

Preparing for the Worst

By John L. Pierson, P.E.

A total roof blow-off is every facility manager's worst nightmare. Whether the destroyer is a Midwestern tornado or a Gulf Coast hurricane, older, out-of-code facilities will be the first victims. Although, as we recently saw in Joplin, MO, some disasters are equal-opportunity destroyers. Today's code provides guidance for most wind storm scenarios leaving it up to the designer to determine the life safety role of the structure.

Nevertheless, avoidance of a blow-off is not the equivalent of a trouble-free ride. Direct impact of 150 mph+ winds will damage anything short of a FEMA 361/ICC500 storm shelter. And although not impossible, resisting damage from the kinds of severe hail that pelleted several Midwestern and Southwestern states during the 2011 spring storm season, presents a Herculean challenge for most roofing materials. In short, even if you and your architect have done everything right, sometimes everything will still go wrong.

Before we talk about how to prepare for what can go wrong, let's identify some important considerations for roof systems.



“Design and Maintenance can make all the Difference”

Designing Protection

When it comes to roofing, thicker and stronger is better, but so are the details of how water is kept out.

- [For Metals...](#)
 - Metal roofing assemblies need to be tested to the local wind storm design criteria. This means that tests must be run not only on the panels, but on the decking or the framing purlins (as called for by the design) to which the metal roof panels are attached.

Structural standing seam metal panels rated for higher wind storm criteria are typically 22 gauge or thicker.

- Air and water leakage testing is essential to show that a system is not only strong, but watertight as well. At a minimum, standing seam metal systems should be tested by ASTM E 1646 and ASTM E 1680 to 20 psf of pressure.
- [For Single Plies...](#)
 - A lowslope roof single-ply application must be fully adhered to meet higher wind storm criteria.
 - Even a hail-rated single ply is not going to be able to withstand the sharp objects that blow around during a tornado or hurricane as well as a metal roof or properly surfaced modified bitumen membrane.
- [For Modified Bitumen...](#)
 - High tensile and tear performance membranes provide an additional strength and safety factor when extreme weather strikes.
 - If gravel is embedded in a flood coat (as acceptable by code), this surfacing can provide superior protection in comparison to most other roof systems.
 - The strength of modified bitumen roofs is often dictated by the insulation assembly, so just like metal, the entire mod bit roof assembly must be tested for wind storm resistance.
- [For All Commercial Roofs...](#)
 - A properly maintained roof, whose structural integrity is intact when storms hit, is going to outperform a similar roof system that has been neglected.

[Factory Mutual Global](#)¹ and [Underwriters Laboratories Inc.](#)² are two of the most well known entities that have independently established wind uplift and other performance standards for commercial roofing, upon which most building code requirements are based. However, there are other test standards (TAS, ASTM, AAMA) that go above and beyond building code requirements, which may be specified depending on your safety requirements.

There is a great deal of information to understand that goes well beyond the scope of this article so be sure to consult with a qualified roofing professional to identify roofing standards and code requirements that apply to your facilities.



¹ Factor Mutual (FM®) is a registered trademark of Factory Mutual Global.

² Underwriters Laboratories (UL®) is a registered trademark of Underwriters Laboratories Inc.

Setting Realistic Expectations

Prior to storm season, a committed roofing partner can help you set in place a disaster response plan so that the storm's impact can be minimized, in the event of roof damage. Having a plan in place, with contractors ready to respond, is the best way to minimize the impact of storm damage on a facility.



The challenge is securing the services of a dependable contractor

after a storm when everyone around you is similarly worried about their roofs. Contracting for disaster response services *before* you ever need them is the best way to ensure help will be available when you do.

Here is how the process should work:

- Perform comprehensive inspections to assess the condition of all roofs before signing any contract so that you have a good reference for the existing conditions of your buildings. This is critical to determining what type of services you want contracted, and will help you make knowledgeable decisions after a storm event. It is very common to work with a Disaster Response provider to perform such comprehensive inspections. Ensure the company you use has local representation and their primary business is roofing.
- Based upon inspection results and your specific needs, the disaster response plan should prioritize building areas and separate facilities by importance. At a minimum, this plan should:
 - Identify a basic scope of work to be performed when the contract is activated
 - Identify a clear understanding between temporary repair and permanent repair
 - Identify a group of first-responder contractors
 - Identify specific customer contact information for each facility, in addition to security and access requirements for each building
 - Identify the local representative's contact information for your disaster response service provider. If working on a regional level, make sure all regional managers are listed as well.
- A contract for disaster response services should be signed and renewed on an annual basis so that provider performance may be evaluated after each storm season. Further, a contract should include a specific rate schedule for agreed upon scope of repair work. Negotiate this rate schedule ahead of time to protect your organization from inflated pricing after a storm.

- The contract should make available not one but multiple first-responder contractors who are pre-approved to work with whatever variety of roofing materials you may be using. Multiple regional responders, rather than a single local contractor, should be available since local contractors are likely to be affected by the same storms that are disrupting your business.
- In addition to your roofing partner having a local representative in place, larger companies may be able to provide regional support as well, which can be helpful should your local representatives be affected by the storm. Ideally, both your local and regional representatives should be familiar with your roofs and understand your priorities before you require their assistance.
- Finally, your roofing partner should be capable of providing a wide range of roofing-related material solutions as well as general contracting services, for seamless delivery of whatever combination of materials and services is required.
- Although you should expect to pay for whatever time and materials are required to ensure the long-term preventive maintenance and code compliance of your roofs, there should be no fee attached to emergency response services until and unless you need them.
- When and if disaster response services are required, you can expect a local representative to prepare an immediate assessment of damages. This assessment will result in a comprehensive scope of work prepared for your approval, which should encompass all materials and services required to restore the lasting watertight protection of your roofs.
- Although it is impossible to generalize a timeline that is reasonable for all contingencies that may arise, a reasonable turnaround for typical emergency response services might look something like this:
 - If time permits, confer with your disaster response services provider when storm warnings are first issued to verify the predetermined disaster response plan. If any building priorities have changed, be sure to communicate this to your provider.
 - If structural damage occurs, verification of building safety by the appropriate code authority must precede any contractor work.
 - The first-responder contractor should arrive on site to install temporary waterproofing if not immediately, then as soon as possible following the storm.
 - The local representative should present permanent repair scope of work immediately following assessment of damages.
 - Permanent repair work should be completed by a predetermined, mutually agreed upon date.

Minimizing Stress and Delays



Results of studies on the roofing damages during the 2004 and 2005 hurricane seasons show that 95 percent of all roofs designed according to building code received no significant damage. That is a very important statistic when looking at loss prevention and maintenance of your facility roofs. In addition to designing your roofs to meet or surpass all building code requirements, the single most important

prerequisite for expediting emergency services while minimizing stress is to keep your roofs performing *as originally specified*. That's why a [proactive preventive maintenance](#) program should be part of any emergency response contract.

The critical components to look for when contracting for preventive maintenance are these:

- Does the contract allow for competitive bidding of labor?
- Will it include a comprehensive analysis of existing roofs to establish a base line and priorities for remedial work?
- Will you have on-line access to all relevant documentation, such as work history, warranties, scopes of work, alternative recommendations, and photo documentation before, during, and after projects?
- Is the leak-alert notification method redundant and adequate to ensure timely response to genuine emergencies?
- Who will be responsible for coordinating and managing any repairs or reconstruction required?
- On what criteria have the contract's storm-ready contractors been selected, e.g., are they financially sound and technically competent for the expected range of work required?

Finally, be sure to keep in mind that you will want to work with an organization well acquainted with the procedures required by the Federal Emergency Management Agency (FEMA) and the proper filing of insurance claims to expedite any available reimbursements for work performed.

Conclusion

In conclusion, the best way to be prepared for a natural disaster is to have a thorough knowledge of the present condition of your roofs, and a plan for what to do when a storm strikes.

Emergency preparedness demands three things:

- Code-compliant design
- A clearly defined response methodology in advance of any actual emergency
- On-going maintenance of the building envelope

Consistent attention to these three issues will minimize disruptions related to all but the most extreme weather conditions.

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