

Storm Tested, Shelter Approved



What You Need to Know
about Tornado Doors

T

TORNADO DOORS ARE THE HOTTEST SPECIALTY product in the business right now. The biggest factor may be that tornado shelters can now look and function as part of the normal use of the space rather than only as shelters. Another reason may be that the greater number of high-profile tornadoes over the last few years has significantly increased public awareness of the need for properly designed shelters.

Tornado doors are unique products, and the regulatory landscape is shifting. Here are a handful of tips concerning specialty tornado doors and the shelters they protect.

BY JEFF WHERRY

Code Change Is Coming

The *International Building Code (IBC)* 2015 requires that new school construction in areas susceptible to tornadoes with winds of 250 mph or higher must have storm shelters. Check out the map in ICC 500, and you will see that this zone ranges from Texas to Alabama up to New York.

Any new K-12 structure with the capacity to hold 50 or more people will be required to have shelter space to house the structure's maximum occupancy. And it's not only educational facilities that are affected by this change. Emergency operation centers, 911 call stations, and fire, rescue, ambulance and police stations are also included.



Photos courtesy of the Steel Door Institute

While some regions may wait years to adopt IBC 2015, others have already chosen to implement shelter construction requirements in advance of IBC 2015. Local codes could even require some existing facilities to be retrofitted with storm shelters.

Corey Schultz, an architect with Schultz Squared Architects in Wichita, Kan., is an expert on tornado shelters. When interviewed recently about the code change, Schultz said, "This is long overdue in my opinion. I realize that schools are having trouble with funding as it is, but you really can't put a price on a child's life. In recent years we've heard heartbreaking stories about schools hit by tornadoes, so I'm really glad this is being added to the code."

Installation Is Critical

It is important to ensure that tornado doors are installed properly. An improper installation can result in the door not withstanding the labeled wind load. Be sure to check the manufacturer's installation directions, which are often found in a manual or even on a video on its website. The Authority Having Jurisdiction also has the right to invoke the "special inspections" provision of the code, at which time all installation and listing details will be required.

Tornado doors are especially heavy, so there's a high possibility that an improper installation will result in a sagging door. This may cause the heavy bottom rods to drag and damage the floor. Often the people hired to install doors are handy people, skilled in making things work. But you can't "make it work" with tornado doors—instructions should be followed to the letter.

It's a good idea to have a pre-installation meeting. The meeting might include the contractor, specifier, door supplier, manufacturer's representative and the person who will perform the installation. It's imperative that the latter, the "boots on the ground" person, is present. In this meeting, the team should discuss common installation problems, review the installation instructions, and then perform a mock installation. This process is especially important with specialty doors like tornado doors; lives may be on the line.

An Educated Design

Now that architects are designing classrooms and assembly occupancies to also serve as shelters, door and hardware professionals may be confronted with some unusual conditions. These can include interior openings communicating with the shelter space, which would become "exterior" openings if a tornado removed the surrounding non-hardened portions of the building.

Hardware: Gravity is required to make most FEMA hardware work. So if the door is oriented horizontally—perhaps for a unique window design—it won't latch properly. Unique designs should always be discussed with the manufacturer.

Corridors and Swinging Doors: Consideration needs to be given when placing your shelter at the end of a corridor. You'll want to create some kind of connection or cross corridor that allows people to exit the host building when the shelter doors are closed so that people don't walk into a dead end.

Also, the tornado doors should open away from the shelter. So if the shelter is being built on to the end

Now that architects are designing classrooms and assembly occupancies to also serve as shelters, door and hardware professionals may be confronted with some unusual conditions.

of a corridor that was previously an exit door, the shelter door must swing into the corridor without obstructing the exit and exit access.

Day In, Day Out

To make the installation of a shelter cost-effective, the room should be designed for daily use—not just as a shelter. The biggest bang for the buck is constructing the shelter for everyday use. Some people go with a single-purpose shelter to save money, but if they factor in per-hour use, then they'll find those types of shelters much more expensive.

Swirling Winds and Fine Print

Some manufacturers claim to have doors that are tornado-resistant, but their products have only passed at 200 mph or less. Architects, not realizing the error, subsequently specify tornado door



The April 25-28, 2011, outbreak of 358 tornadoes was one of the fiercest on record. This is an aerial view of a tornado-damaged school in Tuscaloosa, Ala., one of the hardest hit regions.

systems and bid the project. It's only when the shop drawings come through that the team learns that the manufacturer doesn't really have the doors they thought they ordered.

Unfortunately, it falls to the architect to read the fine print. It's not enough to know that a company has "storm-resistant" doors—the information needs to be more specific: Are the doors for rain storms, hurricanes or tornadoes? What is the testing protocol of the materials that are being specified? How many miles per hour are they tested to? What was the missile used in testing? Who conducted the test? The product needs to meet the code requirements.

The most reliable means of ensuring product compliance is to do so through third-party listing agencies, which maintain online databases of assemblies listed to ICC 500 and FEMA P361. These listings provide the details of the assembly, down to the specific components that are required or permitted.

Shelter Management

If disaster strikes, people will need to ensure that everyone is safely

ensconced in the shelter and that the door is securely latched. If it isn't, then the powerful wind and flying debris could push it open. It's a minute detail, but in order for that system to operate properly, the tornado door has to be fully latched. Some listed assemblies rely on hardware with a single-point latch for normal operation, as well as a second operation to engage additional latches in emergency conditions. That's something the building's management needs to know and have listed in the shelter operation plan.

A violent storm can be a stressful situation. It's not unusual for people to panic once the shelter is locked down. As soon as someone opens an exit door, the shelter has been compromised. Building management needs to be made aware that they should have people standing guard over each shelter exit. Even just a quick peek outside can cause serious problems.

When designing the shelter, keep people as comfortable as possible; that will reduce the panic and need to flee. Make sure there's plenty of light and that people have access to a restroom.

Facility designers can add value for their clients by helping them develop a management plan for emergency situations, such as what to include in the shelter, how to close the shutters, how to ensure that the bolt is properly engaged, how to operate the ventilation system, and more.

Be Proactive

Finally, be proactive with your knowledge of tornado doors and shelter designs. Don't wait for the code to take effect. Properly designed and installed tornado doors save lives. 



About the Author:

Jeff Wherry has held the position of managing director of the Steel Door Institute (SDI) for more than two decades. An expert on all aspects of the steel door industry, Wherry has overseen the

development of SDI's steel door and frames standards that are used for millions of buildings in the United States. He also oversees the audit that confirms that SDI member manufacturers abide by these standards, ensuring products that are consistent and well-constructed. He can be reached at jjw@wherryassoc.com.