

The following bullet points summarize the Fortified Tornado requirements developed by the Institute for Business & Home Safety. The requirements are similar in composition to the Hurricane wind requirements.

As with all Fortified Homes, the first overall requirement is that the home is built according to the basic requirements of a model building code. As such, the Fortified requirements are not a replacement of a building code, but an enhancement to existing building codes. The program requires that buildings built in communities that have a BCEGS rating higher than 5 or no rating must be approved by a professional engineer or architect as compliant with a current model building code.

The underlying premise behind the Fortified Tornado requirements is to use hurricane resistant building techniques in Tornado prone areas. With this in mind, the prescriptive requirements were developed based on the 110 mph (equivalent to about 130 mph peak gust) requirements from SSTD-10-99 Standard for Hurricane Resistant Residential Construction. The prescriptive requirements listed for the Fortified Tornado Program can be applied if the following conditions are met:

- Construction type is either wood frame or reinforced masonry.
- Wood species used has a specific gravity greater than 0.49; i.e., Southern Pine, Douglas Fir-Larch, Hem-Fir, Red Oak and mixed Maple.
- Maximum spacing of studs in wood frame walls in 16 inches on center Wall/story heights are 10 feet or less.
- Buildings are either 1 or two stories in height.
- Horizontal building dimensions do not exceed 60 feet (length or width) and a length to width ratio less than or equal to 2.

If any of these conditions are not met, then for a home to be considered Fortified for Tornado, a registered Professional Engineer or Architect must certify that the structure was designed for wind loads corresponding to at least 130 mph (3 second gust). If these conditions are met, then the Fortified Inspector will verify that the following prescriptive requirements are in place.

Fortified Tornado Windstorm Protection Checklist

- Adequate Load Path: A continuous and adequate load path from the roof to the foundation of the home exists. To be considered Fortified, the building must have positive connections from the roof to foundation as a means to transmit wind uplift and shear loads safely to the ground. This includes providing roof-to-wall connection hardware (e.g. hurricane straps), inter-story connection hardware, anchorage to the foundation and full structural wood panel sheathing on exterior walls.
- All anchor bolts shall be minimum 5/8" bolts with 3"x3"x1/8" washers. They shall have a minimum 7" embedment into concrete or masonry.
- Sill plates shall have anchor bolts every four feet and within 6 to 12 inches of the end of each plate.

- Walls must be anchored directly to the foundation with anchor bolts every 2 feet or otherwise connected to a properly anchored sill plate with hardware connectors every 2 feet.
- All exterior wood framed walls must be fully sheathed with minimum ½” wood structural panels (Plywood or OSB). Sheathing shall overlap both top and bottom plates and be continuous from the plate for at least 2 feet into the wall. Nail schedule shall be 10d nails at 12” spacing.
- Blocking shall be provided at 48” on center in the first two framing spaces of wood framed walls from all corners and at either end of garage door openings.
- All exterior walls shall be considered “shear walls” for at least 50% of their length. Fully sheathed wall segments wider than 48 inches without any openings larger than 144 square inches are considered shear walls provided that they have hold downs at the end of each segment with minimum allowable load capacities as follows:
 - Top story end wall 3100
 - 1st story (under 2nd) 8350
 - Top story sidewall 2600
 - 1st story (under 2nd) 5300
- Hardware connectors must be provided from all roof framing members to wall frames. All connectors shall wrap over the top of the roof truss or rafter and be installed according to manufacturers recommendations. Minimum allowable load capacities for these straps are:
 - SSTD-10 (per truss end) 1093#
 - ASCE 7-98 1147#
- Inter-story (2nd story to 1st story) details must include metal strapping every 48 inches (every 3rd stud) with an allowable load capacity of at least 980# and be sheathed with continuous wood structural panels of at least 15/32 inches.
- All wood framed floors must have 2x4 blocking in the first two spaces between the floor joists every 4 feet with 10d at 4”/12” on 1st floor and 10d 3”/12” on 2nd floor nails for shear resistance.
- Roof Construction: The roof framing, sheathing and covering all must be constructed to resist wind loads and wind effects. This includes thicker roof sheathing fastened with ring-shank nails, bracing of gable ends, wind and impact resistant roof coverings and upgraded roofing underlayments.
- Gable end bracing shall be provided at all gable end walls at 4 feet on center and extending back 8 feet from the gable end wall or through the use of an appropriate connector. The brace will consist of a 2x4 fastened with 2 10d nails at each truss and 4 10d nails into the blocking in the first space. Alternatively gable end bracing hardware connectors with a minimum 476# may be used every 4 feet.
- 5/8" Plywood roof sheathing with 8d ring shank nails at 4” on center on the panel edges and into the gable-end framing member at the wall line. 8d ring shank nails at 6 inches on center are required everywhere else.
- All roof-sheathing joints shall be sealed with a self-adhered asphalt/rubber tape to provide a secondary moisture barrier.
- An impact resistant roof covering – UL 2218 class 4.
- Roofing underlayment of at least equivalent of 30# felt.

- Openings: All garage doors, doors, skylights and windows over 32 square feet in area must be impact-resistant or protected by a passive protection system that complies with ASTM E 1996. All other openings must be rated for a minimum design pressure of positive or negative 50 pounds per square foot. All openings must be flashed.
- Safe Rooms: The Fortified program is not a substitute for an in-residence storm shelter or "safe room". The "Tornado Fortified" criteria are designed to increase the overall safety and survivability of the entire dwelling and not just a room. The program acknowledges and fully supports the additional life-safety benefits of safe rooms and refers all interested parties to the FEMA requirements for safe room design and construction.