

# Fire Engineering®

## Hurricane Clips

Article and photos by Gregory Havel

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Winds apply pressure to the walls of buildings. Winds passing over the roofs of the same buildings try to lift the roofs. Most of the time, the methods used to attach the roof rafters or trusses to the walls are strong enough to resist these uplift forces. However, high wind velocities, such as those found in severe thunderstorms, hurricanes, and tornadoes, can apply uplift forces to roofs that are strong enough to break the connections between rafters or roof trusses and the walls and remove the roofs from buildings.

Severe hurricanes struck Florida and the Gulf Coast in the late 1980s and early 1990s. Hurricane Andrew struck south Florida in August 1992 with high winds and gusts so strong that they disabled or destroyed some wind measurement instruments and caused \$26.5 billion in damages (more than \$38 billion in 2006 U.S. dollars). As a result of these storms, more durable techniques for attaching roofs to the top plates of walls and wood studs to the bottom plates were developed. In most of the United States, model and state building codes now require the use of these methods.



Photo 1 shows a common method used to reinforce the connection between a rafter or roof truss and the double top plate of a wood-frame wall. It shows a lightweight metal strap or clip (to the right of the manufactured gusset plate) attached with nails in addition to the number of nails required by code or architect to attach the roof truss. Note that for this hurricane tie to be effective, the proper number and size of nails must be used: every hole in the tie must have a nail into wood.



Photo 2 shows a common method to reinforce the connection between a wood stud and the bottom plate of a wood-frame wall. It shows lightweight metal clip attached with nails to both the wood stud and the wood bottom plate, which must be bolted to its concrete foundation or use similar ties to connect it to the wood trusses and wall plates of the floor assembly below. The proper number and size of nails must be used to attach this tie, or it will not be effective. In this photo, the tabs of the metal clip that are bent to match the faces of the stud and the nails

are concealed by the wood blocking between the studs.

These hurricane clips are also called “seismic ties,” since they reinforce wood frame buildings and reduce the probability of their collapse in earthquakes. Their use is required by building codes in areas subject to earthquakes, even if storms with high winds are rare.

Please note that hurricane clips or seismic ties do not affect the fire resistance of a wood-frame building. Made of lightweight galvanized steel, they are considered noncombustible, but have no fire-resistance rating. Since they are usually installed inside a fire-rated wall or floor-ceiling assembly, they will be unaffected by a fire that is outside the fire-rated assembly. If the fire breaks into the fire-rated assembly, the combustible wood and other materials inside the assembly will char and burn; weaken the connections provided by the nails, the gusset plates, and the hurricane ties; and cause the rapid failure of the fire-rated floor-ceiling or wall assembly, causing structural collapse.

Internet search for “hurricane clips”, “hurricane ties”, or “seismic ties” for detailed information from manufacturers on the varieties, selection, and installation of these types of hardware. Also, talk to your building inspector about their use in buildings in your response area and about local and state building code requirements.

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