Hurricane Charley: A preliminary report

by **Mark S. Graham**

On Aug. 13, Hurricane Charley swept through portions of Florida. The hurricane-force winds tested roof system performances and the effectiveness of recent building code improvements that were instituted as a result of previous hurricanes. Following is a brief summary of NRCA's observations in the aftermath of Hurricane Charley.

Hurricane conditions

Hurricane Charley made landfall from the Gulf of Mexico in southeast Florida near Port Charlotte and followed a generally northeasterly direction through the state, passing through portions of Orlando before entering the Atlantic Ocean near Daytona Beach. Recorded wind speeds along this path were are high as 145 mph (65 m/s) near Port Charlotte, 105 mph (47 m/s) at Orlando and 85 mph (38 m/s) at Daytona Beach.

Because current design basic wind speeds in the hurricane's path range from 130 mph to 140 mph (58 m/s to 65 m/s) at the coastline to as low as 100 mph (45 m/s) inland, Hurricane Charley provided real-life field tests of roof system performance in design high-wind conditions.

Observations

During the week of Aug. 16, NRCA Technical Services staff, accompanied by several Florida-based NRCA contractor members, toured portions of the hurricane's path and conducted inspections of specific buildings' roof systems.

Given the hurricane's severity for the areas and specific roof systems we viewed, roof system performance generally was good. With few exceptions, we found roof systems that were designed and installed according to current applicable building codes performed satisfactorily. In most instances, the roof systems damaged by the hurricane needed only minor repairs (small patches, reattachment of edge metal flashings, etc.) to return them to functionality.

However, several specific roof system types and components did not perform as well.

For example, we viewed a number of fully adhered, single-ply membrane roof systems where the membranes delaminated from their substrates, resulting in large-scale failures. In a number of these instances where single-ply membranes were adhered directly to polyisocyanurate insulation, the insulations' topside facers delaminated from the insulations' foam cores. In several other instances, delamination occurred within the adhesive (intended to bond the membrane to the substrate), leaving the underlying insulation substrate intact.

Asphalt shingles' performances varied greatly. Although relatively new asphalt shingles appeared to have performed well, blow-off of aged (seven years or more), lightweight asphalt shingles was common. Also, performance of asphalt shingles installed by the racked installation method, which was common in some areas, was noticeably poorer than that of asphalt shingles that were installed conventionally.

Also, performance of roof perimeter edge metal flashings varied greatly. In general, fascia and copings attached with continuous front cleats appeared to perform well, but similar flashing configurations with intermittent or no front cleats, including some roofing manufacturers' proprietary systems, did not.

Closing thoughts

Hurricane Charley proved to be a real-life test of roof system performances in high-wind conditions and the effectiveness of recent enhancements in building code requirements.

Although most roof systems designed and installed according to current guidelines and codes performed satisfactorily, the performances of fully adhered single-ply membrane roof systems—particularly those adhered directly to polyisocyanurate insulation—and lightweight asphalt shingles are of concern.

During the coming months, I expect additional reports from other researchers will be offered regarding roof system performance following Hurricane Charley and other recent high-wind events. It will be interesting to learn about their observations. Collectively, there should be some useful lessons learned from these events that can lead to improvements in the components and roof system types that experienced performance problems.

Also, during the coming months, I would not be surprised to see government agencies, insurers and other interested parties make further changes in building design standards and codes related to high winds.

Mark S. Graham is NRCA s associate executive director of technical services.

WEB EXCLUSIVE

Log on to www.professionalroofing.net to view NRCA s photos of the roof system damage Hurricane Charley caused.