

# Hotels

## Preventing Avoidable Loss from Wind-Driven Rain

Wind-driven rain that occurs during severe convective storms (thunderstorms) or hurricanes leads to water intrusion, subsequent interior damage, and business downtime.

**Rain  
plus  
wind  
equals  
more  
damage!**

**W**ater intrusion from heavy rain usually starts at the roof. Adding wind to the mix can create more entry points within the building envelope; water can enter through windows, sliding doors, balcony doors, and package terminal air conditioners (PTAC units). This can cause costly damage to contents and finishes—all while interrupting operations.

Learn more about areas vulnerable to water intrusion and how to help prevent avoidable damage.



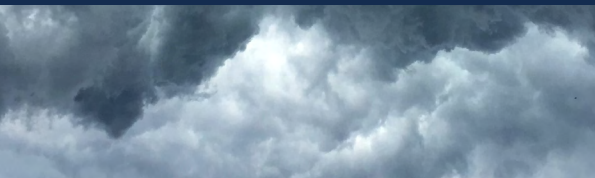


## Storm Prep

When a major storm threatens, staff should check empty rooms to ensure operable windows and balcony doors are closed.

## Routine Inspections

- ✓ PTAC
- ✓ Windows
- ✓ Doors



## Recommend Routine Inspections

Most hotels have personnel who are responsible for the daily maintenance and upkeep of the property. This staff should conduct thorough inspections twice a year and following severe weather events that include wind-driven rain.

Considerations:

- Size of property
- Occupancy (considering seasonal fluctuations)
- Required tools
- Proper fall protection

Depending on the size of the building(s), routine inspections can be conducted in segments or “spot checks.” Because each hotel is unique, maintenance staff should develop a plan to maximize the efficiency of each inspection while identifying areas of the building that have higher vulnerability. For example, windows/doors located on higher floors are subjected to higher pressure changes, southern exposed windows/doors are more vulnerable to degradation by direct sunlight, and areas with a history of past issues, such as damage or wear, require special attention. Note that staff will need to enter specified rooms to properly inspect vulnerable areas.

For **aging hotel properties** and those with **saltwater exposure** due to proximity to the coast, IBHS recommends more frequent physical inspections. Salt water can accelerate the degradation of materials, including exterior weathering, mechanical erosion, and increased water intrusion or moisture penetration.

If the maintenance inspection reveals the **first signs of water intrusion** (moisture or mold), a qualified façade/building envelope consultant should be hired to inspect. Note that if damage is found in one area, it’s expected to be in other similar locations and a more in-depth analysis should be done.

### Water Intrusion Testing

To understand water resistance of building components, the American Society for Testing and Materials (ASTM) and American Architectural Manufacturers Association (AAMA) have developed several documents related to testing. Water intrusion testing can be conducted by the façade/building envelope consultant and can be broken down into three categories.

- Lab testing of building components is used to determine the water resistance of a building component prior to it being installed on site. This can provide guidance to architects and owners when selecting products for a hotel. It should be noted that the test is limited to the exact assembly and installation as it was tested in the lab, meaning it must be installed identically in the field to obtain similar results.
- In-situ testing of recently installed assemblies is used to either confirm lab testing and proper installation of the component or to help determine the resistance of non-lab-tested assemblies. It should be noted that this is the best way for new hotels to ensure water intrusion will not be an issue and gives owners peace of mind for several years.
- Diagnostic testing is conducted on existing windows and doors to replicate water intrusion, which can help identify mitigation strategies.

# Where is a Hotel Vulnerable to Wind-Driven Rain?

Policyholders should assess the following components during routine inspections.

## PTAC Units

Package Terminal Air Conditioners (PTAC), which are individual air conditioner units found in hotel rooms, are inserted directly into an opening in an external wall and extend into a room's interior. These units have multiple components that can act as a path for water entry into a room during wind-driven rain events.



## INSPECT & MITIGATE

### A. Orientation

The tilt is critical to reducing water entry for units with external drains. Such units should be installed with a minimum slope of 2 degrees to the outside wall (per manufacturer guidelines). This can reduce water entry by 90%. Measure the tilt of the unit at several locations along the bottom of the sleeve to ensure it is consistent. If the unit was installed without the proper tilt, hire a licensed HVAC (heating, ventilation, and air conditioning) contractor that specializes in PTAC units to inspect and provide additional guidance.

### B. Weather stripping

Look at the weather stripping that sits between the PTAC unit and sleeve to ensure it has been installed correctly and consistently—otherwise, this can increase the risk of water entry. If damaged, new weather stripping may be required. Work with the manufacturer to determine whether this can be fixed by the maintenance crew or if hiring a licensed HVAC contractor is necessary.

### C. Internal drains

Installations that use internal drains for PTAC units can reduce water entry by approximately 95%. Ensure the internal drainpipe size is adequate and water is flowing freely in order to handle high water volume, as 1 gallon of water per unit can flow through a pipe every 4 minutes during heavy rain. If the unit has an inadequately sized drain, work with the manufacturer to see if there are any mitigation options. Otherwise, a new unit with a properly sized drain may be required.

### D. Caulking

Examine caulking around PTAC units to determine if any damage or improper caulking has occurred. Repair with a manufacturer-approved caulk as necessary.

## REPLACEMENT OR NEW CONSTRUCTION

When installing new PTAC units, make sure they are installed with the proper tilt to the exterior of the building. For both new construction and replacement, the weather stripping should be continuous, caulking properly installed, and the internal drain should be adequately designed. Refer to manufacturer instructions for more details.

# Where is a Hotel Vulnerable to Wind-Driven Rain?

## Windows

Windows have penetration joints that may be closed with caulk, glazing, gaskets, seals, or weather stripping. Over their lifetime, some of these systems receive little to no attention, which can lead to aging and excessive degradation. This allows water from a wind-driven rain event to penetrate the building and cause costly damage. There are two types of windows commonly found in hotels and motels: fixed and operable windows.

### **FIXED WINDOWS:**

Typical windows found in hotels rooms are fixed windows. Their two joints are vulnerable: glass-to-frame and frame-to-wall.

### **INSPECT & MITIGATE**

#### **A. Glass-to-frame**

Inspect sealant, which will have wet or dry glazing.

- **Wet glazing:** Look for excessively aged, damaged, or missing glazing, or glazing with holes. Hire a licensed contractor to fix or replace sealant.
- **Dry glazing:** Look for cracked, worn, excessively aged, or missing glazing. Hire a licensed contractor to fix or replace sealant.

#### **B. Frame-to-wall**

Inspect for cracked, excessively aged, brittle, or missing caulking. Seal with manufacturer-recommended caulking.

### **OPERABLE WINDOWS: (SINGLE-HUNG/DOUBLE-HUNG)**

Some smaller hotels and motels have operable windows, which have the same vulnerabilities as fixed windows, plus frame-to-frame joints where wind-driven rain can enter.

### **INSPECT & MITIGATE**

#### **A. Frame-to-frame**

Inspect gasket or weather stripping (varies per manufacturer). Look for signs of excessive aging or damage. Hire a licensed contractor to repair or replace.

## REPLACEMENT OR NEW CONSTRUCTION

Windows should be designed for the site-specific design wind pressures as defined by the American Society of Civil Engineers' (ASCE) 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures. Windows should be laboratory tested and rated for water intrusion, which should be identified in the product specifications.

For the best protection and understanding of what was installed during construction or retrofitting, a field moisture intrusion test, ASTM E1105 or AAMA 502, should be conducted. This is an onsite test that subjects the physical window to different water and air pressures.



### **What is glazing?**

The mechanism that holds glass in an opening while providing protection against water intrusion and temperature expansion. There are two types of glazing:

- Wet glazing - a sealant installed over a backer rod that sits in the frame itself. Sealed with a wet seal (a type of caulk).
- Dry glazing - uses a preformed rubber gasket.

Glazing life expectancy (all applications including windows and doors):

- Dry: 10 years
- Wet: 20 years

A qualified façade/building envelope consultant should be hired to inspect routinely at its life expectancy to ensure proper functionality.

# Where is a Hotel Vulnerable to Wind-Driven Rain?

## Doors

Like windows, doors have penetration joints that may be closed with caulk, glazing, gaskets, seals, or weather stripping. These joints are often overlooked, which can lead to premature or excessive aging and degradation of vital components. This allows water from a wind-driven event to penetrate the building and cause costly interior damage.

For doors with glass inserts, there is potential for water to breach the glazing so it is important to inspect the sealant, which will have wet or dry glazing.

- **Wet glazing:** Look for excessively aged, damaged, or missing glazing, or glazing with holes. Hire a licensed contractor to fix or replace sealant.
- **Dry glazing:** Look for cracked, worn, excessively aged, or missing glazing. Hire a licensed contractor to fix or replace sealant.



### **SWINGING GLASS DOORS:**

Swinging glass doors are typically used on first floor entryways and for access to outdoor gardens or event spaces. These systems are typically not rated for water penetration resistance because they have a low threshold protected by a compressed gasket. However, it is typical to see the gasket of the threshold become uncompressed, which allows for water penetration. A rain guard and sweep gasket should be installed at the bottom of the exterior side of the door.

Water intrusion most often occurs between the door and the threshold, as well as where the two doors meet. It must be assumed that water intrusion will occur here; therefore, these doors should only be used in ground floor areas that are not above interior spaces and where the leak can be mitigated.

## **INSPECT & MITIGATE**

### **A. Door-to-door**

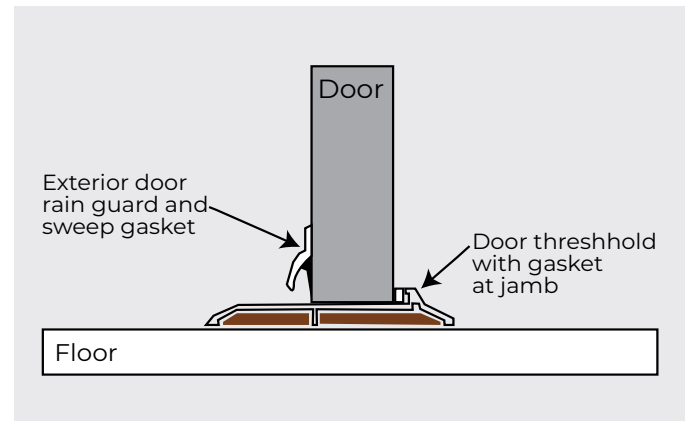
Gaskets where two doors meet should sit flush up against one another providing a tight seal. If there is damaged, wavy, or missing gasketing, repair or replace as necessary.

### **B. Exterior door rain guard and sweep gasket**

A rain guard and attached sweep gasket can be attached to the exterior side of the door to resist water penetration below the door. It should be properly installed to manufacturer specifications to help direct water away from the interior. If damaged or missing, replace the guard and gasket.

### **C. Threshold**

Check to make sure the compressed gasket is form-fitted to the door jamb. If necessary, work with the door manufacturer to replace the compressed gasket so that it is form-fitting and creates a watertight seal.



# Where is a Hotel Vulnerable to Wind-Driven Rain?

## **PERSONNEL DOORS:**

Personnel doors with exterior access are typically used for stairwells accessing the roof, mechanical rooms, including penthouses, utility spaces, loading areas, and other similar areas of hotels. It is not uncommon to see sections of these doors fitted with glass. Since these doors are widely used for staff access, little maintenance is conducted and weatherproofing for these doors may be limited. They typically rely on sealants/caulking between the door jamb and door frame, continuous gasketing installed at the perimeter of the door, and have a gasket at the door threshold. Personnel doors located on hotel roofs are particularly vulnerable to water intrusion.

## **INSPECT & MITIGATE**

### **A. Door jamb and frame sealant/caulking**

Inspect for any gaps, missing, brittle or excessively aged sealant/caulking. Repair with a manufacturer-approved caulk.

### **B. Exterior door gasket**

Inspect for continuous non-compressed gasketing that form-fits to the frame. Replace any damaged, excessively aged, or missing gaskets.

### **C. Threshold gasket**

Inspect for continuous non-compressed gasketing that form-fits to the threshold of the door. Replace any damaged, excessively aged, or missing gaskets. Note: Hollow doors in high traffic areas that utilize equipment can damage this gasket and should be monitored more frequently.



## **SLIDING DOORS: (MANUAL & AUTOMATIC)**

Manual sliding doors are typically used for balconies and may be on the upper levels of the building. They include a fixed frame that has a threshold, head, and side jambs that include a sliding glass door within. The threshold can be depressed into the floor slab allowing the threshold to be ADA accessible. This detail leaves the interior spaces more susceptible to water intrusion. These doors rely on a gasket that sits between the sliding door and the fixed frame perimeter to keep a watertight seal.

Automatic sliding doors can be found at ground level typically around the hotel lobby and pool access. They can be single doors that open in one direction, or can be a dual system where the doors slide open in different directions. In both cases, there is a potential for water intrusion through the recessed threshold, frames, and where the door meets the frame or other doors. Some automatic sliding doors have telescoping panels where



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several smaller individual panels move collectively to create an opening. In this case, the additional panel-to-panel points can contribute to a higher risk of water intrusion.

In both cases, there are typically brush gaskets that sit between the fixed and sliding part of the door, between doors (telescoping), and at the bottom of the door near the threshold. These locations are at higher risk for water intrusion; water at this location needs to be drained at the threshold frame below.

## INSPECT & MITIGATE

### A. Door jamb and frame sealant/caulking

Inspect for any gaps, missing, brittle or excessively aged sealant/caulking. Repair with a manufacturer-approved caulk.

### B. Door perimeter gasket

Inspect for continuous non-compressed gasketing that form-fits to the threshold of the door. Replace any damaged, excessively aged, or missing gaskets.

### C. Door-to-door (telescoping)

Gaskets where two doors meet should sit flush up against one another providing a tight seal. If there is damaged, wavy, or missing gasketing (rubber or brush), repair or replace as necessary.

### D. Threshold and/or guiding rail/track

The threshold and/or guiding track is a source for water intrusion. Inspect the door to ensure it is properly operating in the threshold or connected to the track per manufacturer specifications. If a brush gasket is located at the bottom of the door, make sure it is not damaged or missing. Repair or replace as necessary. In some cases, an additional lip can be added to the threshold toward the interior of the guiding rail/track. This can provide additional protection against water intrusion.



# Where is a Hotel Vulnerable to Wind-Driven Rain?

## **TERRACE DOORS:**

Similar to sliding doors, these doors are typically found in hotel rooms with typical balconies or Juliet style. With a fixed frame around the entire perimeter of the door, they perform well for water penetration. The threshold is often raised to allow for the removal of water. While this is important to mediate water intrusion, this creates issues for ADA accessibility. Alternatively, the threshold can be depressed into the slab of the floor, but this can cause problems with water penetration. Additionally, when two terrace doors meet, it provides an additional point of entry for water, which should be mitigated with a gasket.



## **INSPECT & MITIGATE**

### **A. Door jamb and frame sealant/caulking**

Inspect for any gaps, missing, brittle, or excessively aged sealant/caulking. Repair with a manufacturer-approved caulk.

### **B. Threshold gasket**

Inspect for continuous non-compressed gasketing that form-fits to the threshold of the door. Replace any damaged, excessively aged, or missing gaskets.

### **C. Door-to-door**

Gaskets where two doors meet should sit flush up against one another providing a tight seal. If there is damaged, wavy, or missing gasketing, repair or replace as necessary.

## **REPLACEMENT OR NEW CONSTRUCTION**

Doors should be designed for the site-specific design wind pressures as defined by the American Society of Civil Engineers' (ASCE) 7, Minimum Design Loads and Associated Criteria for Buildings and Other Structures. Additionally, doors should be laboratory tested and rated for water intrusion, which should be noted in the product specifications. Doors that do not have a rating typically incorporate features that do not add to the resistance of water intrusion such as a sunken or low thresholds.

Due to their high thresholds, terrace or sliding doors can be rated for water penetration resistance. Storefront and terrace doors have low threshold profiles or are rarely rated.

For the best protection and understanding of what is installed, a field moisture intrusion test (ASTM E1105 or AAMA 502) should be conducted. This is an onsite test that subjects the physical window to different water pressures.

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