NUCOR CFR™ STANDING SEAM ROOF SYSTEM TABLE OF CONTENTS

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NUCOR CFR™ TRAPEZOIDAL RIB STANDING SEAM ROOF SYSTEM

The Nucor CFR™ trapezoidal rib standing seam roof system panel is available as a component of one of Nucor Building Systems’ Standard Roof Systems.

The Nucor CFR™ Standing Seam Roof System presents the building owner with a high quality, economical alternative to other roofing systems. The system is designed to meet the demanding needs of today’s building market.

The Nucor CFR™ system is a functional roof specifically designed for low slopes. This roof system has been extensively tested to ensure the highest level of performance for weather tightness and structural integrity. The panels have been tested and approved by Factory Mutual® and Underwriters Laboratories® for wind uplift as well as hail and fire resistance. The flexible options offer a number of cost effective design solutions.

The Nucor CFR™ system is a raised seam metal roof which is designed to “float” to accommodate thermal expansion and contraction. This is accomplished with concealed sliding clips which allow for up to 3” of expansion and contraction. The panel sidelpop has factory-applied mastic and can be completely erected without the use of electric seaming machines. Nucor offers a hand-operated crimping tool for the Nucor Roll Lock™ installation option.

Information about the available panel and seaming options, panel properties, performance and testing information, and much more is available at the Nucor Building Systems website at the below link.

Nucor CFR™ Trapezoidal Rib Standing Seam Roof Panel

The following pages outline the different seaming options and span capacities as well as provide Nucor standard details for this roof system.
**NUCOR CFR™ PROPERTY AND SPAN TABLE**

**CFR Roof (24 Gage A792 Grade 50, Class 1 with Fy = 50 ksi, Fu = 65 ksi)**

<table>
<thead>
<tr>
<th>Panel Gage</th>
<th>Thickness (in.)</th>
<th>Yield (Ksi)</th>
<th>Tensile (Ksi)</th>
<th>Panel Wt. (Psf)</th>
<th>Ix (Gross) (\text{in}^4)</th>
<th>Sx (eff.) (\text{in}^3)</th>
<th>Ma (Kip-in.)</th>
<th>Sx (eff.) (\text{in}^3)</th>
<th>Ma (Kip-in.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>0.0222</td>
<td>50</td>
<td>65</td>
<td>1.19</td>
<td>0.3640</td>
<td>0.149</td>
<td>4.4465</td>
<td>0.083</td>
<td>2.4905</td>
</tr>
</tbody>
</table>

**Allowable Gravity and Wind Pressure (psf): Panel: (Stress, Deflection, and Web Crippling)**

<table>
<thead>
<tr>
<th>Span (Ft)</th>
<th>Simple Span</th>
<th>2 Equal Spans</th>
<th>3 Equal Spans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stress</td>
<td>L/60</td>
<td>L/240</td>
</tr>
<tr>
<td>2.0</td>
<td>763</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>2.5</td>
<td>489</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>3.0</td>
<td>339</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>3.5</td>
<td>249</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>4.0</td>
<td>191</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>4.5</td>
<td>151</td>
<td>n/c</td>
<td>n/c</td>
</tr>
<tr>
<td>5.0</td>
<td>122</td>
<td>n/c</td>
<td>n/c</td>
</tr>
</tbody>
</table>

**Allowable Wind Suction (psf): Panel: (Stress and Deflection) - Standard Clip with 2 Fasteners**

<table>
<thead>
<tr>
<th>Span (Ft)</th>
<th>Roll Lock</th>
<th>Vise Lock</th>
<th>Vise Lock 360®</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.0</td>
<td>60.3</td>
<td>84.5</td>
<td>107.4</td>
</tr>
<tr>
<td>2.5</td>
<td>54.9</td>
<td>77.4</td>
<td>98.4</td>
</tr>
<tr>
<td>3.0</td>
<td>49.5</td>
<td>70.4</td>
<td>89.3</td>
</tr>
<tr>
<td>3.5</td>
<td>44.1</td>
<td>63.3</td>
<td>80.3</td>
</tr>
<tr>
<td>4.0</td>
<td>38.7</td>
<td>56.3</td>
<td>71.3</td>
</tr>
<tr>
<td>4.5</td>
<td>33.3</td>
<td>49.3</td>
<td>62.2</td>
</tr>
<tr>
<td>5.0</td>
<td>27.9</td>
<td>42.2</td>
<td>53.2</td>
</tr>
</tbody>
</table>

Contact the engineering team for capacities with different panel, fastener, or clip configurations. Note: n/c indicates that deflection considerations do not control over stress limits.
NUCOR CFR™ SEAMING OPTIONS

GENERAL

The Nucor CFR™ roof system has three seam type options. The project design and performance requirements govern which seam type is required.

Different seam types may be required on specific areas of the roof. In all cases, refer to the erection drawings to determine the required seam type and locations.

NUCOR ROLL LOCK™ SEAM

The Nucor Roll Lock™ seam requires the roof panels be seamed with the manual seaming tool only at the panel clips, the eave, the high side of the roof panels and at the end laps.

"NUCOR ROLL LOCK"™ SEAM

Crimped with Manual Seaming Tool

At Panel Clips & Panel Ends

Between Panel Clips & Panel Ends
NUCOR VISE LOCK® SEAM

The Nucor Vise Lock® seam requires seaming the roof panel with the manual seaming tool at the starting eave or ridge end of the panels, and at the end laps. Then seaming the full length of the roof panels with the Motorized Seaming Machine.

NUCOR VISE LOCK® SEAM

<table>
<thead>
<tr>
<th>At Panel Clips</th>
<th>Between Panel Clips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Clip</td>
<td>Panel Clip</td>
</tr>
<tr>
<td>Roof Panel</td>
<td>Roof Panel</td>
</tr>
</tbody>
</table>

Bi-directional seamer available for this seam option only.

NUCOR VISE LOCK 360® SEAM

The Nucor Vise Lock 360® seam can be formed with a one pass VL 360 seamer OR two separate seamers, one set-up with Vise Lock tooling and the other set-up with Vise Lock 360 tooling. The Nucor Vise Lock 360® seam requires manual seaming at the low eave so that you can start the Motorized Seaming Machine onto the panels.

NUCOR VISE LOCK 360® SEAM

<table>
<thead>
<tr>
<th>At Panel Clips</th>
<th>Between Panel Clips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Panel Clip</td>
<td>Panel Clip</td>
</tr>
<tr>
<td>Roof Panel</td>
<td>Roof Panel</td>
</tr>
</tbody>
</table>

Panel Clip Roof Panel Roof Panel

Bi-directional seamer available for this seam option only.
CF0025PE – PANEL PROFILE

Female Seam (trailing edge of panel)

Seam Sealant (factory applied in the seam)

Factory Dimples (Typ. both ends)

Minor Rib (Typ)

Male Seam (leading edge of panel)

Seam Sealant

Female Seam

Female Rib

Minor Rib (Typical)

Male Seam

Male Rib

Panel Width 24"
CLIP AND INSULATION APPLICATIONS:

1. Nucor Building Systems recommends that insulation be used in all CFR roof applications to avoid problems with condensation formation. Insulation also provides a buffer between the purlins and the CFR roof to reduce noise and possible damage due to metal-to-metal contact. Insulation requirements are as follows:

   **Short Clips:** 2" to 4" of insulation compressing to 1/2" over roof purlins. EPS foam spacers are available for limited use in un-insulated areas.

   **Tall Clips:** 4" to 6" of insulation compressing to 3/4" thickness under thermal block at roof purlin locations. Thermal blocks are required when tall clips are used. 1 ½" thermal blocks with adhesive are available for limited use in un-insulated roof areas.

   **Tall Clips:** Maximum of 8" of single layer batt insulation is allowed, which requires special attention to maintain panel modularity and thermal performance.

   **Super Tall Clips:** Maximum of 12" combined layers of batt insulation is allowed, which requires special attention to maintain panel modularity and thermal performance. 2 ½" thermal blocks with adhesive are available for limited use in un-insulated roof areas.(Spl order)

2. Fixed or floating clips may be used as determined by the following:

<table>
<thead>
<tr>
<th>Roof Structural Type</th>
<th>Panel Run &lt;= 80'-0&quot;</th>
<th>Panel Run &gt; 80'-0&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purlins</td>
<td>Fixed Clips</td>
<td>Floating Clips</td>
</tr>
<tr>
<td>Joists</td>
<td>Floating Clips</td>
<td>Floating Clips</td>
</tr>
</tbody>
</table>

LAST REVISION DATE: 12/29/17

DETAIL NAME IF APPLICABLE

CF0010PE.DWG

5.0.7
EA6022 – THERMAL BLOCK – TALL CLIPS

SPECIAL CONDITION AT A BOX BEAM

BOX BEAM AT LOW EAVE

BOX BEAM AT HIGH EAVE

SPECIAL CONDITION AT AN EAVE BEAM

EAVE BEAM AT LOW EAVE

EAVE BEAM AT HIGH EAVE

IF THIS PROJECT HAS AN EAVE BEAM WITH (2) PURLINS, AS SHOWN, DO NOT ATTACH ROOF CLIPS TO THE "SECOND" PURLIN. HOWEVER, THERMAL BLOCKS ARE PROVIDED FOR INSTALLATION AT THE SECOND PURLIN.

INSULATION TIE-OFF AT THE EAVES VARIES BASED ON THE EAVE CONDITION. REFER TO THE ROOF PANEL ERECTION MANUAL FOR DETAILS.

THERMAL BLOCK DETAIL AT TALL / SUPER CFR CLIPS

CFS ROOF WITH BATT INSULATION

DETAIL AT JOIST SIMILAR
EA6023 – THERMAL BLOCK – TALL CLIPS WITHOUT INSULATION

SPECIAL CONDITION AT A BOX BEAM

BOX BEAM AT LOW EAVE

BOX BEAM AT HIGH EAVE

SPECIAL CONDITION AT AN EAVE BEAM

EAVE BEAM AT LOW EAVE

EAVE BEAM AT HIGH EAVE

IF THIS PROJECT HAS AN EAVE BEAM WITH (2) PURLINS, AS SHOWN, DO NOT ATTACH ROOF CLIPS TO THE "SECOND" PURLIN. HOWEVER, THERMAL BLOCKS ARE PROVIDED FOR INSTALLATION AT THE SECOND PURLIN.

1 1/2" THERMAL BLOCK
MK. H3305
2 1 1/2" THERMAL BLOCK
MK.

CNR PANEL

DETAIL AT JOIST SIMILAR

THERMAL BLOCK DETAIL AT TALL/SUPER TALL CFR CLIPS

CNR ROOF WITHOUT INSULATION

EA6023

LAST REVISION
DATE: 12/29/17
BY: EGB CHK: KMC

DETAIL NAME IF APPLICABLE
EA6023.DWG

5.0.9
EA6024 – THERMAL BLOCK – SHORT CLIPS WITHOUT INSULATION

SPECIAL CONDITION AT A BOX BEAM

BOX BEAM AT LOW EAVE  BOX BEAM AT HIGH EAVE

SPECIAL CONDITION AT AN EAVE BEAM

EAVE BEAM AT LOW EAVE  EAVE BEAM AT HIGH EAVE

IF THIS PROJECT HAS AN EAVE BEAM WITH (2) PURLINS, AS SHOWN, DO NOT ATTACH ROOF CLIPS TO THE "SECOND" PURLIN. HOWEVER, EPS FOAM SPACER IS PROVIDED FOR INSTALLATION AT THE SECOND PURLIN.

FOAM SPACER DETAIL AT SHORT CLIPS

CFR ROOF WITHOUT INSULATION

DETAIL AT JOIST SIMILAR

EA6024.DWG
EA6025 – GUIDANCE TO INSTALLING SINGLE OR MULTI LAYERS OF INSULATION

SEE CFR ERECTION MANUAL FOR PROPER INSTALLATION INSTRUCTIONS

THE INSTALLATION OF THE SYSTEM REQUIRES SPECIAL ATTENTION TO MAINTAIN PROPER PANEL MODULARITY AND THERMAL PERFORMANCE AS NOTED BELOW:

- USE MODULARITY CLAMPS TO HOLD PANEL TRAPEZOID AT 5 1/16" WIDE ALONG FULL LENGTH OF PANEL SEAM, SEE SECTION A.
- USE MODULARITY TOOL(S) TO HOLD PANEL CLIPS IN PLACE, PRIOR TO FASTENING, TO MAINTAIN A CONSTANT 24" WIDE PANEL COVERAGE.
- DO NOT ADJUST THE PANEL WIDTH BY MORE THAN ± 1/8" ON ANY PANEL.
- CFR ADJUSTABLE MODULARITY TOOL (BUYOUT), MK. HDX10
- CFR MODULARITY CLAMP (BUYOUT), MK. IT100
- CFR MODULARITY TOOL (SUPPLIED), MK. M10301

**SECTION A**

- STRETCHING PANEL COVERAGE
- SHRINKING PANEL COVERAGE

**CORRECT PANEL MODULARITY**

- MEASURE OVER 2" – 2" FROM INSTALLED CLIP FASTENER, PRE-DRILL (1) 5/16" # PLUG HOLE, BE SURE TO LOCATE 3/8" TO 1" FROM EDGE OF PURIN FLANGE. THIS WILL ENSURE THAT AT LEAST 3 (3) FASTENERS CAN BE INSTALLED IN CLIP BASE OF WIND.

- MEASURE OVER 2" – 2" FROM CENTER OF INSTALLED VOID CLOSURE AND MARK ON FRAME PLATE GUTT WASTIC INSTALL NEXT VOID CLOSURE AS SHOWN.

- MEASURE OVER 2" – 2" FROM CENTER OF INSTALLED VOID CLOSURE AND MARK ON FRAME PLATE GUTT WASTIC INSTALL NEXT VOID CLOSURE AS SHOWN.

**ADJUSTING PANEL MODULARITY**

- PURLIN SHOWS JUST SHOWN FOR CLARITY
- INSULATION NOT SHOWN FOR CLARITY

- INSTALL NEXT VOID CLOSURE AT BUILDING EAVE.

- ROOF PANEL CLIP
- MARK ANNUAL START PANEL
- VOID CLOSURE

- MEASURE OVER 2" – 2" FROM CENTER OF INSTALLED VOID CLOSURE AND MARK ON FRAME PLATE GUTT WASTIC INSTALL NEXT VOID CLOSURE AS SHOWN.

- MEASURE OVER 2" – 2" FROM CENTER OF INSTALLED VOID CLOSURE AND MARK ON FRAME PLATE GUTT WASTIC INSTALL NEXT VOID CLOSURE AS SHOWN.

- MARK ANNUAL

**GUIDANCE TO INSTALLING SINGLE OR MULTI LAYERS OF INSULATION WITH "CFR" ROOF**

- SINGLE OR MULTI LAYERS OF FIBERGLASS BLANKET INSULATION, EXPANDED TO FULL THICKNESS
- SINGLE OR MULTI LAYERS OF LAYER FIBERGLASS BLANKET INSULATION

**PROPER INSULATION AT MID-SPAN**

- DO NOT PULL THE INSULATION TIGHT AS THIS WILL SIGNIFICANTLY REDUCE THE THERMAL PERFORMANCE OF THE ROOF SYSTEM AND COULD CAUSE ROOF PANEL MODULARITY ISSUES.

- SINGLE OR MULTI LAYERS OF LAYER FIBERGLASS BLANKET INSULATION
- PULLED TOO TIGHT
NUCOR COMPOSITE CFR™ OPTIONS:

FA6003 – BATT INSULATION WITH Z-BARS

- Z-bars are 16 gage material and spaced either 4 or 5 foot apart, depending on insulation width.
- Panel clips attach directly to z-bars with standard self-drilling screws.
- Overall batten insulation thickness allowed: 5” min and 12” max.
- For UL90 requirements, please contact NBS.

## Z-BAR FASTENER QTY & SPACING

Z-BAR CAN BE ORIENTED EITHER AS SHOWN OR OPPOSITE TO FACILITATE EASE OF INSULATION INSTALLATION

<table>
<thead>
<tr>
<th>Z-BAR CHART</th>
<th>GAUGE</th>
<th>LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>C9B9S</td>
<td>16</td>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>C9B10S</td>
<td>16</td>
<td>10'-0&quot;</td>
</tr>
<tr>
<td>C9B12S</td>
<td>14</td>
<td>5'-0&quot;</td>
</tr>
<tr>
<td>C9B20</td>
<td>14</td>
<td>10'-0&quot;</td>
</tr>
</tbody>
</table>

VARIABLES (SEE PLAN FOR SPACING, Z-BAR LAYOUT AND PART USAGE)

<table>
<thead>
<tr>
<th>H1020 FASTENERS</th>
<th>QTY PER SPACING</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>D</td>
</tr>
</tbody>
</table>

GENERAL NOTES

1) NBS recommends that the batt insulation be installed in two layers, as shown above.
2) The limited method of installation helps ensure that there are no gaps in the insulation. (Gaps in the insulation can cause condensation problems.)
3) The Z-bar fastener 1/2” with short clips or 1-1/2” with full clips.

FA6003

Z-BAR FASTENER QTY & SPACING

BATT INSULATION DETAIL AT BACK-UP PLATE

COMPOSITE CFR BATT INSULATION INSTALLATION RECOMMENDATION DETAIL - Z-BARS AND 1.5B DECK

FA6003

5.0.12

DETAIL NAME IF APPLICABLE

FA6003.DWG
Z-bars are 16 gage material and typically spaced 4 foot apart.
Panel clips attach directly to z-bars with self-drilling screws and bearing plates.
Overall rigid board insulation thickness allowed: 3” min and 10” max.
For UL90 requirements, please contact NBS.
Panel clips attach directly to secondary member with extra-long self-drilling screws and bearing plates.

Overall rigid board insulation thickness allowed: 2" min and 5" max.

UL90 requirements: 5'-0" max purlin spacing, 5'-6" max joist spacing.

**GENERAL NOTES**

1) NUCOR RECOMMENDS THAT THE RIGID BOARD INSULATION BE INSTALLED IN TWO LAYERS, WITH THE TOP LAYER BEING 1" THICK, AS SHOWN ABOVE.

2) NUCOR RECOMMENDS THAT THE RIGID BOARD INSULATION ENDLAPS AND SIDE LAPS BE STAGGERED AS SHOWN ABOVE.

3) THIS RECOMMENDED LAYERED METHOD OF INSTALLATION ALLOWS FOR MUCH EASIER INSTALLATION OF THE BACK-UP PLATES AT ROOF PANEL ENDLAPS AND THE HIGH EAVE OR RIDGE.

4) THIS RECOMMENDED LAYERED METHOD OF INSTALLATION ALSO HELPS ENSURE THAT THERE ARE NO GAPS IN THE INSULATION. (GAPS IN THE INSULATION CAN CAUSE CONDENSATION PROBLEMS).

5) NUCOR RECOMMENDS TAPING OF ALL RIGID BOARD INSULATION JOINTS TO HELP ENSURE THAT THERE ARE NO GAPS IN THE INSULATION.

**RIGID BOARD DETAIL AT BACK-UP PLATE**

(ENLAP SHOWN, HIGH EAVE AND RIDGE SIMILAR)

REFER TO THE SHEETING DETAILS FOR SPECIFIC PART NUMBERS AND QUANTITIES.

**COMPOSITE CFR RIGID BOARD INSTALLATION RECOMMENDATION DETAIL**

FA6005 – RIGID BOARD INSULATION

**LAST REVISION**

DATE: 02/16/15  DETAIL NAME IF APPLICABLE

BY: AK  CHK: EGB  FA6005.DWG

5.0.14