

A PROGRAM OF IBHS

FORTIFIED

HOME

EXISTING HOMES™

HIGH WIND

TECHNICAL SUMMARY



2015



INTRODUCTION

This FORTIFIED Home™ standard addresses high winds common in inland communities. Those inland communities are identified as locations where the design wind speed is less than or equal to 90 mph (Vasd) as determined in ASCE 7-05 or 115 mph (Vult) as determined in ASCE 7-10. The primary goal is to strengthen homes to reduce roof and other forms of property damage, disruption, and loss of use caused by severe thunderstorms, straight-line wind events, and high winds at the outer edges of tornadoes.

For more detailed information about how to make your home stronger, safer, and more resistant to high winds, please visit fortifiedhome.org. You can also follow us on Twitter at @DisasterSafety and on Facebook at www.facebook.com/buildfortified.

Eligible Dwellings

To be eligible for a FORTIFIED Home™–High Wind designation, a home must be installed on a permanent foundation. New and existing homes may qualify.

The following is a list of property types eligible for consideration:

1. Single-family detached homes (including modular homes)
2. Two-family dwelling units (duplex)
3. (HUD) manufactured homes built after 1994
4. Townhouses (each unit must extend from foundation to roof; no “stacked” dwellings)

Available Designations

FORTIFIED Roof™ – New Roof

FORTIFIED Roof™ – Existing Roof

FORTIFIED Silver™ – New Roof

FORTIFIED Silver™ – Existing Roof

FORTIFIED Gold™ – New Roof

FORTIFIED Gold™ – Existing Roof

Designation Term Limit

FORTIFIED Roof, FORTIFIED Silver, and FORTIFIED Gold designations are valid for 5 years. Designations expire on March 31 following the fifth anniversary of the awarding of the designation. Homes may be redesignated for an additional 5-year term by having a redesignation inspection. The redesignation inspection focuses on the roof covering and any substantive changes to systems covered under the FORTIFIED Home program. Homeowners will receive a notice when a redesignation is required.



Hazard: High Wind

Applicable where the design wind speed is equal to or less than 90 mph (Vasd) as determined in ASCE 7-05 or 115 mph (Vult) as determined in ASCE 7-10.

Construction Type: Existing residential, single-family detached

Note: Some **details have been left out** to simplify the summarized descriptions below. Full descriptions of material and installation requirements can be found in the FORTIFIED Home–High Wind standards 2015 edition or in related Technical Bulletins that can be found online at fortifiedhome.org.

FORTIFIED Roof Requirements

- Roof deck must be a minimum of 3/8-in. OSB or plywood for FORTIFIED Roof or FORTIFIED Silver designation. Please note that 3/8-in. OSB or plywood qualifies for a designation **only** if the spacing of the roof framing is 16 in. o.c. or less. **For FORTIFIED Gold designation, roof deck must be 7/16-in. OSB or plywood with roof framing 24 in. o.c. or less.**
- Roof deck must be attached properly:
 - Minimum 8d smooth-shank nails spaced nominally at 4 in. o.c. along all framing members.
 - OR**
 - 8d ring-shank nails at 6 in. o.c. along all framing members.

These requirements provide prescriptive methods to create a qualified roof without replacing the roof covering. This approach may be used ONLY when all the following conditions can be documented:

- The existing roof cover is high-wind rated. Documentation is required and must include:
 - Name of the installer
 - Year of installation
 - Roof covering manufacturer
 - Product or model number
 - Wind or wind pressure rating
- The existing roof cover does not show visible signs of damage or deterioration.
- Only one layer of roof covering is present.
- The existing roof cover has at least 5 years of useful life remaining.



- There is adequate access to the attic to allow application of closed-cell spray urethane-based foam adhesives along joints between roof sheathing and roof framing members, as well as along all seams between roof sheathing elements.

If roof deck attachment does not meet roof deck attachment requirements listed above and/or the roof deck is not sealed with a qualified method, the application of a closed-cell foam adhesive from inside the attic will be required. See detailed requirements below:

- To provide enhanced roof sheathing attachment and to seal the roof deck, apply a 1.5- to 3-in. fillet, as required by the manufacturer, of 2-part spray-applied, closed cell polyurethane foam adhesive to:
 - All joints between sheathing
 - All intersections between roof sheathing and roof framing members
 - All valleys

Use the minimum density and installation requirements prescribed by the manufacturer to meet a minimum Design Uplift Pressure of 80 psf on the sheathing.

If the existing roof conditions listed above are not met, the roof cover must be replaced. When the existing cover is removed, the roof deck must be sealed with a qualified system from the top.

Sealed Roof Deck Methods When Re-Roofing

- **Method 1**—Tape horizontal and vertical joints between roof sheathing panels and apply an underlayment (described below) over the entire roof deck. There are two material options for taping the seams on the roof deck.
 - **Material Option 1:** Apply an ASTM D1970 compliant self-adhering polymer-modified bitumen flashing tape, at least 4 in. wide, directly to the roof deck to seal the horizontal and vertical joints in the roof deck.
 - **Material Option 2:** Apply an AAMA 711-13, Level 3 (for exposure up to 80°C/176°F) compliant self-adhering flexible flashing tape, at least 3¾ in. wide, directly to the roof deck to seal the horizontal and vertical joints in the roof deck.

All flashing tape used to achieve a sealed roof deck must be fully adhered without voids (e.g., wrinkles) to be accepted. Do not nail or staple the tape to the roof sheathing. Refer to the manufacturer's requirements for installation as some tapes may require installation



over primer. Next, apply a code-compliant #30 ASTM D226 Type II or ASTM D4869 Type III or IV underlayment over the self-adhering tape. As an alternative, apply a reinforced synthetic roof underlayment which has an ICC approval as an alternate to ASTM D226 Type II felt paper. The synthetic underlayment must have a minimum tear strength of 15 lbf in accordance with ASTM D4533 and a minimum tensile strength of 20 lbf/in. in accordance with ASTM D5035. Underlayment must be attached using annular-ring or deformed-shank roofing fasteners with minimum 1-in.-diameter caps (button cap nails) at 6 in. o.c. spacing along all laps and at 12 in. o.c. in the field or a more stringent fastener schedule if required by the manufacturer for high-wind installations. Horizontal laps must be a minimum of 2 in. and end laps must be a minimum of 6 in.

- **Method 2**—Cover the entire roof deck with a full layer of self-adhering polymer-modified bitumen membrane meeting ASTM D1970 requirements. Cover the membrane with a layer of #15 ASTM D226 Type I underlayment over the fully adhered membrane to provide a bond break that prevents shingles from becoming fused to the self-adhering membrane.
- **Method 3**—Install two (2) layers of ASTM D226 Type II (#30) or ASTM D4869 Type III or Type IV (#30) underlayment in a shingle-fashion, lapped 19 in. on horizontal seams (36-in. roll), and 6 in. on vertical seams. **Synthetic underlayments are not allowed for this option.**

The starter course of felt is to be installed as described below and shown in Figure A below. Cut 17 in. off one side of the roll and install the remaining 19-in.-wide strip of underlayment along the eave, safely tacked in place. Carefully install a 36-in.-wide roll of ASTM D226 Type II (#30) or ASTM D4869 Type III or Type IV (#30) underlayment over the 19-in.-wide course of ASTM D226 Type II (#30) or ASTM D4869 Type III or Type IV (#30) underlayment along the eave. Follow the same procedure for each course, overlapping the sheets 19 in. (leaving a 17-in. exposure). Fasten the bottom edge of the roll (eave edge or horizontal lap) with a row of annular-ring or deformed-shank nails with 1-in.-diameter caps at 6 in. o.c. Since the bottom edge (horizontal lap) of the next layer of underlayment will be fastened approximately 19 in. above the horizontal lap below, install a row of annular-ring or deformed-shank nails with 1-in.-diameter caps with 12 in. o.c. horizontal spacing about 10 in. above the bottom lap. When the installation is completed, the resulting fastening of the two layers of felt should consist of the same fasteners at approximately 6 in. o.c. along all



laps and at not more than 12 in. o.c. in the field of the sheet between the side laps. Add fasteners along any exposed vertical laps so that the maximum spacing between fasteners is 6 in. o.c.

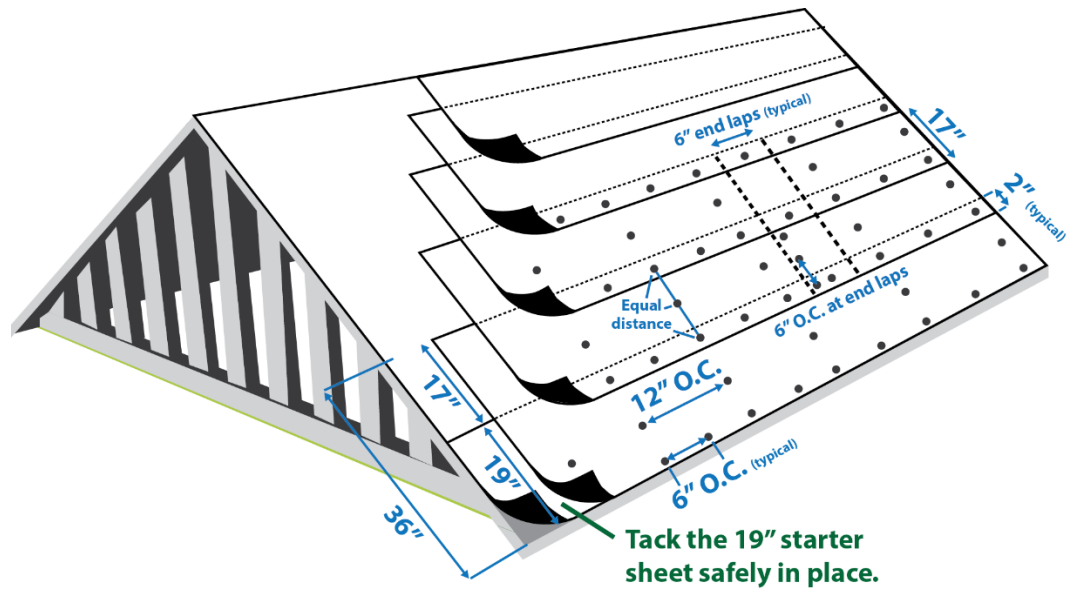


Figure A (above)

Roof Covering Requirements When Re-roofing

Note: Only one layer of roof covering is allowed. Strip roof to bare deck.

- Shingle roof
 - Shingle roof coverings must be high-wind rated
 - Wind rating requirements: ASTM D3161 Class F or ASTM D7158 Class G or H.
 - Drip edge
 - Drip edge must be installed (at eaves and rakes) with 3-in. laps. Drip edge shall extend ½ in. below sheathing and extend back on the roof a minimum of 2 in. Drip edge at eaves and at gable ends shall be installed over the underlayment. The drip edge shall be mechanically fastened to the roof deck at maximum of 12 in. o.c.
 - Starter strips
 - For shingle roofs, starter strips must be adhered at the eave and rake. Either embed the starter strip in roofing cement or use self-adhered starter strips.



- All other roof coverings must be rated for these minimum design wind speeds and exposure classifications: ASCE 7-05 design wind speed, $V_{asd} = 110$ mph, Exposure B or ASCE 7-10 design wind speed, $V_{ult} = 140$ mph, Exposure B).
 - Concrete and clay tile systems
 - Underlayment attachment and tile attachment shall meet the requirements of the design wind speed and exposure category listed above.
 - Metal panel roof systems and low-slope roof systems
 - Shall be installed in accordance with the manufacturer's installation instructions and shall provide uplift resistance equal to or greater than the design uplift pressure for the roof based on the design wind speed and exposure category listed above.

FORTIFIED Silver Requirements

- All FORTIFIED Roof requirements must be satisfied.
- Gable walls must have minimum of 3/8-in. sheathing.
- Gable overhangs must not be vented.
- Gable end walls must be braced.
- Porches and carports must have adequate connections from the roof framing to the beam/wall, from beam to column, and column to structure below.
- Chimneys must be adequately connected to the roof structure.

FORTIFIED Gold Requirements

- All FORTIFIED Roof and FORTIFIED Silver requirements must be satisfied.
- Garage doors must meet design pressures associated with $V_{asd} = 110$ mph (ASCE 7-05) or $V_{ult} = 140$ mph (ASCE 7-10) design wind speeds.
- Continuous load path (CLP) engineering design based on the following minimum design wind speeds and exposure classification: ASCE 7-05 design wind speed $V_{asd} = 110$ mph, Exposure B or ASCE 7-10 design wind speed $V_{ult} = 140$ mph, Exposure B.

In an existing home, it can be very difficult to determine if a home has a continuous load path, and if it does, that the load path meets FORTIFIED Home requirements. This is due in large part to the fact that many of the

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connections required to develop a continuous load path are concealed by finished materials (including but not limited to drywall, trim boards, or exterior cladding like siding, stucco, or brick). Additionally, it is extremely rare for homes to be designed by an engineer except in high-seismic areas or in certain areas subject to hurricane winds because this type of design is not required to obtain a building permit. Therefore, for an existing home, it is necessary to have an analysis performed by a licensed structural engineer, who can then provide a professional opinion about whether an adequate continuous load path exists. **This continuous load path analysis must be based on providing connections to resist pressures using Vasd =110 mph design wind loads or Vult=140 mph for terrain exposure B.**

If the engineer determines retrofitting is required to meet FORTIFIED Home standards, the engineer will need to provide a retrofit design providing connections to resist wind pressures and resulting loads using Vasd= 110 mph (Vult=140 mph) design wind loads for terrain exposure B.

The engineer's opinion and/or design must provide construction documents prepared by the professional engineer and indicate:

- ✓ Design wind speed, exposure category, mean roof height
- ✓ Verification of roof, ceiling, and floor framing
- ✓ Number of stories
- ✓ Design of load path from roof to wall and/or specific details indicating method of connection
- ✓ Design of load path from upper floors to lower floors and/or specific details indicating method of anchorage of wall above to wall below
- ✓ Design of load path from lowest wall to foundation and/or specific details indicating method of connection
- ✓ Foundation design that is adequate for wind uplift and lateral loads

NOTICE: ALL OF THE ABOVE MUST BE DOCUMENTED PRIOR TO BEING CONCEALED BY FINISHED MATERIALS. TAKE PHOTOGRAPHS OF THE IMPROVEMENTS WHILE THE HOME IS BEING UPGRADED. A COMPLETE PHOTO FILE SHOULD BE PRESENTED TO THE FORTIFIED EVALUATOR WORKING ON THE PROJECT.

Compliance forms from a structural engineer will be required to satisfy the documentation requirements for gable framing and bracing, porch/carport

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connections, and chimney connections. Blank copies of these forms can be obtained from IBHS or your FORTIFIED Evaluator.