



Garage Doors on the Rise

A Federal Alliance for Safe Homes (FLASH) coalition is advancing compelling research that establishes the value of wind-resistant garage doors in providing home protection benefits that deliver value well beyond expectations.





01 Background

Whether a hurricane, tornado, derecho, or tropical storm is headed your way, your best shot at keeping your roof and adjacent walls intact is a wind-resistant garage door. However, few outside the academic, meteorological, and insurance industry communities knew this until Dr. Marc Levitan, lead research engineer for the National Windstorm Impact Reduction Program (NWIRP) at the National Institute of Standards and Technology (NIST), presented a standout presentation during the November 2023 [National Disaster Resilience Conference \(NDRC\)](#) hosted by the [Federal Alliance for Safe Homes \(FLASH\)](#).

At NDRC, Dr. Levitan presented his findings from the post-disaster, wind-damage database he established after the 2011 Joplin, Missouri, tornado. The EF-5 intensity, 200 mph tornado destroyed more than 3,000 homes and devastated the town. “We discovered an extremely high correlation between losing the garage door and then the roof, particularly when wind speeds were between 110 and 120 miles per hour,” Levitan says. “Basically, if the garage door was gone, then the roof was gone, too. Conversely, if the garage door was intact, the roof was likely to be there as well.”

“The most compelling post-event field damage research I’ve seen about the importance of wind-resistant garage doors was when NIST revealed that when garage doors survived, 90% of homes sustained no structural roof or side wall damage,” says Kent Nafziger, vice president of [Haas Door](#) in Wauseon, Ohio.

02

A Strong, but Relatively Unknown Body of Evidence

Decades of research into strengthening roof resilience during high-wind events have generated new building techniques, codes, and standards that keep people safe and reduce property damage. However, researchers from organizations such as the Federal Emergency Management Agency (FEMA), the Insurance Institute for Business & Home Safety (IBHS), and NIST have addressed another important vulnerability in homes that has gained more recognition since 2023: garage doors.

FEMA post-disaster Mitigation Assessment Team (MAT) reports, as far back as Hurricane Andrew in 1992, and after more recent storms like Hurricane Irma and Hurricane Michael, have noted the opportunity to help maintain the structural integrity of buildings by reducing the chance of garage door damage during high wind events, according to the [International Code Council \(ICC\) Building Safety Journal](#). The FEMA MAT reports cite garage door damage as a key contributor to the cascading pressurization of buildings, leading to blow-off of the roof assembly.



03

The Role of Wind Pressure

The correlation between the garage door and the integrity of the roof and wall structures depends on wind pressure.

“When air is pushing into the garage and the garage door fails, the air builds into the garage cavity,” explains Dr. Tanya M. Brown-Giammanco, director of disaster and failure studies at NIST. “The internal air pressure in the garage pushes air into the house and roof, which causes structural damage to the walls and roof.”

The combination of internal pressure after a garage door fails and external pressure creates the most damage to a home, according to Levitan. This dynamic of wind pressure building in a garage is often compared to a balloon inflating and eventually popping.

While at IBHS serving as Managing Director of Research, NIST’s Dr. Brown-Giammanco found that structural damage to a roof was more frequent when the garage door failed. Her investigation showed that approximately 60% of homes with damaged garage doors had structural roof damage.



60%

of homes had roof structure damage if the garage door was damaged.

Less than 10%

of homes had roof structure damage if the garage door remained intact.

Garage door failure rates were higher for hurricanes than tornadoes, assuming same max wind speeds, but ...

If a garage door failed, it was more likely to result in roof structure damage in a tornado than a hurricane.

Results from Kovar et. al 2018

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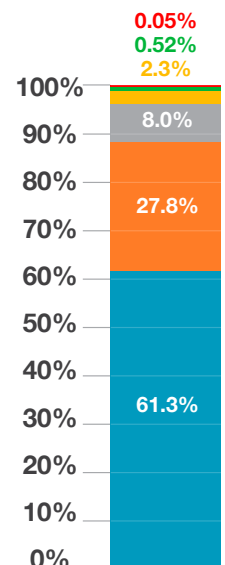
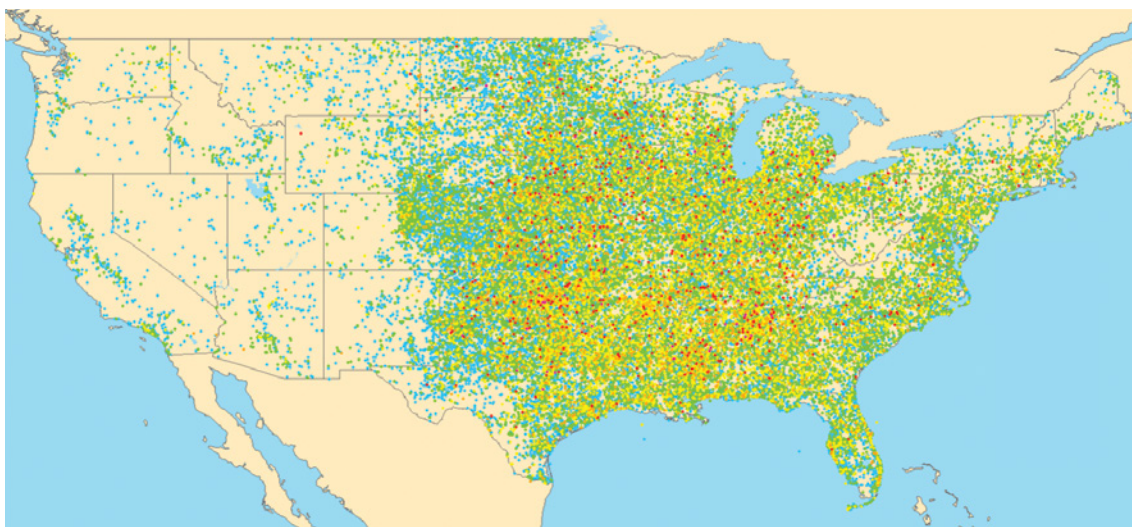
Not Just Hurricanes, Tornadoes Too

What's significant about research on the impact of garage doors and wind events is that it's not limited to hurricanes. While named tropical storms and hurricanes garner intense media attention, high-wind events are far more common in areas far from hurricane danger zones.

Tornadoes occur across more than 75% of the U.S., according to the National Oceanic and Atmospheric Administration (NOAA), and 94% of tornadoes have wind speeds at 135 miles per hour and lower.



Tornadoes 1950 - 2016



Source: NIST tornado distribution map using NOAA data

F-Scale

EF0 EF1 EF2 EF3 EF4 EF5



Tornado Intensity Distribution

Enhanced Fujita Scale (NOAA/SPC)

EF	Wind (mph)	Category	% of Tornadoes
EF0	65-85	Weak	53%
EF1	86-110	Weak	33%
EF2	111-135	Strong	8%
EF3	136-165	Strong	2%
EF4	166-200	Violent	0.5%
EF5	>200	Violent	0.05%

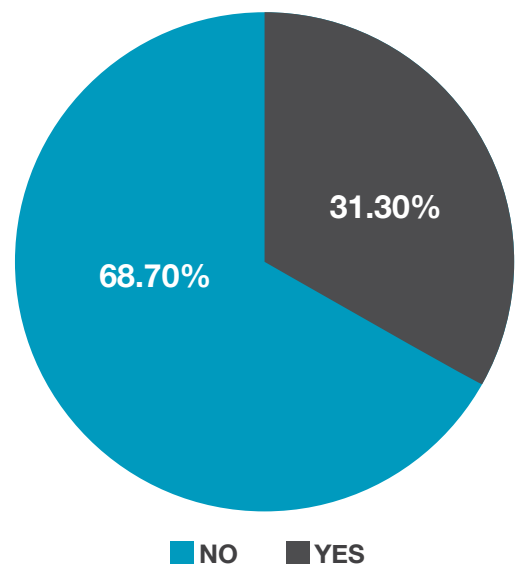
85% of tornadoes are weak (EF0-EF1) • <1% are violent (EF4-EF5)

As wind-rated garage doors are designed to withstand winds up to 135 miles per hour or higher, they can play a pivotal role in saving homes and lives across a wide swath of the country. However, most consumers are unaware of their potential value.

An April 2026 national consumer survey by FLASH found that 69% of respondents were unaware of the critical role garage doors play in high-wind events. Once they understand the correlation between wind-rated garage doors and a home's structural integrity, they are typically willing to pay the relatively small cost of an upgrade.

April 2026 – Garage Door Survey

Before today, were you aware that garage door failure can lead to major roof and wall damage during high-wind events?



05

Time-tested, Wind-rated Garage Doors

While many consumers and builders are unaware of the benefits of wind-resistant garage doors, manufacturers that belong to the [Door & Access Systems Manufacturers Association \(DASMA\)](#) have provided them since the 1990s, says David L. Monsour, PE, technical director for DASMA.

“Wind-rated garage doors were mandated in Florida after the devastation of Hurricane Andrew, and then they spread to more locations in the 2000s,” Monsour says. “For the past 20 to 25 years, the great majority of garage door manufacturers have offered wind-rated doors.”

DASMA provides its members with educational materials, including technical data, standards, and research on the importance of wind-resistant garage doors.

“Residential wind-rated garage doors are common but not ubiquitous,” Monsour says. “In Florida, almost all garage doors are wind-rated, but nationally, my sense is that less than half are wind-rated.”



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David L. Monsour, PE,
Technical Director for DASMA

06 Good, Better, Best Garage Doors

From the exterior, wind-resistant garage doors can look the same as other garage doors, Nafziger says. The differences lie in the number of horizontal struts, the hardware, and the door installation.

“Standard garage doors offer some wind resistance even when they’re installed with no jamb overlap,” he says. “Wind-resistant and impact garage doors, which offer higher levels of protection, typically have at least one inch of jamb overlap.”

Standard garage doors can be considered “good,” while wind-resistant doors are “better,” and impact doors, which can withstand higher wind pressures and debris impacts, are “best.”

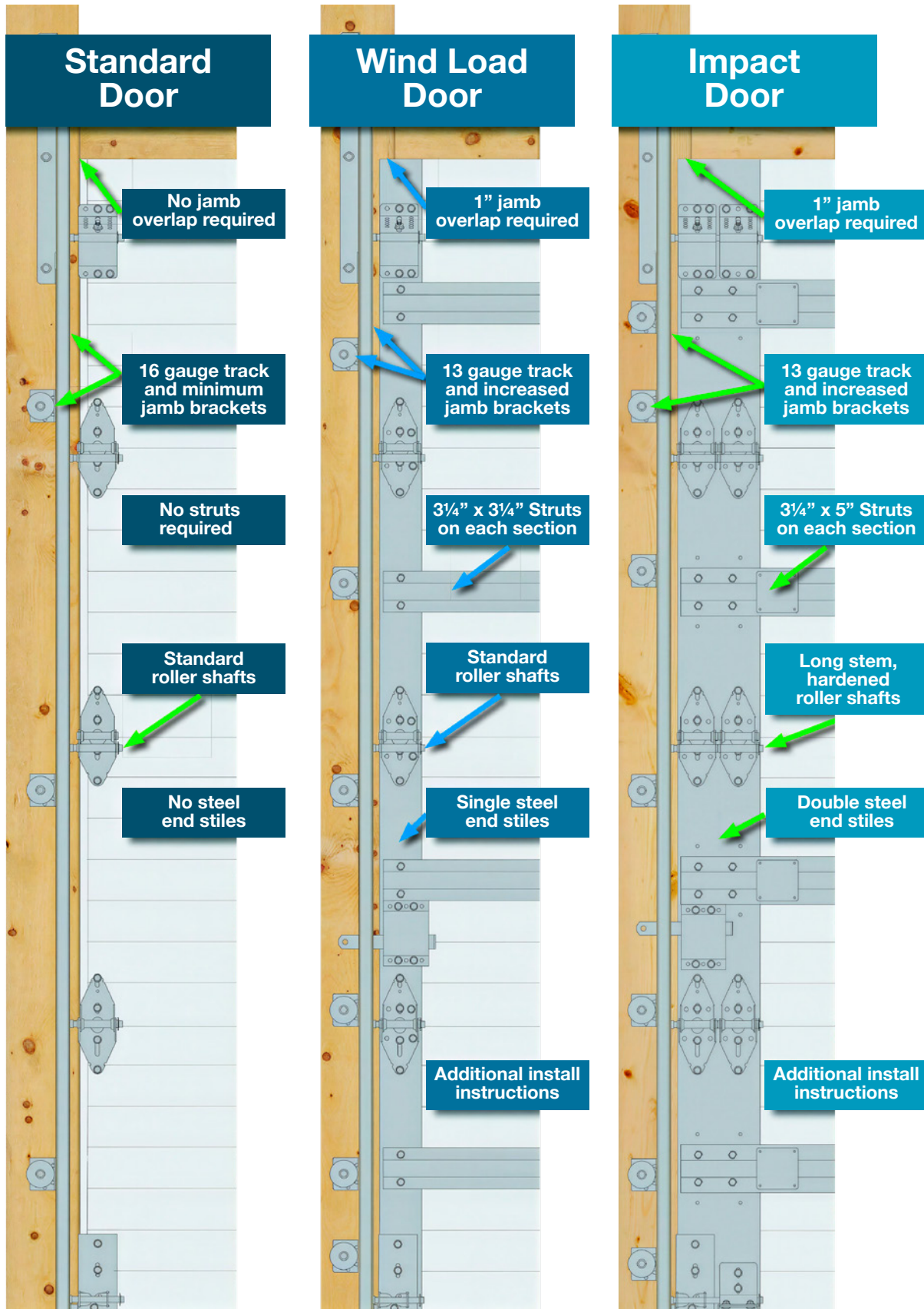
Standard garage doors can use lighter 19 or 20-gauge vertical tracks with only two jamb brackets, whereas wind-resistant and impact models demand much heavier gauge vertical tracks and can have as many as seven or more brackets. Standard doors usually feature single-length rollers and will not utilize additional struts or steel end stiles.

Wind-resistant and impact-rated garage doors call for specialized hardware for durability and resilience. Wind-resistant models can employ strengthened struts and additional end stiles. While impact-rated versions can call for even stronger struts as well as double-end stiles with dual hinges using hardened long-stemmed steel rollers for additional reinforcement for the highest pressures.

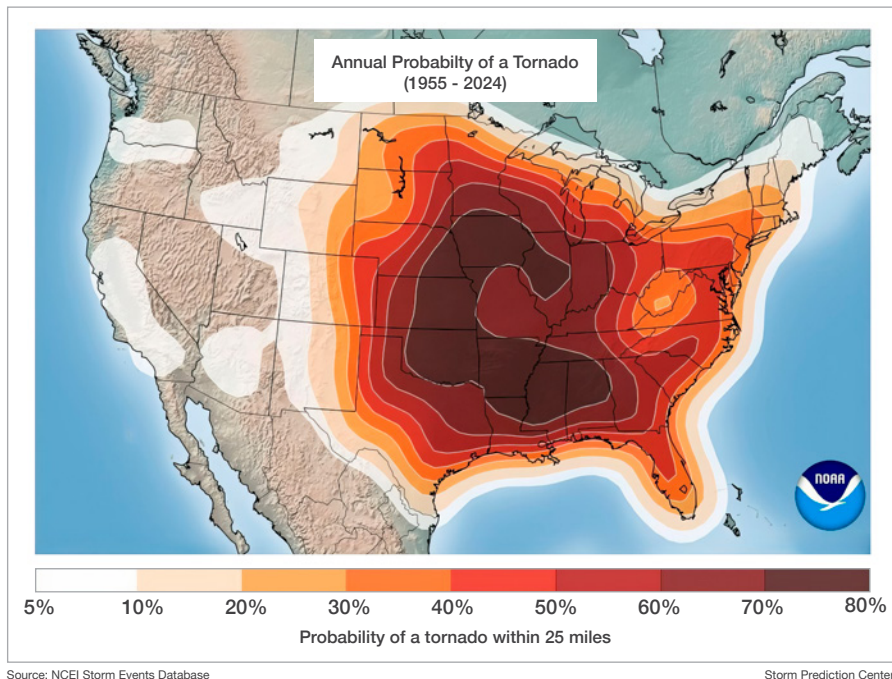
Garage door dealers can help homeowners and builders choose the correct product for their area, Nafziger says.

“The local building official will have a map of your area that determines the minimum wind speed required for your area, then you need to check the exposure category based on the home’s location and the mean roof height,” he says. “That information, plus additional factors, such as proximity to the corner and building code risk category, combine to determine the required design pressure for the garage doors.”

Since storms generate both positive and negative pressure on a garage, which can push a garage door in or pull it out, garage doors are rated for both types of pressure, Nafziger explains. “Areas in the U.S. susceptible to hurricanes may require impact-resistant garage doors, which also resist penetration from flying debris during a high wind event,” he says.



Graphic Courtesy of Haas Door



07

Market Specifics:

Wind-Resistant Garage Door Benefits

Wind-rated garage doors are more commonly installed in hurricane-prone locations, according to Brown-Giammanco.

Researchers found that storm type affected garage door failure rates. For example, even within the same wind-speed range, there were more garage door failures among homes during Hurricane Ike in 2008 than during two tornado events. The likely reason for the higher level of garage door failures during a hurricane rather than a tornado is the duration of those events.

However, NIST researchers found that when a garage door failed, it was more likely to result in associated roof structural damage during tornadoes than during hurricanes.

“Even if you live in an area where the statistical chance of a tornado hitting your home is low, installing a wind-resistant garage door is a nominal investment that protects you from an excessive level of damage,” Brown-Giammanco says.

Tornado zones cover 75% of the U.S., according to the National Oceanic and Atmospheric Administration (NOAA). In addition, according to Dr. Levitan, tornadoes kill more people every year than earthquakes and hurricanes combined.

08 Beyond Hurricanes and Tornadoes

Nafziger points out that high-wind events are not limited to hurricanes and tornadoes. Various types of severe wind events can occur across the U.S.

“In July 2025, there was a derecho in Iowa with wind gusts up to 112 miles per hour,” Nafziger says. “We saw that the roof came off on homes without wind-rated garage doors, but homes that had standard struts – wind resistant, not impact doors – held up well against the wind.”

A derecho hit Washington, D.C. in June 2012, causing 80 deaths and significant property damage.

“The destruction from a derecho can be extensive and cause widespread damage, and they don’t always occur in places you might expect,” Brown-Giammanco says. “You can get intense wind anywhere.”





09

Helping Consumers Increase Resilience and Insurability

The FLASH [“Resilience Policy Resource Guide and Retrofitting Program Playbook”](#) provides information on state-specific programs that offer tax breaks, rebates, and mandatory or voluntary insurance discounts for resilience measures, including, in most cases, wind-resistant garage doors. States with frequent storms, such as Alabama, Florida, Louisiana, and South Carolina, offer incentives to increase home resilience, as do numerous other locations. Many are tied to the IBHS FORTIFIED program.

The IBHS FORTIFIED home certification program’s Silver and [Gold levels](#) include wind-resistant or impact-rated garage doors as features that enhance resilience to tornadoes, hurricanes, and other wind events.

The [FORTIFIED program’s advice to homeowners](#) includes recommendations for every budget. For those willing to spend \$1,000 or more to strengthen their home against wind events, the program recommends installing a wind-rated garage door.

“A garage door is one of the most vulnerable areas of your home, so consult your local building code department or a local garage door dealer to find out the wind rating required for garage doors in your area. When building to FORTIFIED, adhere to the design pressure specified in the standard or the local code – whichever sets a higher requirement,” according to FORTIFIED.

10

Building Codes and Garage Doors

Wind-rated garage doors have been required everywhere that adopts and enforces the International Residential Code (IRC) since 2000.

“The design pressure rating requirement for a garage door depends on where it’s located, but every garage door is supposed to have a rating,” Brown-Giammanco says. “In practice, though, non-rated garage doors are installed all the time.”

Some door panels themselves offer wind resistance, but it’s the combination of the panels and the hardware used to install the doors that makes them wind-resistant, according to Levitan.

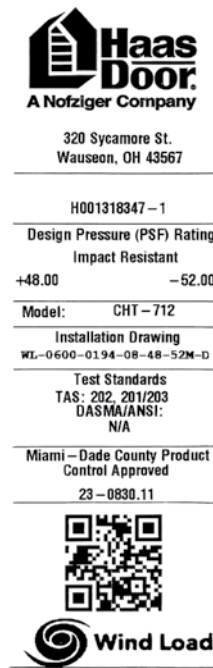
“The 2021 IRC code requirements are clearer than earlier codes,” Monsour says.

“According to the 2021 IRC, garage doors need a permanent label provided by manufacturers that shows the wind-load rating.”

Since that code requirement is relatively new, many builders and contractors are unaware and don’t follow the labeling mandate, Brown-Giammanco says.

The 2021 IRC requires testing and labeling that lists the positive and negative design load pressure ratings.

“The testing and ratings are based on local conditions, so you don’t have to install a Miami-level wind-rated garage door in Ohio,” Monsour says. “Builders and inspectors should be looking



for verification that the garage door has been built and installed for the project-specific required design wind pressure.”

Unfortunately, Monsour says, wind-rated garage doors should be part of a building inspection, but that element is often overlooked or deprioritized.

“Manufacturers, installers, and builders need to understand the important protection wind-resistant

garage doors offer,” Brown-Giammanco says. “Code inspectors also need to follow through and inspect all garage doors for their wind-rated label.”

Building codes lag technology in some cases, Nafziger says.

“Builders should think about their local code as the bare minimum, then ask themselves what else they can do to make a home safer and more resilient for their customers,” he says.

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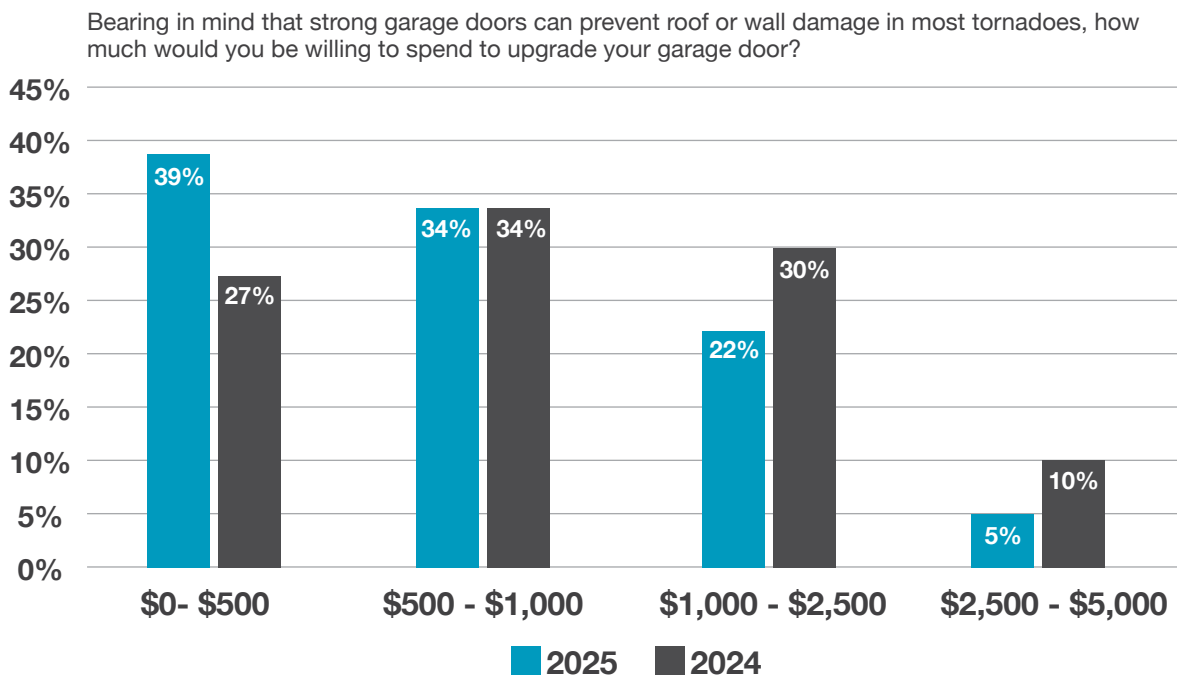
Cost-Benefit Analysis

Garage doors are a standard cost for newly built homes. Increasing the safety of the residents and the structural integrity of their home with a wind-resistant garage door requires a minimal additional investment of approximately \$225, Nafziger says.

For homeowners rebuilding after a storm or renovating their home, that number holds: while garage doors overall may cost \$1,000 to \$10,000,

depending on the size, materials, and style, the added cost of more resilient garage doors is minimal.

“In 2024, FLASH did some research into how much people were willing to pay to increase the safety of their home,” Nafziger says. “They found that 34% of homeowners are willing to pay as much as \$1,000 for added safety, and 35% will pay as much as \$500. In other words, about 70% of people are willing to pay for garage door upgrades.” And the April 2026 FLASH survey findings showed consistent willingness to pay for upgrades.



#TornadoStrong Annual Survey Results & Comparison, 2025 vs. 2024, FLASH

The extra \$225 for wind-rated garage doors fits easily into that budget, especially when you compare it to the cost of a roof replacement that might be required if their garage doors fail, he says.

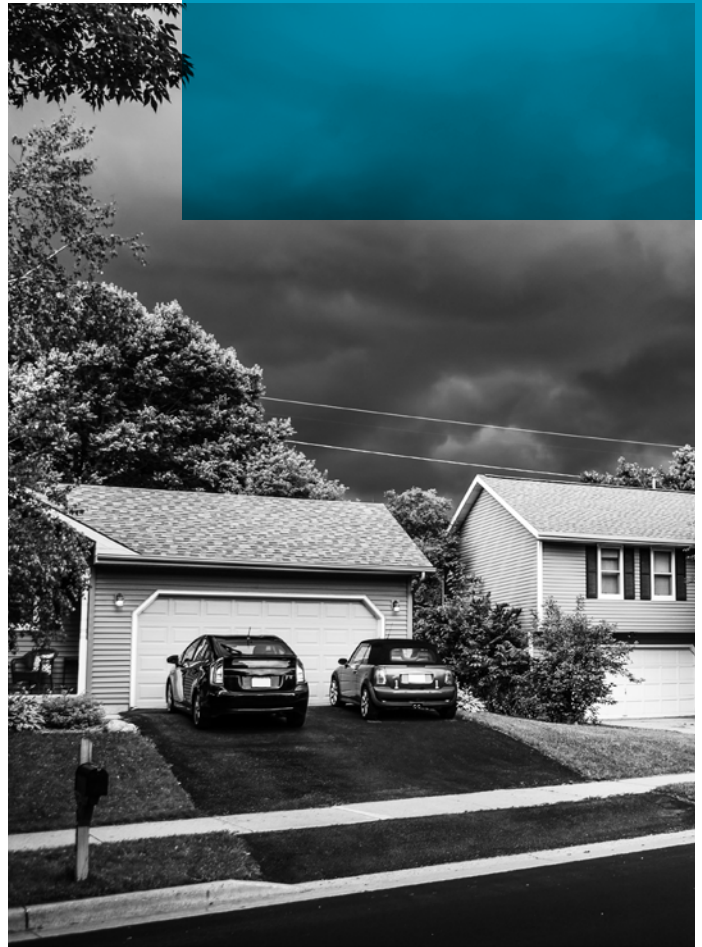
“When you think about how many times in the years ahead you may get an alert about a potential tornado or even just a major thunderstorm with high winds, it should make you feel better to spend a little money to replace your garage doors to protect your home and your family,” Nafziger says.

While research shows that wind-rated garage doors provide a great defense for the overall structure of a house by preventing the wind from getting inside the house, many builders and homeowners are not aware that these doors are available in a variety of styles and price points that are not significantly more costly than standard doors, Monsour says.

“There’s a side benefit of installing new garage doors, too, particularly in an upgraded style: they consistently are among the top home improvements with the highest return on investment for homeowners,” Monsour says.

In the [2025 Zonda Cost vs. Value Report](#), garage door replacement is the most valuable renovation project, with an ROI of 268% at the time of sale.

“It’s not cost-prohibitive to replace garage doors, maybe \$2,000 to \$3,000,” Brown-Giammanco says. “That’s not much when you’re renovating, particularly when that investment can make a huge difference in reducing damage to your home and improving your family’s safety.”



In some cases, depending on the door style and wind load, you can add wind resistance to an existing garage door, according to Monsour.

In addition to peace of mind and ROI, homeowners may benefit from an insurance premium discount for wind-resistant or impact-resistant garage doors, depending on their location and insurance company.

“Insurance companies are also starting to talk about requiring wind-rated garage doors during post-disaster rebuilding to lower the risk of claims after future wind events,” Nafziger says.

12

Simple Installation Tweaks with a Big Payback

Wind-resistant and impact garage doors require additional steps to ensure proper installation.

“Proper installation of wind-resistant garage doors is critical because you need to transfer the pressure against the garage door to other parts of the building, including the structural support for the garage door, to transfer loads evenly,” Levitan says.

The struts require some extra attention, but are designed to be installer-friendly, Nafziger says.

“There’s not a huge difference, just a little additional prep,” Nafziger says. “But installing garage doors is not a DIY project, either.”

Wind-resistant and impact-resistant garage doors meet consumer desires for cost-effective solutions to resilience, he says, so every builder and homeowner should consider installing them.

“Manufacturers are ready with a variety of wind-rated garage doors,” Monsour says. “Most garage doors manufactured now can be provided with a wind load rating, but not every model can be provided with the highest ratings.”



13

Convening the Stakeholders and Sharing the Story

Following NIST's 2023 NDRC presentation, FLASH established a multi-track, public-private initiative to increase consumer and industry understanding of wind-rated garage doors and their role in protecting homes. The effort includes consumer awareness research, stakeholder dialogue, and outreach to builders, building officials, consumers, dealers, door manufacturers, insurance commissioners, and meteorologists. The results so far have been very promising, as the upgraded garage doors benefit all parties by increasing family safety, preventing losses, reducing insurance costs, and creating marketplace opportunities.

A garage door dealer's reaction after attending a Haas Door-hosted training by FLASH and NIST suggests potential for future success. "Thank you, Haas, for taking such an active role in educating people about this important issue. In a recent Haas order, I was pleasantly surprised to learn that upgrading to wind-load-rated doors cost only 3% more than non-wind-load-rated doors. When a homeowner understands what's at risk, that 3% is

a no-brainer," said Michael Cash, Owner of Northview Doors & Systems, Twin Cities Metro.

FLASH and the coalition are focusing future efforts on fostering a common language (wind-loaded vs. wind-resistant vs. wind-rated), standardizing post-storm forensic-engineering research protocols, creating simplified design-pressure calculation tools, and expanding outreach to consumers, leaders, and influencers.

"Communicating affordable, achievable, and impactful home protection options to the public is the premier way that we achieve our mission of strengthening homes and safeguarding families from disasters," said FLASH President/CEO Leslie Chapman-Henderson. "We are honored to lead on this issue, and we applaud the industry and research professionals who have provided compelling evidence and enthusiastically come together to help advance this essential safety and resilience solution."

Editor's Note: Dr. Tanya Brown-Giammanco served as Managing Director of Research during her prior tenure at IBHS, where she led and participated in various garage door research and testing projects. In her new role at NIST, she continues to focus on the critical role that garage doors play in preventing wind losses.