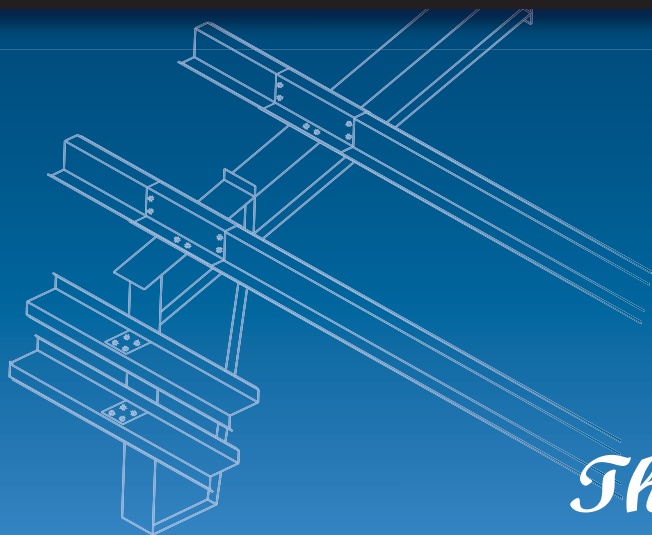


NUCOR

BUILDING SYSTEMS



The Brand of Choice

NUCOR "CFR"[™] ROOF SYSTEMS

www.nucorbuildingsystems.com



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NUCOR BUILDING SYSTEMS IS A NUCOR COMPANY

Nucor Corporation is a Fortune 500 company, producing steel and steel products and is well known for its ability to manufacture high quality products at very competitive prices. These attributes apply equally to Nucor Building Systems (NBS). NBS is a complete building systems manufacturing company and one of the most flexible and diverse manufacturers in operation today. Our metal building manufacturing facilities are located in:

- Waterloo, Indiana
- Swansea, South Carolina
- Terrell, Texas
- Brigham City, Utah

NUCOR "CFR"™ SYSTEM - FOUNDATION OF PERFORMANCE

The Nucor Building Systems "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 foundation of the "CFR" system is based on the critical need for the roof to satisfy four basic principles:

- Weathertightness** "CFR" is a weathertight system*
- Strength** "CFR" is safe and satisfies code and uplift requirements
- Erector Friendliness** "CFR" is flexible and easy to install
- Cost Effectiveness** "CFR" is an economical roofing solution

The Nucor "CFR" system is a functional roof specifically designed for low slopes. Our roof has been extensively tested to ensure the highest level of performance for weathertightness as well as 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.

For more information, visit www.nucorbuildingsystems.com



* Refer to the Nucor "CFR"™ Weathertightness Warranty for specific performance criteria. Due to a process of continuous improvement, all information contained herein is subject to change without notice.

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 sidelap has factory applied mastic and can be completely erected without the use of electric seaming machines. Nucor offers a hand-operated crimping tool for seaming, as well as a seaming machine to achieve the Nucor “Vise Lock”™ installation option. Other features of the Nucor “CFR” system include:



High Performance Panel Finish

Standard finish for the Nucor “CFR” is Galvalume®. A high quality painted finish is also available as an option.

Non-Handed System

Nucor “CFR” is designed to allow the installer to erect the roof in either direction, providing flexibility to choose the most efficient starting points on the roof. Additionally, in most cases the installer has the option to install either the roof or wall system first.

Flexible Seaming Options

The roof can be completely installed without the use of electric seaming machines. An electric machine is available for use after roof installation when required due to high uplift conditions or specified criteria, but the seamer does not have to be run as the panels are installed. In all cases the roof is installed and crimped leaving the electric seaming to be accomplished safely and efficiently as one of the last steps of construction.

Wide Range of Insulation Options

Nucor “CFR” is designed to work with a variety of insulation systems including fiberglass batt, rigid board, and rigid board with the use of a liner decking. This offers the builder and owner flexibility when choosing the best system to meet the functional needs of the building. It is recommended that some type of insulation be used with all “CFR” roof systems to prevent wind flutter or damage due to the effects of condensation.

Mastic in Compression

The mastic is placed in complete compression at all locations. A heavy, aluminum cinch strap is used at panel endlaps to eliminate panel buckling and costly roof leaks. The use of the cinch strap also greatly reduces the number of fasteners required at endlaps.

Fasteners Outside the Building Envelope

At the eave and ridge locations, fasteners are uniquely placed outside the building envelope, greatly reducing the chance for water penetration into the roof system.

Patented Panel Splice Detail

Panel splices have been designed with a patented system to occur away from the purlin or joist so that normal tolerance found in construction will not hinder installation of the system. The continuous endlap design provides continuity as well as reduced handling of panels during installation.

Factory Punched and Notched

Nucor “CFR” panels are factory punched and notched to aid the installer in providing a weathertight fit. The pre-punched holes reduce debris on the roof and promote erector efficiency.



Solid Seam Design

Our seam profile is intentionally “stout” to provide flexibility in the field as well as a positive lock by the electric seamer, when the seamer is required. This all but eliminates the possibility of the seamer malfunctioning and damaging the seam as can occur with older “Pittsburgh-style” seams.

Diaphragm

The Nucor “CFR” system, because it is designed as a floating system, cannot be solely relied upon as a diaphragm for resisting lateral load forces or providing lateral stability to roof structural members. Due consideration for this must be addressed by the project engineer of record or system designer when “CFR” is used in conjunction with other structural systems. When replacing an existing screwdown roof, additional bracing may be required to laterally support the members. Engineering and material for these uses shall not be provided by Nucor Building Systems.



Roof Top Units

Roof top units and roof penetrations should be kept to a minimum and be clearly identified on the Nucor order documents including size, location, and weight. See the Nucor Product & Engineering Manual for specific information concerning framing and flashing options (available on-line at www.nucorbuildingsystems.com).

Standard Finishes

The standard finish for the Nucor “CFR” is Galvalume. A high-performance painted finish is also available. Consult your local Nucor Building Systems plant for specifics. Accessories, including gutter brackets, cinch straps, end dams, and rib covers are provided in an unpainted finish. If desired, accessories can be field painted to match the roof. Paint can typically be acquired locally, and is not provided by NBS.

SYSTEM WARRANTIES AVAILABLE

Standard Warranties

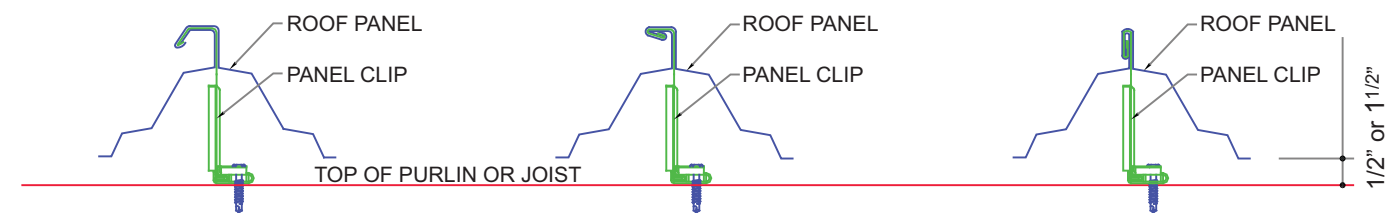
- 25 Year Galvalume® Finish
- 25 Year Silicone Polyester Paint Finish
- 30 Year Kynar (Fluoroceram®) Paint Finish

Optional Warranty

- 20 Year Weathertightness

For more specific details, please refer to the *Nucor Warranty Guide*, available at nucorbuildingsystems.com. Hard copies of all Nucor warranties are available upon request.

FLEXIBLE SEAMING OPTIONS



Nucor “ROLL LOCK”™ SEAM

- Hand Crimped at Clips
- UL Rated

Nucor “VISE LOCK”™ SEAM

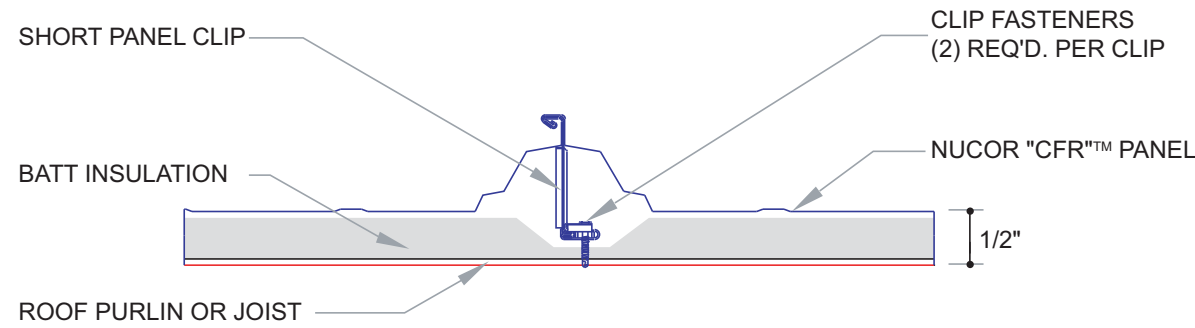
- Mechanically Seamed
- UL Rated
- FM Approved

Nucor “VISE LOCK 360”™ SEAM

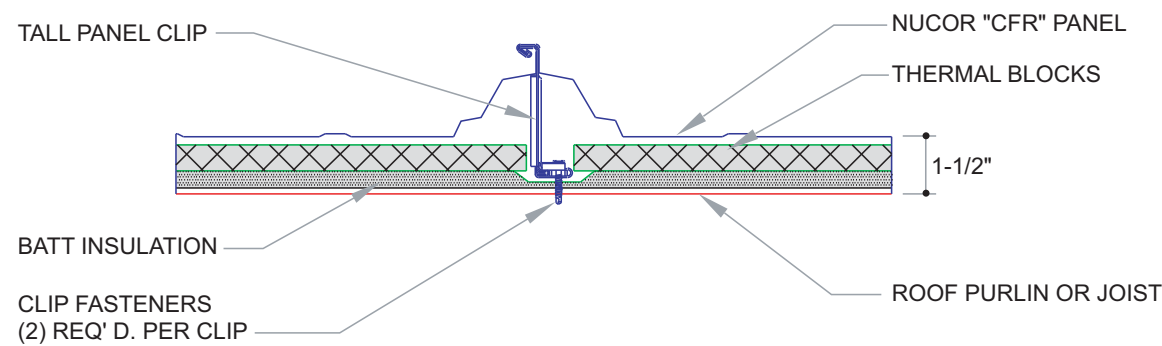
- Mechanically Seamed
- UL Rated
- FM Approved
- Enhanced Uplift Capacity

Galvalume® is a registered trademark of BIEC International, Inc.; FM® is a registered trademark of Factory Mutual, Inc.; Fluoroceram® is a registered trademark of Arkema, Inc.; UL® is a registered trademark of Underwriters Laboratories, Inc.

NUCOR "CFR" PANEL WITH SHORT CLIP



NUCOR "CFR" PANEL WITH TALL CLIP & THERMAL BLOCKS



INSULATION REQUIREMENTS

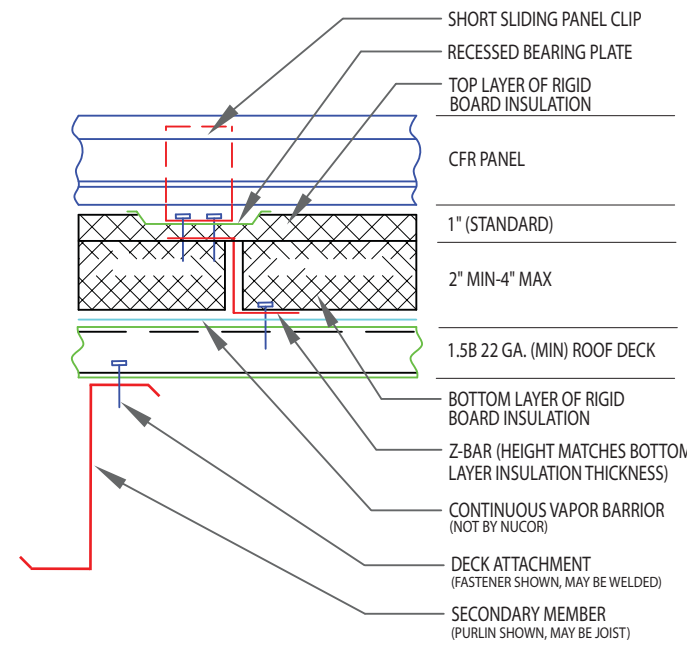
Nucor Building Systems recommends that insulation be used in all "CFR" roof applications to avoid problems with condensation forming. Insulation also provides a buffer between the purlins and the "CFR" roof to reduce noise and possible damage due to metal to metal contact. Insulation requirements are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

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

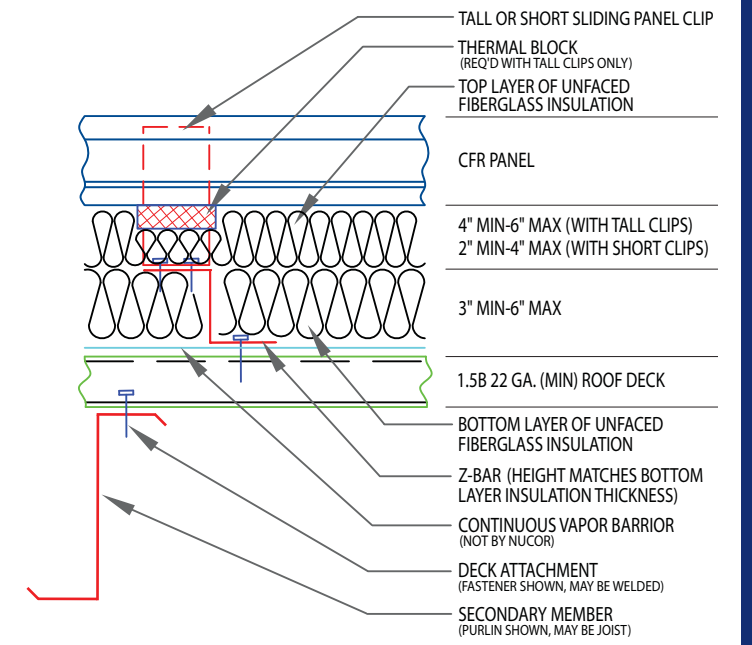
Tall Clips: 4" to 6" of insulation compressed to 3/4" thickness under thermal block at roof purlin locations. Thermal blocks are required when tall clips are used.

CLIP APPLICATIONS		
Roof Structural Type	Panel Run <= 120'-0"	Panel Run >= 120'-0"
Purlins	Fixed Clip	Floating Clip
Joists	Floating Clip	Floating Clip

RIGID BOARD INSULATION w/Z-BARS

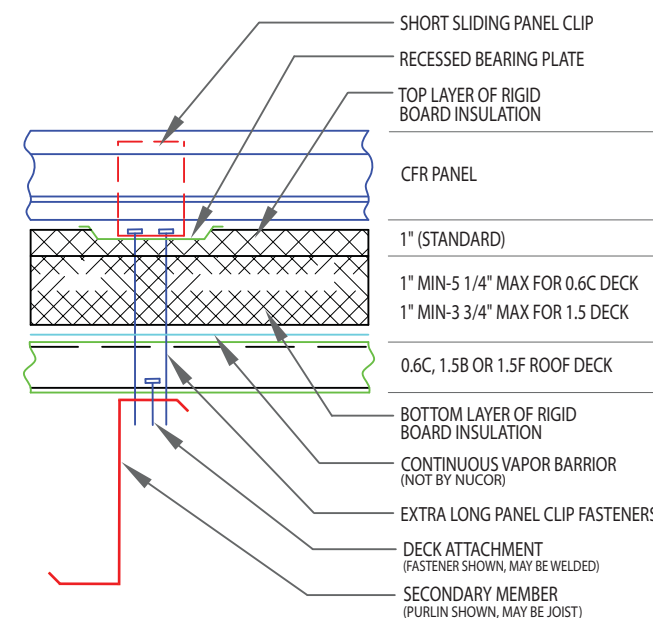


FIBERGLASS INSULATION w/Z-BARS



- NBS recommends that either the rigid board or fiberglass insulation be installed in two layers, as shown above.
- This recommended layered method of insulation helps ensure that there are no gaps in the insulation, which can cause condensation problems. Insulation is not by Nucor.
- Roof deck is fabricated in accordance with SDI specifications and tolerances. Nucor does not offer warranties on liner decking.
- Panel clips fasteners must engage the Z-bar member. Self-drilling fasteners without a washer are utilized.
- A vapor barrier is required in all "Composite CFR" applications to avoid condensation. Vapor barrier not provided by Nucor.
- For UL90 requirements, please contact Nucor.
- Z-bars (16 gage min.) are spaced 4'-0" apart to accommodate Rigid Board Insulation widths, and 4'-0" or 5'-0" apart to accommodate Standard Fiberglass Insulation roll widths.

RIGID BOARD INSULATION



- NBS recommends that the rigid board insulation be installed in two layers, with the top layer being 1" thick, as shown on the left.
- This recommended layered method of insulation helps ensure that there are no gaps in the insulation, which can cause condensation problems. Insulation is not by Nucor.
- Roof deck is fabricated in accordance with SDI specifications and tolerances. Nucor does not offer warranties on liner decking.
- Panel clips fasteners must engage the roof secondary member. Self-drilling fasteners without a washer are utilized. Nucor recommends the deck and roof secondary member be pre-drilled for the panel clip fasteners to help avoid fastener drill point breakage.
- A vapor barrier is required in all "Composite CFR" applications to avoid condensation. Vapor barrier not provided by Nucor.
- For UL90 requirements, please contact Nucor.

- Standard 24" Width
- 3" Nominal Height
- Standard 24 Gage Galvalume - 50 ksi steel
Siliconized Polyester & Kynar painted is available as an option
- Minimum Roof Slope: 1/4:12
Slopes greater than 4:12 may require special flashing details
- Custom Lengths 6'-0" to 55'-0"
- Designed for use with fiberglass batt or rigid board insulation
- Panels rated for UL90 and Factory Mutual uplift approval
- Standard roof line trim and flashing to be 26 gage
- Factory applied mastic in panel sidelap



- No through-fasteners - this is a fully adhered system
- UL90 approved without cumbersome reinforcing channels and framing
- Shipped preassembled for easy installation
- Endlap splices are pre-punched for easy and proper installation
- Weathertight system

PERFORMANCE AND TESTING SUMMARY

Classification	Panel Gage	Secondary	Spacing	Seam Option
Factory Mutual 1-60	24	Purlins or Joists	5'-0"	Nucor "Vise Lock"
Factory Mutual 1-90	24	Purlins or Joists	5'-0"	Nucor "Vise Lock"
UL90 - Listing #552	24	Purlins or Joists	5'-0"	Nucor "Roll Lock"

ASTM & AISI TESTING

- ASTM E 1592 Uplift Testing
- AISI Purlin Stability Base Testing
- ASTM E 1680 Air Infiltration
- ASTM E 1646 Water Infiltration
- ASTM E 2140 Water Penetration
- ASTM E 108 Flame Spread

TECHNICAL SPECIFICATIONS

Property	ASTM Standard	Value
Tensile Strength	D-638	25,772 psi
Tensile Modulus	D-638	1.52 x 10 ⁶ psi
Flexural Strength	D-790	24,306 psi
Flexural Modulus	D-790	.79 x 10 ⁶ psi
Compressive Strength	D-695	28,905 psi
Barcol Hardness	D-2583	45 - 50
Uniform Building Code Class	Std. 52-4	CCII
Smoke Developed	E-84	< 450
Burning Rate	D-635	< 2.5" / Min.
U Factor with Film Coefficients	Non- Insulated	1.28
	Insulated	.66

IMPORTANT!!!

Never walk, step, or stand on a translucent panel. Injury or death could result.



25 YEAR MATERIAL WARRANTY FOR GALVALUME® ROOF & SIDEWALL PANELS

Nucor Building Systems warrants to its Purchaser and to the original Owner that Nucor Building Systems Galvalume® Panels if used in the construction of a building erected within the United States, will not rupture, fail structurally, or perforate within a period of twenty-five (25) years after shipment from the Nucor Building Systems plant due to exposure to normal atmospheric conditions:

This warranty DOES NOT APPLY to panels exposed at any time to corrosive or aggressive atmospheric conditions, including but not limited to:

1. Areas subject to salt water (marine atmospheres) or to constant spraying of either salt or fresh water.
2. Areas subject to fallout or exposure to corrosive chemicals, fumes, ash, cement dust or animal waste.
3. Areas subject to water run-off from lead or copper flashings or areas in contact with lead or copper.
4. Conditions or circumstances where corrosive fumes or condensates are generated or released inside the building.
5. Areas where panels were not stored or installed per Nucor specifications.

This Warranty DOES NOT apply in the event of:

- A. Mechanical, chemical, or other damage sustained by the panels during shipment, storage, erection, or after erection.
- B. Failure to provide free drainage of water, including internal condensation, from overlaps and all other surfaces of the panels.
- C. Failure to remove debris from overlaps and all other surfaces of the panels.
- D. Damage caused to the metallic coating of the panels by improper scouring or cleaning procedures.
- E. Deterioration of the panels caused by contact with green or wet lumber.
- F. Presence of damp insulation or other corrosive materials in contact with or close proximity to the panels.
- G. Failure to use appropriate fasteners as specified in the Nucor Building Systems Erection Manual for all panel connections.
- H. Damage caused to metallic coating due to falling objects including hail and/or wind-borne debris.
- I. Failure of panels applied to slopes which are flatter than 1/4:12.

Additionally, insulation systems must be as defined in Nucor standard documents. Uninsulated areas are excluded from this warranty. Improper use of cutting blades or hot saws that expose the panels to debris shall void the warranty. Product life may be diminished by water runoff from existing structures, condensation unit runoff, or pipes and the like that introduce irritants to the panels.

NUCOR PROJECT #
 NUCOR PROJECT NAME
 PURCHASER
 ORIGINAL OWNER

 Sales Service Manager

THE FOREGOING WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

The foregoing warranty applies only to panels that remain in place at the site of the original construction and which have been stored and erected in strict accordance with all applicable Nucor Building Systems instructions and drawings. The foregoing warranty is extended solely to the original Purchaser and to the Original Owner of the building on which the panels are erected, and is not transferable or assignable. Labor for replacement panels shall be covered by the Purchaser.

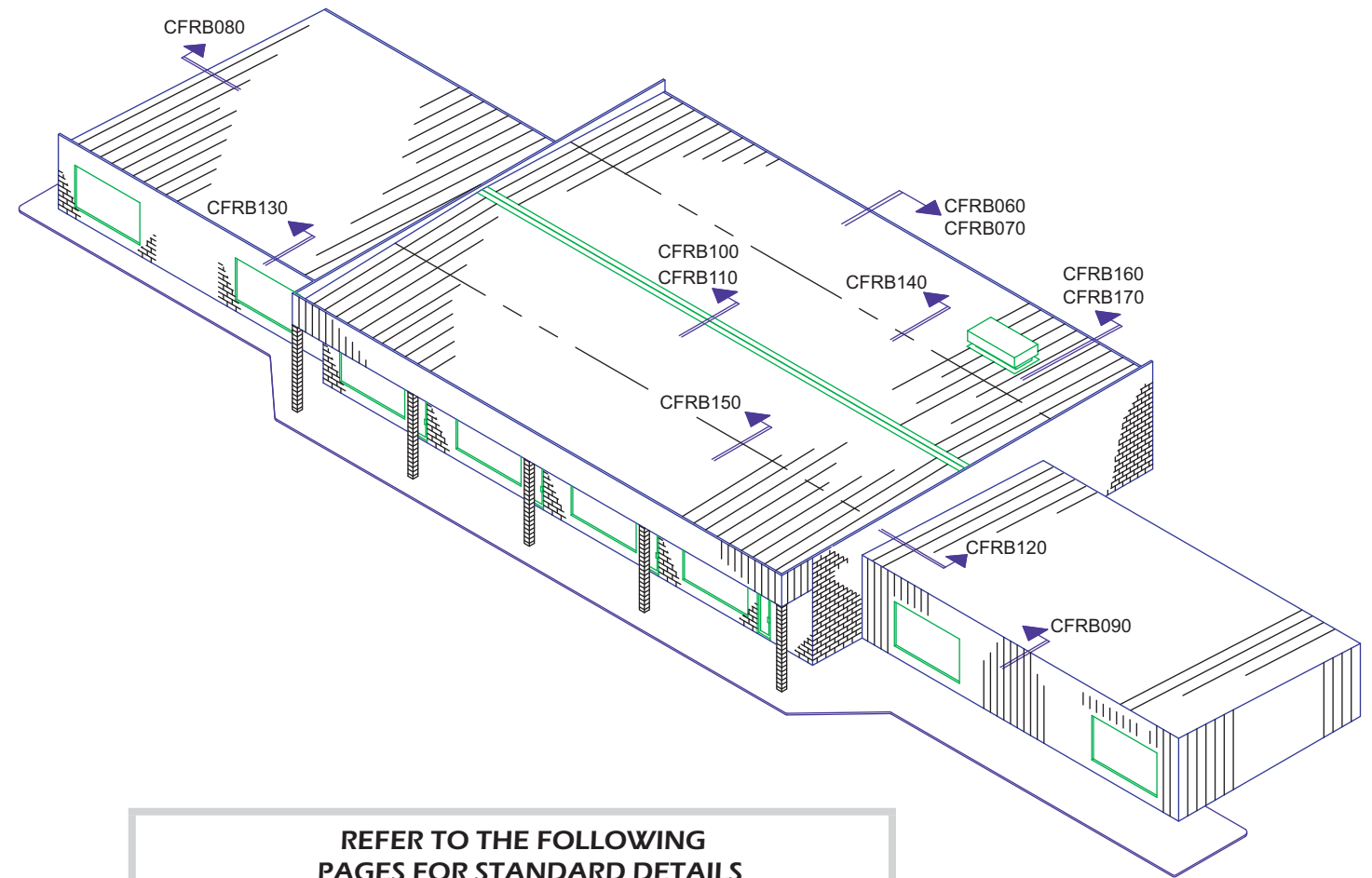
In the event of the failure of the panels to conform to the foregoing warranty within twenty-five (25) years from the date of shipment of the panels from Nucor's plant, Nucor must be notified in writing within thirty (30) days of discovery of such failure and given an adequate identification of the panels involved in the claim, including date of installation, invoice number and date of shipment. No corrective action shall be taken without Nucor Building Systems first having been afforded reasonable opportunity to examine the failure and to approve the method of corrective action taken. Failure to give such notice shall void this warranty.

PURCHASER'S OR ORIGINAL OWNER'S EXCLUSIVE REMEDY AGAINST NUCOR BUILDING SYSTEMS, AND NUCOR BUILDING SYSTEM'S SOLE OBLIGATION, FOR ANY AND ALL CLAIMS, WHETHER FOR BREACH OF CONTRACT, WARRANTY, TORT (INCLUDING NEGLIGENCE), OR OTHERWISE, SHALL BE LIMITED TO REPAIRING DEFECTIVE PANELS, OR AT NUCOR BUILDING SYSTEMS' SOLE OPTION, TO FURNISH EXW LOADED NUCOR BUILDING SYSTEMS' PLANT SUFFICIENT REPLACEMENT PANELS FOR THE DEFECTIVE PANELS.

Nucor Building Systems shall not in any event be liable for the cost of labor to replace any defective panels, nor shall Nucor Building Systems have any liability for incidental or consequential damages.

Nucor shall not have any obligation under any warranty or guarantee until all bills for material, installation and erection of said building and component thereof and labor and other work performed by the Purchaser have been paid in full by the Owner.

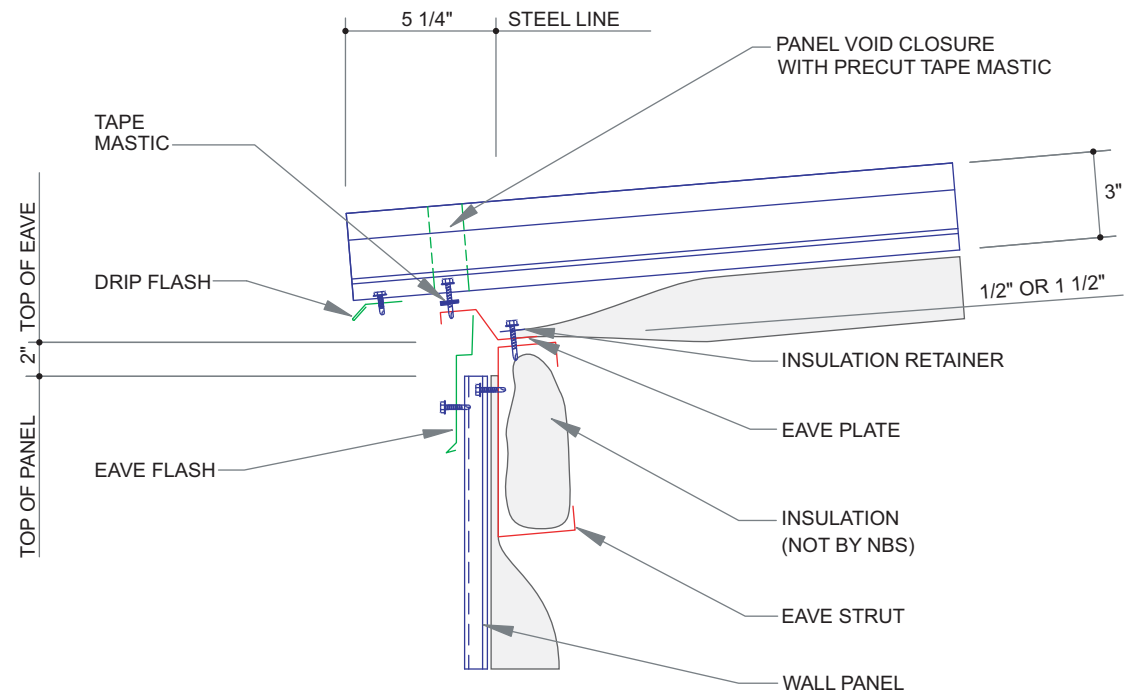
Builder has certified that Nucor panels were stored and installed in accordance with Nucor instructions. In the event Panels were not stored and installed in accordance with Nucor instructions, the Builder and/or those responsible for installation assume all liabilities to the Owner.



REFER TO THE FOLLOWING PAGES FOR STANDARD DETAILS

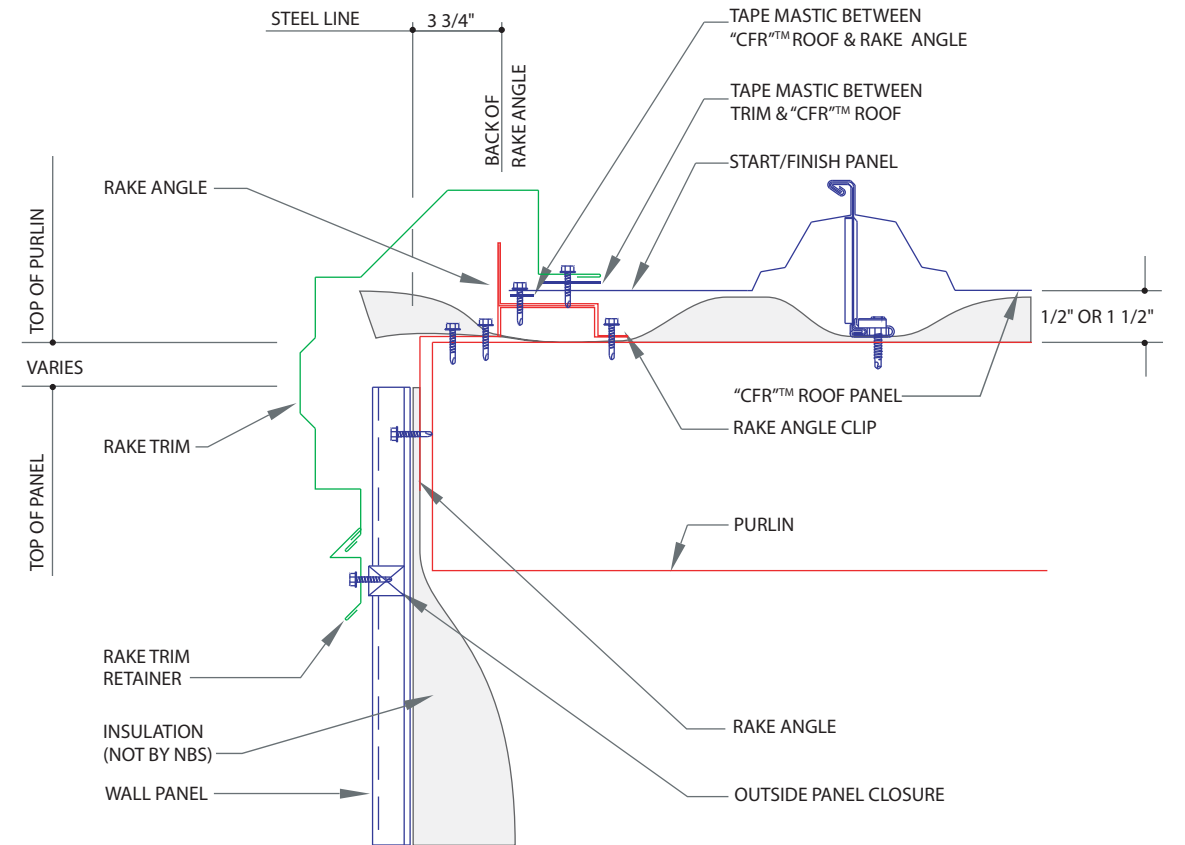
DETAIL	DESCRIPTION	PAGE
CFRB060	Simple Eave	10
CFRB070	Eave Gutter	10
CFRB080	Sculptured Rake	11
CFRB090	High Eave	11
CFRB100	Standard Ridge	12
CFRB110	Optional Ridge	12
CFRB120	Rake Parapet	13
CFRB130	High Eave Parapet	13
CFRB140	Panel Splice	14
CFRB150	Roof Step Expansion Joint	14
CFRB160	Single Roof Curb	15
CFRB170	Double Roof Curb	15

SIMPLE EAVE DETAIL



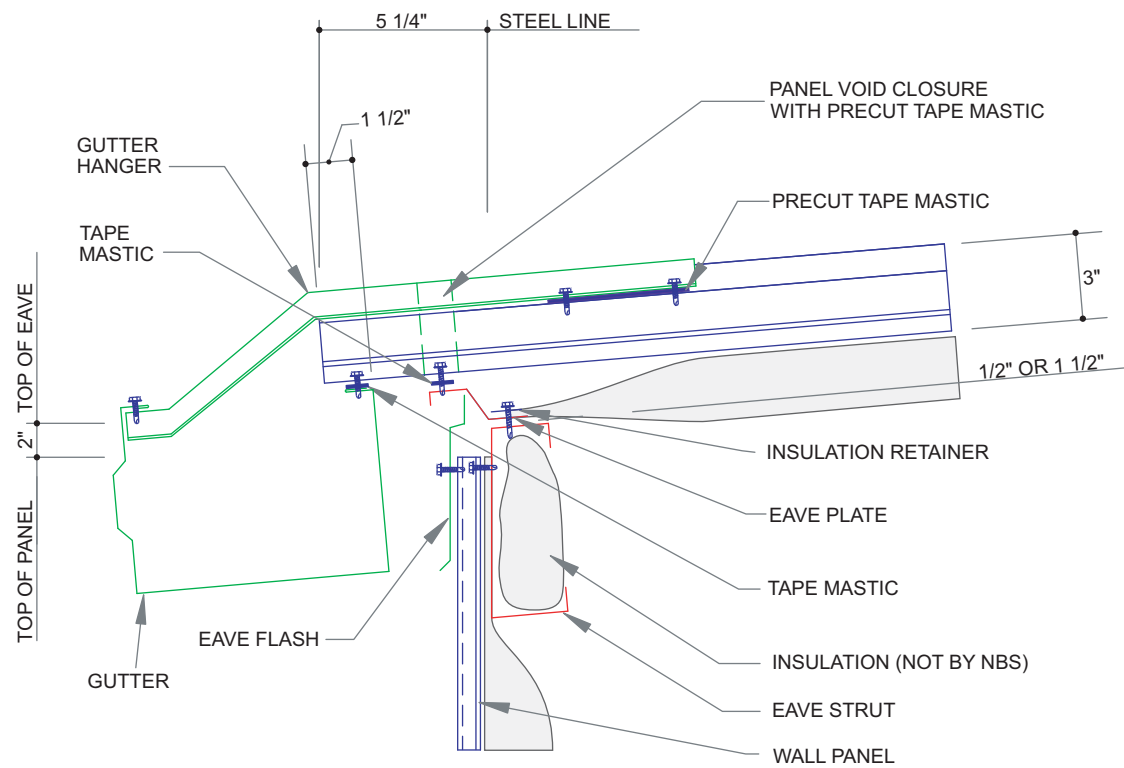
CFRB060

SCULPTURED RAKE DETAIL



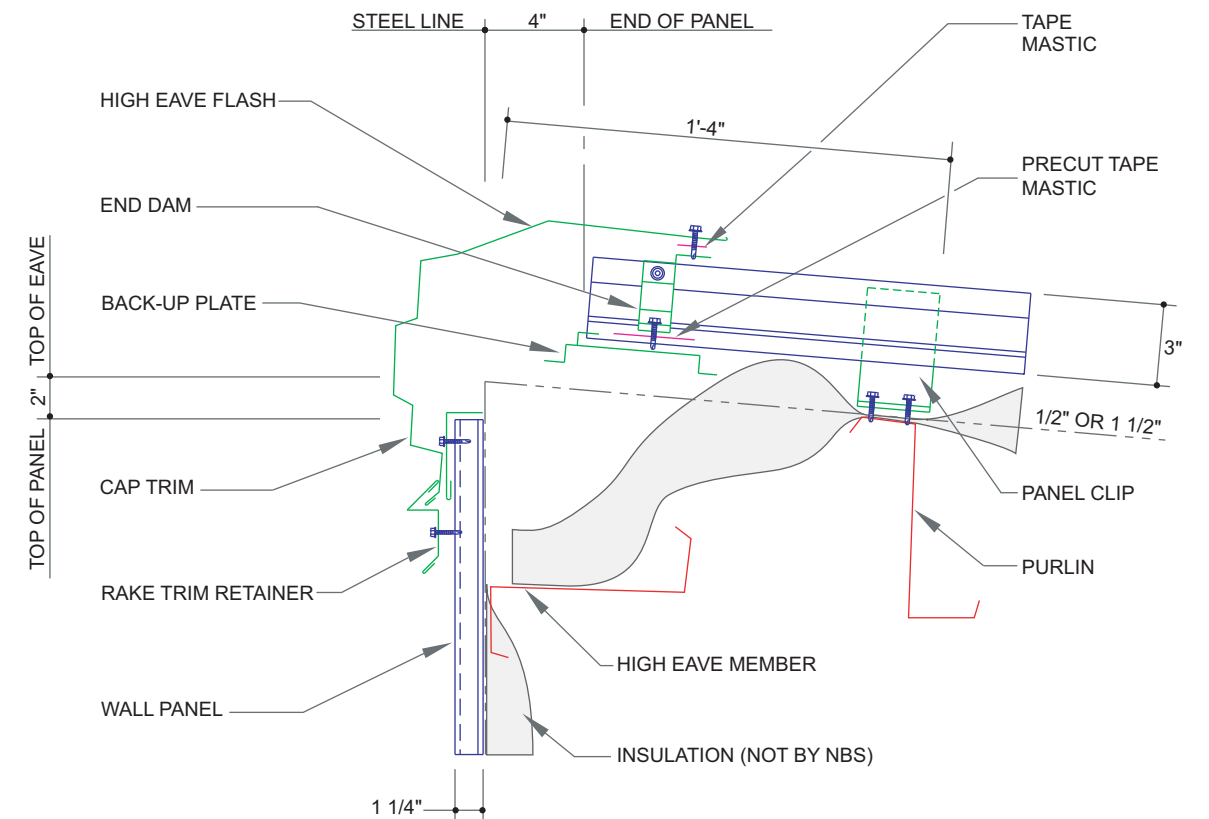
CFRB080

EAVE GUTTER DETAIL



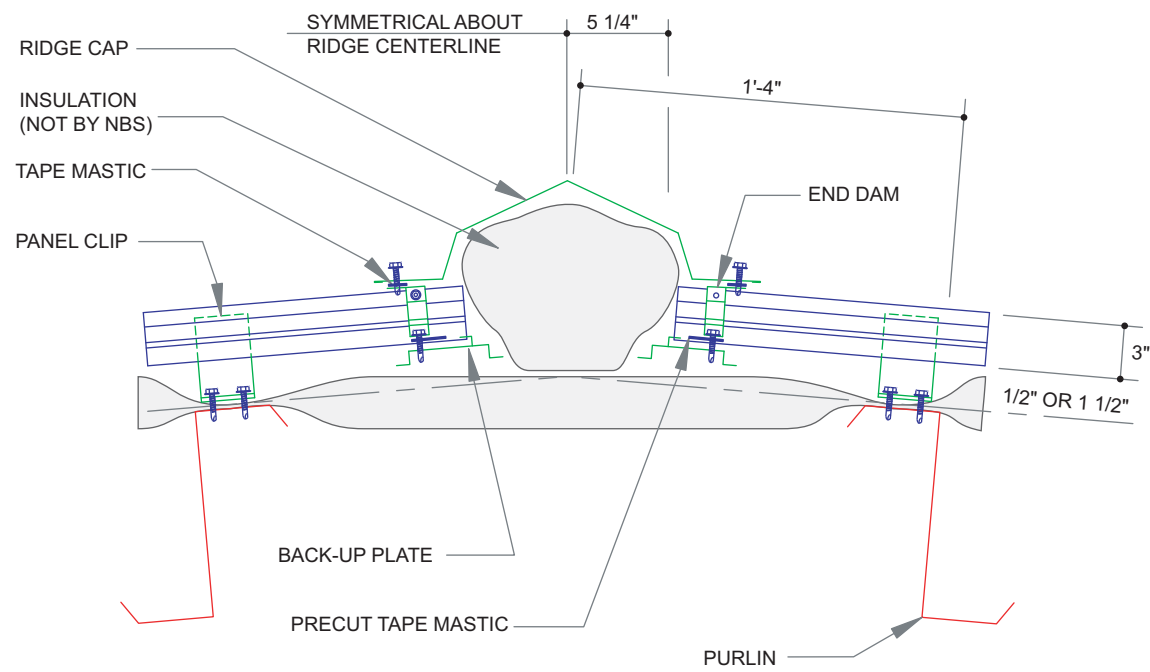
CFRB070

HIGH EAVE DETAIL



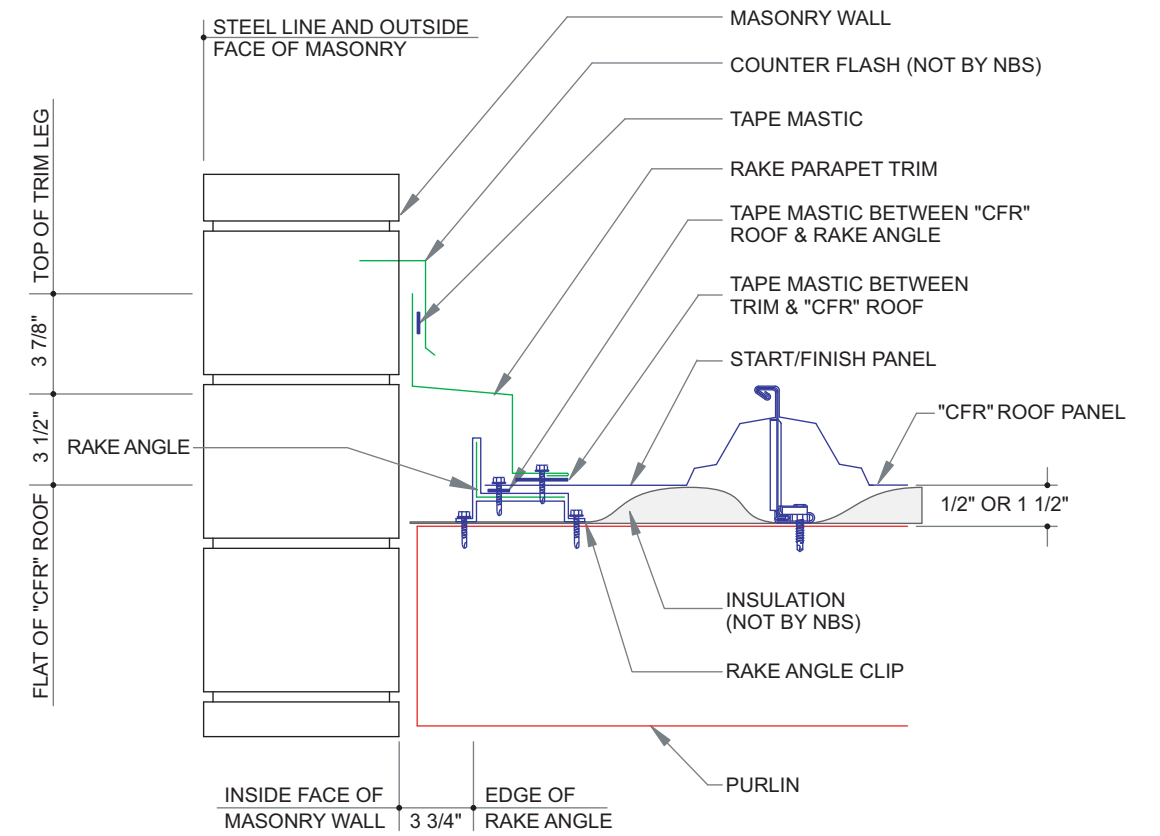
CFRB090

STANDARD RIDGE DETAIL



CFRB100

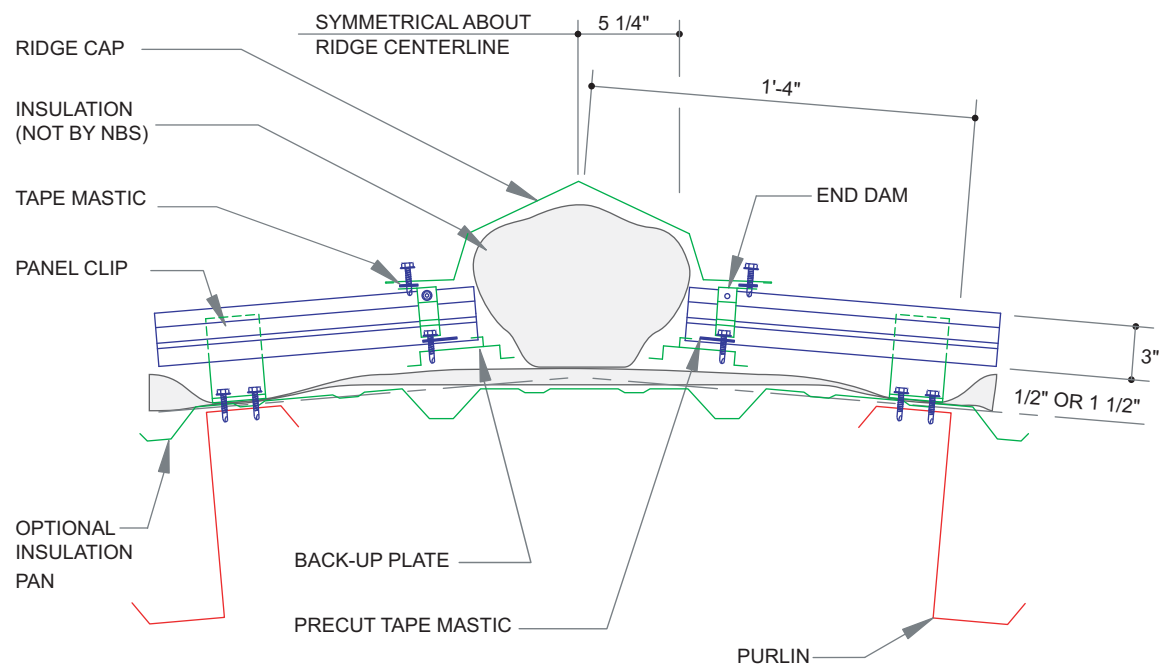
RAKE PARAPET DETAIL



Do not fasten rake parapet trim to masonry wall

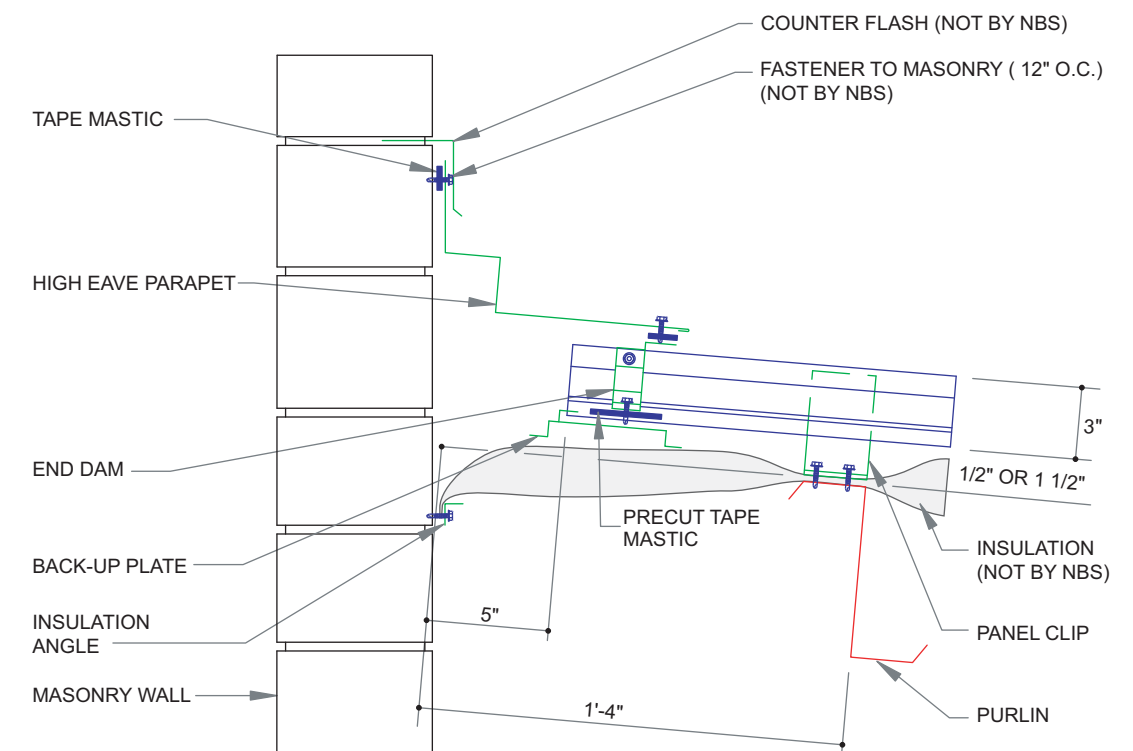
CFRB120

OPTIONAL RIDGE DETAIL



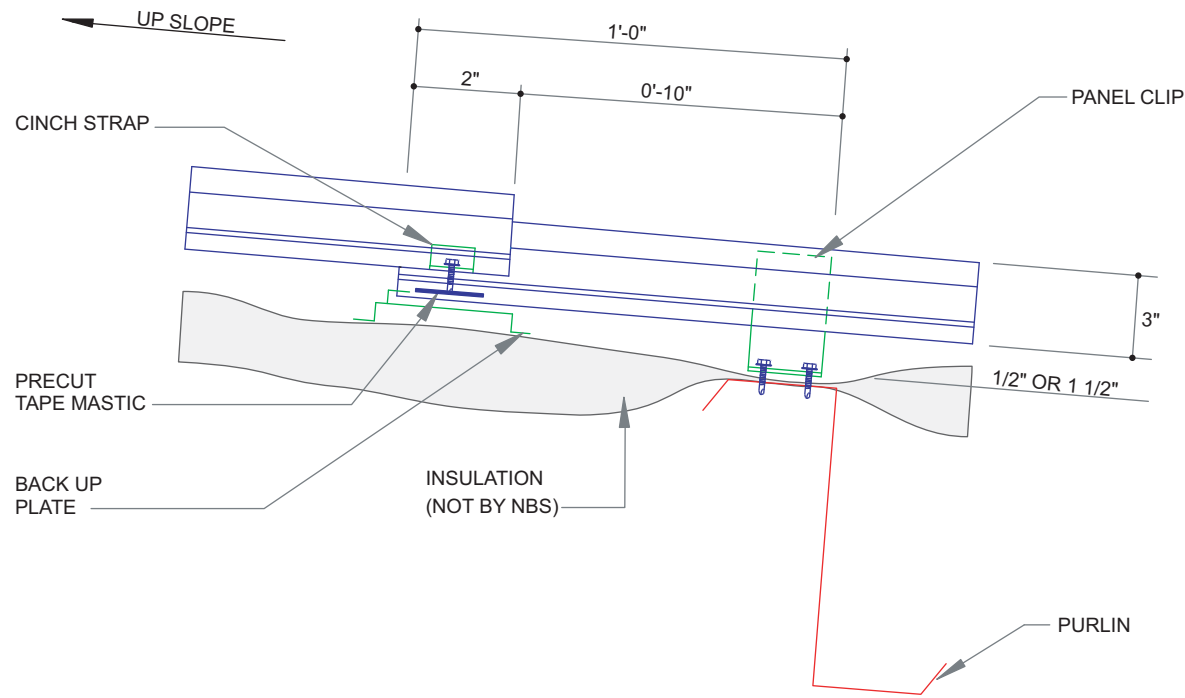
CFRB110

HIGH EAVE PARAPET DETAIL



CFRB130

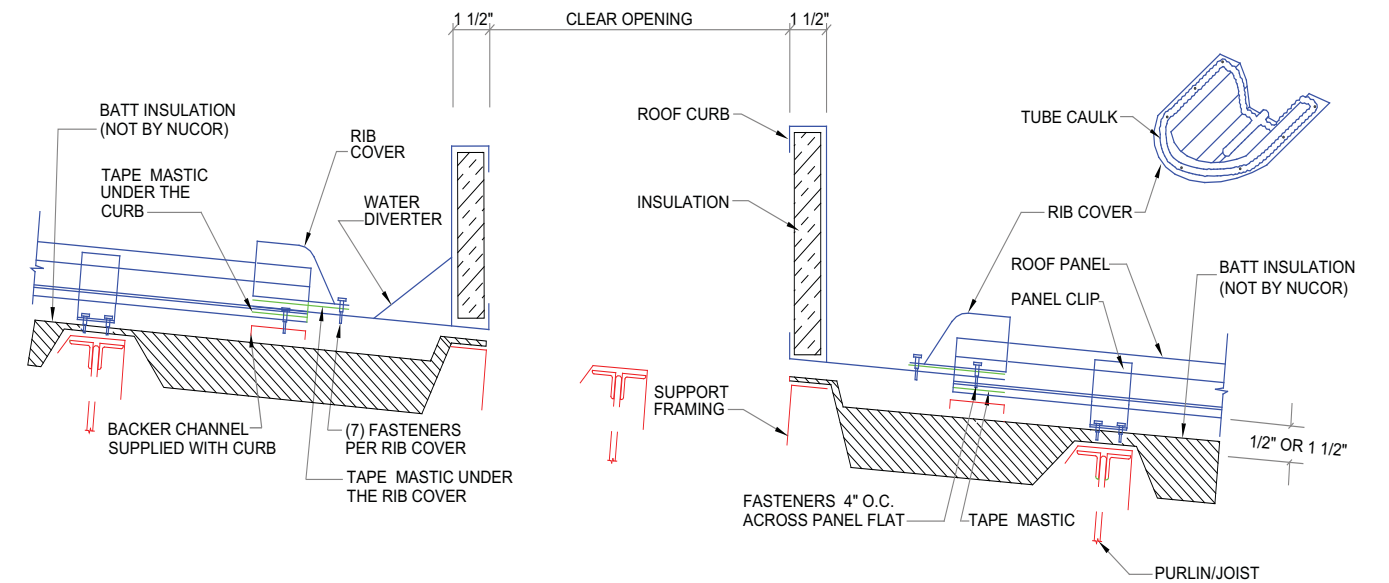
PANEL SPLICE DETAIL



See Page 16 for an exploded view of the endlap

CFRB140

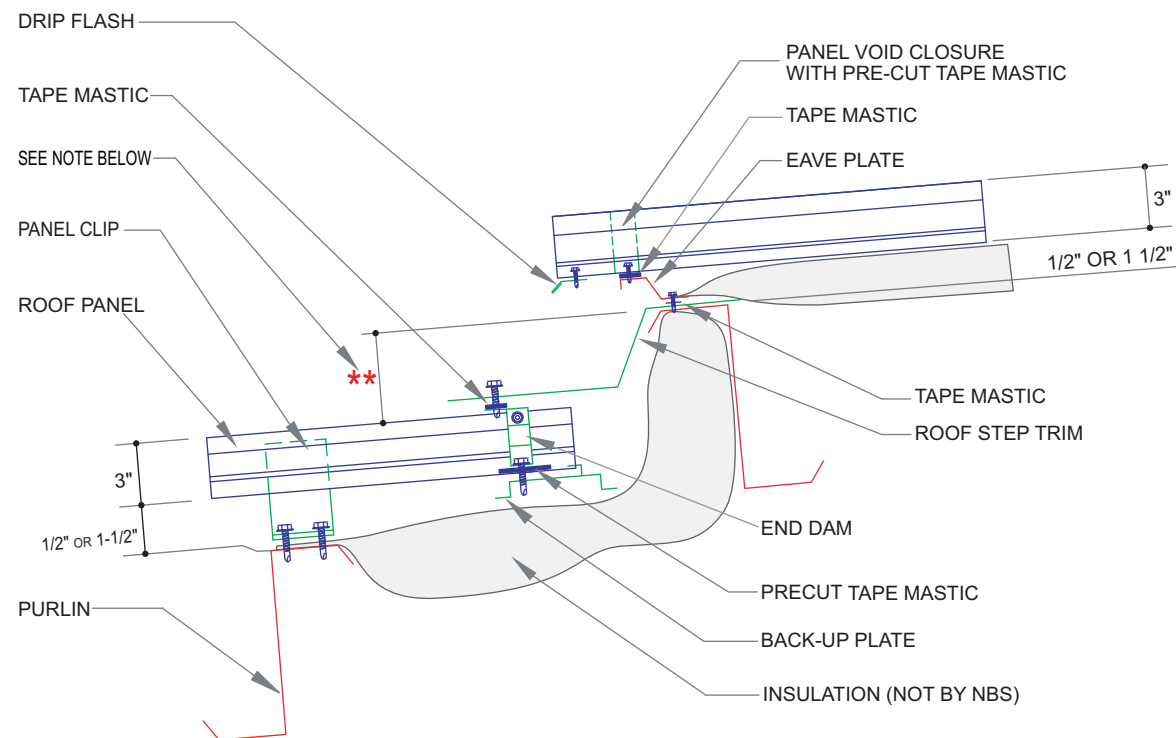
SINGLE ROOF CURB DETAIL



For RTU's less than 750# with sliding panel clips

CFRB160

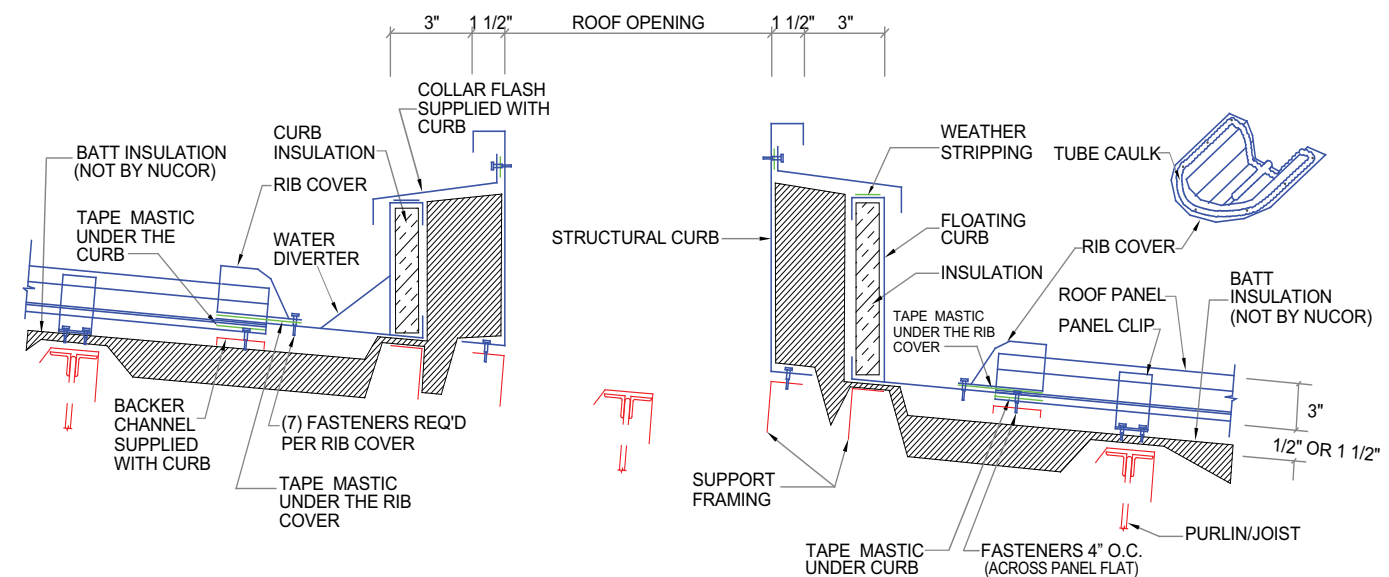
ROOF STEP EXPANSION JOINT DETAIL



** 4 1/2" if lower roof plane panel has tall clips; 5 1/2" if lower roof plane panel has short clips
Dimensions do not apply to composite roof systems

CFRB150

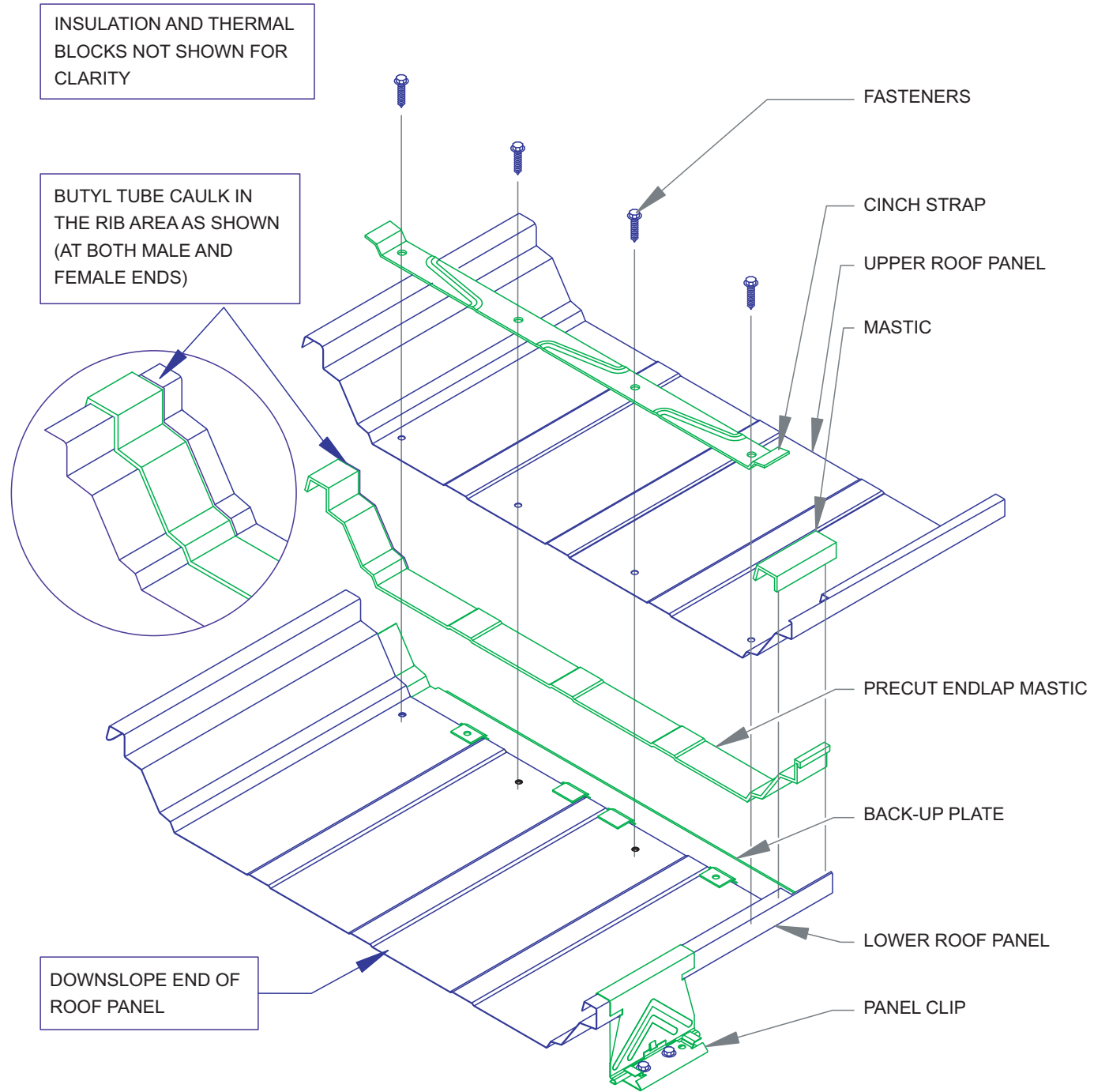
DOUBLE ROOF CURB DETAIL



For RTU's > than 750# and < 1200# with sliding panel clips

CFRB170

EXPLODED ENDLAP DETAIL



Indiana Plant

305 Industrial Parkway
Waterloo, IN 46793
Ph: 260.837.7891
Fax: 260.837.7384

Northeast Sales Office

201 Granite Drive
Suite 280
Lancaster, PA 17601
Ph: 717.735.7766
Fax: 717.735.7769

South Carolina Plant

P.O. Box 1006
200 Whetstone Rd.
Swansea, SC 29160
Ph: 803.568.2100
Fax: 803.568.2121

Texas Plant

600 Apache Trail
Terrell, TX 75160
Ph: 972.524.5407
Fax: 972.524.5417

Utah Plant

P.O. Box 907
1050 North Watery Lane
Brigham City, UT 84302
Ph: 435.919.3100
Fax: 435.919.3101

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