



# Hurricane-Resistance Designation

The goal of the FORTIFIED for Existing Homes program is to strengthen your home against specific regional natural hazards through a retrofitting process. Depending on the natural hazard, the program may involve a combination of tiers and levels to achieve varying degrees of disaster resistance. Each of the lower-level retrofit requirements must be completed before moving onto the next level, and each level builds in additional disaster protections.

## WHY FORTIFIED?

The FORTIFIED for Existing Homes Designation provides tangible evidence that a home is built and/or retrofitted according to standards that bring critical elements and systems in your home up to, and sometimes beyond, those used in new hurricane-resistant construction. The FORTIFIED approach is incremental to keep costs manageable, while tackling the vulnerabilities that lead to damage in common, weaker storms such as a Category 1 hurricane. As the levels progress to include more extensive retrofit requirements, the hurricane resistance of the home increases to add protections against less frequent, but more intense storms, such as a Category 2 or greater. This approach provides a common sense path toward making your home more resilient when a hurricane strikes.

## DESIGNATION PROCESS

The designation process involves you, contractors, and accredited FORTIFIED for Existing Homes Evaluators, who verify that the retrofits performed adhere to the stringent program standards and ensure that you get what you are expecting when making this investment.

Designations are only available for single-family detached homes. The following is a list of property types that are not eligible for a FORTIFIED for Existing Homes' designation:

- Single-family homes that have not been completed (these homes may qualify for designation under the FORTIFIED for Safer Living® program),
- Townhomes,
- Duplexes, triplexes, and quadplexes,
- Multi-unit residential buildings,
- Residential portions of mixed-use buildings,
- Commercial buildings

The following information relates specifically to the FORTIFIED for Existing Homes Hurricane-Resistance Designation.

Depending on the level of retrofits performed, your home can achieve one of the following FORTIFIED for Existing Homes' hurricane-resistance designations:

### Tier 1:

- FORTIFIED Bronze
- FORTIFIED Silver

### Tier 2:

- FORTIFIED Gold

Tier 1 designations are generally most appropriate for older homes, which were built prior to the adoption and enforcement of modern engineering-based building codes that produce well connected structural systems designed to resist the forces produced by high winds. Tier 1 retrofits harden the building systems that are most frequently damaged or lead to water intrusion in hurricanes. However, homes that only achieve a Tier 1 designation may still sustain substantial structural damage if they are subjected to the eyewall of a major hurricane.

Tier 2 designations, which require a more invasive evaluation, will be most easily achieved by two types of homes:

1. Homes that are undergoing substantial renovations or being rebuilt after a disaster where access to structural connections and components comprising a continuous load path are more accessible.
2. Homes built after modern engineering-based building codes have been adopted and enforced in the area.

*NOTE: The first modern engineering-based guide for construction of hurricane-resistant homes was published by the Southern Building Code Congress International (SBCCI) in 1990 as SSTD 10-90. If your home was built before 1990, it is unlikely that you will have a well-executed, continuous load path that ties the structure together and anchors it to the foundation. This standard was first widely*

adopted along coastal areas in the mid 1990s and was revised in 1993, 1996 and 1999. The International Code Council's International Residential Code (IRC) and International Building Code (IBC) were published in 2000 and also directed builders in high wind coastal areas to use engineering-based design and construction.

- **Regional Information**
  - If your home is located in the Southeast, where the SBCCI's Standard Building Code was used and was built after 1990 or was built in any hurricane-prone region after 2002, there is a chance that it includes a reasonable continuous load path. Contacting the local building department will help determine if SSTD 10 or the IRC was being enforced at the time of your home's construction.
  - Coastal Texas residents should inquire about whether your home was built to meet the Texas Department of Insurance Hurricane Resistance Guidelines adopted after 1997.
  - Coastal North Carolina residents, load path provisions similar to those found in SSTD 10 were adopted in 1997.

This information is provided as a rough suggestion of when it is likely that homes may have been built with a well-developed load path and to assist you in deciding which type of inspection you want to have performed. Some builders may have adopted better construction methods earlier than suggested here and some communities may have adopted the provisions or similar requirements earlier than suggested. The Tier 2 inspection outlined above should provide you with a good idea of whether in fact your home has a reasonably well-developed, continuous load path.

## GETTING STARTED

To begin the process of attaining a FORTIFIED designation, you or someone representing your interests must submit a brief, online application that indicates your desire to pursue a FORTIFIED for Existing Homes Hurricane-Resistance Designation. The application can be found and submitted online through the Institute for Business & Home Safety's Web site [www.Disaster-Safety.org/FORTIFIED](http://www.Disaster-Safety.org/FORTIFIED).

Once the application is received it will be forwarded to an approved FORTIFIED for Existing Homes evaluation partner and a detailed inspection will be scheduled. This inspection will evaluate key areas of your home, which building science research has identified as the highest sources of loss during hurricanes.

In order of priority the areas are:

### **Tier 1:**

1. The roof – roof structure and roof covering
2. Attic ventilation systems

- a. Ridge
  - b. Off ridge
  - c. Gable end
  - d. Soffits
3. Window, entry door and garage door openings
  4. Gable-end framing
  5. Connection of auxiliary structures (carports, porches, etc.)

### **Tier 2:**

6. Continuous load path connections

Tier 1 inspections will be non-destructive and will require approved evaluators to inspect your home both inside and outside. Tier 2 inspections will comprise all of the evaluation elements in Tier 1 and the additional requirement of evaluating your home's foundation, structural components above grade, and structural connections comprising the load path. Depending on your home and its construction type, this evaluation process may require limited amounts of invasive investigation to gather the necessary information to provide an appropriate retrofit action plan. You will be given a choice of which type of inspection you want conducted.

The inspection is designed to collect enough information to provide an assessment of the overall condition of your home, and to identify components and systems that are typically vulnerable to wind-related damage and water intrusion during a hurricane. Once the existing conditions have been recorded by the FORTIFIED accredited evaluator, the data is analyzed and a current condition report is issued.

The current condition report identifies specific retrofits required for achieving a Bronze, Silver or Gold FORTIFIED for Existing Homes Hurricane-Resistance Designation. These retrofits will be identified and explained to you by the FORTIFIED Existing Homes Evaluator.

## CURRENT CONDITION REPORT

This report will identify which assemblies and systems meet the program's standards and which will require retrofitting or replacement, in order for your home to be awarded each of the first two or all three levels of a FORTIFIED for Existing Homes Hurricane-Resistance Designation.

The evaluator then will also inform you about recommended retrofits that are required for higher levels of designation, most of which are more easily accomplished when FORTIFIED Bronze designation retrofits are being completed. For example,

in certain instances, such as wood-frame gable end walls that are not sheathed with wood planks or structural panels, the requirements for achieving a FORTIFIED Bronze designation will contain recommendations for additional retrofits, which are part of the FORTIFIED Silver designation, but which will be easier to accomplish while this particular FORTIFIED Bronze retrofit is being carried out. These recommendations are intended to serve two purposes: to identify cost-effective ways for your home to achieve a higher level of designation and to alert you when retrofits performed in order to achieve the Bronze designation could make it more difficult to achieve the Silver or Gold designations in the future.

The inspection will also alert you to the existence of certain conditions, which must be addressed before proceeding with a FORTIFIED retrofit designation or which would make a FORTIFIED designation potentially cost prohibitive to achieve. In addition to examining the methods and materials used to construct the property, the initial inspection also looks for possible evidence of damage from pests, lack of maintenance, and normal wear and tear. If the inspection finds that your home has termite damage or rot, all of this damage must be repaired prior to proceeding with, or at least concurrent with, any retrofits performed to achieve a FORTIFIED for Existing Homes Hurricane-Resistance Designation.

If the inspection finds that the roof structure is unusual or poorly constructed, IBHS likely will require that a registered structural engineer be brought in to conduct a more thorough evaluation and to design specific retrofit solutions for the roof.

The evaluation inspection also may determine that your home has critical weaknesses that could be expensive to fix before it can be retrofitted using the prescriptive solutions outlined in the **FORTIFIED for Existing Homes Contractor's Guide**. Examples of conditions that could indicate that it will be more costly to retrofit your home in order to qualify for a FORTIFIED Bronze or higher designations include:

- Roof sheathing that is less than 7/16-inch thick.
- Roof framing members that are spaced more than 24 inches apart.
- Significant damage to roof structural members.

If it is determined that your home needs significant work before it can be retrofitted using the solutions outlined in this guide and you still want to pursue a designation, the additional solutions will have to be developed by a licensed professional engineer (structural) and accepted by approved FORTIFIED representatives or their designees.

After you have decided which retrofits you will invest in, the strengthening of your home can begin. Inspections may be required throughout the retrofitting process to ensure compliance of certain retrofits with IBHS FORTIFIED for Existing Homes' standards. Examples of retrofits requiring in-process inspections include re-nailing the roof sheathing in Option 2 (described in detail below) of the FORTIFIED Bronze designation and bracing a wood-framed gable end as required in the FORTIFIED Silver designation. These inspections are intended

to identify compliance and to allow for corrections to be made prior to the work being obscured from view, which occurs once the retrofit project is completed.

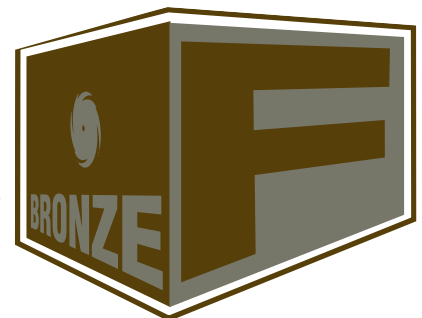
Upon completion of work, a final inspection is performed by the FORTIFIED for Existing Homes evaluator and a final designation report is generated and sent to IBHS. If all of the required retrofits are consistent with the program standards, IBHS will issue a designation certificate for the property. The FORTIFIED for Existing Homes Designation provides tangible evidence that a home is built and /or retrofitted according to standards that bring critical elements and systems of your home up to and sometimes above those used for new hurricane-resistant construction. The approach followed is incremental so that costs are more manageable, but it is based on a systematic comprehensive approach to tackling the vulnerabilities that lead to damage in the more common weaker storm events first (Bronze level). As the retrofits progress to higher level designations, the home becomes more resistant to the less frequent but more intense hurricanes and hurricane effects. We believe that this approach provides a common sense path towards making your home more resilient when a hurricane strikes.

## DESIGNATION LEVELS AND REQUIREMENTS

*NOTE: Each of the designations issued under the FORTIFIED for Existing Homes program will be valid for five years. At the end of the five-year period, each home will require a re-designation inspection.*

## HURRICANE FORTIFIED BRONZE

Two options are available for obtaining this designation. By having two methods for achieving significant improvement to the most vulnerable system in your home, the FORTIFIED program gives you:



•the ability to manage your investment and apply it to achieve the maximum effect;

•options that can fit your family's schedule better by minimizing the time required to complete the necessary retrofits, and minimizes the number of intermediate inspections required for designation.

**Option One:** Improving the existing roof. This method is not as effective as re-roofing because it does not ensure that a wind resistant roof cover is in place. However, improving roof sheathing attachment (as described in detail below) and providing a barrier from the inside to help resist water intrusion can help

reduce hurricane-related damage resulting from the loss of some roof covering. This option is considered appropriate when your home has a relatively new roof or has an expensive roof covering that has a long life expectancy under normal conditions. If you qualify for this option, and select it, then your designation will be FORTIFIED Bronze<sup>1</sup>. The 1 indicates the option you chose.

**Option Two:** Replace the roof covering. This option takes advantage of the opportunity to re-nail the roof deck and install a sealed roof deck on the exterior surface of the roof to reduce chances of water intrusion if the roof cover is damaged. If you choose this option, your designation will be FORTIFIED Bronze<sup>2</sup>.

Both options include: (a) taking steps (if required) to strengthen the anchorage of any outlookers that are used to support a gable roof overhang; (b) strengthening roof sheathing fastening to the structure; and (c) actions aimed at reducing water intrusion into the attic space, which could lead to the saturation of insulation and cause ceilings to collapse. These mitigation measures are extremely important because failure of a gable end overhang, loss of roof sheathing or water intrusion may lead to the need to vacate your home for an extended period of time after a storm, lengthening the amount of disruption you and your family experience.

#### **FORTIFIED Bronze<sup>1</sup> – Option One:** IMPROVING THE EXISTING ROOF

##### Required Retrofits

- Improve anchorage of roof deck/outlookers at gable ends by installing additional uplift connectors, thereby securing the outlookers to the top of the gable end wall and improved anchorage of the end of the outlookers where they connect with the roof framing.
- Reduce chances of attic ventilation system failure, including securing soffits with nails, staples, or screws, strengthening the attachment of roof vents, and replacing gable end vents with approved products or covering gable end vents with shutters.
- Have a closed-cell, urethane-based adhesive foam applied to joints between roof sheathing and all structural members (on both sides of the members) and along any joints between sheathing panels. This adhesive foam will provide a sealed roof deck and increase the strength of the sheathing attachment to roof framing members. The spray foam adhesive application must achieve a minimum Design Uplift Pressure of 110 PSF (in accordance with TAS 202-94 test protocol).

#### **FORTIFIED Bronze<sup>2</sup> - Option Two** RE-ROOFING

##### Required Retrofits

- Add nails to improve the roof sheathing connection to the roof structure. Added nails must be 8d ring-shank nails and the actual number of nails to be added

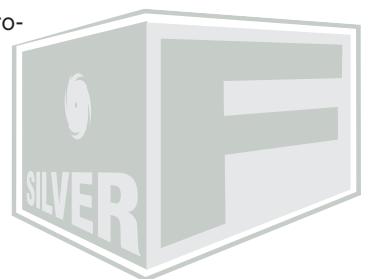
depends on the type and spacing of existing nails, as well as the location of the house. Generally, all retrofitted houses will have a minimum of 8d nails with a maximum nail spacing of 6 inches on-center. For wind speeds greater than 120 mph, maximum nail spacing of 4 inches on-center is required in a 4-foot zone at the edge of gable roofs and the corners of hip roofs.

- Provide backup water intrusion barrier for the interior by installing a sealed roof deck before the roof cover is applied. Alternatives include installing a modified bitumen tape (peel and stick) over seams where roof decking meets, installing a peel and stick product that covers the entire roof deck, or installing an ASTM Type 2 underlayment that has been properly attached.
- Improve the anchorage of roof deck/outlookers at gable ends by installing additional uplift connectors securing outlookers to the top of the gable end wall and improved anchorage of the end of the outlookers where they connect with the roof framing.
- Reduce the chances of attic ventilation system failure, including securing soffits with nails, staples, screws or adhesives, requiring roof vents that meet water intrusion standards (TAS 100 A), and replacing gable end vents with approved products or providing permanent anchors and shutters that can be installed over gable end vents as part of pre-storm preparation.
- Apply a high-wind rated roof cover that meets wind speed requirements for the site. Requirements for shingles are an ASTM D 7158 (Class F, G or H) or ASTM D 3161 (Class F) rating for inland areas with design wind speeds at or below 110 mph, ASTM D7158 (Class G or H) for areas with design wind speeds at or below 120 mph, and ASTM D7158 (Class H) for areas with design wind speeds greater than 120 mph.

## HURRICANE FORTIFIED SILVER

*A prerequisite to the FORTIFIED Silver designation is completion of FORTIFIED Bronze retrofits (either Option 1 or Option 2). IBHS will track which option was used because Option 2, which requires a high-wind rated roof cover, is expected to achieve better performance in hurricane conditions than Option 1, which does not require a new roof cover.*

FORTIFIED Silver retrofits provide prescriptive methods for protection of glazed openings, entry doors, and garage doors; structural retrofits to gable ends that are more than 4 feet tall, and improving the anchorage of attached structures.



## Required Retrofits

### Protect Openings

- Windows, sliding glass doors, skylights, etc., must be either impact-rated to comply with approved standards (Large Missile Test ASTM E 1996 and E 1886 or TAS 201,202,203) or protected by an opening protection system that meets these same standards or was approved under the old SSTD 12 standard. Code minimum shutters made of plywood and OSB sheathing are not accepted in areas where design wind speeds (ASCE 7-98 through ASCE 7-05 maps) are greater than or equal to 120 mph.
- Garage doors must meet design pressure requirements for the location and exposure or be protected by a shutter system (See *IBHS' Shutter Selection Guide* for more information), which meets the design pressure required for your home's location and is approved for impact protection using the standards listed above.
- Entry doors must be either impact-rated and design pressure-rated, passing the standards listed above, or be protected by an opening protection system that meets these standards.

### Strengthen Gable Ends

- Strengthen gable ends that are more than 4 feet tall by bracing the top and bottom of the gable wall, adding wall studs as needed (this will be dictated by the method of retrofit) and strengthening the connection of the gable end to the wall below.

### Improve Anchorage of Porches or Carports

- Provide/modify uplift connections at the top and bottom of porch/carport columns as necessary.

## HURRICANE FORTIFIED GOLD

A prerequisite to FORTIFIED Gold designation is completion of FORTIFIED Bronze retrofits (either Option 1 or Option 2) and FORTIFIED Silver retrofits.

FORTIFIED Gold requires development of a continuous load path from roof to foundation; chimneys must be adequately anchored; and windows and entry doors, even those that are protected from wind-borne



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debris, must meet wind design pressure requirements for the location. Property owners may want to anticipate the requirements of FORTIFIED Gold before investing in opening protection devices that cover windows or doors that have no pressure rating.

## Required Retrofits

### Load Path Development and Chimney Anchorage

- Examples are provided for load path development from roof to foundation and for chimney anchorage.
- Prescriptive guidance is provided for simple building shapes and types of construction, so that the expense of engaging an engineer is not necessary.
- However, engaging a professional engineer to develop specific solutions may result in more cost-effective solutions for developing the required load paths and will likely be needed for complicated structures.
- The professional engineer must provide engineered details with specific directions for the contractor to follow for strengthening the building.

### Windows and Entry Doors

- Windows and entry doors must meet design pressure requirements for the location. Most shutter systems have gaps that are large enough to allow the hurricane induced external pressures to build up on windows and doors being protected. There have been numerous cases where windows or doors have failed due to wind pressure despite the fact that they were protected by shutters.
- For FORTIFIED Silver, it is sufficient to protect windows and doors enough to prevent pressurization of the house.
- For this highest level of designation, IBHS seeks to have critical elements of the building envelope (roof sheathing fastening, roof cover, windows and doors) improved to the level of a new home built to the current high-wind requirements. In some cases, such as roof sheathing fastening and water intrusion protection, the requirements actually exceed those of the current building code high-wind requirements..
- Homeowners may want to anticipate the requirements of FORTIFIED Gold before investing in opening protection devices.

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