WHITE PAPER

Roofing Best Practices: FORTIFIED HOME PROGRAM

Overview:

One key consideration for the installation of roofing materials is resistance to wind uplift and excessive wind loading in general. We have all seen the pictures of "flying" roof elements on the news which not only leads to roofing failure, but the flying debris is well known to break windows which allows the outside elements into the interior of that structure and has been known to cause injury and even death to people being struck by debris. While this concern is typically associated to coastal areas, the impact of high winds is a major concern in areas that are not considered "coastal" in both the commercial and residential roofing domains. A program of education and certification has been developed by the Insurance Institute for Business and Home Safety (IBHS) identified as FORTIFIED Building that is being adopted in an ever-growing number of jurisdictions in the United States. This program provides performance guidance as well as a model for certification that provides enhanced wind performance for roofing applications. This document explores some of the FORTIFIED program details that differentiate the program from the current requirements of the IBC and IRC around metal roofing construction and retrofit.

Discussion:

The FORTIFIED program, developed by IBHS, has been created to assist the designer by quantifying a design practice that will provide additional resistance to hurricanes, low-level tornadoes, and severe thunderstorms. This is done by ensuring that the performance level of the roof assembly is tested with results that can be directly compared to the requirements of the IBC/IRC. There is also a quality control component, involving an evaluator reviewing the required documentation during the installation phase to ensure that the key to performance elements are completed in the same way that the assembly was tested. The recognized testing of the FORTIFIED program includes several existing roof tests including UL 580, UL1897, FM 4474 and ASTM E1592, however the performance levels required to meet the program minimums are based upon many years of experience dealing with this type of wind loading and generally more than what is required by the local codes.

Metal roof assemblies are designed to meet the loads defined within the IBC/IRC and to keep wind and water from entering the structure. This is important for a commercial structure (IBC) as well as residential building (IRC). The primary focus for the FORTIFIED program is residential design where IRC Section R905.1 specifically requires "unless otherwise specified in this section, roof covering shall be installed to resist the component and cladding loads specified in table R301.2(2), adjusted for height and exposure in accordance with table R301.2(3)."

It seems a relatively straightforward requirement for the design of residential construction, however design to the loading required by these IRC tables is often not closely controlled by the design community.

FORTIFIED HOME PROGRAM

While still relatively new, the wind load requirements and certification provided through the FORTIFIED HOME program has reached a level of over 500 applications per month and the geographic areas where this program is being required is expanding beyond coastal areas on a regular basis. Participation in the FORTIFIED HOME program is voluntary, however it allows the homeowner (or commercial building owner) to participate in decision-making on the roof design for their structure. FORTIFIED HOME has three levels of designations that build on each other. Builders and homeowners can only achieve the Silver or Gold designation level with a FORTIFIED Roof.

FORTIFIED Roof™ (formerly FORTIFIED Bronze™) helps homes better withstand severe weather by keeping the roof on and keeping water out.

FORTIFIED Silver™ includes all the requirements of FORTIFIED Roof plus strengthens windows, doors, and gable ends and ensures attached structures like porches and carports are well anchored.

FORTIFIED Gold™ adds to the FORTIFIED Roof and FORTIFIED Silver requirements by tying the structure together.

The FORTIFIED ROOF program is a voluntary program that manufacturers can participate in to show what performance to expect from a roof assembly rather than designing to the minimum requirements defined in the codes. IBC and IRC do not specifically require the FORTIFIED roof program.

Specific Questions about the FORTIFIED Roofing Program

1. Databases including Underwriters Laboratory for roofing assemblies are typically tested to a specific load. Most manufacturers already have test results including UL 1897, ASTM E72, and ASTM E1592. What makes the FORTIFIED program different?

   While the codes generally do not require testing to failure, the FORTIFIED program is designed to determine the capabilities of the roofing assembly so that the maximum allowable load can be determined. The assembly must meet or exceed the component and cladding load requirements referenced below.

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R905.1 Roof covering application. *Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions. Unless otherwise specified in this section, roof coverings shall be installed to resist the component and cladding loads specified in Table R301.2(2), adjusted for height and exposure in accordance with Table R301.2(3).*

1504.3.1 Other roof systems. *Built-up, modified bitumen fully adhered or mechanically attached single-ply roof systems, metal panel roof systems applied to a solid or closely fitted deck and other types of membrane roof coverings shall be tested in accordance with FM 4474, UL 580 or UL 1897.*

1504.3.2 Structural metal panel roof systems. *Where the metal roof panel functions as the roof deck and roof covering and it provides both weather protection and support for loads, the structural metal panel roof system shall comply with this section. Structural standing-seam metal panel roof systems shall be tested in accordance with ASTM E1592, or FM 4474. Structural through-fastened metal panel roof systems shall be tested in accordance with ASTM E1592, FM 4474, or UL 580.*

Exceptions:

1. *Metal roofs constructed of cold-formed steel shall be permitted to be designed and tested in accordance with the applicable referenced structural design standard in Section 2210.1.*
2. *Metal roofs constructed of aluminum shall be permitted to be designed and tested in accordance with the applicable referenced structural design standard in Section 2002.1*

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2. <u>The ICC ES also has a listings service, would someone not be able to find information on the FORTIFIED program in this directory?</u>

The ICC-ESR is referred to in item 3 below. Remember we want the contractors to know what to look for and where to find it so they can submit the information. What is submitted must comply with one or more of the documentation considerations below and the installation must match.

As experts in metal roofing products, MCA is the logical choice as a resource for design information on non-structural metal roof systems. Directing homeowners, designers, and contractors to MCA for information on installation, certification, and the testing required for a roof assembly to meet the requirements of a FORTIFIED roof designation is a constructive first step in understanding and meeting the requirements of the program.

<u>Metal roof assemblies must have the following documentation for FORTIFIED HOME program consideration:</u>

1. UL 580 test report (safety factor = 2.0) for design pressure requirements **up to 52.5 psf (maximum)**.
2. For design pressure requirements greater than 52.5 psf, a UL 1897 test report (safety factor = 2.0) will be required with design pressure ratings greater than or equal to the project design pressures.
3. Third party evaluation reports such as, but not limited to, ICC-ES ESR, UL ER, Intertek CCRR, FBC Product Approval, Miami Dade Notice of Acceptance, and Texas Department of Insurance Product Evaluation are all examples of acceptable support documentation. Third-party evaluation reports indicate the conditions of acceptable use to meet the code requirements, the report however is not a code approval. The engineer of record and the authority having jurisdiction (AHJ), many times the building

inspector, reference the report to show that the material/assembly is code compliant however the final decision for acceptance is in the hands of the AHJ.

Summary:

The FORTIFIED program is a new way to look at an old problem. Not only is there a design program, but that design program is controlled by an evaluator review of installation and testing documentation that promises to better supply wind resistant roof assemblies for both commercial and residential construction. While the focus is currently on residential construction, a wind event doesn't know the difference between commercial or residential construction and soon these criteria will also find their way into the IBC/IRC.

MCA supports this program and is working to educate both the buyers and the designers on the requirements of the fortified program. Properly designed, metal roofing may provide significant benefits in a fortified design. Please contact your roofing supplier for more information on the capabilities of the metal roof in the fortified design program.

Founded in 1983, the Metal Construction Association brings together the diverse metal construction industry for the purpose of expanding the use of all metals in construction. MCA promotes the benefits of metal in construction through:

- Technical guidance
- Product certification
- Educational and awareness programs
- Advocating for the interests of our industry
- Recognition of industry-achievement awards
- Monitoring of industry issues, such as codes and standards
- Research to develop improved metal construction products
- Promotional and marketing support for the metal construction industry
- Publications to promote use of metal wall and roof products in construction

For more information, please visit the MCA Web site at www.metalconstruction.org

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