This guide specification document is intended for BEMO’s Structural Standing Seam Metal Roof and Wall Panel System in the following profiles:

**BEMO 65/305**; 2 9/16” (65mm) high x 12” (305mm) wide

or

**BEMO 65/400**; 2 9/16” (65mm) high x 15 ¾” (400mm) wide

or

**BEMO 65/500**; 2 9/16” (65mm) high x 19 ¾” (500 mm) wide

or

**BEMO 65/Custom**; 2 9/16” (65mm) high x Custom width

For Wall applications, the word “Roof” can be replaced with “Wall”.

This guide specification is provided as a technical support tool for specifying **BEMO’s Structural Standing Seam Metal Roof (or Wall) System, BEMO’s Ice and Water Shield Underlayment, BEMO’s BEMO-Shield Plus HT Water, Air, Vapor Shield Underlayment, BEMO’s Snow Stopper Snow Guard System, BEMO’s Fall Protection System, BEMO’s FLEX Multi Axis Sub-Framing System**, and **BEMO’s ancillary products**. This document should be reviewed and edited to suit project specific requirements by a qualified design professional. Contact BEMO USA for more information on this or other products made by BEMO. Telephone: 480-545-7900, [www.bemousa.com](http://www.bemousa.com)

Editor Note: Edit document to suit project specific requirements and specifier practice. Text edits are required at sections shown as *(Specifier: in red like this).* Remove red specifier notes and unused optional text in final version of the specification document.

Editor Note: The Construction Specifications Institute (CSI) recommends and supports use of its current MasterFormat section title and numbering system, shown below as SECTION 07 41 13 - METAL ROOF PANELS. (If using the earlier MasterFormat 1995 section title and numbering designation, the section may be numbered and titled as SECTION 07610 – SHEET METAL ROOFING).

BEMO reserves the right to make changes to these specifications without notice.

**PART 1 - GENERAL**

*Specifier: Red Italicized sections require editing and/or consultation with BEMO for correct application.*

# 1.1 WORK INCLUDED

1. Furnish and install roofing panels, clips, fasteners, flashing, closures, insulation and related

accessories required for a complete roofing system as indicated on the contract documents.

# 1.2 RELATED WORK SPECIFIED ELSEWHERE

1. Section (insert section number here) – Flashing and Sheet Metal
2. Section (insert section number here) – Sub-Decking Metal
3. Section (insert section number here) – Roof Insulation
4. Section (insert section number here) – Underlayment
5. Section (insert section number here) – Structural and/or Light Gage Framing
6. Section (insert section number here) –­ Sealants

# 1.3 QUALITY ASSURANCE

1. Manufacturer’s Qualifications:
	1. Prior to bidding the manufacturer shall have had at least (10) ten years experience in architectural and industrial roofing systems.
2. Installer Qualifications:
	1. Prior to bidding the installer shall have a minimum of (5) years experience of installation with structural field-formed concealed clip roofing systems.
	2. Manufacturer must train and certify the installer so as to provide a single source responsibility for this portion of the work.
3. Source Limitation: Obtain components for roofing system from or approved by roofing system manufacturer.
4. Sheet Metal Roofing Standard: Comply with SMACNA's "Architectural Sheet Metal Manual" unless more stringent requirements are specified or shown on Drawings.
5. Preinstallation Conference: Conduct conference at Project site. Comply with requirements in Division 01. Review methods and procedures related to roofing system including, but not limited to, the following:
	1. Meet with the Architect, General Contractor, Construction Manager, Engineer, Authority's insurer if applicable; testing and inspecting agency representative; roofing Installer; roofing system manufacturer's representative; deck Installer; and installers whose work interfaces with or affects roofing, including installers of roof accessories and roof-mounted equipment.
	2. Review methods and procedures related to roofing installation, including manufacturer's written instructions.
	3. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities needed to make progress and avoid delays.
	4. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
	5. Review structural loading limitations of roof deck during and after roofing.
	6. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
	7. Review governing regulations and requirements for insurance and certificates if applicable.
	8. Review temporary protection requirements for roofing system during and after installation.
	9. Review roof observation and repair procedures after roofing installation.

# 1.4 REFERENCE LATEST EDITIONS OF PUBLICATIONS AND STANDARDS

1. Building Design Codes – Uplift, Live and Dead Loads
	1. ASCE 7 (current edition unless specified elsewhere) Minimum Loads for Buildings and Other Structures
2. Reference Standards
	1. American Iron and Steel Institute (AISI), Specification for the Design of Cold-Formed Steel Structural Members (2017).
	2. Aluminum Association Design Manual.
	3. American Society for Testing and Materials (ASTM) (Current Edition).
3. ASTM E1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding by Uniform Static Air Pressure Difference.
4. ASTM E1680 - Standard Test Method for Rate of Air Leakage through Exterior Metal Roof Panel Systems.
5. ASTM E1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
6. ASTM E2140 - Standard Test Method for Water Penetration of Metal Panel Roof Systems by Static Water Pressure Head.
7. ASTM A240 - Standard Specification for Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels and for General Applications.
8. ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
9. ASTM A666 - Standard Specification for Annealed or Cold-Worked Austenitic Stainless Steel Sheet, Strip, Plate, and Flat Bar.
10. ASTM A792 - Standard Specification for Steel Sheet, 55 percent Aluminum-Zinc Alloy-Coated by the Hot- Dip Process.
11. ASTM B69 - Standard Specification for Rolled Zinc.
12. ASTM B209 - Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate.
13. ASTM B221 - Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes.
14. ASTM B370 - Standard Specification for Copper Sheet and Strip for Building Construction.
	1. Underwriters Laboratory, USA (UL LLC).
15. UL 580 - Tests for Uplift Resistance of Roof Assemblies.
	1. FM Global (FM): FM 4471 - Approval Standard for Class 1 Panel Roofs.
	2. Florida Building Code - current edition, product approvals.
	3. MCA Metal Roof Installation Manual.

# 1.5 SUBMITTALS

1. Provide the following:
	1. Submit the following Test Reports certified by an independent testing laboratory or an independent professional engineer to verify that the proposed roofing will meet the performance requirements of this specification.
2. ASTM E1592 Structural Performance Test Results.
3. Halter/Clip Fastener Pull-Out Tests and Calculations.
4. UL 90 Classification Test Data.
5. Concentrated Load Test Results.
6. Air Infiltration ASTM E1680 and Water Penetration ASTM E1646 Test Results
7. 100,000 Clip Cycling Test Results.
8. ASTM E2140 Water Penetration Test Results.
9. With the Proposal: Qualification and/or exceptions to the drawings and specifications.
10. Prior to Fabrication:
11. Shop Drawings: Submit complete shop drawings, catalog cuts, calculations with all details, roof plans, wall elevations and field installation notes clearly indicated. Drawings must be approved before fabrication can begin.
	1. Show fabrication and installation layouts of sheet metal roofing, including plans, elevations, and keyed references to termination points. Distinguish between shop- and field-assembled work.
	2. Include the following:
12. Details for forming sheet metal roofing, including seams, thicknesses and dimensions.
13. Details for joining and securing sheet metal roofing, including layout of fasteners, clips, and other attachments. Include pattern of seams.
14. Details of termination points and assemblies, including fixed points.
15. Details of expansion joints, including showing direction of expansion and contraction.
16. Details of roof penetrations.
17. Details at connection to rainscreen, if applicable.
18. Details of edge conditions, including eaves, ridges, valleys, rakes, crickets, and counter flashings.
19. Details of special conditions.
20. Details of connections to adjoining work.
21. Details of the following accessory items, at a scale of not less than 1-1/2 inches per 12 inches
22. Roof tie-offs.
23. Flashing and trim.
24. Roof curbs.
25. Snow guards.
26. Performance Requirements. Submit structural design calculations and test reports certified by a registered professional structural engineer licensed in the State of \_\_\_\_\_\_\_\_\_\_ *(Specifier: insert state where project is located)* to verify load carrying capacities and thermal movement allowance of the panel system.
27. Furnish certified laboratory test reports showing that the proposed system has been tested and conforms to applicable provisions specified herein.
28. Samples and descriptive date:
29. Roof panel: Full panel width, 12 inches long.
30. System Clips/Halters: Two Required.
31. Fasteners: Two of each type to be used with a statement identifying the intended use of each.
32. Closure: One metal and one neoprene
33. Insulation: 12 inch square sample of specified thickness.
34. Sealants: One sample of each type and statement identifying the intended use of each.
35. Snow guards.
36. Qualifications Data: For installer and manufacturer.
37. Maintenance Data: For roofing system to include in maintenance manuals.
38. Inspection Report: Sample copy of roofing system manufacturer’s inspection report of completed roofing installation.

*Specifier: Select warranty types. All may not apply.*

# 1.6 WARRANTY

1. Manufacturer’s Warranty: Standard performance warranty provided by the manufacturer to warrant all panels, flashings, sealants, fasteners, and accessories against defective materials and/or workmanship for a period of two (2) years. Manufacturer’s standard warranty must accompany submittal package.
2. Manufacturer’s Weather-tight Warranty: Standard performance warranty provided by the manufacturer to warrant all panels, flashings, sealants, fasteners, and accessories against defective materials and/or workmanship for a period of twenty (20) years. Manufacturer’s joint-liability Weather-Tightness standard warranty must accompany submittal package.
3. Manufacturer will require review and approval of shop drawings for all warranty projects.
4. Inspections required by panel system manufacturer technical representative.
5. Special Warranty on Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace sheet metal roofing that shows evidence of deterioration of factory- applied finishes within specified warranty period. This is a pass-through warranty from the paint coating manufacturer.
6. Fluoropolymer Finish: Deterioration includes, but is not limited to, the following:
	1. Color fading more than 5 Hunter units when tested according to ASTM D 2244.
	2. Chalking in excess of a No. 8 rating when tested according to ASTM D 4214.
	3. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
7. Finish Warranty Period: Twenty (20) years from date of Substantial Completion.
8. Special Material Substrate Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
	1. Failures include, but are not limited to, the following:
9. Structural failures including rupturing, or perforating.
10. Deterioration of metals and other materials beyond normal weathering.
	1. Warranty Period: Twenty (20) years and six (6) months from date of Substantial Completion.
11. Special Installer's Warranty: Roofing Installer's warranty, signed by Roofing Installer, in which Roofing Installer agrees to repair or replace components of custom-fabricated sheet metal roofing that fail in materials or workmanship within specified warranty period.
	1. Failures include, but are not limited to, the following:
12. Structural failures.
13. Loose parts.
14. Wrinkling or buckling.
15. Distortion or disengagement of fasteners.
16. Failure to remain weathertight, including uncontrolled water leakage.
17. Deterioration of metals, metal finishes, and other materials beyond normal weathering, including nonuniformity of color or finish.
18. Galvanic action between sheet metal roofing and dissimilar materials.
	1. Warranty Period: Five (5) years from date of Substantial Completion.

**PART 2 - PRODUCTS**

# 2.1 ACCEPTABLE MANUFACTURERS

1. Basis of Design: BEMO USA Corporation, 1755 N. 48th Street, Mesa, Arizona 85205. Tel 877-530-BEMO (2366) or 480-545-7900; [www.bemousa.com](http://www.bemousa.com).

*Specifier: Select a panel profile, width, shape, and texture from the list below. Consult with BEMO for proper application.*

1. Profile: BEMO 65/305 or BEMO 65/400 or BEMO 65/500 or BEMO 65/Custom Coverage
2. Panel Width: 305mm (12”) or 400mm (15.75”) or 500mm (19.75”) or (Custom)
3. Seam Height: 65 mm (2.55”) minimum
4. Shape: Straight or Convex Curved or Concave Curved or Serpentine Curved or Tapered
5. Texture: Smooth or Stucco Embossed
6. Anti-capillary Groove: Integrated into all panels
7. Joint Type: Mechanically Seamed Bulb with Factory Applied Seam Sealant

*Specifier: Tapered panels vary from 682 mm (26 7/8”) to 100 mm (4”). Consult with BEMO for proper application.*

*Specifier: BEMO recommends consulting with the local sales rep for all curved and tapered applications and roof panel lengths exceeding 100’-0” long.*

1. Requests to use alternate systems must be submitted in writing to the project designer at least ten (10) days prior to the bid date. Performance requirements, certified statements, samples, sample warranties and descriptive date must accompany the request for substitution.
2. Manufacturers listed in this section are prequalified manufacturers. Substitution of manufacturers product for those specified will not be allowed at any time during the bidding or construction phases of this project.
3. Being listed as a prequalified manufacturer does not release the manufacturer from providing complete and acceptable performance data as indicated in this specification.

# 2.2 PERFORMANCE REQUIREMENTS

*Specifier: Delete scope in Paragraph A if not applicable. Consult with BEMO.*

1. General: Provide complete sheet metal roofing system, including, but not limited to, custom-fabricated metal roof panels, sub-framing, clips, anchors and fasteners, sheet metal flashing and drainage components related to sheet metal roofing, fascia panels, trim, cleats, underlayment, insulation, coverboard, rain screen overlay, snow guards, walkway, fall protection, lightning protection, roof penetrations, and accessories as indicated and as required for a weathertight installation.
2. The standing seam roof system shall be designed to safely resist the positive and negative loads as required for the location and type of project designed.
3. Structural-uniform uplift load capacity of the panel system shall be determined in accordance with the principles of ASTM E1592, “Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference” as follows:

The Factor of Safety on the test results shall be 1.65 for the panel and clip/halter ultimate loads with no increase for wind.

1. The Factor of Safety for fasteners shall be 3.0 for single fastener in each connection, 2.25 for 2 or more fasteners in each connection and 4.0 in masonry.
2. Design uplift capacity for condition of gage, span or loading other than those tested may be determined by interpolation of test results.
3. Deflection shall be I/180 for positive loading.
4. Wind Loads: As indicated on Drawings.
5. Snow Loads: As indicated on Drawings.
6. Water penetration of the panel assembly at 20 psf pressure for 15 minutes shall have “no uncontrollable leakage” when tested in accordance with ASTM E1646.
7. Air infiltration of panel assembly at 20 psf pressure shall be no more than 0.02 cfm/sf of panel when tested in accordance with ASTM E1680.
8. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E 2140.
9. The panel system shall have a U.L. Class 90 rating.
10. Cycle Thermal Test: Provide metal roof panel assemblies that have been tested a minimum 100,000 cycles of 1” movement using 10 lbs positive load at 5’-0” spans with no signs of wear through the panel clip. Any clip attachment that causes any direct wear on the panel itself will not be approved or allowed on this project.
11. Concentrated Load Performance: Provide metal roof panel system that withstand a concentrated load of 300 lbs (136 kg) applied to a 4 sq. in. (2580 sq. mm) at mid-span and center of the panel halfway between supports without causing deformation, buckling or side lap separation.

*Specifier: Delete FMG Listing if the building is not FM insured. Otherwise, consult with BEMO for specific FM Roof Nav numbers applicable to the project.*

1. FMG Listing: Comply with FMG 4471. Provide metal roof panel assembly listed in FMG’s "Approval Guide."
2. Fire and Windstorm Classification: Class 1A-90 or Class 1A-120 or Class 1A-150.
3. Hail Resistance: SH.
4. Panels are to be fabricated full length with absolutely no end lap conditions allowed unless approved otherwise in writing by the architect.
5. The manufacturing equipment must be owned and operated by the manufacturer who must also train and certify the installer and take complete responsibility for the entire work scope.
6. Fire Performance for Roof Assembly: Meet requirements of ASTM E108, Class A.

*Specifier: Panel lengths greater than 400 feet are possible. Consult with BEMO for special clips.*

1. Fasten the roofing panels to the structure through the use of concealed halters/clips which are designed to allow for up to and including a full 3-3/4” of panel movement without impeding the performance of the panel.
2. Curved panels either concave, convex or both are to be manufactured in one continuous panel length and curved without crimping or distorting the standing seam legs of the roof panels. Mechanical curving equipment must be owned and operated by the manufacturer.
3. Removable for replacement. Panels shall be designed to allow for replacement of individual panels without removing adjacent panels using manufacturer’s un-seaming tool.
4. Roll Forming Equipment to have a minimum of 12 hardened tooling roll forming stations with a profiled post shear. Pre-shearing and portable roll forming equipment is strictly prohibited.
5. Panels that are Roofing Installer roll formed, coil supplier roll formed, private label roll formed or toll formed panels will not be accepted.
6. Thermal Movements: Provide sheet metal roofing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, distortion and other detrimental effects. Provide clips that resist rotation and avoid shear stress as a result of sheet metal roofing thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
7. Temperature Change (Range): 120 deg F, ambient; 180 deg F, material surfaces.
8. Energy Performance: Provide roofing system with Solar Reflectance Index (SRI) minimum 78 for roof slopes of 2:12 or less and 29 for roof slopes greater than 2:12 when calculated according to ASTM E 1980 based on testing identical products by a qualified testing agency.

# 2.3 MATERIALS

1. Metal Roof panels are to be BEMO Structural Standing Seam Metal Roof System as manufactured BEMO USA and installed by trained and certified contractors or approved equal.

*Specifier: Select metal type and thickness and remove all others. Consult with BEMO for proper application.*

1. Fabricate metal roof panels from a minimum of:

Aluminum: .032” or .040” or .050” thick aluminum alloy 3004-H14 (or 3105-H34) conforming to ASTM B209. *(Refer to paint section if painted)*

*Or*

Zinc Coated (Galvanized) Steel: .0356” (20 gage) or .0296” (22 gage) or .0236” (24 gage) G-90 Galvanized steel conforming to ASTM A653 structural quality Grade 33.

*Or*

Aluminum-zinc Coated (Galvalume) Steel: .0356” (20 gage) or .0296” (22 gage) or .0236” (24 gage) conforming to ASTM A792, Grade 50B with an AZ50 coating when coil coated. (or AZ55 when unpainted. (*Refer to paint section if painted)*

*Or*

Stainless Steel: .0356” (20 gage) or .0296” (22 gage) or .0236” (24 gage) stainless steel conforming to ASTM A240/A 240M or ASTM A666, Type 304, 316 or 316L. *Consult with BEMO for correct application and finish options.*

 *Or*

Weather Steel: .0466 (18gage) or .0356” (20 gage) or .0296” (22 gage) or .0236” (24 gage) conforming to ASTM A606 weathering steel. *Consult with BEMO for correct application.*

*Or*

Copper: 16oz or 20oz or 24oz or 32oz Natural Copper, Type 110, conforming to ASTM B370, 1/2 hard temper. *Consult with BEMO for correct application.*

*Or*

*Specifier: If zinc, select mill finished or pre-patina, consult with BEMO for options.*

Zinc: 0.8 mm, 1.0 mm or 1.25 mm architectural titanium zinc alloy mill finish or pre-patina, whose base is electrolytic high grade with a 99.995% Zn degree of purity and alloying additives of 0.08% to 1.0% copper and 0.07% to 12% titanium, .001% to .015% aluminum conforming to ASTM B69 Architectural Rolled Zinc, Type 1 and Type 2.

1. Concealed Clips
2. Fasten standing seam roofing to structure with specially designed and tested clips manufactured exclusively for the roofing system.
3. Clips/halters must be designed to allow the roofing materials free movement in either direction parallel to the standing leg of the panel.
4. Clips must be designed to allow for a minimum of 5/8” air space under the pan of the panels and the substrate materials.

*Specifier: Delete this paragraph if specifying natural unpainted metals. Consult with BEMO for additional film thicknesses or paint system types if not listed below. Consult with BEMO for the proper selection of the ideal paint system intended for the application and environment.*

1. Exposed Coil Coated Finish

1. Fluoropolymer Two-Coat System: Nominal 1.0 mil total dry film thickness consisting of a 0.2-mil primer with a 0.8-mil 70 percent PVDF fluoropolymer color coat, AAMA [620] [621].

Or

*Specifier: Select two-coat mica system when a pearlescent appearance is desired.*

1. Special Fluoropolymer Two-Coat Mica System: Nominal 1.0 mil total dry film thickness consisting of a 0.20-mil primer with 0.8-mil 70 percent PVDF fluoropolymer color coat providing a pearlescent appearance, AAMA [620] [621].

Or

*Specifier: Select two-coat coastal system for projects within 1,500 ft. of salt water.*

1. Special Fluoropolymer Two-Coat Coastal System: Nominal 1.8 mil total dry film thickness consisting of a 0.8-mil primer with a 0.8-mil 70 percent PVDF fluoropolymer color coat, AAMA [620] [621].

Or

*Specifier: Select three-coat metallic for colors requiring a more vibrant metallic effect.*

1. Special Fluoropolymer Three-Coat Metallic System: Nominal 1.5 mil total dry film thickness consisting of a 0.2 mil primer with 0.8-mil 70 percent PVDF fluoropolymer color coat containing metal flakes, and a 0.5-mil 70 percent PVDF fluoropolymer clear coat, AAMA [620] [621].

Or

*Specifier: Select three-coat w/clear for bright pigment colors and added protection.*

1. Special Fluoropolymer Three-Coat w/Clear System: Nominal 1.5 mil total dry film thickness consisting of a 0.2 mil primer with a 0.8 mil 70 percent PVDF fluoropolymer color coat, and a 0.5 mil 70 percent PVDF fluoropolymer clear coat, AAMA [620] [621].

Or

*Specifier: Select three-coat thick film primer and thick film clear coat for extra protection against harsh chemicals, corrosion, and UV rays (ideal for industrial locales).*

1. Special Fluoropolymer Three-Coat Thick Film Primer and Thick Film Clear Coat System: Nominal 2.4 mil total dry film thickness consisting of a 0.8 mil primer with 0.8 mil 70 percent PVDF fluoropolymer color coat, and a 0.8 mil 70 percent PVDF fluoropolymer clear coat, AAMA [620] [621].

*Specifier: Select BEMO-FLON for harsh environments requiring a wider range of glosses (matte to high gloss) than PVDF and in more vibrant colors.*

1. Special BEMO-FLON FEVE Fluoropolymer Two or Three-Coat System: Nominal 1.1-1.4 mils total dry film thickness consisting of a 0.4-0.5 mils primer and 0.7-0.9 mils FEVE color coat.
	1. Gloss Value: \_\_\_ *(Select a value ranging from 3% to 85%. The number of coats and thickness must be coordinated with actual color prior to specifying. Consult with BEMO.)*

*Specifier: Select standard or custom. This should be coordinated with above paint finish type.*

1. Color shall selected from: Manufacturers Standard or Custom by Architect
2. Interior Surface: Manufacturer's standard two coat system consisting of a nominal 0.2 mil primer and nominal 0.3 ml acrylic or polyester backer finish for a nominal 0.5 mil total dry film thickness.

*Specifier: Select the following for reservoir projects.*

The backside of the panels to have an additional EPA approved 0.2 mil Clear Coat.

# 2.4 UNDERLAYMENT MATERIALS

1. Basis of Design: BEMO-HT Ice and Water Shield as supplied by BEMO USA Corporation, Mesa, Arizona tel 480-545-7900; [www.bemousa.com](http://www.bemousa.com).
2. Self-Adhering, High-Temperature Sheet: 40 mils thick minimum, consisting of a white face sheet comprised of a Tri-laminate woven HDPE. In accordance with ASTM D412 Die C - Ultimate elongation MD/XD (%) – 88/55 and Tensile Strength minimum of MD/XD (%) – 11200/13100 (1624/1900psi). Membrane must be proven to not “flow” at 250F. Material is able to be left exposed for up to 180 days.

*Note to specifier: Delete BEMO-XTREME HT Ice and Water Shield if using BEMO-Shield Plus HT*

1. Basis of Design: BEMO-Shield Plus HT Water, Air, and Vapor Shield for Roofs and Walls as supplied by BEMO USA Corporation, Mesa, Arizona, tel 480-545-7900; [www.bemousa.com](http://www.bemousa.com).
	1. Self-Adhering, High Temperature Sheet: 10.2 mils thick, consisting of a non-asphaltic high strength polypropylene.
	2. UV Exposure Period: 12 months
	3. Roll Dimensions/Coverage: 60” x 100’ / 500 ft2

# 2.5 SNOW GUARDS

1. Basis of Design: BEMO Snow Stopper System as manufactured by BEMO USA Corporation, Mesa, Arizona tel 480-545-7900; [www.bemousa.com](http://www.bemousa.com).
2. The snow guard system as indicated on drawings shall designed, engineered, supplied, and warranted by the SSMR panel manufacturer. The snow retention system will not be allowed to penetrate the standing seam metal roofing system. All attachments to the roof will be made to the standing seam and not hinder the thermal movement of the roof panels.
3. Type: Fence type with non-penetrating clamp attached directly to the standing seam. All components to be aluminum or stainless steel.
4. Components:
	1. Clamps manufactured from 6061 T6 mill finish aluminum.
	2. Snow Stop Fence manufactured from 6061 T6 mill finish aluminum.
	3. Stainless steel bolt, lock nut and washer
	4. Finish: Two or Three-coat spray applied high performance fluoropolymer extrusion coating to match color of SSMR panel.
5. The Snow Retention System will perform to the following:
6. The ultimate connection load of the seam clamp shall be min. 1700 LBS. parallel (longitudinal) to the standing seam roof system.
7. All snow load requirements shall be derived from the “Roof Snow Load Study” performed by RWDI if applicable.
8. Snow Guard system components shall be sourced by the metal roofing panel manufacturer and include signed and sealed shop drawings and calculations by a licensed Professional Engineer to substantiate all structural design and performance requirements in accordance with the contract documents and applicable building codes

# 2.6 WALKWAY SYSTEM

1. Basis of Design: BEMO Walkway System as manufactured by BEMO USA Corporation, Mesa, Arizona tel 480-545-7900; [www.bemousa.com](http://www.bemousa.com).
2. The walkway system shall designed, engineered, supplied, and warranted by the SSMR panel manufacturer.
3. Type: Grip Strut Plank Grating x 12” nominal width x 2” high
4. Material: Aluminum Alloy 5052-H32, 0.080” thick (contact BEMO for other material options)
5. Components:
6. Aluminum Angle Clips and Channel
7. Stainless Steel Utility Clamp for attachment to standing seam panel
8. Stainless Steel Tek Fasteners
9. Handrail (if applicable) (contact BEMO for requirements)

*Note to specifier: Select finish option. This should be coordinated with above paint finish type. Mill finish is standard.*

1. Finish: Mill Finish Standard (or Two or Three-coat spray applied high performance fluoropolymer extrusion coating to match color of SSMR panel).
2. Walkway system components shall be sourced by the metal roofing panel manufacturer and include signed and sealed shop drawings and calculations by a licensed Professional Engineer to substantiate all structural design and performance requirements in accordance with the contract documents and applicable building codes.

*Specifier: Delete this part if not necessary.*

# 2.7 FALL ARREST/RESTRAINT SYSTEM

1. Basis of Design: BEMO-XTREME Fall Arrest System as supplied by BEMO USA Corporation, Mesa, Arizona tel 480-545-7900; [www.bemousa.com](http://www.bemousa.com).
2. The fall arrest system shall be designed, engineered, supplied, and warranted by the SSMR panel manufacturer.

*Specifier: Select one.*

1. Type: Xtrusion Anchor and Cable System or Xtrusion Rail
2. Design, provide and install standing seam metal roof manufacturer’s standard available fall

protection system that mounts directly to the standing seam metal panel ribs with specialty designed clamps (through fastener attachment is not permitted), cross member plates and safety cable(s). Include all associated clips, clamps, etc., required for a complete system.

1. Fall protection system shall be a “restraint” system that allows maintenance access to gutters

and lightning protection system without allowing access close enough to edge of roof to allow a

fall.

1. Fall protection system shall provide un-interrupted fall protection from all roof access areas

(Hatches, Ladders, etc.)

1. Fall protection system components shall be sourced by the metal roofing panel manufacturer and include signed and sealed shop drawings and calculations by a licensed Professional Engineer to substantiate all structural design and performance requirements in accordance with the contract documents and applicable building codes.

*Specifier: Delete this section if not applicable. Consult with BEMO for proper design and application of the FLEX System*

# 2.8 MULTI-AXIS 3D SUB-FRAMING MATERIALS

1. Basis of Design: BEMO-FLEX as manufactured by BEMO USA Corporation, Mesa, Arizona tel 480-545-7900; [www.bemousa.com](http://www.bemousa.com).
2. The Multi-Axis 3D Sub-framing shall be designed, engineered, supplied, and warranted by the SSMR (Standing Seam Metal Roof) panel manufacturer. The requirement of the 3D Sub-framing is to provide for a smooth non-segmented appearance on the surface of the SSMR panel system. The 3D Sub-Framing System is intended to compensate for irregularities and segmentation in the metal deck plane and orient the finished roof panel at the correct position per the 3D model. The Sub-Framing shall be installed directly on the coverboard over the segmented metal deck plane and anchored directly to the metal deck.
3. Maximum Height: 16 ½” (distance between top of ice and water shield to underside of SSMR panel)
4. Components:
5. Galvanized Steel U-shape Lower Base Channel
6. Galvanized Steel U-shape Upper Base Channel (pre-assembled at factory)
7. Galvanized Steel Positioning Brackets (pre-assembled at factory)
8. Aluminum Halter Clips and/or Polyamide Thermal Halter Clip (pre-assembled at factory)
9. Performance Requirements: It will be expected of the SSMR panel manufacturer to provide for a complete engineered system that will be anchored directly to the metal deck. The SSMR panel manufacturer shall provide for the following:
10. 3D field laser scans of the Lower Base Channel and data conversion for use in the development of the dimensional parameters for fabrication purposes.
11. Precise layout and installation drawings showing identification of all parts and pieces.
12. Complete Bill of Material. Note – All components of the sub-framing system shall be uniquely engraved with a part identification number and correlated with the installation shop drawings.
13. Signed and Sealed Shop Drawings and Calculations by a licensed Professional Engineer to substantiate all structural design and performance requirements in accordance with the contract documents and applicable building codes.
14. Factory fabrication and assembly of the Upper Base Channel, Positioning Bracket, and Halter Clip.
15. Installer Training.
16. Field Verification of the segmented deck conditions prior to installation of the coverboard and underlayment
17. Field Inspection Services by the manufacturers Technical Representative with a minimum of 10 years experience.
18. SSMR panel manufacturer must review the deflected roof model before design commences along with the structural steel survey from the General Contractor to ensure there has not been any unexpected movement of the structure during installation and report deviations, if any, to the architect and engineer of record. Costs to correct deflections or deviations outside the tolerances published in the contract documents (or industry standards) and/or outside the range of the sub-framing system maximum tolerances shall not be the responsibility of the SSMR panel manufacturer.

*Specifier: Delete this section if it is unnecessary*

# 2.9 MOUNTING RAIL

1. Akkord Rail: Extruded aluminum component of roof manufacturer’s standard design mechanically seamed to panel leg without penetration.

1. Required for attachment of solar panels or other cladding materials (i.e. Rain Screen Systems).

*Specifier: Delete this section if it is unnecessary*

# 2.10 ROOF ACCESORY MOUNTING CLAMPS

1. Utility Clamps: 12ga. Type 301 stainless steel UL rated horizontal or vertical flange clamps of roof manufacturer’s standard design used for attachment of roof accessories. Other clamp types are not acceptable.
2. Required for attachment of lightening protection components, walkways, and guy wires.

# 2.11 ACCESSORIES

1. Sealants: Provide sealant type recommended by manufacturer that are compatible with panel materials, are nonstaining, and do not damage panel finish.
2. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, nonsag, nontoxic, nonstaining tape.
3. Joint Sealant: Manufacturer's standard or recommended liquid and preformed sealers and tapes and as follows:
4. Factory-Applied Seam Sealant: Manufacturer’s continuously applied standard hot-melt type.
5. Concealed Joint Sealant: Non-curing butyl, AAMA 809.2.
6. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311
7. Sheet Metal Roofing Accessories: Provide components required for a complete sheet metal roofing assembly including trim, copings, fasciae, corner units, ridge closures, clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of sheet metal roofing, unless otherwise indicated.
8. Closures: Provide closures at eaves and ridges, fabricated of same metal as sheet metal roofing. Ridge, headwall, hip, etc. shall use a combination foam and metal closure.

*Specifier: BEMO offers a variation of panel clip material types and sizes. Standard is 18ga Type 301 stainless steel hook clip with stainless steel base. Consult with BEMO for other options.*

1. Panel Clips: Minimum 18ga Type 301 stainless steel hook or 18ga galvanized steel hook and stainless-steel base *or galvanized steel base or standard Halter (Aluminum or Thermal Composite)* panel clips designed to withstand negative-load requirements.
2. Bearing Plates: Install bearing plates directly over rigid board insulation/underlayment at each clip location (not required over ½” minimum mineral board).
	1. Bearing plates shall be four by six (4 x 6) inch by twenty-two (22) gage steel.
	2. Bearing plates shall be pre-punched with a hole pattern matching the panel clip.
3. Cleats: For mechanically seaming into joints and formed from the following materials:
	1. Aluminum Roofing: 0.0250-inch- thick stainless steel or as required by the SSMR panel manufacturer.
4. Flashing and Trim: Formed from same material and with same finish as sheet metal roofing unless specified otherwise elsewhere. Provide flashing and trim as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, rakes, corners, bases, framed openings, ridges, fasciae, and fillers.
5. Pipe and Penetration Flashing: Premolded, flashing sleeve or pipe collar with flexible metal ring bonded to sloped base. Intended to provide weatherproof seal and to isolate pipe movement from vibration and expansion/contraction.
6. Roof Curbs: Fully welded or wet sealed and riveted or as required by the manufacturer for weathertightness warranty. Curb backpan, sidepan, apron flashing and counter flashing shall be fabricated from same material and finish as sheet metal roofing, minimum thickness matching the sheet metal roofing; with bottom of skirt profiled to match roof panel profiles; with weatherproof top box and integral full-length cricket (or manufacturer standard). Fabricate curb sub framing of nominal 0.062-inch- thick, angle-, C-, or Z-shaped galvanized steel or stainless-steel sheet. Fabricate curb and sub framing to withstand indicated loads of size and height indicated. Coordinate dimensions with rough-in information or Shop Drawings of equipment to be supported.
7. Factory insulate curbs with 1-inch- thick, rigid insulation.
8. Factory install wood nailers at tops of curbs.
9. Fabricate curb units with water diverter or cricket and with height tapered to match slope to level tops of units or as required by the manufacturer.
10. Curb base flashing shall be a minimum eight (8) inches above the horizontal roof surface.
11. Curbs must be installed to accommodate panel thermal movement with a 1” minimum clearance.

# 2.12 MISCELLANEOUS MATERIALS

1. General: Provide materials and types of fasteners, solder, welding rods, protective coatings, separators, sealants, and other miscellaneous items as required for a complete roofing system and as recommended by fabricator for sheet metal roofing. Provide accessories made of the same or compatible materials as the items to which they are applied.
2. Fasteners: Self-tapping screws, self drilling screws, self-locking rivets and bolts, and other suitable fasteners designed to withstand design loads. Use the same metal or a metal compatible with the item fastened. At any location where dissimilar metals are to be fastened, provide stainless steel fasteners.
3. Concealed Fasteners: Corrosion resistant steel fasteners (zinc plated, stainless steel or equal) designed to meet structural loading requirements. Provide #14 as a minimum fastener size.
4. Exposed Fasteners: Heads matching color of sheet metal roofing by means of plastic caps or factory-applied coating.
5. Fasteners for Flashing and Trim: 300 series stainless steel self-drilling screws with hex washer head and bonded washer.
6. Blind Fasteners: 300 series stainless steel rivets or aluminum.

# PART 3 - EXECUTION

# 3.1 DELIVERY AND STORAGE

1. Secure suitable facilities for storage and protection on site before delivery of materials.

# 3.2 INSPECTION

1. The manufacturer/installer shall examine the building to verify that the structure is ready for roofing installation.
2. Manufacturer/installer cannot proceed until all structural supports and/or substrates are satisfactorily installed in accordance with the drawings, specifications and applicable industry standards.
3. The manufacturer’s Technical Field Representative shall conduct periodic inspections of the work in progress as described herein and shall furnish written documentation of all such inspections. The frequency of the inspections shall be as required by the manufacturer with a minimum of two inspections.

3.3 INSTALLATION

1. The manufacturer must train and certify the installer.
2. All attachments shall allow for thermal expansion and contraction of the roofing materials.
3. Install all panels in one continuous unbroken length for any length of 350’ or less.
4. Panels are to be mechanically seamed after installation in the field.

# 3.4 DAMAGED MATERIAL AND CLEANING

1. Replace any materials or components that are damaged beyond repair prior to completion.
2. Each area will be wiped down as it is completed.

End of Section