

“Deep Impact”

Editor's note:

In this installment of the Tech Corner, DASMA Technical Director Dave Monsour reviews the complex landscape of impact test requirements in common codes and standards.



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After Hurricane Andrew devastated the southern tip of Florida in 1992, manufacturers of garage doors and rolling doors may have sensed that big changes were coming to their industry. But could they have foreseen that within a few months they would be purchasing and installing something like a *cannon* in their test labs?

Q: Why do codes and standards require buildings to provide protection from windborne debris?

Wind distributes pressure rather evenly on buildings. But the debris tossed around in windstorms exerts a very different type of force: sudden and piercing. In the wake of Hurricane Andrew, building codes began to recognize that protection from flying debris was just as important as traditional resistance to wind.

Q: What is the difference between “windborne debris resistance” and “impact protection”?

In the context of wind-load requirements, impact protection is the same thing as windborne debris resistance.

Q: Is impact protection required of building products everywhere?

No, generally just in coastal regions or where tornado resistance is required.

Q: In general, what does impact protection require of doors?

Doors installed on the outside walls of buildings, if those buildings are located in a windborne debris region, generally have to be tested to a nationally recognized standard and affixed with a label that verifies compliance.

Q: What are these “nationally recognized standards”?

The most commonly recognized standards are ASTM E1886, along with its companion standard ASTM E1996, and ANSI/DASMA 115, which is publicly available on the DASMA website.

Q: What exactly do the standards require?

The “cannon” referred to earlier is a compressed-air-powered cannon that shoots what is called a “large missile” — a 9-lb. wood 2x4, usually about 8 ft. long — at several specified locations on the door. The speed of the missile is a minimum of 50 ft./s for most cases, but for some cases a minimum of 80 ft./s is required. The door is expected to withstand the impacts with minimal damage. While the energy generated by one of these cannon shots doesn't quite match that of the asteroid in the movie “Deep Impact,” it does entail some sturdy construction for the doors, glazing, and window frames.

Q: When does the enhanced speed of 80 ft./s apply?

The enhanced speed is for cases that require enhanced protection, defined as Risk Category III and IV structures, in regions of the country subject to the fastest winds — usually considered to be anything above 150 mph. Risk Category III and IV structures are those that are deemed to be essential or represent a substantial hazard to human life in the event of failure, such as public utilities, defense installations, hospitals, prisons, police and fire stations, and buildings with large occupancies.

In Miami-Dade and Broward counties, it is not just glazed doors that need to be impact resistant — it is all exterior doors.

Q: Do all exterior doors have to meet the impact requirements if they are installed in buildings within the windborne debris region?

Most commonly it is just glazed doors that need to be protected.

Q: Is anything different in Florida?

The one big difference in Florida is for what is known as the “High Velocity Hurricane Zone (HVHZ),” which is defined as Miami-Dade and Broward counties. In this region, it is not just glazed doors that need to be impact resistant — it is all exterior doors. Also, the test standard required in the HVHZ is Florida's own protocol known as TAS 201.

Q: Is the threat from debris in tornadoes handled the same way as other windborne debris?

In general, yes. The testing requirements are no different, and the same standards — ASTM E1886/1996 and ANSI/DASMA 115 — are referenced. The main difference is where the requirements are applied; i.e., you have to determine if the structure in question is subject to tornado requirements (Is it large enough and is it in the “tornado-prone region” of the country as defined by the code?). The region goes well beyond the Atlantic and Gulf coasts and comprises roughly the entire U.S. east of the Rocky Mountains.

Q: What about tornado shelters?

Tornado shelters and storm shelters need to be designed to the ICC 500 *Standard for the Design and Construction of Storm Shelters*. These are specialized structures with much more stringent impact test requirements established to protect the lives of people taking refuge in these shelters during tornadoes and hurricanes. Rolling doors and sectional doors are accepted in these applications if they meet the stringent requirements, which include impact tests with a 15-lb. wood 2x4 shot out of the air cannon at speeds of up to 100 mph. The tests are for all doors, not just glazed doors.

Contact us

If you have questions about this topic or suggestions for future content, please email Dave Monsour at dasma@dasma.com.