

Protect your home and property from storm damage. Here are 13 easy, affordable things you can do right now

BY JAMES GLAVE

BRACING FOR THE BIG ONE

SHELTER NO MORE
It doesn't take the 140-mph winds of Hurricane Katrina, which leveled this house in Mississippi, to wreak havoc on a home. Wind speeds of even 75 mph can tear off a roof.



Get ready for “another above-normal year for hurricane activity.” So says Dennis Feltgen, a spokesman for the National Oceanic and Atmospheric Administration (NOAA). Katrina and Rita may have struck a year ago, but the images of devastation are still fresh in our minds. And now, as another storm season gets under way, it’s not just Florida and the Gulf States that need to be worried. The whole Eastern Seaboard, from Miami to Boston, is vulnerable. According to NOAA, we can expect up to 16 named storms this summer, with eight to 10 reaching hurricane proportions, and as many as six of those hitting destructive Category 3 strength or higher. And those aren’t the only weather systems we need to watch out for, either: Just ask folks in the stretch of the country’s midsection known as Tornado Alley, or the victims of hailstorms in Colorado.

The good news is that with a few tools, a weekend or two, and a little know-how, homeowners can take meaningful steps today to improve their home’s odds of surviving severe weather, whether it’s a hurricane in Florida or a twister in Texas. To help you get started, we canvassed engineers, contractors, architects, emergency managers, and, of course, our own experts, and compiled their best nuts-and-bolts advice. The bottom line: You don’t have to spend a bundle for protection. Nor do you have to live in a bunker—though if you’re tempted, we’ve got just the thing for you (see page 114). Even a handful of nails or a few tubes of strategically applied construction glue can dramatically increase your house’s odds of staying put in a storm.

The fact is, your home is your single greatest investment, and when it comes to protecting it from ferocious weather, you simply can’t afford to wing it. There’s a storm in your future, and your game plan for fighting it starts right here.

Since 1998, when this tornado roared through Atlanta, new building codes have been introduced nationwide, with the aim of protecting houses against damage from the elements. For details on code in your area, go to iccsafe.org.

WEB EXCLUSIVE

Dozens more expert safety tips, essential emergency gear, plus storm insurance advice: thisoldhouse.com/shortcuts



PHOTOS: ATLANTA CONSTITUTION/ SIGMA/ CORBIS; (PREVIOUS PAGE) LOUIS DELUCA/ DALLAS MORNING NEWS/ CORBIS

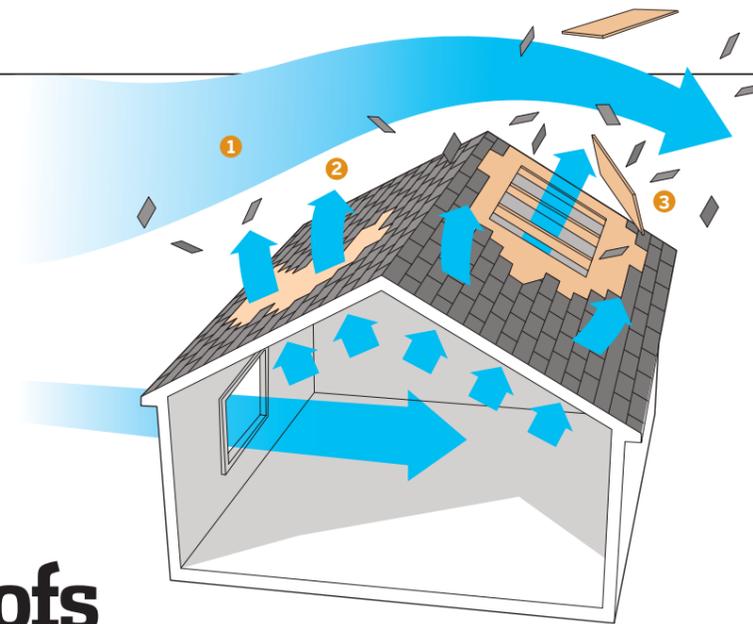
PHOTO: COURTESY OF STANLEY TOOLS

Roofs

The Danger: As hurricane winds pass over a roof (1), they create powerful upward-sucking forces (2). If shingles or other roofing materials are not securely attached, they will simply peel off (3), opening avenues for water to infiltrate. In the worst-case scenario, roof sheathing pulls off too, compromising the house’s structural integrity while it exposes the inside to the elements.

Permanent Solution: For new construction or additions, the roof should be built to wind-rating codes for your area, with 5/8-inch ply-

wood decking fastened securely to the roof framing. Waterproof the seams with self-adhering flashing tape, cover the sheathing with roofing felt, and top the whole thing off with shingles rated for wind and impact resistance. Typically, these are a laminated sandwich of fiberglass and asphalt, held down by six nails in a special pattern. In addition, glue down all shingles within 2 feet of the roof’s vulnerable outer edges with an asphalt cement. Look for the MP1 rating on the label, the highest industry standard for asphalt adhesives.



UNCOMMON NAIL
With its extra-large head, beefy ring shank, and spiral threads at the top, the HurriQuake nail is designed to increase a roof’s resistance to uplift forces by as much as 100 percent. In tests, it didn’t pull out even when subjected to wind gusts of up to 170 mph. (Greater shear strength makes it handy in earthquakes, too.) And that added protection will only run you about \$15 for a whole house. Go to bostitch.com for more details.



What You Can Do Now

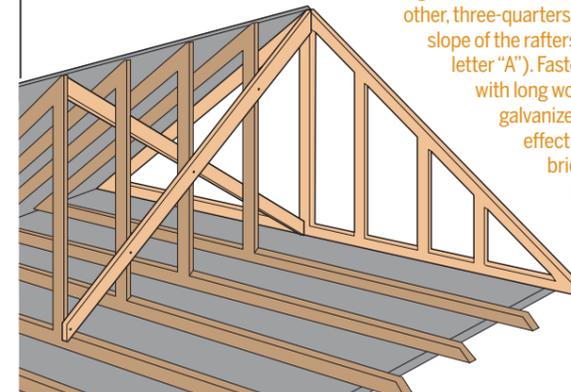
BRACING

Hip roofs, in which all four sides slope toward a central ridgeline, are naturally more wind-resistant than gable roofs. One way to strengthen a gable roof is to brace the end walls, which are the most vulnerable to uplift.

Get up into the attic and nail or screw a pair of 2x4s in an “X” pattern—one extending from the peak of the gable to the bottom center brace of the fourth truss, and the other from the bottom center of the gable to the top center brace of the fourth truss. Use 3-inch-long wood screws with a 1/4-inch-diameter shank, or 16d galvanized common nails, and reinforce the new braces wherever they meet roof members with 1-inch galvanized-steel straps.

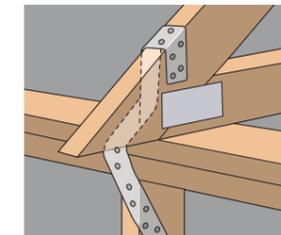
If your roof is framed with rafters, you can strengthen it by adding collar ties. “Adding collars will improve a roof’s ability to take wind load,” says John Knezevich of Thornton-Tomasetti Group Engineering, in Fort Lauderdale,

Florida. Brace every pair of rafters by running a long stud from one side of the roof to the other, three-quarters of the way up the slope of the rafters (imagine the letter “A”). Fasten it at each end with long wood screws and galvanized-steel straps, effectively creating a bridge across the inside of the roof.



ADHESIVE

Get up into the attic and run a half-inch bead of construction adhesive along each rafter or truss where it meets the plywood roof sheathing above. “A good, thick bead down the edge on both sides of the rafter will tighten everything right up,” says *This Old House* general contractor Tom Silva. This simple step will roughly triple a roof’s protection against being torn off by the wind.



STRAPPING

Hurricane straps—1-inch-wide galvanized-steel ties that extend from the stud to the top plate and over the truss or rafter—tie the roof and walls together. While it’s not easy to retrofit them (there’s little maneuvering room in the attic at the edge of a pitched roof), it can be done by a skilled professional, who may need to remove a section of roof sheathing or siding to gain access. Attach a strap at each roof-to-wall connection.



BUILD YOUR SKILL
Emergency roof-patching techniques. *Workshop*, p. 117

ILLUSTRATIONS BY JASON LEE



Windows

Keeping windows intact is often the first line of defense against more catastrophic damage. If hurricane-force winds get inside the house, internal pressure will blow the roof off from within.



IN THE TESTING LAB

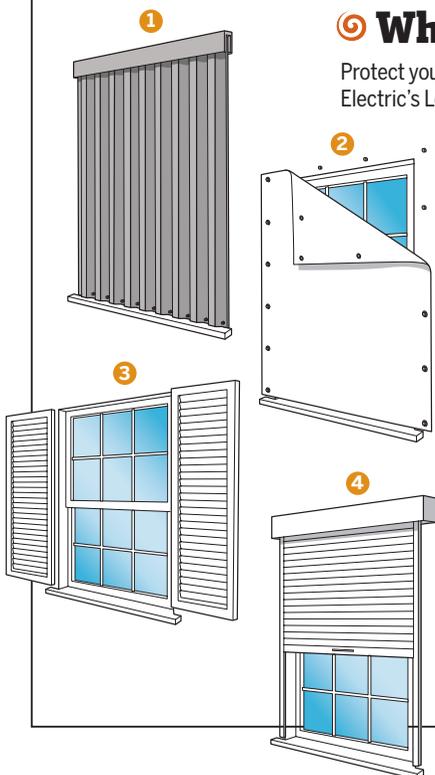
If you buy new windows or doors for use in a hurricane region, you can rest easy knowing that they will have already taken some serious hits in the lab. That's because building-envelope products—roofing, windows, doors, and so on—sold in so-called high-velocity wind zones are required to meet stringent ASTM International standards for wind pressurization and debris impact. To determine if the goods are up to snuff, independent testing facilities simulate a hurricane's fury. To test how well impact windows perform, for instance, technicians fire a 9-pound 2x4 out of an air cannon at 50 feet per second. Should the wooden missile penetrate or significantly crack the window, then it's back to the drawing board for the manufacturer.

The Danger: High winds and flying debris will smash unprotected windows, setting off the catastrophic phenomenon known as internal pressurization. "The wind comes in through a broken window or failed door, and it's gotta come back out," explains Leslie Chapman-Henderson, CEO of the Federal Alliance for Safe Homes, a coalition of insurance firms, private corporations, and government agencies. "The pressure will build, and it will literally explode out whatever weak spots it finds in your structure."

Permanent Solution: Install new impact windows, tested to one of the major standards (see box, right). Available from most leading manufacturers, these consist of a layer of plastic sandwiched between two pieces of glass. "Impact windows are similar to your car's windshield, but quite a bit thicker," says Steve Berg, coastal products manager for Andersen Windows. The superstrong glass may crack if hit hard enough by flying debris, but the bonded plastic interlayer will keep the pane intact and keep the wind out. Impact windows come in a variety of styles, including historically accurate double-hungs. Expect to pay between 75 and 110 percent more for an impact-resistant insulated window than for the conventional-strength variety.

What You Can Do Now

Protect your windows with storm shutters made of steel, aluminum, or high-strength polycarbonate plastic such as General Electric's Lexan. Dozens of companies manufacture shutters. Here are a few common permanent and removable options.



1. ALUMINUM PANELS
Interlocking corrugated metal panels slide into a premounted track and attach with wing nuts. The permanent track can be painted to match the house's exterior. Panels provide solid protection against debris and wind, but they're tough to handle (mind the sharp edges!), bulky to store, and time-consuming to install, especially on upper floors. For a good-sized family home, two people should allow at least a half day to mount them. Around \$8 to \$10 per square foot.

2. FABRIC SHIELDS
PVC-coated polyester fabric panels don't offer the same degree of protection as steel or aluminum, but they do meet Florida Building Code standards. And unlike metal shutters, they're easy to handle and store, and won't leave your home in total darkness. "The Fabric Shield allows enough light in that it looks like your mini-blinds are closed," says Mike George, a spokesman for manufacturer Wayne Dalton. About \$8 to \$15 per square foot, installed.

3. COLONIAL
Along with Bahama-style shutters, which swing down to cover a window from the top, these permanent swing-out shutters, in aluminum or fiberglass, combine protection and convenience with architectural style. When a storm approaches, just pull them closed and latch them securely. You can usually do this from inside the house, which means no perilous work atop ladders. The downside: They're expensive, at \$30 to \$35 per square foot, installed.

4. ROLL-DOWN
When not in use, steel roll-downs retract into a housing above or beside the window. They can be operated manually or automatically; if you opt for motorized, just remember to install a battery backup. "Roll-downs are the Bentleys of the storm-shutter world," says Steve Buzella, owner of manufacturer Metal-Tech, in Hialeah, Florida. He's not kidding: It can cost tens of thousands of dollars to hire a pro to equip a 2,000-square-foot house with the fully automated variety.



Garage and Entry Doors

🌀 **The Danger:** If your home has an attached garage, think of that wide, roll-up door as a hurricane welcome mat. When 100-plus-mph winds hit the relatively thin aluminum panels of a standard door, typically, that door buckles and fails, allowing pressure to build up inside the house until it blows apart. The same is true of double entry doors: Without adequate reinforcing, they can potentially blow in or be pulled off.

🌀 **Permanent Solution:** Replace garage and entry doors with storm-rated models. For garage doors, that means braced steel construction with beefier rollers, hinges, and tracks, and additional track-attachment points. Reinforced entry doors typically are made of fiberglass, steel, or solid wood with impact glazing. Prices range from a few hundred dollars for steel to several thousand for top-of-the-line fiberglass, like the Craftsman-style model from Jeld-Wen's Aurora collection. "It's made to emulate a hardwood door," says Kevin Pine, associate marketing manager for Jeld-Wen Doors. "But it's a much stronger product than a conventional stile-and-rail door."

"More than 90 percent of the time, the garage door is the first thing to go," says Leslie Chapman-Henderson, CEO of the Federal Alliance for Safe Homes. Fortunately, it's also one of the easiest parts of the house to strengthen against blow-in.

🌀 What You Can Do Now:

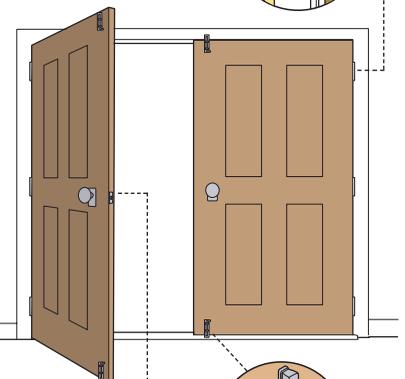
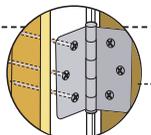
REMOVABLE BRACING SYSTEM

Temporary reinforcing posts will improve your chances against a blow-in or pull-off. A retrofit kit, like the aluminum Collier Fortress Brace or the Secure Door system, sells for about \$150 for a standard single door. Vertical posts slot into holes drilled in the floor and fasten at the top via a preinstalled bracket. When a storm warning goes out, you simply insert the posts to bolster the door. (colliersprings.com; securedoor.com)

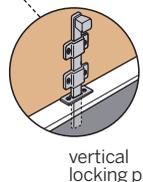
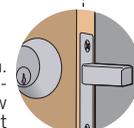
BEEFED-UP DOOR HARDWARE

Some simple hardware changes are all it takes to dramatically improve the strength of a double entry door. For starters, replace hinge screws with longer versions that extend all the way through the surrounding framing. Change out the standard deadbolt for a longer-throw version, and add deadbolts top and bottom. Multiple-point locking systems, like the Trilennium from W&F Manufacturing (starting at \$300; wfmfg.com), have two or more internal deadbolts, giving you added protection without compromising looks. Finally, add vertical locking pins to the top and bottom of the moveable door; in a traditional setup, only the stationary door has them. Make sure the lower pin extends down into concrete or solid wood.

hinge screws into framing



min. 1-inch-throw deadbolt



vertical locking pins



Landscaping

⦿ The Danger: When the ground is saturated by floods or heavy rain, poorly rooted or sited trees can blow over onto your house or onto power lines, and dead branches can snap off and become airborne missiles. And it's not just trees that pose a hazard. Even landscape features like the pool can be a problem. If flooding causes it to overflow, the chlorinated water can damage plants and grass, so remember to lower the water level in advance of the storm.

⦿ Permanent Solution: If you're establishing a new landscape, plant well-rooted varieties of trees, which tend to be slower-growing species with smaller leaves. Ask a local nursery for wind-tolerant choices, but good bets include live oak, beech, Indian tamarind, and bald cypress. "Slower-growing trees tend to have stronger wood," says Charles Livio, vice president of the Landscape Inspector's Association of Florida. Proper planting techniques help trees develop a strong root system, says *This Old House* landscape contractor Roger Cook. Avoid planting a large tree in a small area, such as a narrow strip alongside a driveway. If the roots are constrained, they can't get a good purchase in the soil, increasing the chance of a blowdown.

The "safest" trees—that is, those most likely to remain standing in a storm—tend to be indigenous varieties. "Look for native plants, which have withstood the local weather for hundreds of years," says *TOH* landscape contractor Roger Cook.

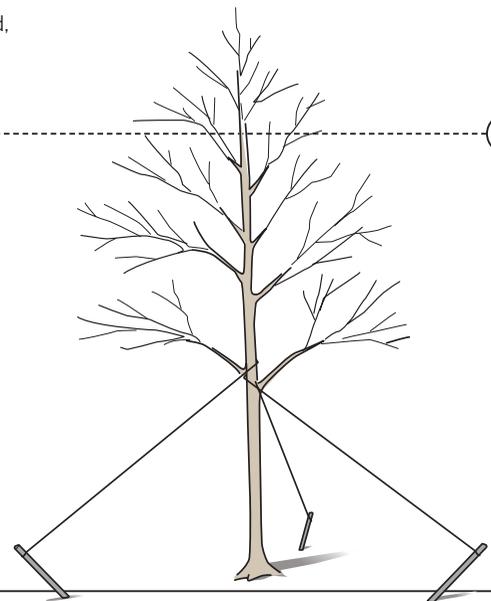
⦿ What You Can Do Now:

PRUNING AND BRACING

Well-pruned trees will weather a bad storm far better than those that are simply left to grow unattended. Structural pruning, particularly in a tree's early years, can prevent it from developing competing trunks (called "co-dominant leaders") that grow alongside each other from a central point. "That's like the San Andreas Fault waiting to open up the next time there's a big wind," says horticulturalist Charles Livio. "The trees just split in half."

Prune mature trees so that wind can blow through the canopy of leaves, not against it. "Very dense foliage presents a sail effect," Livio explains. As for fruit trees, pick the fruit in advance of a storm if possible. "That will lighten the load and reduce the risk of projectiles," Livio says.

Finally, brace younger trees in advance of a storm with stranded nylon rope and 3-foot-long sections of #4 or #6 rebar, or wood stakes pounded into the ground at 45-degree angles away from the trunk. Be sure to remove the stakes and ropes after the danger passes.



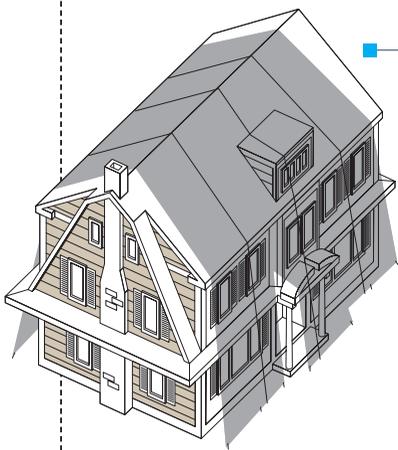


Security Blankets



Basement Bunker

Folks in tornado country know all about storm shelters. But after last year, some people in hurricane-prone regions are seeking a more secure place to hunker down than the “windowless interior room” recommended by emergency agencies. Those people might want to check out DuPont’s Kevlar-reinforced StormRoom. The prefab shelter comes in sizes from 4 by 6 feet to 12 by 12 feet (\$6,000 to \$12,000, installed). Once bolted and epoxied to a house’s concrete foundation, it withstands winds in excess of 250 mph. But make sure to assess your flood risk first. “Storm shelters might provide protection from flying debris and wind,” deadpans Mark Smith, of the Louisiana Governor’s Office of Homeland Security and Emergency Preparedness. “But they don’t float.” stormroom.dupont.com



A Seat Belt for Your House

Back in 2004, while passing flatbed trucks on the freeway near Orlando, Florida, structural engineer Frank Bennardo marveled at how well mesh tarps held down the big rigs’ loads. “Why not do the same thing for houses?” he wondered. And so he did. Teaming up with shutter manufacturer Michael Madden, Bennardo coined the Cat 5 Hurricane Netting System. Throw a few 10-foot-wide bolts of the PVC-coated polyester over your house, hook it to anchors sunk into the ground, tighten the straps, and you effectively batten down the whole homestead. “It literally Saran-Wraps your house together,” says Bennardo. “It deflects the wind and diverts it over the whole structure.” Consider it a supplement to storm shutters or impact windows. But at just 85 cents a square foot, plus \$2.50 or so per tie-down, it sure costs less than a new roof. hurricane-net.com

Portable Power

It could take a week or more for utilities to restore power to storm-lashed neighborhoods. Here, a trio of solutions to keep you rolling through the blackout. **1. FRIDGE AND FREEZER:** The Yamaha EF3000iSE portable gas generator pumps out enough juice to power your fridge, freezer, and a few lights for as long as 20 hours per 3.4 gallons of regular unleaded. The built-in power inverter

means that the engine output increases as power needs do, which conserves fuel and reduces noise. \$2,099; yamaha-motor.com

2. MOBILE PHONE: Your cell phone may be your lifeline to the outside world. Keep it going with little more than sunshine and the Brunton Solaris 6. Just unfold the 29-by-9-inch panel in the sun, plug in your phone, and the unit will charge it in about one to three hours. \$129; brunton.com

3. WEATHER RADIO: The Freeplay EyeMax will give you the latest news, but it also receives continuous advisories from NOAA Weather Radio. Don’t worry about batteries—it’s powered by a hand crank that folds out of the housing. Thirty seconds of cranking keeps it going for a half hour. \$70; freeplayenergy.com

