

Evaluation of CFR Roof Panels for HVHZ- 24-DrJ-0075  
June 10, 2024

Mr. Mark J Klos  
Nucor  
1550 Coraopolis Heights Rd Ste 600  
Moon Township, PA 15108-2973

Re: Evaluation of CFR Roof Panels for HVHZ

Dear Mr. Klos:

DrJ Engineering, LLC (DrJ) has been asked to provide a Florida professional engineering accepted engineering practice review with respect to the CFR Roof Panels. This work has been performed pursuant to our areas of expertise. The purpose of the DrJ review is to provide an engineering assessment of the conformance of the CFR Roof Panel with the 2023 Florida Building Code (FBC) specifically for High Velocity Hurricane Zones (HVHZ).

CFR Roof Panels conform to Section 1512 through Section 1523 and Section 2603 and Section 2615 of the 2023 FBC. CFR panels have a polyisocyanurate (polyiso/PIR) plastic core with a minimum density of 2.0 pcf and two steel facers. These facers are made from Galvalume® AZ50 coated steel (interior facer only) or galvanized coated G90 steel (minimum 33 ksi) and are 24 ga (exterior facer) or 26 ga thick (interior facer). These thicknesses meet the weather protection requirements in Section 1518.9 in the FBC. The available thicknesses of the CFR panels are 3", 4", 5" and 6". The panels have a coverage width of 36" or 42". Panels shall be installed on roofs down to a minimum slope of  $\frac{1}{2}$ ":12" per Section 1523.6.5.2.4.1.1 of the FBC.

Panels must be attached to a minimum of three supports that are a minimum of 14 ga steel (minimum  $F_y = 50$  ksi). Panels shall be fastened through the supports to the framing members using  $\frac{1}{4}$ "-14 Type 3 hex head self-drilling screws. Fasteners must be long enough to penetrate through the support at least 3 threads. For 12 ga or thicker supports a  $\frac{1}{4}$ "-20 or  $\frac{1}{4}$ "-28 Type 5 self-drilling screws may be used instead. Self-tapping screws may be used as well. All fasteners must be corrosion resistant. Panel attachment must include fastening a corrosion resistant steel panel clip using 3 fasteners per indicated position to the structural support below (See Figure 1). The exterior standing seam shall be mechanically hand crimped after the installation of the clip and is mechanically seamed after the adjacent panel is installed. Each end clip shall be installed using 3 fasteners per indicated position to the structural support below (See Figure 1). Additionally a  $\frac{1}{4}$ "-20 x  $\frac{3}{4}$ " long stainless steel machine screw shall be installed through the center of the upper part of the clip using a stainless steel locking nut with a  $1\frac{1}{8}$ " diameter neoprene and stainless steel washer on each side (See Detail 2 of Figure 1).

The maximum allowable inward and outward transverse loads for different spans of this product can be found in **Table 1** and **Table 2**. These tables conform to the requirements of the FBC.



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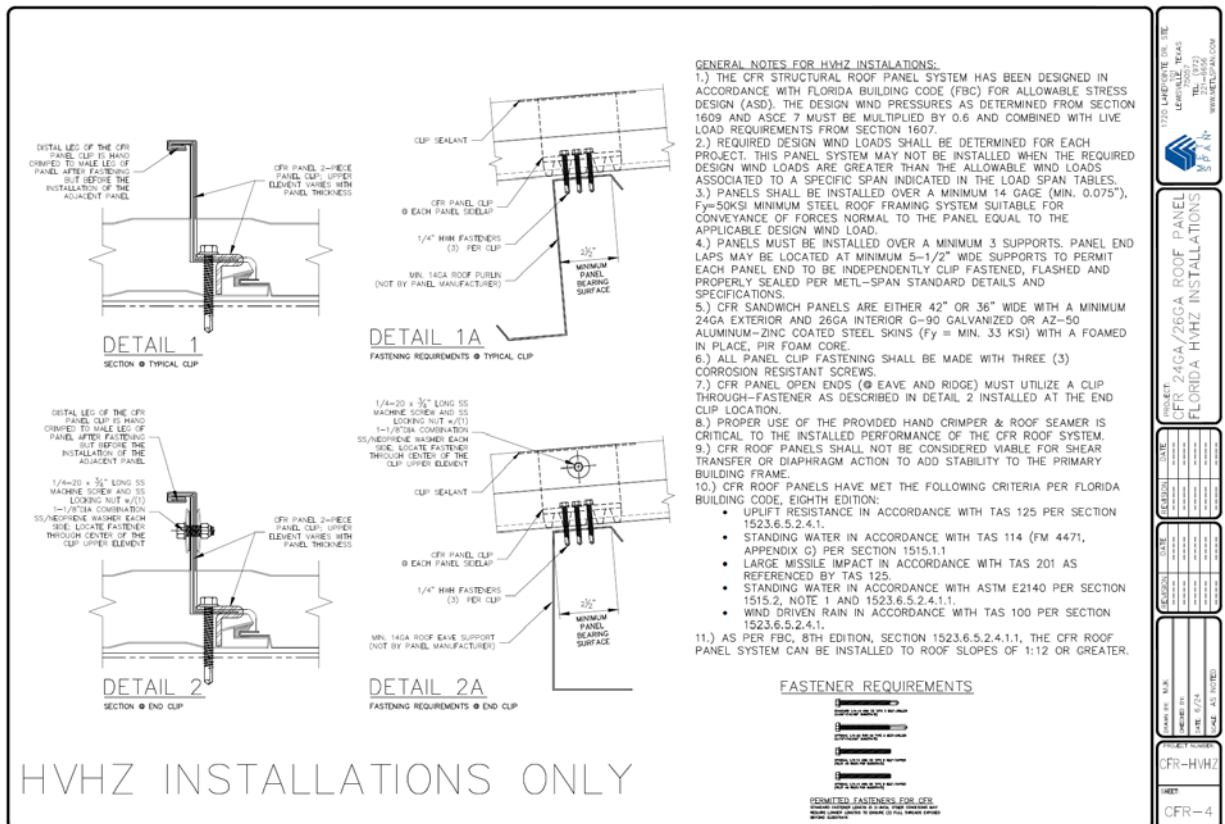
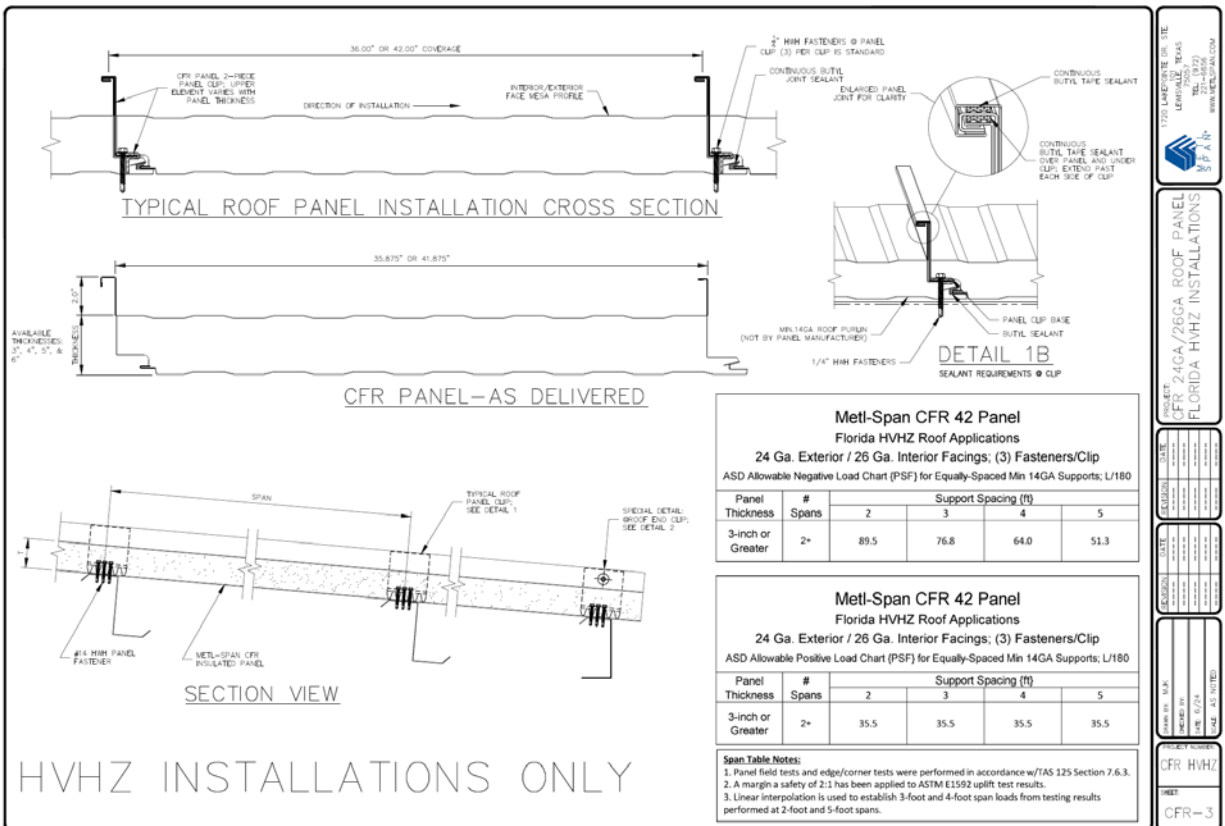


Figure 1. CFR 24GA/26GA Roof Panel HVHZ Installation Instructions



**Table 1.** Allowable Outward Loads for 24Ga/26Ga Faced CFR 42 Roof Panel with L/180 Deflection Ratio<sup>1,2,3,4</sup>

| Thickness (in)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | # of Spans | Support Spacing (ft) |    |    |    |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------|----|----|----|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            | 2                    | 3  | 4  | 5  |
| 3+                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2+         | 90                   | 75 | 65 | 50 |
| <p>1. Based on Allowable Stress Design (ASD). Linear interpolation was used to establish 3-foot and 4-foot span loads based on tested conducted on 2-foot and 5-foot spans. No factor has been applied for loads limited by deflection.</p> <p>2. Allowable outward loads shown in this table are based on the lowest value of uplift, and panel field tests conducted in accordance with ASTM E1592 and TAS 125 respectively.</p> <p>3. Structural capacity of the panel supports is not considered in this table</p> <p>4. Please contact Metl-Span Engineering for additional information and assistance</p> |            |                      |    |    |    |

**Table 2.** Allowable Inward Loads for 24Ga/26Ga Faced CFR 42 Roof Panel with L/180 Deflection Ratio<sup>1,2,3,4</sup>

| Thickness (in)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | # of Spans | Support Spacing (ft) |   |   |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|----------------------|---|---|---|
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |            | 2                    | 3 | 4 | 5 |
| 3+                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 2+         | 35                   |   |   |   |
| <div>1. Based on Allowable Stress Design (ASD). Linear interpolation was used to establish 3-foot and 4-foot span loads based on tested conducted on 2-foot and 5-foot spans. No factor has been applied for loads limited by deflection.</div> <div>2. Allowable outward loads shown in this table are based on the lowest value of uplift, and panel field tests conducted in accordance with ASTM E1592 and TAS 125 respectively.</div> <div>3. Structural capacity of the panel supports is not considered in this table</div> <div>4. Please contact Metl-Span Engineering for additional information and assistance</div> |            |                      |   |   |   |

This panel is available for use in High-Velocity Hurricane Zones (HVHZ).

DrJ's procedures are fully compliant with the ISO/IEC 17065 certification process and DrJ's scope of expertise.

If there are any additional questions or concerns, we will gladly provide a Florida professional engineering<sup>1</sup> and ANAB ISO/IEC 17065 accredited<sup>2</sup> approved agency response. Pursuant to the 2023 FBC Code Section 1707.1<sup>3</sup> we would sincerely appreciate knowing the specific sections of the adopted building code and/or professional engineering law that this engineering evaluation does not comply with so that we can cure any non-compliance. From specifics, we can then delineate a path forward for everyone involved to cure any violations, as this will serve everyone's free and fair market competition's best interests.

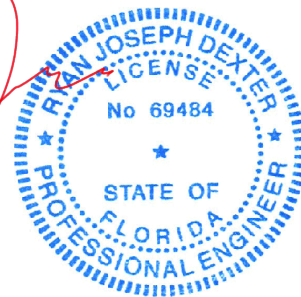
Our goal with the foregoing analysis is to provide both the accepted engineering analysis and regulatory compliance substance to support a systematic path to approval. Please contact us if we can help further in any way. If your request is time-sensitive, please contact Jill Zimmerman at (920) 988-7165. Thank you very much.

Respectfully yours,

Larry Wainright  
Vice President Product Certification  
608-310-6742

Ryan Dexter, P.E.  
Florida P.E. No. 69484  
Vice President  
608-310-6744

DrJ Engineering, LLC  
Certificate of Authorization #29766



RYAN J  
DEXTER

Digitally signed by RYAN J DEXTER  
DN: c=US, o=Florida  
serial=4014100000017AED3  
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<sup>1</sup> Approved source. An independent person, firm or corporation, approved by the building official, who is competent and experienced in the application of engineering principles to materials, methods or systems analyses, which is a professional engineer. To find licensed professional engineers please see this website: <https://www.nspe.org/resources/licensure/licensing-boards>. An approved source is "approved" when a professional engineer (i.e., Registered Design Professional [RDP]) is properly licensed to transact engineering commerce. The regulatory authority governing approved sources is the state legislature via its professional engineering regulations. Commercial and professional engineering laws affirm that the RDP has the ability to undertake commerce applying engineering principles in their area of expertise without restraint or discrimination. Ohio has set legal precedent.

<sup>2</sup> ANAB accredited approved agencies. An approved agency shall be objective, competent and independent. An approved agency is "approved" when it is ANAB ISO/IEC 17065 accredited. DrJ Engineering, LLC (DrJ) is listed in the ANAB directory. Language is found in Section 1703.1.1.

<sup>3</sup> In the absence of approved rules or other approved standards, the building official shall accept duly authenticated reports from approved agencies in respect to the quality and manner of use of new materials or assemblies as provided for in Section 104.11.