CODE ALERT

CA-01-GC-03-21
FM 1-29 Data Sheet – 2020 Summary Update

Carlisle's Code Alerts address issues pertaining to FM and UL, bring awareness to industry updates and new approvals, and discuss existing approved assemblies that may require additional clarification. The contents of each release will address specific field inquiries or respond to unique market trends. Feedback concerning future topics is strongly encouraged.

Mechanically Fastened Roofing Systems

An updated version of the FM 1-29 Property Loss Prevention Data Sheet was published in February 2020. Changes made to that document that affect mechanically fastened roofing systems include the following:

New designations for field, perimeter, and corner areas. Now referred to as Zones 1, 2, and 3, respectively.
Addition of a new secondary interior field area designated as Zone 1' ("Zone 1 Prime").
Addition of a calculated, performance-based attachment enhancement method for Zones 2 and 3.
Modified prescriptive enhancement attachment requirements for Zones 2 and 3.

This Code Alert will focus on the 2020 FM 1-29 performance-based and prescriptive enhancement requirements for membrane attachment on mechanically fastened roofing systems. This includes linear induction-welded systems.

Performance-Based Enhancement

FM has added an option into 1-29 for the performance-based enhancement of Zones 2 and 3 for mechanically fastened membrane systems. The determination is based on the membrane width and the fastener spacing of the tested assembly chosen for Zone 1. The following example is offered for clarification.

Performance-Based Enhancement Option Example

The FM RoofNav Ratings Calculator was used to determine that an example building requires the following wind uplift ratings:

Zone 1'	Zone 1	Zone 2	Zone 3
90 psf (1-90)	120 psf (1-120)	150 psf (1-150)	210 psf (1-210)

Choose a roofing system that has been tested to meet or exceed the **Zone 1 rating**, which for this example is a 12'-wide membrane fastened 6" oc. The Zone 1' pressure is less than Zone 1, so the as-tested assembly can be used in Zone 1'. However, since the Zone 2 and Zone 3

pressures exceed the tested Zone 1 pressure (120 psf), the membrane width must be reduced (to increase the membrane fastening density) in these areas while maintaining the 6" oc fastener spacing. The calculations for Zones 2 and 3 are as follows:

- Step 1: Determine the area of membrane secured by a single fastener for Zone 1.
  - Fastener row spacing *times* the fastener spacing along the row:
    - 11.5 ft (12' sheet minus seam overlap) x 0.5 ft (6" oc fastener spacing) = 5.75 ft^2 (per fastener securement area).

Zone 2 Enhancement

- Step 2: Determine the needed reduction in the area of membrane secured by a single fastener for Zone 2.
  - Zone 1 tested pressure *times* fastener securement area *divided by* Zone 2 pressure:
    - 120 psf x 5.75 ft^2 / 150 psf = 4.6 ft^2 per fastener.

- Step 3: Determine the reduction in fastener row spacing for Zone 2.
  - Zone 2 area of membrane secured by a single fastener *divided by* fastener spacing:
    - 4.6 ft^2 / 0.5 ft = 9.2 ft maximum row spacing with fasteners spaced 6" oc.

Zone 3 Enhancement

- Step 4: Determine the needed reduction in the area of membrane secured by a single fastener for Zone 3.
  - Zone 1 tested pressure *times* fastener securement area *divided by* Zone 3 pressure:
    - 120 psf x 5.75 ft^2 / 210 psf = 3.3 ft^2 per fastener.

- Step 5: Determine the reduction in fastener row spacing for Zone 3.
  - Zone 3 area of membrane secured by a single fastener *divided by* fastener spacing:
    - 3.3 ft^2 / 0.5 ft = 6.6 ft maximum row spacing with fasteners spaced 6" oc.

The following table summarizes the performance-based example results calculated above.

Performance-Based Example Summary

Zone 1'	Zone 1 – Tested	Zone 2	Zone 3
Use Zone 1 or System Passing 1-90	12' Sheets 11.5' Row Spacing 6" oc Fastener Spacing	9.2' Row Spacing 6" oc Fastener Spacing	6.6' Row Spacing 6" oc Fastener Spacing

Prescriptive Enhancement Option

The FM prescriptive enhancement option has always been available for mechanically fastened systems and is a simple way to determine the reduction in membrane sheet width / fastener row-to-row spacing for Zones 2 and 3. This method, like the performance-based method, is based on the testing results for Zone 1. The following table contains a summary of the prescriptive enhancement requirements.

Zone 1'	Zone 1 – Tested	Zone 2	Zone 3
Use Zone 1 or Separately Tested System	Tested Spacing	67% of Zone 1 Fastener Row-to-Row Spacing (60% Previously)	50% of Zone 1 Fastener Row-to-Row Spacing (40% Previously)

Prescriptive Enhancement Option Example

An FM Approved roofing system requires the use of a 12'-wide membrane (11.5' oc fastener row spacing) with fasteners spaced 6" oc along the row. The following table identifies the prescriptive enhancement requirements.

Zone 1'	Zone 1 – Tested	Zone 2 (67%)	Zone 3 (50%)
Use Zone 1 or Separately Tested System	12' Sheets 11.5' Row Spacing 6" oc Fastener Spacing	7.7' Row Spacing 6" oc Fastener Spacing	5.75' Row Spacing 6" oc Fastener Spacing

In summary, either the performance-based enhancement or the prescriptive enhancement option can be used to comply with the FM 1-29 2020 update. Please refer to the FM Global publications for all the applicable requirements.

This code alert is intended to be an informational reference only and shall not be considered a replacement to the actual FM 1-29 publication. All FM-insured projects must be reviewed by the local FM Engineering office before beginning any roofing work.

For additional information, please log on to https://www.roofnav.com to access the RoofNav number search, RoofNav Ratings Calculator, and all applicable Property Loss Prevention Data Sheets.

Care must be taken with these systems to ensure Carlisle's minimum warranty requirements are met. The sheet sizes, fastener spacing, and row spacing used in these examples may not satisfy warranty requirements.