

# A dome of a HOME

How one beach home survived Hurricane Ivan.

## HOME CONSTRUCTION

The house has unique features designed not only to meet building codes, but also to survive the beach's harsh environment.



The foundation is built 11 feet above sea level with the ground floor below used for garage space.

### INSIDE

■ The water-proof insulation is made of the same material used for boat docks.

■ The sheet rock has silicone to keep it from distorting when it gets wet.

■ The air conditioning is a duct-free, hydraulic cooling system that prevents mold from penetrating the system. It does not require an outside unit.

The garage openings are designed to let water to flow through during storm surges.

All concrete is designed to break up and wash away during storm surges. Garage floors, driveways and sidewalks are required by code to be 3 inches thick and un-reinforced.

The shell's exterior surface is made of a plastic material similar to the plastic made for truck bed liners.

Hurricane-proof glass is used in the doors and windows. Both windows and doors are set in a few inches from the wall, creating a concrete soffit.

The staircases, by code, are not attached to the building and are designed to break away from during a hurricane.

## THE SECRET IS IN THE SHAPE

Dome homes are naturally resistant to withstand strong wind pressure either from hurricane-force winds or tornadoes. The secret is the concrete re-inforced shell:

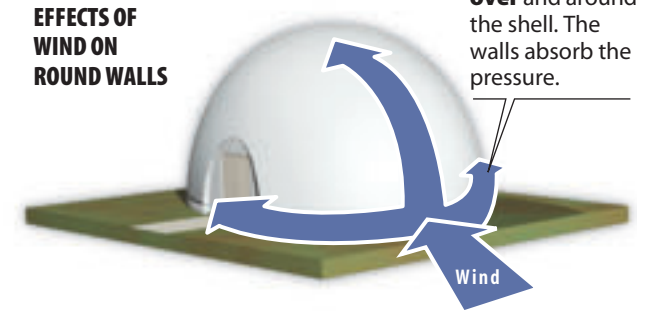
### Wind analysis

The higher the wind speed, the more pressure is absorbed by a home's walls. Domes can be built to withstand constant pressure up to 2,000 pounds per square feet (psf).

Wind speed	Pressure
70 mph	22 psf
100 mph	50 psf
150 mph*	100 psf
300 mph*	404 psf

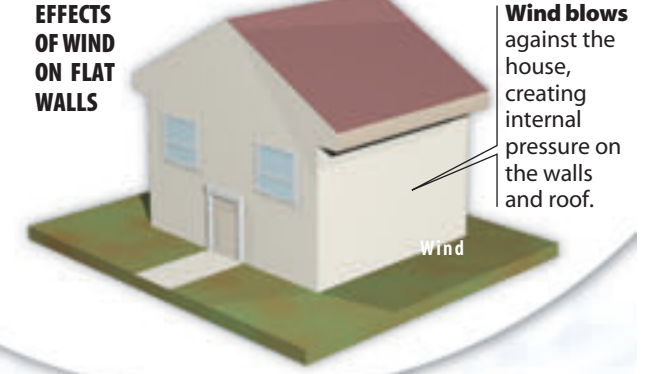
\*A Category 5 hurricane has wind speeds of 150 mph or more. A tornado can have wind speeds of 300 mph or more. At these wind speeds, some buildings are likely to collapse.

### EFFECTS OF WIND ON ROUND WALLS



Wind moves over and around the shell. The walls absorb the pressure.

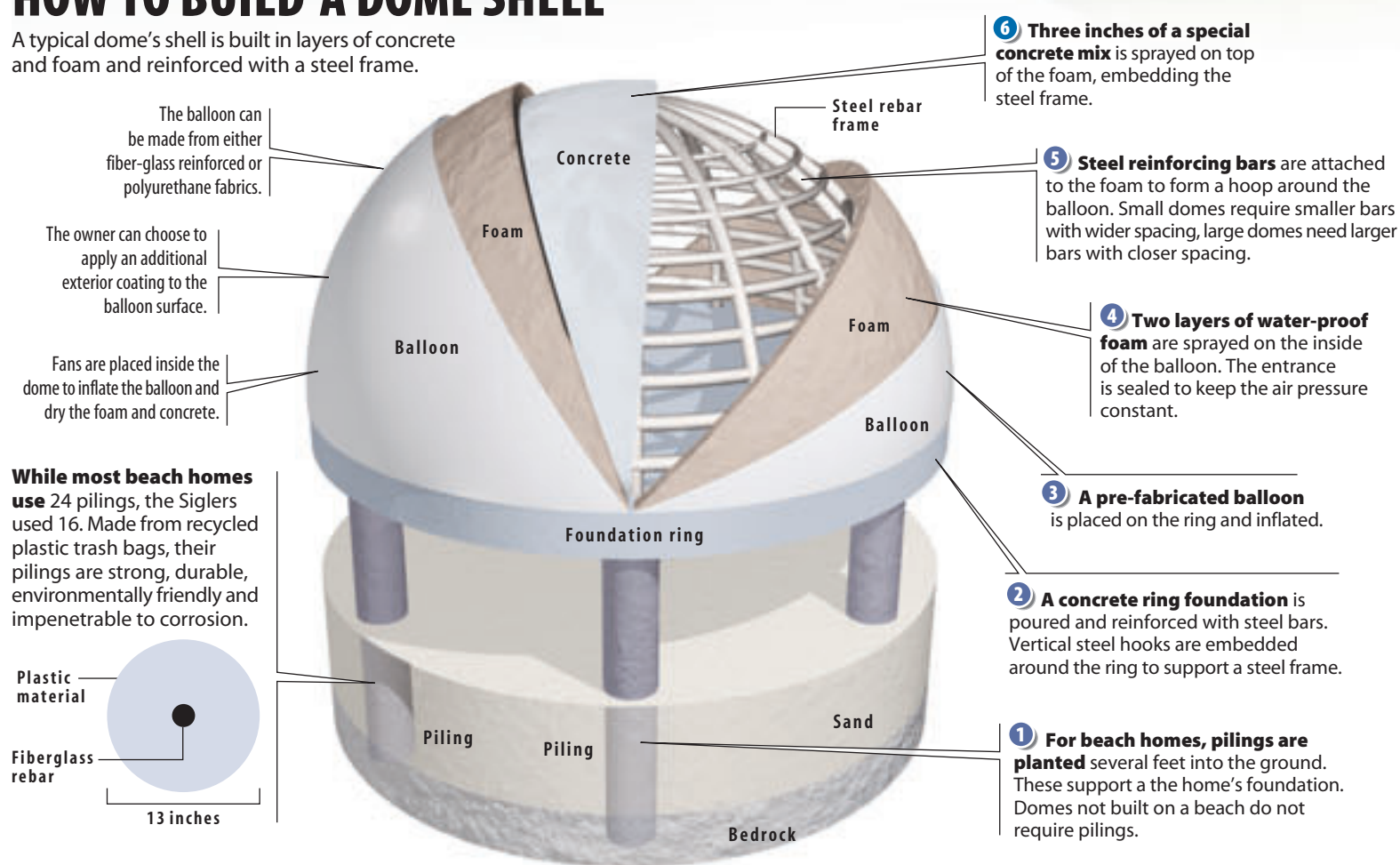
### EFFECTS OF WIND ON FLAT WALLS



Wind blows against the house, creating internal pressure on the walls and roof.

## HOW TO BUILD A DOME SHELL

A typical dome's shell is built in layers of concrete and foam and reinforced with a steel frame.



6 Three inches of a special concrete mix is sprayed on top of the foam, embedding the steel frame.

5 Steel reinforcing bars are attached to the foam to form a hoop around the balloon. Small domes require smaller bars with wider spacing, large domes need larger bars with closer spacing.

4 Two layers of water-proof foam are sprayed on the inside of the balloon. The entrance is sealed to keep the air pressure constant.

3 A pre-fabricated balloon is placed on the ring and inflated.

2 A concrete ring foundation is poured and reinforced with steel bars. Vertical steel hooks are embedded around the ring to support a steel frame.

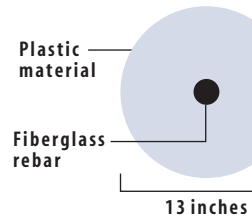
1 For beach homes, pilings are planted several feet into the ground. These support the home's foundation. Domes not built on a beach do not require pilings.

The balloon can be made from either fiber-glass reinforced or polyurethane fabrics.

The owner can choose to apply an additional exterior coating to the balloon surface.

Fans are placed inside the dome to inflate the balloon and dry the foam and concrete.

While most beach homes use 24 pilings, the Siglers used 16. Made from recycled plastic trash bags, their pilings are strong, durable, environmentally friendly and impenetrable to corrosion.



Insurance: Companies do not have policies specifically for dome homes, but the owners received a few discounts.

## A custom-built home

Mark and Valerie Sigler decided to build their three-story, luxury home after Hurricanes Erin and Opal severely damaged their original Pensacola Beach house in 1995. With the help of two architects and a couple of federal grants, the Siglers constructed their dome home in 2002. Today it is a vacation rental during the summer.

Size: The dome is 3,400 square feet, and the ground area is 3,800 square feet.

Floors: 3, including the ground-floor garage

Bedrooms: 4

Unique features: Elevator from ground level to the master suite; Cork used for flooring and kitchen counters to prevent mold from forming; temperature control for each room.

Energy-efficient: The home is one-third bigger than their old house but uses the same amount of electricity.

Price range: \$175 per square foot; shell cost \$45-\$50 per square foot.



## OTHER DOME HOMES

The dome community in the U.S. is small, with only two other homes built on the East Coast's that are in the path of hurricanes:

### The Eye of the Storm

Sullivan's Island, S.C.  
Built in 1991 by George Paul for his parents after their house was destroyed by Hurricane Hugo in 1989. The 3,500-square-foot, four-story home cost \$600,000 to build and has not been through a hurricane yet.



Monolithic Dome Institute photo

### Safe Harbor Dome

Stuart, FL  
Still under construction, this 3,000-square-foot home has already survived Hurricanes Frances and Jeanne. Owned by Billy Elkins and Debbie Razete-Elkins, this two-story home's shell cost the couple \$150,000.



Safe Harbor Dome photo

## AFTER IVAN

The Category 3 hurricane hit Pensacola in September, leaving the Siglers with only 5 percent of their property value damaged.



Hurricane Ivan swept away several homes to the east of the Sigler's and caused significant damage to homes to the west and north. All streets were completely swept away, and yards filled with sand. Pensacola News Journal photo

A Dome of a Home sustained \$100,000 in damage, all of it on ground level: The pool and hot tub were damaged, while landscaping, all concrete and the staircases were swept away. Pensacola News Journal photo

SOURCES: Jonathan Zimmerman, zdomes.com; Robert Bissett, architect; Mark and Valerie Sigler, domeofahome.com; Monolithic Dome Institutes; safeharbordome.com, Pensacola News Journal, Sun-Sentinel research  
Main photo courtesy of A Dome of a Home Staff graphic/ Belinda Long