foam core with multi-laminate on both sides.

“I can give you a ‘Who’s Who’ list of California builders who have called us to express an interest in steel framing,” said Celotex Representative Dave Terhune of the trend.

The Celotex Corporation, based in Tampa, Fla., is a national manufacturer of building and roofing products for commercial and residential use.

Pacific Supply, a division of Pacific Coast Building Products, provided the 3½-inch steel studs used in the metal frame prototype at the Larchmont Homes Antelope Hills community.