

# OPENING PROTECTION

IBHS Selection Guide for Shutters & Other Protective Barriers



## Shutters & Other Protective Barriers

Keeping out wind and water is critical to the survival of your home or business during severe weather. Therefore, protective barriers such as shutters and impact-rated windows and doors should be installed well in advance of a storm. Plywood should only be used as a last-minute alternative, and if used, must be properly fastened. Lastly, do not tape windows. It is a myth that this will prevent them from breaking when impacted by windborne debris. This method provides no protection and wastes valuable time that should be used for other storm preparation tasks.

This guide provides information to help you choose the right protection for your home or business, including a detailed matrix that compares important variables of window protection options such as pros and cons, advance deployment time needed, costs associated with do-it-yourself versus professional installation, and more.

### Benefits of Protective Barriers for Openings

When installed properly, protective barriers can:

- Keep wind pressure from building up inside, which often leads to loss of the roof.
- Reduce the chance glass will break.
- Reduce the chance of wind-driven rain soaking the interior.
- Reduce damage to business equipment/inventory and reduce business interruptions.
- Help ensure continued habitability of a home.

### Protective Barrier Options

Protective barriers may be temporary or permanent. When possible, install permanent protection such as impact-rated windows and doors or roll-down shutters. For temporary protection, permanent fasteners should be installed on the building long before storm warnings, so shutter panels can be put in place quickly when needed.

A wide range of products are available to fit your budget including some do-it-yourself options, which are about 50 percent less per square foot than options requiring professional installation. Aesthetics are also important when determining the right protection. Permanent barriers have a greater impact on a building's appearance, which should be taken into consideration. Many home and business owners choose a mixture of protective measures to meet their individual needs, budgets and tastes.

### Ratings and Labels are Critical

Choose products with the proper approval rating for impact resistance. The label "hurricane tested" alone is not adequate. Look for these ratings or labels:

- ASTM E1886 and E1996
- AAMA 506
- Florida Building Code TAS 201, 202, 203
- Miami-Dade County Product Control Approved and NOA number per TAS 201, 202, 203

### Consider These Questions When Determining Appropriate Openings Protection

#### Business Owners

- Are we open year-round and/or during hurricane season?
- Are employees able to install temporary shutters before a storm?
- Do we have the tools needed to install temporary shutters (ladders, fall protection, plywood, nails, etc.)?
- Do we know what materials make up our exterior walls, and whether we can drill or nail into them to install temporary shutters?
- Is temporary protection practical for our building (all windows are accessible and building is free from large openings)?
- Will the look of permanent products, such as roll-down or accordion-style shutters, negatively impact how my business looks? (These often have visible storage "boxes" on a building's exterior when not in use.)

If the answer to any of these questions is no, installing permanent shutters or impact-rated windows and doors is highly recommended.

#### Business Preparedness

See IBHS' [EZ-Prep](#) and [OFB-EZ](#) for guidance on shutter installation as part of an emergency preparation plan.



#### Homeowners

- Am I a year-round resident?
- Am I capable of installing temporary shutters alone?
- Do I have the tools needed to install temporary shutters (ladders, plywood, nails, etc.)?
- Do I have a single-story home?
- Will the look of permanent products, such as roll-down or accordion-style shutters, negatively impact the appeal of my home? (These often have visible storage "boxes" on a home's exterior when not in use.)

If the answer to any of these questions is no, installing permanent shutters or impact-rated windows and doors is highly recommended.

## Opening Protection - IBHS Selection Guide for Shutters & Other Protective Barriers

	PLYWOOD	CORRUGATED STEEL PANELS	FABRIC PANEL SYSTEMS	CORRUGATED ALUMINUM PANELS	PERFORATED, CORRUGATED ALUMINUM PANELS
PRICE (PER SQ FT)*	\$1–\$2 for DIY; \$3–\$5 for installation by a carpenter or contractor.	\$3–\$5 for DIY; \$6–\$12 for professional installation.	\$4.50–\$6 for DIY; \$8–\$12 for professional installation.	\$6–\$8 for DIY; \$9–\$16 for professional installation.	\$8–\$10 for DIY; \$10–\$18 for professional installation.
DESCRIPTION	1/2" to 3/4" CDX plywood available in 4' x 8' sheets; OSB not recommended. Use 2 layers of 3/8" material to obtain same effect as 1 layer of 3/4" material.	Panels available in widths from 13" to 16" and various lengths. Typically overlapped to cover small to large openings. Available in .024" to .048" thickness.	Panels are a strong polyester weave with PVC coating on both sides. One panel can cover entire opening. Complete DIY kits available.	Panels available in widths from 13" to 14" and are overlapped to cover small to large openings. Available in .040" to .072" thickness.	Panels available in widths from 13" to 14" and are overlapped to cover small to large openings. Available in .05" thickness.
PROS	Lowest-cost protection you can purchase. Available from many sources in all markets. Does not have to be custom ordered.	Inexpensive system with good protection. Easy to deploy when used with track systems.	Won't rot, warp, corrode or rust. Panels can be stored in place with a decorative cover. Lighter weight than most other systems; 70% lighter than metal products. Panels can be used for emergency roof repairs; stronger and more weather-resistant than tarps or plastic. Panels are translucent and allow light inside. Offer 2-, 3- or 4-sided attachment options.	Lighter-weight metal panel option than steel with good protection. Corrosion-resistant when stored dry and separated from concrete floor.	Perforated with small holes on upper ribs to allow light inside. Lighter-weight metal panel option than steel with good protection. Corrosion-resistant when stored dry and separated from concrete floor.
CONS	Heavy and hard to handle. Will warp when wet and during storage and may need to be replaced after a few storms. Should not be used for an opening larger than 4' x 8' unless extra framing is added; see APA guidelines. Panels difficult to install on upper stories unless openings face onto porch or balcony. 1/2" and 5/8" panels can be penetrated by 9-lb test missile, allowing glass to break.	Lighter-weight panels are easily bent by impacts and will allow glass to break unless there is significant distance (3" to 4") between panel and glass. Heavier-weight panels offer better protection, but can be hard to handle in longer lengths or if trying to carry several panels at one time. Panels may corrode if improperly stored.	Significant deflection will occur if impacted by heavy objects. This will likely result in broken glass unless there is a separation of 1' or greater between fabric and glass.	Lighter-weight panels are easily bent by impacts and will allow glass to break unless there is a separation of 3" to 4" between panel and glass. Heavier-weight panels offer better protection, but can be more difficult to handle in longer lengths or when carrying several panels at once. Panels will suffer surface corrosion if improperly stored and will stick together.	Cannot be direct-mounted without tracks. Panels will suffer surface corrosion if improperly stored and will stick together.
ADVANCE DEPLOYMENT TIME NEEDED	Initial installation: 1 hr per opening to cut plywood and install anchors into framing. After permanent anchors are installed may take as little as 5 min per window to install.	Initial installation: 1½ hr per opening to cut metal panels and install anchors into framing. After permanent anchors or tracks are installed, may take as little as 5 min per window to install.	Initial installation: 30 min per opening to install tracks or anchors into framing. After permanent anchors are installed, may take as little as 5 min per window to install.	1 hr per opening to cut tracks and install anchors into framing.	1 hr per opening to cut plywood and install anchors into framing.
WATER PENETRATION RESISTANCE	May reduce water intrusion depending on installation; attaching weather stripping to top and sides of panels, where they come into contact with a wall may provide extra protection.	May reduce water penetration by reducing amount of water being blown against window or door.	If generously overlapped, can significantly reduce water penetration at all pressures.	May reduce water penetration by reducing amount of water being blown against windows or doors.	Unlikely to significantly reduce water penetration; perforation will allow water through very easily.
POROUS OR NON-POROUS	Generally non-porous if the sheet covers entire opening. Only required to be attached on 2 opposite edges.	Does not keep wind pressure from building up on windows or doors. Non-porous by code definition unless built-out with 1/4" or greater separation from the wall, or panels are shorter than minimum required by engineer to maintain the system as non-porous.	May reduce wind pressure buildup on windows or doors depending on attachment. Non-porous, fits against openings on all sides; optional 3-sided/4-sided attachment can be used to keep system against the wall when wrapping over uneven architectural details around openings.	Does not keep wind pressure from building up on windows or doors. Non-porous by code definition unless built-out with 1/4" or greater separation from the wall, or panels are shorter than minimum required by engineer to maintain the system as non-porous.	Does not keep wind pressure from building up on window or door. Non-porous by code definition if installed with track systems and using side and end closures. Considered porous by code definition if direct-mounted with "F" track or just fasteners.
OPERATION	Plywood should be labeled, dried out, and stored flat after usage. Must be taken out of storage and carried to each opening. Deploy well before tropical storm-force winds arrive.	Must be taken out of storage and carried to each opening. Deploy well before tropical storm-force winds arrive.	May be stored in place on openings, reducing installation time. If stored off-site, deploy well before tropical storm-force winds arrive.	Must be taken out of storage and carried to each opening. Deploy well before tropical storm-force winds arrive.	Must be taken out of storage and carried to each opening. Deploy well before tropical storm-force winds arrive.
"DO-IT-YOURSELF (DIY)	YES Home improvement centers	YES Home improvement centers	YES Home improvement centers	YES Home improvement centers	YES Special order

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	<b>CORRUGATED POLYPROPYLENE PANELS</b>	<b>CORRUGATED CLEAR POLYCARBONATE PANELS</b>	<b>CELLULAR POLYPROPYLENE SHEET (4' x 8')</b>	<b>CELLULAR POLYCARBONATE SHEET (4' X 8')</b>	<b>MONOLITHIC POLYCARBONATE SHEET (4' X 8')</b>
<b>PRICE (PER SQ FT)*</b>	\$6-\$8 for DIY; \$10-\$18 for professional installation.	\$6-\$8 for DIY; \$15-\$20 for professional installation.	\$3-\$5 for DIY; \$6-\$12 for professional installation.	\$10-\$15 for DIY; \$20-\$30 for professional installation.	\$10-\$20 for DIY; \$30-\$50 for professional installation.
<b>DESCRIPTION</b>	A flexible translucent plastic corrugated panel system.	Panels are available from most manufacturers, but some require metal panels to be installed on each side to support edges.	Usually sold in 4' x 8' sheets; honeycomb construction that is 1/2" to 5/8" thick.	Usually sold in 4' x 8' sheets; honeycomb construction that is 1/2" to 5/8" thick.	Usually sold in 4' x 8' sheets, but also available in sizes up to 5' x 10'. Thickness for hurricane protection is generally 1/4" with 3/8" recommended for larger openings.
<b>PROS</b>	Corrosion-resistant; allows light inside; lighter than steel or aluminum.	Corrosion-resistant; allows light inside; lighter than steel or aluminum.	Corrosion-resistant; allows light inside; lighter than plywood, steel or aluminum.	Corrosion-resistant; allows light inside; lighter than plywood, steel or aluminum.	Corrosion- and UV-resistant (XL-10 and MR-10); optically clear; allows light inside. Can be left in place year-round, except on bedroom windows unless there are means of egress. GE Lexan XL-10 and MR-10 are designed for prolonged exposure and carry a 10-year warranty against discoloration.
<b>CONS</b>	The increased impact resistance arising from the panel flexibility also means the system will allow breakage if hit by heavy objects unless there is significant distance (3" to 4") between panel and glass. Chemical exposure can significantly reduce strength.	The increased impact resistance arising from the panel flexibility also means the system will allow breakage if hit by heavy objects unless there is significant distance (3" to 4") between panel and glass. Some systems are UV-resistant and can be left up during the season on windows that do not provide emergency escape in bedrooms. Chemical exposure can significantly reduce strength. Distorts view if left in place year-round.	The increased impact resistance arising from the panel flexibility also means the system will allow breakage if hit by heavy objects unless there is significant distance (3" to 4") between panel and glass. Some systems are UV-resistant and can be left up during the season on windows that do not provide emergency escape in bedrooms. Chemical exposure can significantly reduce strength. Must be fastened on all 4 sides.	The increased impact resistance arising from the panel flexibility also means the system will allow breakage if hit by heavy objects unless there is significant distance (3" to 4") between panel and glass. Some systems are UV-resistant and can be left up during the season on windows that do not provide emergency escape in bedrooms. Chemical exposure can significantly reduce strength. Must be fastened on all 4 sides.	The sheets are expensive and may only be available through wholesale accounts. Some systems are only available to commercial contractors. XL-10 scratches easily.
<b>ADVANCE DEPLOYMENT TIME NEEDED</b>	Initial installation: 1 hr per opening to cut panel and install anchors into framing. After permanent anchors are installed, could take as little as 5 min per opening to install.	Initial installation: 1 hr per opening to cut panel and install anchors into framing. After permanent anchors are installed, could take as little as 5 min per opening to install.	Initial installation: 1 hr per opening to cut panel and install anchors into framing. After permanent anchors are installed, could take as little as 5 min per opening to install.	Initial installation: 1 hr per opening to cut panel and install anchors into framing. After permanent anchors are installed, could take as little as 5 min per opening to install.	Initial installation: 1 hr per opening to cut panel and install anchors into framing. After permanent anchors are installed, could take as little as 5 min per opening to install.
<b>WATER PENETRATION RESISTANCE</b>	May reduce water penetration depending on installation; attaching weather stripping to top and sides of panels where they bear against wall may provide extra protection from water intrusion.	May reduce water penetration depending on installation; attaching weather stripping to top and sides of panels where they bear against wall may provide extra protection from water intrusion.	May reduce water intrusion depending on installation; attaching weather stripping to tops and sides of panels where they bear against wall may provide extra protection from water intrusion.	May reduce water intrusion depending on installation; attaching weather stripping to tops and sides of panels where they bear against wall may provide extra protection from water intrusion.	May reduce water intrusion depending on installation; attaching weather stripping to tops and sides of panels where they bear against wall may provide extra protection from water intrusion.
<b>POROUS OR NON-POROUS</b>	Does not keep wind pressure from building up on windows or doors. Non-porous by code definition unless built-out with 1/4" or greater separation from the wall, or panels are shorter than minimum required by engineer to maintain the system as non-porous.	Does not keep wind pressure from building up on windows or doors. Non-porous by code definition unless built-out with 1/4" or greater separation from the wall, or panels are shorter than minimum required by engineer to maintain the system as non-porous.	Generally non-porous if the sheet covers entire opening. Attach on all 4 sides.	Generally non-porous if the sheet covers entire opening. Attach on all 4 sides.	Generally non-porous if the sheet covers entire opening. Only the 2 opposite edges must be attached.
<b>OPERATION</b>	Must be taken out of storage and carried to each opening. Deploy well before tropical storm-force winds arrive.	Must be taken out of storage and carried to each opening. Deploy well before tropical storm-force winds arrive.	Must be taken out of storage and carried to each opening. Deploy well before tropical storm-force winds arrive.	Must be taken out of storage and carried to each opening. Deploy well before tropical storm-force winds arrive.	May be permanently installed over windows that do not provide emergency escape (i.e., bedrooms). Removable panels must be stored and carried to each opening for deployment.
<b>"DO-IT-YOURSELF (DIY)</b>	YES Home improvement centers	YES Home improvement centers	YES Home improvement centers	YES Home improvement centers	YES Specialty suppliers and home improvement centers

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	FLEXIBLE WIND ABATEMENT SCREEN SYSTEMS	ALUMINUM ACCORDION SHUTTERS	FABRIC PULL-DOWN SHUTTERS	ROLL-UP SHUTTERS EXTRUDED ALUMINUM SLATS	ROLL-UP SHUTTERS HIGH-DENSITY FOAM-FILLED ALUMINUM SLATS
PRICE (PER SQ FT)*	Not available for DIY; \$10–\$20 for professional installation.	Not available for DIY; \$18–\$28 for professional installation.	Not available for DIY; \$28–\$35 for professional installation.	Not available for DIY; \$28–\$50 for professional installation.	Not available for DIY; \$28–\$50 for professional installation.
DESCRIPTION	Lightweight flexible screen. Attached with straps and buckles to wall, eave, or beams using large eye bolts or ground anchor screws. Some systems also use clips, carabiners or grommets.	Aluminum slat folding shutter system that moves horizontally and folds out of the way on either side of opening.	Fabric shutter system that uses a counter balance spring and hood to store shutter when not in use. Similar to roll-up shutter system, but 4" hood rather than 8"–12" hood for storage.	Extruded aluminum slats are the strongest and most impact-resistant. Blades are double-wall hollow slats with wall thickness ranging from 0.40" to 0.60".	High-density, foam-filled slats are made with thin roll-formed aluminum, which is wrapped around a foam core that provides stiffness.
PROS	Lightest-weight protection product on the market. Capable of easily covering large areas at relatively low cost. Easily folds up for storage; some manufacturers provide storage bags with orders. Some systems have a Miami-Dade NOA and reduce likelihood of glass breakage from flying debris. Some systems are designed as non-porous and allow glass breakage when impacted.	Moderately priced; easily covers large openings; offers excellent protection from flying debris. Can be closed in seconds, deploys faster than most other systems. Offers increased security by providing locks. Can be used for upper windows and operated from the inside, if building has single/double-hung or sliding windows or in-swing or sliding glass doors. Commonly used to enclose entire balconies. Build-out tracks reduce need for unsightly frames and additional tubes.	Moderate-price very low profile hood system, which can be hidden in soffits or by decorative trims. Can be closed in seconds and deploys faster than any other operable system. Provides excellent protection from water intrusion. Can be used for upper windows and operated from the inside, if building has single/double-hung or sliding windows or in-swing or sliding glass doors.	Motorized systems can be automated by using anemometers, timers, remote controls, or even telephone or computer-operated systems. Offers good security for absentee owners or properties in evacuation zones. One of the better systems for resisting water intrusion, when using unvented slats. Can be manually operated from inside, so is suitable for all styles of operable or fixed windows and in-swing or out-swing doors.	Lightweight slats allow larger shutters without the need for motorization. Motorized systems can be automated. Offers good security for absentee owners or properties in evacuation zones. One of the better systems for resisting water intrusion, when using unvented slats. Can be manually operated from inside, so are suitable for all styles of operable or fixed windows and in-swing or out-swing doors.
CONS	The reinforcing in screen is sewn; stitching can break down from long UV exposure, weakening the system. Large screens may require 2 or more persons to deploy. Not easy to install for openings above first floor. Not recommended for installation on edges of cantilevered concrete decks or balconies, unless design is inspected by an engineer, since screen will apply great uplift and/or downward forces, possibly overloading anchors or damaging structure itself.	Adds a lot of material around openings; sometimes viewed as unattractive. Needs regular maintenance and cleaning to keep system from seizing or freezing up. Noise complaints may arise when opening and closing. Some condominiums restrict use due to noise.	Flexible material allows contact with the door or glass when impacted by large missiles. Size is limited to 7' x 7' 8". Moderate design pressure limits used in coastal areas.	Extruded aluminum is heaviest slat on the market and will require motors at around 45 sq ft of coverage, increasing the cost. Requires vertical storm bars to keep slats from being pulled out of track system for large spans or high design pressures. Large hoods not easy to hide and can be unattractive. Must be built-out to prevent contact with door or glass.	Lightweight slats bend more easily than extruded aluminum slats. Roll-formed aluminum can bend, causing problems with the operation of shutter over time. Requires more storm bars since unsupported span is less than that of extruded aluminum slats. This makes system roughly the same price or slightly higher than that for extruded aluminum slat system. Large hoods not easy to hide and can be unattractive. Must be built-out to prevent contact with doors or glass.
ADVANCE DEPLOYMENT TIME NEEDED	Must be taken out of storage and carried to each opening. Deploy well before tropical storm-force winds arrive.	Since system is permanently mounted, can be closed very quickly, allowing more time to prepare for evacuation or sheltering in place.	Since system is permanently mounted, can be closed very quickly, allowing more time to prepare for evacuation or sheltering in place.	Since system is permanently mounted, can be closed very quickly, allowing more time to prepare for evacuation or sheltering in place.	Since system is permanently mounted, can be closed very quickly, allowing more time to prepare for evacuation or sheltering in place.
WATER PENETRATION RESISTANCE	May reduce water penetration by reducing amount of water being blown against windows or doors, particularly if installed some distance away.	May reduce water penetration by reducing amount of water being blown against windows or doors. However, may not significantly reduce water penetration under high pressures, unless mounted on the edge of a porch or balcony several feet away from the opening being protected.	Excellent resistance against water intrusion, even at high pressures.	May reduce water penetration by reducing amount of water being blown against windows or doors. However, may not significantly reduce water penetration under high pressures, unless mounted on the edge of a porch or balcony several feet away from the opening being protected.	May reduce water penetration by reducing amount of water being blown against windows or doors. However, may not significantly reduce water penetration under high pressures, unless mounted on the edge of a porch or balcony several feet away from the opening being protected.
POROUS OR NON-POROUS	Does not keep wind pressure from building up on windows or doors. Generally, all systems considered non-porous since the open weave is less than 10% ventilated.	Does not keep wind pressure from building up on windows or doors. Generally, all systems considered non-porous by code definition.	Non-porous; will likely reduce pressures on window or door being protected.	Does not keep wind pressure from building up on windows or doors. Generally, all systems considered non-porous by code definition.	Does not keep wind pressure from building up on windows or doors. Generally, all systems considered non-porous.
OPERATION	Loops, buckles, straps, carabiners, clips or grommets secure system to permanent or removable anchor systems.	Pull shutter sections together to shut and engage either locking pins, locks or both depending on system design.	Pull shutter down and engage locking pins.	Manually crank shutter down or activate motor using a switch or remote option.	Manually crank shutter down or activate motor using a switch or remote option.
"DO-IT-YOURSELF (DIY)	NO Professional installation only	NO Professional installation only	NO Professional installation only	NO Professional installation only	NO Professional installation only

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	ROLL-UP SHUTTERS FLEXIBLE PVC SLATS	COLONIAL HINGED SHUTTERS	BAHAMA AWNING SHUTTERS	STAINLESS STEEL WOVEN SCREEN BARRIERS	PERFORATED STEEL BARRIER SYSTEMS
PRICE (PER SQ FT)*	Not available for DIY; \$28-\$50 for professional installation.	Not available for DIY; \$38-\$50 for professional installation.	Not available for DIY; \$38-\$50 for professional installation.	Not available for DIY; \$28-\$50 for professional installation.	Not available for DIY; \$40-\$60 for professional installation.
DESCRIPTION	End retention clip system is used to keep PVC slats from pulling out of side tracks.	Authentic swinging shutters fold back to sides of windows. Available in louvered and raised panels made of aluminum and high-impact, aluminum-reinforced PVC or fiberglass.	Adds decorative look to hurricane protection. Very popular in the islands, where shutters are used to shade and keep rain out of screened openings.	Looks like a heavy insect screen in a heavy-duty welded or mechanically assembled frame.	Steel sheets are perforated using small round holes to create a screen-type effect. Frames are welded to steel sheets that are mechanically fastened to frame and/or sub frame.
PROS	Lightweight slats allow larger shutters for manual operation before having to go to motorized systems. Motorized systems can be automated. Offers good security for absentee owners or properties that are evacuated. One of the better systems for water penetration resistance when using unvented slats. Can be manually operated from inside, so is suitable for all styles of operable or fixed windows and in-swing or out-swing doors.	Due to decorative look, these are widely accepted where historical or architectural review committees strictly control aesthetics. Permanently mounted and usually only requires a screwdriver to attach the additional locking hardware. Adds decorative accent to existing structures.	Due to decorative look, these are widely accepted where historical or architectural review committees strictly control aesthetics. Permanently mounted and usually only requires a screwdriver to attach the additional locking hardware. Adds decorative accent to existing structures. Another benefit is shading the window, which can significantly reduce energy costs.	Always in place; no need to deploy system. Used to reduce or eliminate glass breakage from vandalism for schools and public buildings. Screen reduces solar glare and can aid in reducing energy costs. Stainless steel screen will not rust or corrode even if exposed to salt spray. Screen does not distort or block view like perforated barriers.	Always in place; no need to deploy system. Used to reduce or eliminate glass breakage from vandalism for schools and public buildings. Barrier reduces solar glare and can aid in reducing energy costs. Stainless steel perforated sheet will not rust or corrode even if exposed to salt spray.
CONS	Lightweight slats bend more easily than extruded aluminum slats. PVC can become brittle over time, causing slats to disengage. Requires more storm bars than extruded aluminum because unsupported span length is shorter, which makes system roughly the same price or slightly more expensive than extruded aluminum slat system. Large hoods not easy to hide and can be unattractive. Must be built-out to prevent contact with doors or glass.	Most have to be closed and secured from outside, which makes this an impractical system above first floor. One of the most expensive shutter systems on the market. Needs room on each side of opening for shutter to fold back. Multiple folding panels have bulky look when trying to cover triple or larger mullied window units. System works best on single or twin windows.	Most have to be closed and secured from outside, which makes this an impractical system above first floor. One of the most expensive shutter systems on the market. Bulky when trying to cover triple or larger mullied windows units.	Generally requires heavy build-out framing structures to mount multiple units. Porous system may allow some internal pressurization, if a glass opening fails from pressure.	Generally requires heavy build-out framing structures to mount multiple units. Porous system may allow some internal pressurization, if a glass opening fails from pressure. Regular perforated steel screen will rust in salt conditions; stainless steel perforated sheet is expensive. Round holes in barrier can cause distortions in outside view; not as optically clear as screen barrier systems.
ADVANCE DEPLOY- MENT TIME NEEDED	Since system is permanently mounted, can be closed very quickly, allowing more time to prepare for evacuation or sheltering in place.	After initial installation, takes 15-30 min per shutter depending on type of system selected.	After initial installation, takes 10-30 min per shutter depending on type of system selected.	No deployment necessary; system stays in place.	No deployment necessary; system stays in place.
WATER PENETRATION RESISTANCE	May reduce water penetration by reducing amount of water being blown against windows or doors. However, this reduction may not be as significant under high pressures unless mounted on the edge of a porch or balcony several feet away from the opening being protected.	Does not significantly reduce water penetration. Open louver systems or perforated panel backs will allow water inside, which creates opportunity for window and door leaks.	Does not significantly reduce water penetration. Open louver systems or perforated panel backs will allow water inside, which creates opportunity for window and door leaks.	Does not reduce water penetration due to the open weave and approximate 40% porosity of the system.	Does not reduce water penetration due to the open weave and approximate 40% porosity of the system.
POROUS OR NON-POROUS	Does not keep wind pressure from building up on windows or doors. Generally, all systems considered non-porous.	Does not keep wind pressure from building up on windows or doors. Generally, all systems considered non-porous.	Does not keep wind pressure from building up on windows or doors. Generally, all systems considered non-porous.	Porous; does not reduce pressure on windows or doors.	Porous; does not reduce pressure on windows or doors.
OPERATION	Manually crank shutter down or activate motor using a switch or remote option.	Shutters use a spring clip to hold them open. Closures will likely require additional bars, clips, or other types of mechanically fastened hardware that are stored when not in use.	Shutters use a telescoping arm with locking thumb screw to hold them open. Closures will likely require additional clips, or other types of mechanically fastened hardware that are stored when not in use.	No deployment needed; always in place.	No deployment needed; always in place.
"DO-IT-YOURSELF (DIY)	NO Professional installation only	NO Professional installation only	NO Professional installation only	NO Professional installation only	NO Professional installation only

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	<b>IMPACT-RATED LAMINATED WINDOWS</b>	<b>TRIPLE-PANE IMPACT-RATED LAMINATED WINDOWS</b> (Double-glazed means insulated glass or IG)	<b>IMPACT-RATED LAMINATED DOORS</b>	<b>TRIPLE-PANE IMPACT-RATED LAMINATED DOORS</b> (Double-glazed means insulated glass or IG)	<b>IMPACT-RATED GARAGE DOORS</b>
<b>PRICE (PER SQ FT)*</b>	Not available for DIY; \$28-\$50 for professional installation.	\$40-\$60 for DIY; \$50-\$70 for professional installation.	\$40-\$60 for DIY; \$50-\$70 for professional installation.	\$40-\$60 for DIY; \$50-\$80 for professional installation.	Single-bay door: \$750-\$900; Double-bay door: \$985-\$1,295.
<b>DESCRIPTION</b>	Single-glazed windows are referred to as single-pane; usually only available in aluminum uninsulated frames. The single sheet of glazing is comprised of 2 sheets of glass with a laminate in between.	Double-glazed is insulated glass and is more energy efficient. The laminate is bonded between 2 pieces of glass on the inside and a regular piece of glass on the outside.	Single-glazed doors are referred to as single-pane; usually available in steel, aluminum, fiberglass or wood. The single sheet of glazing is comprised of 2 sheets of glass with a laminate in between.	Double-glazed is insulated glass and is more energy efficient. The laminate is bonded between 2 pieces of glass on the inside and a regular piece of glass on the outside.	Available in steel insulated pan or foam-core doors from a variety of manufacturers. Should not be confused with wind load-rated doors, which generally are not impact-resistant.
<b>PROS</b>	Hurricane protection is always in place; no deployment necessary. Provides additional security protection. Low impact to aesthetics of structure.	Hurricane protection is always in place; no deployment necessary. Provides additional security protection. Low impact to aesthetics of structure.	Hurricane protection is always in place; no deployment necessary. Provides additional security protection. Low impact to aesthetics of structure. Using an impact-rated glass door instead of a shutter can give you an additional means of escape, and may be cost-effective if combined with shutters on other openings.	Hurricane protection is always in place no deployment necessary. Provides additional security protection. Low impact to aesthetics of structure. Using an impact-rated door instead of a shutter can give you an additional means of escape, and may be cost-effective if combined with shutters on other openings.	Hurricane protection is always in place no deployment necessary. Provides additional security protection. Low impact to aesthetics of structure. Lowest-cost option to protect garage doors; covering with shutters is generally more expensive.
<b>CONS</b>	Single-glazed windows do not meet energy efficient standards for solar heat gain. When the glass breaks, replacement costs are an insured loss, but cost is expensive. More expensive to replace older windows with impact-rated glass than to shutter existing windows.	The entire insulated glass unit must be replaced, even if only the outer piece of glass breaks. This is quite expensive. More expensive to replace older windows with impact-rated glass than to shutter existing windows.	Single-glazed doors do not meet energy efficient standards for solar heat gain. When the glass breaks replacement costs are an insured loss, but cost is expensive. Replacing doors with impact-rated glass doors is more expensive than using shutters to cover existing doors.	The entire insulated glass unit must be replaced, even if only the outer piece of glass breaks. This is quite expensive. Replacing doors with impact-rated glass doors is more expensive than using shutters to cover existing doors.	A larger motor and an automatic garage door opener may be required; impact-rated garage doors require a minimum 1/2 HP motor. Most impact-rated garage doors will not have decorative glass panels.
<b>ADVANCE DEPLOYMENT TIME NEEDED</b>	Always in place; none needed.	Always in place; none needed.	Always in place; none needed.	Always in place; none needed.	Always in place; none needed.
<b>WATER PENETRATION RESISTANCE</b>	Does not reduce water penetration in hurricane or tropical storm conditions. Openings will have minor leaks at lower pressures and extensive leaking will occur at higher pressures. Using casement and fixed windows will help to reduce water penetration.	Does not reduce water penetration in hurricane or tropical storm conditions. Openings will have minor leaks at lower pressures and extensive leaking will occur at higher pressures. Using casement and fixed windows will help to reduce water penetration.	Does not reduce water penetration in hurricane or tropical storm conditions. Openings will have minor leaks at lower pressures and extensive leaking will occur at higher pressures. Using casement and fixed windows will help to reduce water penetration.	Does not reduce water penetration in hurricane or tropical storm conditions. Openings will have minor leaks at lower pressures and extensive leaking will occur at higher pressures. Using casement and fixed windows will help to reduce water penetration.	N/A
<b>POROUS OR NON-POROUS</b>	Non-porous	Non-porous	Non-porous	Non-porous	Non-porous
<b>OPERATION</b>	Always in place; none needed.	Always in place; none needed.	Always in place; none needed.	Always in place; none needed.	Always in place; none needed.
<b>DO-IT-YOURSELF (DIY)</b>	Situation-specific	Situation-specific	Situation-specific	Situation-specific	Situation-specific

\* Prices per square foot are estimates that vary based on building location and specifications.  
For product estimates and more information, please contact your local contractor or home improvement center.