NUCOR®
BUILDINGS GROUP

The following Nucor Buildings Group (American Buildings, CBC Steel Buildings, Kirby Building Systems and Nucor Building Systems), Standard Specifications Guide provides the owner or design professional a detailed description of all standard Nucor Buildings Group (NBG) products. This guide is designed to aid the architect or engineer of record in the process of specifying the best building system solution.

These comprehensive specifications cover many aspects of the NBG product line. Since it is possible to apply the various NBG products covered in this manual in many different ways, not all conditions are addressed, and more detailed information is available. For the unique needs of an individual project building design, please contact the appropriate brand's engineering team for assistance.

The specifications incorporates, by reference, the latest edition of the MBMA Metal Building Systems Manual, published by the Metal Building Manufacturers Association (MBMA), to all NBG project specifications.

Notice: In keeping with a program of continuous and never ending improvement all information contained herein is subject to change without notice.

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1. General

1.1. Scope

1.1.1. The building shall consist of all primary and secondary structural members, connection bolts, canopies, roof extensions, sheeting, trim, flashing, doors, fasteners, gutters, downspouts, and other miscellaneous items and accessories as specified, shown, or called for on NBG drawings or order documents. Refer to the Latest Edition of the Metal Building Systems Manual section entitled “Common Industry Practices” for the standards in which this guide will be used. NBG will not provide items not specifically called for in the NBG order documents.

1.2. Dimensional Terminology

1.2.1. The building "width" shall be the distance from outside face of sidewall girt to outside face of sidewall girt (steel line to steel line).

1.2.2. The building "length" shall be the distance from outside face of endwall girt to outside face of endwall girt (steel line to steel line).

1.2.3. The building "eave height" shall be the distance from finished floor to top of eave strut or purlin at the steel line. For buildings with curbs or column recesses, eave height shall still be measured from the finished-floor elevation.

1.2.4. The "bay spacing" shall be the distance from center of primary frame to center of primary frame for interior bays. End bays shall be the distance from outside face of endwall girt (steel line) to center of first interior primary frame.

1.2.5. The "module spacing" on RMG-X buildings shall be the distance from outside face of sidewall girt (steel line) to center of first interior column. It is also the distance from center to center of interior columns for interior spans.

1.2.6. The "roof slope" shall be based on an order-specified vertical rise for each 12" horizontal run unless otherwise stated (1/4” in 12” minimum for CFR, SS360, SSII and Loc Seam; 1/2” in 12” for R-Panel roofs).

1.3. Building Types

1.3.1. Solid web framing consists of members fabricated from shop-welded, hot-rolled steel sheets or plates and hot-rolled flat bars.

1.3.1.1. Rigid frames (RCG) are clear span buildings with tapered sidewall columns. They are commonly used for spans from 40 feet to over 150 feet.

1.3.1.2. Tapered beams (TCG) are clear span buildings suitable for smaller span buildings from 20 feet to 60 feet wide. TCG buildings utilize straight sidewall columns and horizontal bottom flange rafters.

1.3.1.3. Rigid frames with interior columns (RMG-X) are multi-span buildings with interior columns (number of interior columns is designated by the "X"). They provide an economical advantage on buildings from 80 feet to over 300 feet wide.

1.3.1.4. Single slope clear span (RCS) or multi-span (RMS-X) buildings are available in width ranges similar to RCG and RMG-X as previously listed. All roof drainage is taken to the low sidewall.

1.3.1.5. Lean-to (LCS) or (LMS-X) buildings are similar to the single slope building; however, the high side column has been eliminated. The lean-to rafter is supported by the main building frame, sidewall, or endwall column.

2. Design

2.1. Design Criteria

2.1.1. All structural steel sections and welded plate members shall be designed in accordance with the latest editions of the AISC 360 Specification for Structural Steel Buildings or CSA Specification for Structural Steel Buildings (S16) and the latest edition of the AWS D1.1 Structural Welding Codes or CSA Welded steel construction (metal arc welding) (W59), as required by the order documents and the specified building code.

2.1.2. All cold-formed structural members and exterior covering shall be designed in accordance with the AISI North American Specification for the Design of Cold-Formed Steel Structural Members (AISI S100). All standards for the welding of cold-formed members are based upon the latest edition of AWS D1.3 Structural Welding Code or CSA Welded steel construction (metal arc welding (W59), as required by the order documents and the specified building code.

2.1.3. The primary and secondary framing and covering shall be designed for all applicable loads and combinations of loads as set forth in the specified governing building code for the order under consideration. This may be any of the standard model building codes currently published, such as: the International Code Council's International Building Code (IBC) or the National Research Council of Canada's National Building Code of Canada (NBCC). Additionally, many orders may be within states or municipalities that have their own amendments to the governing model code or that have their own independent code. In this case, loads, Interpretation of any local code or other requirements is no the responsibility of the Metal Building Manufacturer. Specification of loads and codes and design responsibility shall be as stated in the "Common Industry Practices" section of the latest MBMA Metal Building Systems Manual. These "common industry practices" will apply regardless.

2.1.4. The appropriate code shall be specified at the time of the building quotation.

2.2. Engineering Certifications

2.2.1. All buildings shall be designed by or under the direct supervision of registered professional engineers in accordance with the information specified to NBG on the order documentation in compliance with the "Common Industry Practices" section of the latest MBMA Metal Building Systems Manual. NBG's sealing engineer is not the "Engineer of Record" for the project and cannot be construed as such.

2.2.2. Design calculations, certified by a professional engineer, may be purchased with the order, if requested.

2.2.3. A letter of certification, certified by a professional engineer, may be supplied with the building quote proposal, if requested. A letter of certification shall be provided with the order at the time the anchor bolt plans are complete.

2.2.4. All permit drawings shall be stamped with a professional engineer's seal in the state of the building location. Approval drawings will not be sealed. Erection drawings will be sealed only if specifically requested by the customer.

2.3. Non-Standard Design Loads

2.3.1. All building types shall be available with non-standard design loads as required by the local code or governing body provided these loads are specified on the order documents. Special dead, live, or wind loads shall be applied in the same manner as standard design loads for the type of building involved as long as demonstrated in the latest Metal Building Systems Manual.

2.4. Auxiliary Design Loads

2.4.1. Crane and impact loads shall be applied in accordance with the latest editions of the AISC Specification for Structural Steel Buildings, the CSA Specification for Structural Steel Buildings (S16), the "Common Industry Practices" section of the latest MBMA Metal Building Systems Manual as applicable, and the appropriate building code specified on the NBG order documents.

2.4.2. Seismic loads, for buildings in areas subject to earthquakes, shall be derived using the procedure set forth by appropriate building codes specified on the NBG order documents.

2.5. Load Combinations

2.5.1. Load combinations shall be per the specified building code.

3. Anchor Bolts and Foundations

3.1. Anchor Bolts

3.1.1. Anchor bolts and base plates shall be designed to resist all column reactions. Sizes used shall be as those shown on NBG's drawings. The length and embedment anchorage of all anchor bolts shall be the responsibility of the foundation engineer.

3.1.2. Anchor bolts shall not be supplied by NBG and are the responsibility of the contractor or erector to furnish.

3.1.3. Leveling plates shall not be supplied by NBG unless specifically called for on the order documents.

3.2. Foundations

3.2.1. Foundations shall be designed by a qualified registered professional engineer to accommodate the local soil conditions and meet building reaction requirements in addition to other loads imposed by building use or occupancy. It shall be the responsibility of the Engineer of Record to verify that the loading criteria defined on the Order Documents is adequate for the location of the project in question.

3.2.2. Neither the foundation design nor the reinforcing steel shall be supplied by NBG. It shall be the responsibility of the customer, contractor, or erector to obtain these items.

4. Drawings

4.1. General

4.1.1. NBG shall supply on all orders three sets of anchor bolt drawings and reactions.

4.1.2. NBG shall supply on all orders three sets of final erection drawings.Upon request, NBG shall supply three sets of permit drawings showing engineering design details, critical clearances, key connection details, material specifications, and lateral load resisting elements such as bracing, diaphragm, and shear wall layouts.

4.1.3. NBG shall supply three sets of approval drawings on specified jobs. Approval drawings shall show building layout, critical clearances, critical details, and may include permit drawing information if requested. Final fabrication will not begin until approval drawings have been returned with appropriate release signatures or appropriate instruction has been given to NBG to release the project using a Change Order.

4.1.4. NBG does not supply shop fabrication drawings for review or approval. As-built drawings are not provided by NBG.

4.1.5. Unless noted on the order documents, all drawings are issued on 11" x 17" paper stock. Full-size prints (24" x 36") are available at an additional cost.

4.1.6. NBG does not provide electronic drawing files or as-built drawings.

5. Structural Framing

5.1 General

5.1.1. The term "primary structural" members or framing shall refer to any built-up, hot-rolled, or cold-form columns or framing systems which transfer their loads directly to the structure's foundation.

5.1.2. The term "secondary structural" members or framing shall refer to any cold-form, hot-rolled, or built-up purlins, girts, struts, bracing, or beams which transfer their loads from the cladding to the primary structural member or framing to which they attach.

5.1.3. Unless otherwise specified, the minimum standard design thickness of structural framing members shall be as follows:

- Webs of welded built-up members : 0.125"
- Flanges of welded built-up members : 0.188"
- Cold-formed secondary framing members : 0.060"
- Cable bracing / Rod bracing : 0.250" / 0.625"
- Angle bracing : 0.1875"

5.1.4. All hot-rolled sheet, plate, and strip steel used in webs from 0.125" to 0.225" thick shall conform to the provisions of ASTM A-1011 SS or HSLAS Grade 55 (55,000 psi minimum yield strength). All thicknesses greater than 0.230" (to 0.500" inclusive) shall conform to ASTM A-572 Grade 55 (55,000 ksi minimum yield).

5.1.5. All hot-rolled flat bars used in flanges shall conform to the provisions of ASTM A-572 or A-529 Grade 55, with minimum yield of 55,000 psi.

5.1.6. All wide-flange, channel, and "S" shapes shall conform to the provisions of ASTM A-36, ASTM A-572 or ASTM A-992 ("W" shape only). All tube shapes shall conform to ASTM A-500, Grade B. All hot-rolled or cold-rolled sheet and strip steel less than 0.150" thick used in fabrication of cold-formed structural members shall be of ASTM A-1011, Grade 55 (55,000 psi minimum yield stress).

5.1.7. Cable used for diagonal bracing shall conform to ASTM A-475; coating Class A, Grade- Extra High Strength 7 wire. Threaded rod shall meet ASTM A-529 or A-572, Grade 50 requirements. Angle sections shall meet minimum A-36, A-572 or A-529 Grade 50 requirements.

5.1.8. Structural steel members shall be sheared, formed, punched, welded, and painted by the manufacturer. All shop connections shall be welded in conformance with standards based upon the current edition of AWS D1.1 or CSA W59 referenced previously in this guide in Paragraph 2.1.1. Welders and welding operators are qualified as provided in these same codes.

5.1.9. All field connections of primary structural members shall be bolted with high strength bolts and nuts (ASTM F3125 Gr A325 or A490) and shall be snug tightened unless otherwise specified. Secondary structural members shall be field bolted with ASTM A-307 or Gr A325 bolt assemblies as called for in design.

5.1.10. Light gauge cold-formed sections shall be manufactured by roll or brake-forming. All dimensions shall be fabricated to MBMA tolerances.

5.1.11. All structural-framing members that are not galvanized shall be given one shop coat of a red or gray primer. All surfaces are in accordance to systems industry standards as cleaned of loose rust, loose mill scale, and other foreign matter by using, as a minimum, the hand tool cleaning method SSPC-SP2 prior to priming. All primed surfaces are to be reasonably free of excessive drips, runs, sags, and cracking. Reference MBMA and AISC for intended primer protection, proper care, erection, and function of shop prime coat.

5.1.12. All framing members shall have identifying marks to aid the erector in the erection of the building.

5.2. Primary Structural Members

5.2.1. Rigid frame sidewall columns and rafter beams, shall be shop- welded, built-up "I" shapes. Members shall be of constant depth or tapered, having base plates, necessary clips, and splice plates for completely field-bolted assembly and attachment of secondary members. Rafter beams, endwall columns and canopy beams shall be either built-up "I" shapes, "WF" shapes, or roll-formed "C" sections as required to satisfy load and span requirements. Interior columns shall be square tube sections. Built-up "I" shapes or hot-rolled “WF” or tube sections shall be provided as required to satisfy certain load or order requirements.

5.3. Secondary Structural Members

5.3.1. Purlins and girts shall be roll-formed "Z" or "C" sections of adequate size and thickness as determined by the design criteria. Purlins and girts shall be either simple-span or continuous members.

5.3.2. Purlins for “long-bay” building layouts shall typically consist of bar joists designed under Steel Joist Institute specifications for the prescribed loads. Field bolting of joist bridging and seats is the standard method for connection of joists to supporting primary structural members. Field welding of joist bridging and seats is also an option.

5.3.3. Eave struts shall be roll-formed or brake-formed "C" sections.

5.3.4. Wind bracing shall consist of diagonal cable, rod or angle bracing. Adjustment to cable braces shall be made by an eyebolt assembly. Adjustment to rod bracing may be by threaded assembly. Angle bracing is not adjustable and may require final field welding.

5.3.5. Flange bracing shall consist of angle bracing connected to the web of the purlin or girt and to the compression flange of the primary structural member. Flange braces shall be attached to bar joists either by field bolting or field welding.

5.3.6. Base support for wall panels shall consist of a continuous base angle, base angle flash or base girt which shall be securely attached to concrete by the contractor using powder actuated drive pins/nails, expansion anchors or other similar anchorage.

6. Roof Covering NBG R-Panel Roof Panel

6.1. General

6.1.1. Minimum recommended roof slope for NBG R-Panel is 1/2" in 12".

6.1.2. Maximum recommended building width is 240' (gable) or 120' (single slope) for "Z" purlin roofs. NBG R-Panel profile shall be used in conjunction with zee or cee purlins as supports. Joists or roof beams are not acceptable support members unless specifically agreed to by NBG's Engineering Manager.

6.1.3. The NBG R-Panel (26 gauge) is UL90® rated for uplift resistance per the UL580 testing standard when installed on roof purlins spaced according to UL Construction Listing #167, with a maximum support spacing of 5'-0" on center.

6.1.4. NBG (26 ga.) panel qualifies for a FM 1-120 uplift rating when attached to roof purlins, spaced at 5'-0" on center or less.

6.1.5. NBG (24 ga.) panel qualifies for a FM 1-150 uplift rating when attached to roof purlins, spaced at 5'-0" on center or less.

6.2. Panel Material

6.2.1. NBG R-Panel profile shall be precision roll-formed from 26-gauge steel sheeting.

6.2.2. Galvanized steel sheeting shall be processed in accordance with ASTM A-653. Consult your specific plant for minimum yield strength and grade of material. The galvanized coating shall be 0.90 oz. per square foot (Class G90) in accordance with ASTM A-653. The spangle for galvanized panel is bright flat spangle in accordance with ASTM A-653.

6.2.3. Galvalume® steel sheeting shall be aluminum-zinc alloy coated steel sheet in accordance with ASTM A-792. Consult your specific plant for minimum yield strength and grade of material. It has a coating thickness of 0.55 oz. per square foot.

6.2.4. Roof panels provided by NBG for exterior use are precision roll-formed from pre-painted G90 galvanized or Galvalume® coils. Coils to receive finish paints are subjected to a strenuous cleaning process prior to coating. Next, the coils are primer coated and oven cured. The finish coat is then applied and monitored for proper oven-cure temperature and color uniformity. Finished material is subjected to stringent quality control tests including: physical bend and impact resistance, film thickness, hardness, gloss, and color. This process is time tested and uses the industry proven modified Siliconized Polyester paint system. A 70% PVDF finish is available at an additional cost upon request.

6.3. Panel Configuration

6.3.1. NBG R-Panel panel provides a 36” net coverage and consists of major ribs 1 1/4" deep spaced at 12" on center with an extended purlin bearing sidelap to allow for additional sidelap support. Two minor ribs are evenly spaced in the flat area between major ribs.

6.4. Fasteners

6.4.1. Roof panel to secondary structural fastener shall be a 1/4-14 self-drilling carbon steel screw, hex washer head with sealing washer, 1 1/4" long. Fastener shall have a 20-year corrosion resistant coating. Fastener shall have a painted head to match panel and/or trim color when used with painted material.

6.4.2. Panel to panel, flash to flash, (stitch) fastener for roof shall be a 1/4-14 self-drilling carbon steel screw, hex washer head with sealing washer, 7/8" long. Fastener shall have a 20-year corrosion resistant coating. Fastener shall have a painted head to match panel and/or trim color when used with painted materials.

6.5. Trim and Flashing

6.5.1. Color-coated trim and flashing shall be 26 gauge. Trim shall be provided at eave, ridge, rake, and wherever necessary to ensure a properly constructed building, as defined on the NBG order documents.

6.5.2. Neither counter-flashing for parapet conditions nor tie-in flashing to existing buildings shall be provided by NBG.

6.5.3. All exposed trim and flashing material shall be manufactured from galvanized or Galvalume® steel strip.

6.5.4. Exterior gutters and gable flash shall be manufactured in 20’ or 10' lengths wherever possible depending upon plant capabilities.

6.6. Sealants

6.6.1. Mastic for sidelaps, endlaps, and flashing shall be an isobutylene tripolymer rubber pressure sensitive tape mastic.

6.6.2. Tape mastic for sidelaps shall be 1/8" thick X 1/2" wide and mastic for endlaps shall be 1/5" thick X 3/4" wide.

6.6.3. Tube sealants shall be of the non-hardening elastomeric type. This sealant is to be used at all trim and flashing endlaps.

6.7. Closures

6.7.1. Closures shall be closed cell polyethylene foam to match the panel configuration.

6.7.2. Closures shall be provided at the eave of roof panels.

6.8. Installation of Panels

6.8.1. Storage and installation of the roofing system shall be in accordance with NBG's printed instructions.

6.8.2. All endlaps and sidelaps on roof panels shall be sealed with a continuous row of tape mastic to prevent air and water from infiltrating the building.

6.8.3. Standard maximum panel length shall be 45’.

6.8.4. The use of cutting tools that damage the panel finish shall not be allowed.

6.8.5. Panels shall not be marked with any graphite or lead markers.

6.9. Clean-Up

6.9.1. Roof surface should be cleaned daily during construction of all filings, cuttings, screws, pencil markings, and debris to prevent damage due to oxidation of foreign materials.

6.9.2. Contractor shall thoroughly clean all panels, trim, and gutters of all foreign material upon completion of construction.

7. Roof Covering NBG CFR, SS360 or SSII Standing Seam Roof System

7.1. General

7.1.1. Specifically included are panels, panel clips, flashing, panel splices, ridge material, and all necessary fasteners.

7.1.2. Minimum roof slope is 1/4" in 12".

7.1.3. NBG CFR Panel is UL90® rated for uplift resistance per the UL580 testing standard when installed on roof purlins spaced according to UL Construction Listing #590, supported at a maximum of 5'-0" on center by either joists or purlins.

7.1.4. SS360 and SSII Panels are UL90® rated for uplift resistance per the UL580 testing standard when installed on roof purlins spaced according to UL Construction Listing #93, supported at a maximum of 5'-0" on center by either joists or purlins.

7.1.5. CFR **(24 ga.)** Panels with **8" perimeter clip** have an FM 1-120 uplift rating when installed to roof support members spaced at a maximum of 5'-0" on center by either joists or purlins

7.1.6. SS360 **(24 ga.)** Panels have an FM 1-120 uplift rating when installed to roof support members spaced at a maximum of 5'-0" on center by either joists or purlins

7.2. Panel Material

7.2.1. NBG CFR, SS360 and SSII profiles shall be precision roll-formed from 24 gauge steel. Galvalume® steel sheeting is aluminum-zinc coated steel alloy coated steel sheet with a minimum yield strength of 50 ksi in accordance with ASTM A-792, Grade 50. It has a coating thickness of 0.55 oz. per square foot.

7.2.2. Roof panels provided by NBG for exterior use are precision roll-formed from pre-painted Galvalume® coils. Coils to receive finish paints are subjected to a strenuous cleaning process prior to coating. Next, the coils are prime coated and oven cured. The finish coat is then applied and monitored for proper oven-cure temperature and color uniformity. Finished material is subjected to stringent quality control tests including: physical bend and impact resistance, film thickness, hardness, gloss, and color. This process is time tested and uses the industry proven modified Siliconized Polyester paint system. A 70% PVDF finish (CFR and SSII) is available at an additional cost upon request. Roof accessories (end dams, gutter brackets) are provided as unpainted.

7.2.3. Panel shall be factory-dimpled and notched at ridge, high side, and lap locations.

7.2.4. Panel sidelaps shall have factory-applied non-skinning Butyl mastic.

7.3. Panel Configuration

7.3.1. Panels shall have 3" deep trapezoidal ribs spaced 24" on center. Three minor ribs are spaced in the flat of the panel between the major ribs.

7.4. Panel Clip & Fasteners

7.4.1. Fixed panel clips (CFR only) shall only be used with panel runs of less than 80'. Floating panel clips (CFR and SS360) shall be used up to a 240' panel run and shall be self-centering and allow for up to 1-1/2" expansion and/or contraction of total movement from the centered position. SSII shall be used up to a 200' panel run and shall be self-centering and allow for up to 1-1/4" expansion and/or contraction of total movement from the centered position.The clip design shall insure that movement does not occur between the panel and clip.

7.4.2. The CFR panel clips shall have factory-applied mastic to insure a weather-tight installation. SSII and SS360 clips are perforated allowing factory applied mastic in the panel to fulfill a weather-tight installation.

7.4.3. Each clip shall be attached to the joist or purlin with a minimum of two fasteners. In certain instances, three fasteners may be required. Size and type of clip and fastener quantity will be recommended by NBG for the specific application. Clip fasteners for retrofit applications are not by NBG and must be specified by the owner or his agent.

7.4.4. Panel endlap fasteners shall be a 1/4-14 self-drilling carbon steel screw, hex washer head, 1-1/4" long. Fastener shall have a 20-year corrosion resistant coating.

7.5. Trim and Flashing

7.5.1. Color-coated trim and flashing shall be 26 gauge. Trim shall be provided at eave, ridge, rake, and where necessary to ensure a properly constructed building.

7.5.2. High eave flashing and flashing parallel to the roof panels shall accommodate the thermal expansion and contraction of the roof without damage to the roof panels or flashing. Counter-flashing for parapet conditions and flash to existing buildings are not provided by NBG.

7.5.3. All exposed trim and flashing material shall be manufactured from galvanized or Galvalume® steel strip.

7.5.4. Exterior gutters and gable flash shall typically be manufactured in 20' or 10' lengths wherever possible depending upon plant capabilities.

7.6. Installation

7.6.1. Storage and installation of the roofing system shall be in accordance with NBG's printed instructions.

7.6.2. The CFR and SS360 roof hand crimper is specially designed for use with the respective roof panel. Under no circumstances shall the crimper be used on any other manufacturer's roof system. In addition, under no circumstances is another manufacturer's crimper to be used on the CFR or SS360 roof (even if they appear to be the same). Permanent damage to the seam and/or the panel finish may occur if the NBG crimping tool is not used and shall void all warranties.

7.6.3. The panel splice shall have a 0.060" galvanized steel back-up plate.

7.6.4. The back-up plate shall have alignment tabs to ensure proper fit.

7.6.5. Panel splice shall be sealed with precut tape mastic.

7.6.6. Standard maximum panel length varies per plant (50'-0" to 55'-0"). Check your local plant for their specific max panel lengths.

7.6.7. The use of cutting tools that damage the panel finish shall not be allowed.

7.6.8. Panels shall not be marked with any graphite or lead markers.

7.7. Clean-Up

7.7.1. Roof surface should be cleaned daily during construction of all filings, cuttings, screws, pencil markings, and debris to prevent damage due to oxidation of foreign materials.

7.7.2. Contractor shall thoroughly clean all panels, trim, and gutters of all foreign material upon completion of construction.

7.8. Maintenance

7.8.1. The owner shall keep the roof free and clean of debris and corrosive materials at all times.

7.8.2. Gutters and downspouts shall be cleaned periodically and kept free-flowing at all times.

7.8.3. Flashing and sheeting interfaces shall be inspected yearly to ensure connection and water-tightness.

7.8.4. Endlaps, eaves, ridges, curbs, translucent panels, and other interfaces shall be inspected and maintained yearly. Normal adjustments or tightening of fasteners may be required.

7.8.5. The use of tar and other topical applied products shall not be permitted unless specified by the manufacturer.

7.8.6. Copper, lead flashing, exposed iron, or debris shall not be permitted on the roof.

7.8.7. Pipes to and supports for roof-supported units shall be of a non-corrosive or rust-free material. Field painting of pipes and supports may be required to resist corrosion. Condensation from roof-top units shall be piped to interior or exterior locations. Damage due to condensate water is not covered under manufacturer's warranty.

7.9. Erection Sequence

7.9.1. The CFR, SS360 and SSII Roof System is designed to be erected starting from either end of the building. In rare cases, due to the building layout, it may be required to start erection from a specified end. In those cases, it will be noted as such on the erection drawings.

7.9.2. Sequencing of steel shall be clearly marked on the order documents at the time of order entry.

7.10. Coordination with Other Trades

7.10.1. Supports for the CFR, SS360 and SSII Roof System shall be provided and are required as shown in the drawings and as noted in these specifications. All necessary clearance dimensions for proper elevations relative to the roof panels have been shown. The customer shall be responsible for coordinating these dimensional requirements with other trades associated with the building roof system.

7.11. Erection Care

7.11.1. The erector must be skilled in the erection of metal building systems and is responsible for complying with all applicable local, federal, and state construction and safety regulations. This includes OSHA regulations as well as any applicable requirements of local, national, or international union rules or practices. The Erector remains solely responsible for the safety and appropriateness of all techniques and methods utilized by its crews in the erection of the metal building system and/or the CFR, SS360 or SSII roof system. The Erector is also responsible for supplying any safety devices such as scaffolds, runways, nets, etc., which may be required by the governing codes to safely erect the metal building system and/or CFR, SS360 and SSII roof system.

7.11.2. Anchorage for safety devices may be added at an additional cost provided specific connections are designed and clearly noted on the order documents. All anchorage points must be noted with exact location, magnitude, and direction of force for a fully-braced structure.

7.11.3. The erector shall exercise great care and attention to the details as shown on the erection drawings to insure a secure and proper fit of all components. NBG shall not be responsible for supervising and/or coordinating the erection of the roof system with other trades.

7.11.4. Due consideration must be given by the erector to the effects of thermal expansion and contraction when erecting a roof tie-in to an existing structure to insure a safe, secure, weather-tight condition. Flashing for tie-ins to existing buildings is typically not included as part of the material provided by NBG. Refer to the sections and details for specific materials provided by NBG.

7.11.5. The erector acknowledges that all details for all conditions can be noted on the plans and that due care and judgment are required to make a safe and watertight condition. Sealants and caulks may be required based upon actual conditions encountered.

7.12. Field-Cutting of Panels

7.12.1. When field-cutting or mitering roof panels, non-abrasive cutting tools such as nibblers or tin-snips shall be used. Abrasive cutting tools such as mechanical grinders, saws, shears, or scissors can damage the Galvalume® or painted finish and create excess metal shavings that can corrode the panels. The use of non-approved cutting devices may void your manufacturer's warranty.

7.13. Roof-Top Units and Curb Supports

7.13.1. The NBG Roof Curb Framing System is level with roof secondary structural members. The outer roof curb in a double curb system, will have channels attached to accommodate the clip off set of 1/2" for short clips, 1 1/2" for tall clips and 2 1/2" for super tall clips. Refer to the details for proper dimensions.

7.13.2. The NBG CFR, SS360 and SSII Roof System is designed as a floating system. Curb framing and flashing must be designed accordingly to allow the curb system to float with the roof during thermal expansion and contraction.

7.13.3. Roof curbs should be laid out maintaining a "3-purlin-space" rule. This rule is that a roof curb should always be located a distance of at least the equivalent of three purlin spaces from the ridge or eave of a building and from any adjacent roof openings or curbs.

8. Roof Covering NBG Loc Seam Vertical Rib Standing Seam Roof System

8.1. General

8.1.1. Specifically included are panels, panel clips, flashing, panel splices, ridge material, and all necessary fasteners.

8.1.2. Minimum roof slope is 1/4" in 12".

8.1.3. Loc Seam Panels is UL90® rated for uplift resistance per the UL580 testing standard when installed on roof purlins spaced according to UL Construction Listing #332, supported at a maximum of 5'-0" on center by either joists or purlins.

8.1.4. Loc Seam **(24 ga.)** Panels have an FM 1-120 uplift rating when installed to roof support members spaced at a maximum of 2'-6" on center by either joists or purlins

8.1.5. Loc Seam **(22 ga.)** Panels have an FM 1-120 uplift rating when installed to roof support members spaced at a maximum of 5'-0" on center by either joists or purlins

8.2. Panel Material

8.2.1. NBG Loc Seam profile shall be precision roll-formed from 24 gauge Galvalume® AZ50 or AZ55 aluminum-zinc alloy-coated steel sheet with a minimum yield strength of 50 ksi in accordance with ASTM A-792, Grade 50, Class 2. It has a coating thickness of 0.50 oz. to 0.55 oz. per square foot.

8.2.2. Roof panels provided by NBG for exterior use are precision roll-formed from pre-painted Galvalume® aluminum-zinc alloy-coated steel coils. Coils to receive finish paints are subjected to a strenuous cleaning process prior to coating. Next, the coils are prime coated and oven cured. The finish coat is then applied and monitored for proper oven-cure temperature and color uniformity. Finished material is subjected to stringent quality control tests including: physical bend and impact resistance, film thickness, hardness, gloss, and color. This process is time tested and uses the industry proven modified Siliconized Polyester paint system. A 70% PVDF finish is available at an additional cost upon request. Loc Seam gutter brackets are provided as the same color as the roof. Loc Seam ridge closure zees are provided unpainted but, a roof colored cover flash is provided.

8.2.3. Panels are not factory punched.

8.2.4. The upper panels on buildings with endlaps will be factory swaged.

8.2.5. Panel sidelaps shall have factory-applied non-skinning Butyl mastic.

8.3. Panel Configuration

8.3.1. Panels shall have 2" deep vertical ribs spaced 16" on center. Slight striations are applied to the panel pan to prevent oil-canning. The upper panels on buildings with endlaps need to be swaged.

8.4. Panel Clip & Fasteners

8.4.1. Floating panel clips shall be used and shall be self-centering and allow for up to 1" expansion and/or contraction of total movement from the centered position. The clip design shall insure that movement does not occur between the panel and clip.

8.4.2. The panel clips shall have factory-punched holes in the top of the clip to allow the sidelap sealant to flow when installed. This is to insure a continuous weather-tight seal along the panel seam.

8.4.3. Each clip shall be attached to the joist or purlin with two fasteners.

8.4.3. Size and type will be recommended by NBG for the specific application. Clip fasteners for retrofit applications are not by NBG and must be specified by the owner or his agent.
8.4.4. Each clip shall be attached to the joist or purlin with two fasteners. Size and type will be recommended by NBG for the specific application. Clip fasteners for retrofit applications are not by NBG and must be specified by the owner or his agent.
8.4.5. Panel endlap fasteners shall be a 1/4-14 self-drilling carbon steel screw, hex washer head, 1-1/4" long. Fastener shall have a 20-year corrosion resistant coating.

8.5. Trim and Flashing

8.5.1. Color-coated trim and flashing shall be 26 gauge. Trim shall be provided at eave, ridge, rake, and where necessary to ensure a properly constructed building.
8.5.2. High eave flashing and flashing parallel to the roof panels shall accommodate the thermal expansion and contraction of the roof without damage to the roof panels or flashing. Counter-flashing for parapet conditions and flash to existing buildings are not provided by NBG.
8.5.3. All exposed trim and flashing material shall be manufactured from galvanized or Galvalume® steel strip.
8.5.4. Exterior gutters and gable flash shall typically be manufactured in 20' or 10' lengths wherever possible depending upon plant capabilities.

8.6. Installation

8.6.1. Storage and installation of the roofing system shall be in accordance with NBG's printed instructions.
8.6.2. The Loc Seam roof hand crimper is specially designed for use with the Loc Seam roof panel. Under no circumstances shall the Loc Seam crimper be used on any other manufacturer's roof system. In addition, under no circumstances is another manufacturer's crimper to be used on the Loc Seam roof (even if they appear to be the same). Permanent damage to the seam and/or the panel finish may occur if the Loc Seam crimping tool is not used and shall void all warranties.
8.6.3. The panel splice shall have a 0.060" galvanized steel back-up plate.
8.6.4. Panel splice shall be sealed with precut tape mastic and butyl caulk.
8.6.5. Standard maximum panel length shall be 50'-0".
8.6.6. The use of cutting tools that damage the panel finish shall not be allowed.
8.6.7. Panels shall not be marked with any graphite or lead markers.

8.7. Clean-Up

8.7.1. Roof surface should be cleaned daily during construction of all filings, cuttings, screws, pencil markings, and debris to prevent damage due to oxidation of foreign materials.
8.7.2. Contractor shall thoroughly clean all panels, trim, and gutters of all foreign material upon completion of construction.

8.8. Maintenance

8.8.1. The owner shall keep the roof free and clean of debris and corrosive materials at all times.
8.8.2. Gutters and downspouts shall be cleaned periodically and kept free-flowing at all times.
8.8.3. Flashing and sheeting interfaces shall be inspected yearly to ensure connection and water-tightness.

8.8.4. Endlaps, eaves, ridges, curbs, translucent panels, and other interfaces shall be inspected and maintained yearly. Normal adjustments or tightening of fasteners may be required.
8.8.5. The use of tar and other topical applied products shall not be permitted unless specified by the manufacturer.
8.8.6. Copper, lead flashing, exposed iron, or debris shall not be permitted on the roof.
8.8.7. Pipes to and supports for roof-supported units shall be of a non-corrosive or rust-free material. Field painting of pipes and supports may be required to resist corrosion. Condensation from roof-top units shall be piped to interior or exterior locations. Damage due to condensate water is not covered under manufacturer's warranty.

8.9. Erection Sequence

8.9.1. Buildings with the NBG Loc Seam Roof System without an endlap are designed to be erected starting from either end of the building. Buildings that have an endlap will have swaged panels and will need to be erected right to left. In those cases, it will be noted as such on the erection drawings.
8.9.2. Sequencing of steel shall be clearly marked on the order documents at the time of order entry.

8.10. Coordination with Other Trades

8.10.1. Supports for the NBG Loc Seam Roof System shall be provided and are required as shown in the drawings and as noted in these specifications. All necessary clearance dimensions for proper elevations relative to the roof panels have been shown. The customer shall be responsible for coordinating these dimensional requirements with other trades associated with the building roof system.

8.11. Erection Care

8.11.1. The erector must be skilled in the erection of metal building systems and is responsible for complying with all applicable local, federal, and state construction and safety regulations. This includes OSHA regulations as well as any applicable requirements of local, national, or international union rules or practices. The Erector remains solely responsible for the safety and appropriateness of all techniques and methods utilized by its crews in the erection of the metal building system and/or the Loc Seam roof system. The Erector is also responsible for supplying any safety devices such as scaffolds, runways, nets, etc., which may be required by the governing codes to safely erect the metal building system and/or Loc Seam roof system.
8.11.2. Anchorage for safety devices may be added at an additional cost provided specific connections are designed and clearly noted on the order documents. All anchorage points must be noted with exact location, magnitude, and direction of force for a fully-braced structure.
8.11.3. The erector of the NBG Loc Seam roof system shall exercise great care and attention to the details as shown on the erection drawings to insure a secure and proper fit of all components. NBG shall not be responsible for supervising and/or coordinating the erection of the Loc Seam Roof System with other trades.
8.11.4. Due consideration must be given by the erector to the effects of thermal expansion and contraction when erecting a roof tie-in to an existing structure to insure a safe, secure, weather-tight condition. Flashing for tie-ins to existing buildings is typically not included as part of the material provided by NBG.

Refer to the sections and details for specific materials provided by NBG.

8.11.5. The erector acknowledges that all details for all conditions can be noted on the plans and that due care and judgment are required to make a safe and watertight condition. Sealants and caulks may be required based upon actual conditions encountered.

8.12. Field-Cutting of Panels

8.12.1. When field-cutting or mitering Loc Seam roof panels, non-abrasive cutting tools such as nibblers or tin-snips shall be used. Abrasive cutting tools such as mechanical grinders, saws, shears, or scissors can damage the Galvalume® or painted finish and create excess metal shavings that can corrode the panels. The use of non-approved cutting devices may void your manufacturer's warranty.

8.13. Roof-Top Units and Curb Supports

8.13.1. The NBG Loc Seam Roof Curb Framing System is level with roof secondary structural members. The outer roof curb in a double curb system, will have channels attached to accommodate the clip off set of 1/2" for short clips and 1 1/2" for tall clips. Refer to the details for proper dimensions.

8.13.2. The Loc Seam Roof System is designed as a floating system. Curb framing and flashing must be designed accordingly to allow the curb system to float with the Loc Seam roof during thermal expansion and contraction.

8.13.3. Roof curbs should be laid out maintaining a "3-purlin-space" rule. This rule is that a roof curb should always be located a distance of at least the equivalent of three purlin spaces from the ridge or eave of a building and from any adjacent roof openings or curbs.

9. Roof Covering NBG Insulated CFR Metal Panel Roof System (Metl-Span)

9.1. General

9.1.1. Specifically included are panels, panel clips, flashing, panel splices, ridge material, and all necessary fasteners.

9.1.2. Minimum roof slope is 1/2" in 12".

9.1.3. Panel endlaps will always be staggered.

9.1.4. Metl-Span CFR Panel is UL90® rated for uplift resistance per the UL580 testing standard when installed on roof purlins spaced according to UL Construction Listing #499, supported at a maximum of 7'-0" on center by either joists or purlins.

9.1.5. Metl-Span CFR Panels have an FM uplift rating when installed to roof support members spaced at a maximum of 5'-0" on center purlins.

9.2. Panel Material

9.2.1. The Insulated CFR profile shall be two layers of precision roll-formed from 24 and 26 gauge material that sandwich a layer of polyisocyanurate foam board insulation.

9.2.2. Insulated CFR roof panels are precision roll-formed from pre-painted Galvalume® aluminum-zinc alloy-coated steel coils. Coils to receive finish paints are subjected to a strenuous cleaning process prior to coating. Next, the coils are prime coated and oven cured. The finish coat is then applied and monitored for proper oven-cure temperature and color uniformity.

9.2.3. Panel are factory cut, notched and swaged eliminating field work and erection costs.

9.3. Panel Configuration

9.3.1. Panels shall have 2” deep vertical ribs seams with available widths of 36" or 42”. Minor ribs are spaced in the flat of the panel between the major ribs.

9.4. Panel Clip & Fasteners

9.4.1. Fixed panel clips only.
9.4.2. Each clip shall be attached to the joist or purlin with three 1/4-14 fasteners.
9.4.3. Panel endlap fasteners shall be a 1/4-14 self-drilling carbon steel screw, hex washer head, 1 1/4” long. Fastener shall have a 20-year corrosion resistant coating.
9.4.4. Panel endlap fasteners shall be a 1/4-14 self-drilling carbon steel screw, hex washer head, 1 1/4” long. Fastener shall have a 20-year corrosion resistant coating.

9.5. Trim and Flashing

9.5.1. Color-coated trim and flashing shall be 26 gauge. Trim shall be provided at eave, ridge, rake, and where necessary to ensure a properly constructed building.
9.5.2. High eave flashing and flashing parallel to the roof panels shall accommodate the thermal expansion and contraction of the roof without damage to the roof panels or flashing. Counter-flashing for parapet conditions and flash to existing buildings are not provided by NBG.
9.5.3. All exposed trim and flashing material shall be manufactured from galvanized or Galvalume® steel strip.
9.5.4. Exterior gutters and gable flash shall typically be manufactured in 20’ or 10' lengths wherever possible depending upon plant capabilities.

9.6. Installation

9.6.1. Storage and installation of the roofing system shall be in accordance with NBG's printed instructions.
9.6.2. Panels will be installed from left to right since they are not symmetrical.
9.6.3. The in-line panel splices shall have a 0.060” prime painted steel back-up angle attached to the purlin at 12” on center. Panels contain factory applied backer plates at endlaps.
9.6.4. Panel splice shall be sealed with precut tape mastic and butyl caulk.
9.6.5. Standard maximum panel length shall be 53’-0”.
9.6.6. The use of cutting tools that damage the panel finish shall not be allowed.
9.6.7. Panels shall not be marked with any graphite or lead markers.

9.7. Clean-Up & Maintenance

9.7.1. Roof surface should be cleaned daily during construction of all filings, cuttings, screws, pencil markings, and debris to prevent damage due to oxidation of foreign materials.
9.7.2. Contractor shall thoroughly clean all panels, trim, and gutters of all foreign material upon completion of construction.
9.7.3. Proper installation and maintenance are extremely important to obtain the best performance and appearance from the insulated panel. Dirt, oil grease, fingerprints or any other kind of containment must be completely removed when the installation is finish to maximize coatings performance.

9.7.4. The building will require periodic maintenance according to conditions at the site: U. V., dirt, smoke, corrosive atmosphere, etc.

9.7.5. To remove oxidation and tough stains, it is recommended to use a household cleaner recommended for use of porcelain sinks and bath tubs. This should be followed with a thorough rinsing. Wire brushing or any abrasive material may damage the painted surface and should not be used.

9.7.6. If "touch up" paint is required, contact NBG to obtain an air-dry urethane color match for your project.

9.7.7. Dirt pickup may cause apparent discoloration of the paint when it has been exposed to dirt-laden atmospheres for long periods of time. Slight chalking may cause some change in appearance in areas of strong sunlight. A good cleaning will often restore the appearance of these buildings. In many cases simply washing the building with plain water using pressure sprays will be adequate. In areas of heavy dirt deposits, a solution of water and detergent may be used. Use a rag or sponge, to clean. A clear water rinse should follow.

9.7.8. Endlaps, eaves, ridges, curbs, and other interfaces shall be inspected and maintained yearly. Normal adjustments or tightening of fasteners may be required.

9.7.9. The use of tar and other topical applied products shall not be permitted unless specified by the manufacturer.

9.7.10. Copper, lead flashing, exposed iron, or debris shall not be permitted on the roof.

9.7.11. Pipes to and supports for roof-supported units shall be of a non-corrosive or rust-free material. Field painting of pipes and supports may be required to resist corrosion. Condensation from roof-top units shall be piped to interior or exterior locations. Damage due to condensate water is not covered under manufacturer's warranty.

9.8. Erection Sequence

9.8.1. Buildings with the Insulated CFR Roof System are designed to be erected from left to right since these panels are not symmetrical.

9.9. Coordination with Other Trades

9.9.1. Supports for the Insulated CFR Roof System shall be provided and are required as shown in the drawings and as noted in these specifications. All necessary clearance dimensions for proper elevations relative to the roof panels have been shown. The customer shall be responsible for coordinating these dimensional requirements with other trades associated with the building roof system.

9.10. Erection Care

9.10.1. The erector must be skilled in the erection of metal building systems and is responsible for complying with all applicable local, federal, and state construction and safety regulations. This includes OSHA regulations as well as any applicable requirements of local, national, or international union rules or practices. The Erector remains solely responsible for the safety and appropriateness of all techniques and methods utilized by its crews in the erection of the metal building system and / or the CFR roof system. The Erector is also responsible for supplying any safety devices such as scaffolds, runways, nets, etc., which may be required by the governing codes to safely erect the metal building system and / or CFR roof system.

9.10.2. Anchorage for safety devices may be added at an additional cost provided specific connections are designed and clearly noted on the order documents. All anchorage points must be noted with exact location, magnitude, and direction of force for a fully-braced structure.

9.10.3. The erector of the NBG Insulated CFR roof system shall exercise great care and attention to the details as shown on the erection drawings to insure a secure and proper fit of all components. NBG shall not be responsible for supervising and/or coordinating the erection of the Insulated CFR Roof System with other trades.

9.10.4. Due consideration must be given by the erector to the effects of thermal expansion and contraction when erecting a roof tie-in to an existing structure to insure a safe, secure, weather-tight condition. Flashing for tie-ins to existing buildings is typically not included as part of the material provided by NBG. Refer to the sections and details for specific materials provided by NBG.

9.10.5. The erector acknowledges that all details for all conditions can be noted on the plans and that due care and judgment are required to make a safe and watertight condition. Sealants and caulks may be required based upon actual conditions encountered.

9.11. Field-Cutting of Panels

9.11.1. When field-cutting or mitering Insulated CFR roof panels, non-abrasive cutting tools such as nibblers or tin-snips shall be used. Abrasive cutting tools such as mechanical grinders, saws, shears, or scissors can damage the Galvalume® or painted finish and create excess metal shavings that can corrode the panels. The use of non-approved cutting devices may void your manufacturer's warranty.

10. Wall Covering

10.1. General

10.1.1. Wall covering shall be NBG's R-Panel, Reverse R-Panel or A-Panel profile, precision roll-formed from 26 gauge steel.

10.1.2. All NBG wall panel configurations have been tested per the ASTM E283 & E331 standards.

10.2. Panel Material

10.2.1. Galvanized steel sheeting shall be processed in accordance with ASTM A-653. Consult your specific plant for minimum yield strength and grade of material. The galvanized coating shall be 0.90 oz. per square foot (Class G90) in accordance with ASTM A-653. The spangle for galvanized panel is bright flat spangle in accordance with ASTM A-653.

10.2.2. Galvalume® steel sheeting shall be aluminum-zinc alloy coated steel sheet in accordance with ASTM A-792. Consult your specific plant for minimum yield strength and grade of material. It has a coating thickness of 0.55 oz. per square foot.

10.2.3. Wall panels provided by NBG for exterior use are precision roll-formed from pre-painted G90 galvanized or Galvalume® coils. Coils to receive finish paints are subjected to a strenuous cleaning process prior to coating. Next, the coils are prime coated and oven cured. The finish coat is then applied and monitored for proper oven-cure temperature and color uniformity. Finished material is subjected to stringent quality control tests including: physical bend and impact resistance, film thickness, hardness, gloss, and color.

10.2.3. This process is time tested and uses the industry proven Modified Siliconized Polyester paint system. A 70% PVDF finish is available at an additional cost upon request.

10.3. Panel Configuration

10.3.1. NBG R-Panel provides a 36" net coverage and consists of major ribs 1 1/4" deep spaced at 12" on center with an extended purlin bearing sidelap to allow for additional sidelap support. Two minor ribs are evenly spaced in the flat area between the major ribs. The R-Panel is designed for blanket insulation up to 4" thick. (6" is possible with special care)

10.3.2. NBG Reverse R-Panel provides a 36" net coverage and consists of major ribs 1 1/4" deep spaced at 12" on center with an extended purlin bearing sidelap to allow for additional sidelap support. Two minor ribs are evenly spaced in the flat area between the major ribs. The NBG Reverse R-Panel is designed for blanket insulation up to 6" thick.

10.3.3. NBG A-Panel panel is an architectural recessed fastener panel. It provides a 36" net coverage and consists of 1 1/4" deep major ribs spaced at 12" on center, with an extended purlin bearing sidelap to allow for additional sidelap support. A sculptured valley is between the major ribs. The NBG A-Panel is designed for blanket insulation up to 6" thick.

10.3.4. NBG Metroline Panel is a symmetrical panel with 1 1/2" ribs uniformly spaced at 7.2" on center. It provides a 36" net coverage and features a capillary break in the sidelap rib. It laps in the low cell. Panel is provided in either 24 or 26 gauge and is designed for blanket insulation up to 6" thick.

10.3.5. NBG Skyview Panel has 1 1/2" ribs uniformly spaced at 7.2" on center. It provides a 36" net coverage and laps in the low cell. Panel is provided in either 24 or 26 gauge and is designed for blanket insulation up to 6" thick.

10.4. Trim and Flashing

10.4.1. Color-coated trim and flashing shall be supplied in 26 gauge. Trim shall be provided at eave, base, corners, framed openings, and where necessary to insure a properly constructed building.

10.4.2. All exposed trim and flashing material shall be manufactured from Galvalume®, galvanized, or painted steel strip.

10.5. Fasteners

10.5.1. Panel to structural fastener for all wall panels shall be a No. 12 self-drilling carbon steel screw, hex head x 1 1/4" long. Fastener shall have a painted head to match panel and/or trim color.

10.5.2. Panel to panel, stitch fastener for all wall panels shall be a 1/4-14 self-drilling carbon steel screw, hex head, 7/8" long. Fastener shall have a painted head to match panel and/or trim color.

10.5.3. Fasteners required for securing trim to masonry or concrete are not supplied by NBG.

10.6. Sealants

10.6.1. Tube sealants shall be used at all trim endlaps, and shall be a polyurethane sealant.

10.6.2. Sealants not provided by NBG shall not be used without specific approval from NBG.

10.7. Closures

10.7.1. Closures shall be manufactured of closed-cell polyethylene foam to match the panel configuration.

10.7.2. Beveled Closures are available for all NBG panel types, Left & Right, Inside & Outside, at roof slopes from > 1 1/2 : 12 to 9 1/2 : 12.
10.7.3. Straight and/or Beveled Closures shall be supplied as ordered to provide a closed wall panel profile at all panel to wall trim conditions. Standard closure offering; at base, low eave, rake, rake parapet, high eave parapet & framed openings. Customer will have the option to remove closures from base trim.

10.8. Installation of Panels

10.8.1. All sidelaps shall be lapped a minimum of one full rib. Panel endlaps shall be a minimum of 4" on wall panels.
10.8.2. All wall panels shall be fabricated in one piece providing the length does not exceed practical limits for shipment or construction.
10.8.3. Storage and installation of the wall system shall be in accordance with NBG's printed instructions.

10.9. Clean-Up

10.9.1. All dirt, oil, grease, fingerprints, or other contaminants shall be removed after installation to insure proper service life of the paint surface

11. Insulated Wall Panel Covering

11.1. General

11.1.1. Insulated Wall Panel covering shall be Flute, Light Mesa, Mesa, Santa Fe, Striated, Tuff-Cast, or Tuff Wall panel profile, precision roll-formed from 26, 24 or 22 gauge steel. Two layers of metal sandwich foam insulation.
11.1.2. Insulated wall panel configurations have been tested per the ASTM E283 & E331 standard.

11.2. Panel Material

11.2.1. Wall profiles shall be two layers of precision roll-formed from 26, 24 or 22 gauge material that sandwich a layer of polyisocyanurate foam board insulation.
11.2.2. Wall panels provided by NBG for exterior use are precision roll-formed from pre-painted Galvalume® aluminum-zinc alloy-coated steel coils. Coils to receive finish paints are subjected to a strenuous cleaning process prior to coating. Next, the coils are prime coated and oven cured. The finish coat is then applied and monitored for proper oven-cure temperature and color uniformity.
11.2.3. Panels are not factory punched or notched.
11.2.4. Panel seams may have optional factory-applied non-skinning Butyl mastic.

11.3. Panel Configuration

11.3.1. Insulated wall panels provide 36" or 42" net coverage and consist of male and female interlocking sides.
11.3.2. Four exterior profiles are available.
11.3.3. The panel fasteners are concealed within the panel lap.

11.4. Trim and Flashing

11.4.1. Color-coated trim and flashing shall be supplied in 26 gauge. Trim shall be provided at eave, base, corners, framed openings, and where necessary to insure a properly constructed building.

11.4.2. All exposed trim and flashing material shall be manufactured from Galvalume®, galvanized, or painted steel strip.

11.4.3. Trims finish will match wall finish as a standard.

11.5. Fasteners

11.5.1. Sidelap panel clips and fasteners are concealed within the lap of the panels

11.5.2. Pancake screws will be provided where a through fastener is required, such as corners. 11.5.3. Each clip shall be attached to girt with two 1/4-14 fasteners.

11.5.4. Panel trim could be attached by 1/8” pop rivets or No. 12 self-drilling carbon steel screw, hex washer head, 7/8” long. Fastener shall have a 20-year corrosion resistant coating.

11.6. Sealants

11.6.1. Tube sealants shall be used at all trim endlaps, panel joints, at the perimeter of the wall, and shall be a polyurethane sealant.

11.6.2. Sealants are to be provided by NBG when possible.

11.7. Installation of Panels

11.7.1. All sidelaps shall be caulked and engaged fully into the previous panel.

11.7.2. All panels shall be secured to the secondary structure with a clip and two fasteners at each support location.

11.7.3. All wall panels shall be fabricated in one piece providing the length does not exceed practical limits for shipment or construction.

11.7.4. Storage and installation of the wall system shall be in accordance with NBG's printed instructions.

11.8. Clean-Up & Maintenance

11.8.1. Surface should be cleaned daily during construction of all filings, cuttings, screws, pencil markings, and debris to prevent damage due to oxidation of foreign materials.

11.8.2. Contractor shall thoroughly clean all panels, trim, and gutters of all foreign material upon completion of construction.

11.8.3. Proper installation and maintenance are extremely important to obtain the best performance and appearance from the insulated panel. Dirt, oil grease, fingerprints or any other kind of containment must be completely removed when the installation is finish to maximize coatings performance.

11.8.4. The building will require periodic maintenance according to conditions at the site: U. V., dirt, smoke, corrosive atmosphere, etc. If further assistance is required, please consult NBG.

11.8.5. To remove oxidation and tough stains, it is recommended to use a household cleaner recommended for use of porcelain sinks and bath tubs. This should be followed with a thorough rinsing. Wire brushing or any abrasive material may damage the painted surface and should not be used.

11.8.6. If "touch up" paint is required, contact NBG to obtain an air-dry urethane color match for your project.

12. Accessories

12.1. Metal Doors & Windows

12.1.1. Standard doors provided by NBG are factory-assembled and include an insulated door leaf consisting of 18 gauge galvanized steel with a powder coated finish available in Black, Bronze, or White. All doors are ADA compliant. Door systems can be obtained with the jambs and door frame unassembled or pre-assembled from the factory.

12.1.2. Standard windows provided by NBG are offered in the following configurations and finishes.

12.1.2.1. Premium Thermal Windows are pre-assembled thermal break windows offered in Fixed Glass, Horizontal Slide, and Project in configuration. Available in Black, Bronze, or White. All thermal windows are tested to AAMA/WDMA/CSA101/I.S.2/A440-08 standards.

12.1.2.2. Economy Non-Thermal Windows are frameless with no thermal break. They are only offered in Horizontal Slide configuration. Available in Black, Bronze, or White. All non-thermal windows are tested to ANSI/AAMA 101-93 standard.

12.1.2.3. Premium Insulview Windows are frameless thermal break windows intended for Insulated Metal Panel projects. They are only offered in Horizontal Slide configuration. Available in Black, Bronze or White. Insulview windows are tested to AAMA 101-85 standards.

12.2. Framed Openings

12.2.1. Framing members for overhead doors shall typically be the same depth as the girts to which they attach. Wall panel edge shall be trimmed and flashed at all openings.

12.2.2. Framing for overhead doors shall be primer-coated or galvanized, as required by the customer.

12.3. Curb Mounted Prismatic Skylights

12.3.1. Prismatic Skylights have a minimum of 4,000 tiny prisms per square foot of glazing layer. The prisms refract sunlight into micro light beams, spreading the sun's bright natural light throughout the space, no direct sunlight-therefore no damaging hot spots, no glares and no UV rays to damage interiors/merchandise.

12.3.2. Prismatic Skylights transmit 35% more light, while still providing 100% diffusion, compared to any standard industrial skylight. Catches up to 20% more light even at low sun angles.

12.3.3. Prismatic Skylights are available with double-glazing of acrylic over Polycarbonate.

Prismatic Skylight Sustainable Temperature limits:

Material Type	Max. Temperature (Fahrenheit)
Acrylic	210°
Polycarbonate	270°

12.4. Translucent Light Panels

12.4.1. Translucent light panels shall be glass fiber reinforced composite panel of ACRYLIT®, containing 100% Acrylic resin monomers.

12.4.2. Panels shall be produced to match the roof/wall panel configuration.

12.4.3. Panels shall weigh eight ounces per square foot.

12.4.4. Nominal length of panels shall be 5'-0", 10'-0", or 11'-0".

12.4.5. Panels shall have “Light Transmission” of 55-60% per ASTM D-1494.
12.4.6. Panels shall have a “Burning Rate” of less than 2 1/2” per minute per ASTM D-635.
12.4.7. Metal panels above and below the translucent section along the same run shall not be shorter than the length of three purlin spaces. Roof translucent panels shall not be located at the eave or ridge. Translucent panels shall have a minimum of four metal panels between each translucent one.
12.4.8. The buyer shall advise all parties and the owner that translucent panels are not designed for foot traffic.
12.4.9. All NBG Translucent panels have a UL® and Florida approval rating at 5’-0” maximum purlin space.

12.5. Rake / Eave Extensions & Canopies

12.5.1. Roof rake / eave extensions shall consist of cantilevered roof purlins or extension beams respectively, 1’-0” through 5’-0” projections, complete with all necessary flashing to provide a weather-tight overhang. Soffit panel is required for rake / eave extensions.
12.5.2. Canopies shall consist of roof panels supported by cantilevered beams and purlins with projections up to 10’-0”. They will come complete with all necessary flashing to provide a finished look with exposed beams. Soffit panel may be requested on the order documents to enclose cantilevered beams and purlins.
12.5.2. Boxed Out Canopies shall consist of roof, face and soffit panels supported by cantilevered beams and purlins with projections up to 10’-0”. They will come complete with all necessary flashing to provide a weather-tight overhang with all framing members enclosed.

12.6. Insulation

12.6.1. Recommended insulation thickness is as follows:
12.6.1.1. Wall or roof blanket insulation over 3” may cause dimpling at support locations.
12.6.1.2. The maximum thickness available for use with the NBG R-Panel Roof is 6” of blanket insulation. (Please note: the maximum thickness allowed under UL® 30, 60, and 90 shall be 6”.)
12.6.1.3. NBG CFR, SS360, SSII and Loc Seam standing seam roof with short panel clip may be installed over blanket insulation from 2" to 4" thick.
12.6.1.4. NBG CFR, SS360, SSII and Loc Seam with tall panel clip may be installed over blanket insulation greater than 4" to 6" thick provided a thermal block is placed between clips. Maximum of 8” single layer batt insulation is allowed, which requires special attention to maintain panel modularity and thermal performance.
12.6.1.5. NBG CFR and SS360 with super tall panel clip may be installed over blanket insulation from greater than 8" to 12" thick provided a thermal block is between the clips. Maximum of 12” combined layers of batt insulation is allowed, which requires special attention to maintain panel modularity and thermal performance.
12.6.1.6. It is recommended that insulation be used in all cases to avoid problems with condensation forming on the underside of the sheeting. This also provides a buffer between the purlins and standing seam roof panels to reduce noise and possible damage due to metal-to-metal contact.

12.6.2 An Insulation Pan (NBG R-Panel liner panel, 28 gauge) may be supplied at the ridge for standing seam roof systems, but it must be requested in the order documents.

12.7. Liner Panel

12.7.1. Liner panel for a wall or ceiling is produced from a 28 gauge material with a white polyester paint coating. Liner panel is not intended to be exposed to the effects of weather, sunlight, moisture, or corrosive environments.

12.8. Crane Systems

12.8.1. See the MBMA Latest Edition of the Metal Building Systems Manual chapter entitled “Crane Loads” for an extensive discussion on the variables required for properly designing metal building systems with cranes.

12.8.2. Monorail and underhung crane beams have rigid specifications with regard to tolerances. Many suppliers of underhung systems require hardened flanges where crane wheels are in contact with the crane beam. NBG's standard approach to monorail and underhung cranes is to design for the effects on the primary structural system only. NBG will qualify back a maximum vertical frame deflection due to crane load combination; project engineer of record needs to review this information with crane supplier. As a standard, all beams, rails, connections to main frames, etc. are by others. NBG will design the frame of the building for vertical and lateral loads and the building longitudinal bracing for the longitudinal loads.

12.8.3 There are capacity limits to the monorail and underhung cranes. For both crane types, NBG will not design to a CMAA service class above C. The monorail crane capacity limit is 5 tons and the underhung crane capacity limit is 10 tons.

12.8.4 It is important to specify clearly on the sketch, of the building(s) included with the order proposal, the start and stop point, direction, orientation and capacity of each monorail or underhung crane in the structure. Please note that the NBG standard connection type is designed as the “truss” type. NBG will provide a web stiffener plate to be located directly over the centerline of the crane connection in the rafter and welded in place by an AWS certified welder in the field. This stiffener plate is shipped loose for the customer to place and weld because of the uncertainty of the exact end location of the crane attachment, allowing the customer more flexibility during erection to allow for unknowns.

12.9. Ridge Vents

12.9.1. Gravity ridge vents are installed on the roof to help facilitate air flow and circulation. They are available in 10 foot lengths and 9" / 12" throats with dampers and locker pulls. Color options are only available in standard finishes of Galvalume or Brite White.They can be used as single units or continuous units.

12.10. Partitions

12.10.1. Interior walls within the building footprint, dividing the internal space. These partitions may be longitudinal - perpendicular to the main frames, or transverse - parallel to the main frames. They can also have sheeting on one side or both sides.

13. Standard Serviceability Criteria

The International Building Code (IBC), ASCE7 standard, and AISC 360 design specification all contain strength and stiffness serviceability limits. The following standard serviceability criteria may be used in lieu of project-specific criteria. They are general in nature, and are not intended to address all possible situations. More stringent serviceability may be required. In such instances, it is expected that the Design Professional retained by the End Customer, General Contractor, or Builder include such criteria in the Order Documents, as described in the "Common Industry Practices", Chapter IV of the latest edition of the Metal Building Systems Manual.

Rigid Frames Members:		
Structural Element(s)	**Deflection Limit**	**Loading**
Rigid Frame Rafter	Rafter Span / 180 Vertical	Collateral + Roof Live/Snow
	Rafter Span / 120 Vertical	Dead + Collateral + Roof Live/Snow
Rigid Frame Lateral Drift w/ Insulated and Uninsulated Metal Wall Panels	Eave Height / 60 Horizontal	Wind
Pinned-Base Masonry, CMU, or Concrete Panel Walls	Wall Height / 100 Horizontal	Wind
Fixed-Base Masonry or CMU Walls	Wall Height / 200 Horizontal	Wind
Pendant or Radio Operated Top-Running Cranes	Eave Height / 100 Horizontal	Wind
	Top of Rail Elevation / 100	Dead + Crane Lateral
Cab Operated Top-Running Cranes	Eave Height / 240 Horizontal	Wind
	Top of Rail Elevation / 240	Dead + Crane Lateral

Post & Beam Frame Members:		
Structural Element(s)	**Deflection Limit**	**Loading**
Post & Beam Rafter	Rafter Span / 180 Vertical	Collateral + Roof Live/Snow
	Rafter Span / 120 Vertical	Dead + Collateral + Roof Live/Snow
Post & Beam, and Sidewall or Endwall Wind Columns	Column Height / 120 Horizontal	Wind
Pinned-Base Masonry, CMU, or Concrete Panel Walls	Wall Height / 200 Horizontal	Wind
Fixed-Base Masonry or CMU Walls	Wall Height / 200 Horizontal	Wind

Roof Secondary Members Supporting:		
Structural Element(s)	**Deflection Limit**	**Loading**
Purlins (Roof Slopes ≥ 1/4:12) and	Bay / 120 Vertical	Collateral + Roof Live/Snow
Roof Joists	Bay / 150 Vertical	Roof Live/Snow (No Ceiling)
	Bay / 240 Vertical	Roof Live/Snow (Suspended Ceiling)

Wall Secondary Members Supporting:		
Structural Element(s)	**Deflection Limit**	**Loading**
Metal Walls	Bay / 90 Horizontal	Wind
Masonry, CMU, Concrete Panel Walls & Members w/ Brittle Finishes	Bay / 240 Horizontal	Wind
Members with Flexible Finishes	Bay / 120 Horizontal	Wind

Roof Sheeting:		
Structural Element(s)	**Deflection Limit**	**Loading**
Uninsulated and Insulated Metal Panel (By NBG)	Secondary Spacing / 60 Vertical	Collateral + Roof Live/Roof Snow
		Load or 200# concentrated load at mid-span of 1'-0" wide panel section
Structural Element(s)	**Deflection Limit**	**Loading**
Roof Panels By Others and Other Materials	Per Order Documents	Per Order Documents

Wall Sheeting:		
Structural Element(s)	**Deflection Limit**	**Loading**
Uninsulated Metal Panel (By NBG)	Bay/60 Horizontal	Wind
Insulated Metal Panel (By NBG)	Bay/180 Horizontal	Wind
Wall Panels By Others and Other Materials	Per Order Documents	Per Order Documents

Crane Runway Beams:		
Structural Element(s)	**Deflection Limit**	**Loading**
Top Running Crane:		
CMAA Service Classes A through C	Bay Length / 600 Vertical	Crane Vertical Static Load
CMAA Service Class D	Bay Length / 800 Vertical	Crane Vertical Static Load
CMAA Service Classes E and F	Bay Length / 1000 Vertical	Crane Vertical Static Load
CMAA Service Classes A through F	Bay Length / 400 Horizontal	Crane Lateral
Underhung Running Crane:		
CMAA Service Classes A through C	Bay Length / 450 Vertical	Crane Vertical Static Load
	Bay Length / 400 Horizontal	Crane Lateral

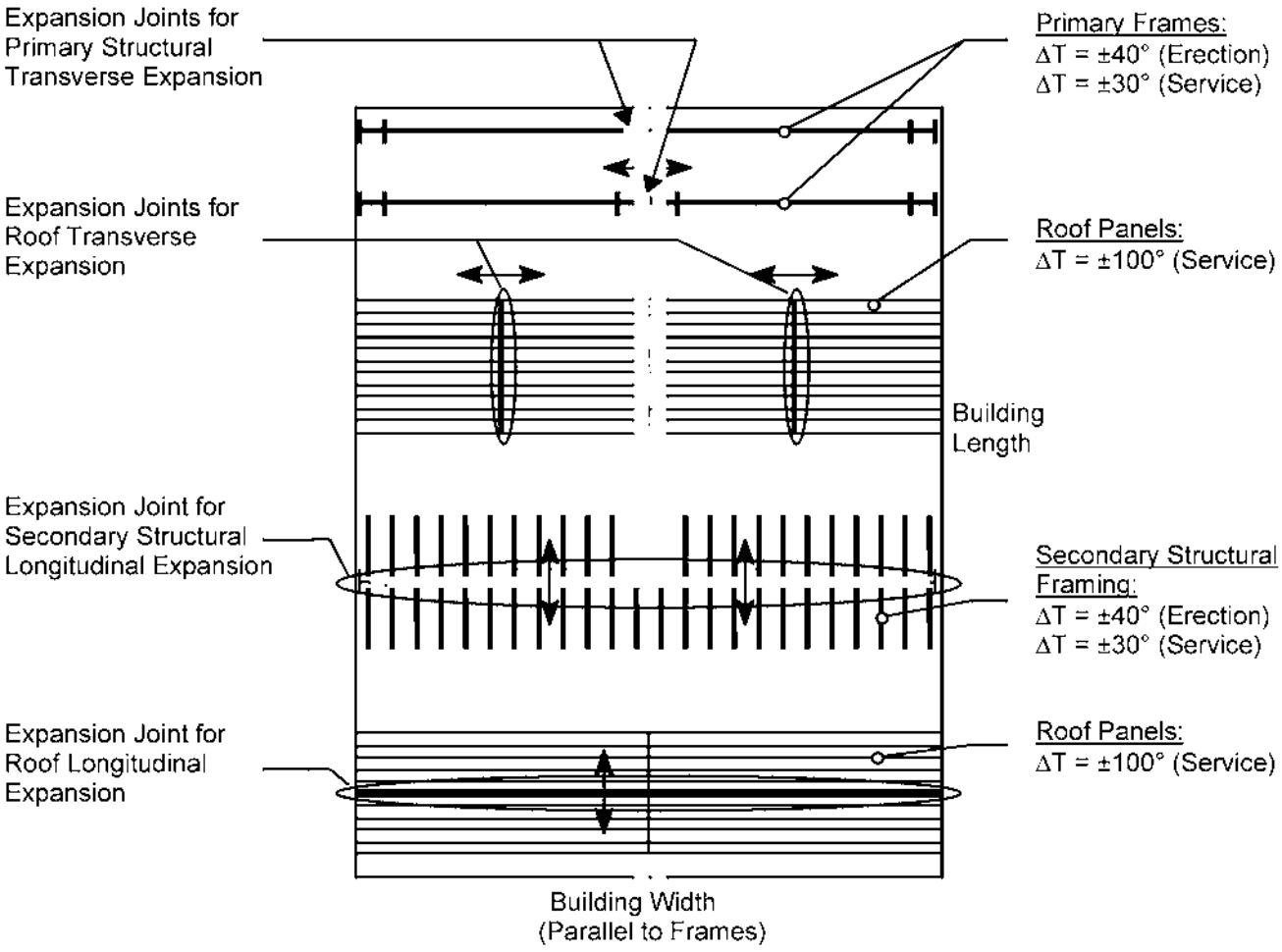
Floor Framing:		
Structural Element(s)	**Deflection Limit**	**Loading**
Floor Beams and Floor Joists	Beam Length / 360 Vertical	Floor Live Load
	Beam Length / 240 Vertical	Dead + Collateral + Floor Live Load

Vibration:

Due to the somewhat qualitative nature of vibration effects on a building system, Nucor Building Systems will typically not have any input other than responding to specific order document requests for design criteria. Some areas where the designs are more likely to see impacts from projects specifications include: mezzanine floor designs, buildings with cranes or other similar equipment as part of the end use operation, and large structures supporting HVAC equipment. Nucor will properly address order document specifications but is not in an expert position to give guidance or direction on the matter of vibration

14. Standard Expansion Joint Requirement Summary

Standard Expansion Joint Requirement Summary



Expansion Joint Type (see diagram above)	Max. Length w/o Expansion Joint	Net ΔT (± °F)	Movement DL (± in)
Transverse Expansion:			
Primary Structural	Not Provided by NBS Unless Specified on NBS Order Documents.		
Roof Panels:	Required at Primary Structural Expansion Joint.		
NBG CFR, SS360 Roof Panels	240' Panel Run	±100°	1.500" One Direction
NBG R-Panel	120' Panel Run	±100°	0.333" Each Direction
Longitudinal Expansion:			
Cold-Formed Purlins	640' with Metal Walls	±70°	1.250" Each Direction
Open-Web Joists	455' with Metal Walls	±70°	0.875" Each Direction
Roof Panels:	Required at Primary Structural Expansion Joint.		
NBG CFR, SS360 Roof Panels	No Additional Limits		
NBG R-Panel	No Additional Limits		

Notes: Roof panel net DT= (Panel DT) - (Primary Structural DT). When using DT other than shown, hold total movement.