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MR SECTION 1: GENERAL

MR-1.1 APPLICATION STANDARDS

- .1 ARCA members consider what constitutes the essential roofing practices which must be carried out for a metal roofing system to provide an acceptance service life in Alberta. These essential practices are referred to as application standards and are the basis for the issuance of the Warranty Certificate.
- .2 The designer should specify the issuance of the ARCA Warranty Ltd. Warranty Certificate to ensure that the Metal Roofing Application Standards are met.
- .3 Due to the complexity and possible combinations of construction, not every situation can be covered by the application standards. The Technical Committee is authorized to rule, upon written application, on situations or conditions not specifically covered by the application standards.

MR-1.2 WARRANTY CERTIFICATE (WC)

- .1 The Warranty Certificate (WC) is a joint undertaking by the ARCA Contractor member and the ARCA Warranty Ltd. which assures the owner of the following:
 - a. The completed roofing system is comprised of ARCA Warranty Ltd. accepted materials proven to perform in Alberta.
 - b. An ARCA Professional Roofing Contractor has supervised completion of the roof installation.
 - c. The workmanship meets ARCA Warranty Ltd. requirements.
 - d. The completed metal roofing system is inspected by an ARCA Warranty Ltd. accredited independent roofing inspector for the issuance of a WC.
 - e. Any workmanship related leaks which are the responsibility of the Contractor, occurring during year's one and two of the warranty term, will be repaired at no additional cost to the owner.

- f. In the event that a member contractor defaults on the warranty, for any reason, ARCA Warranty Ltd. will assure their responsibility and liability for the remainder of the warranty term.

MR-1.3 EFFECTIVE DATE OF CERTIFICATES

- .1 The effective date for the Warranty Certificate is the date of final inspection by the accepted independent roofing inspector.
- .2 Any deficiencies noted on the final inspection report will be rectified prior to issuance of the warranty document.
- .3 If deficiencies are found which are the responsibility of others and which affect the roofing system, the certificate may be issued with a covering letter to the owner outlining the limitations of the certificate (because of such deficiencies) or no certificate will be issued until written confirmation has been received that the deficiencies have been corrected by others.
- .4 The designer/owner may wish to have the effective date of the WC coincide with the completion date for their project.
- .5 Should the completed roofing system be in service for more than three (3) months after application then the following provisions must be undertaken prior to warranty issuance.
 - a. The entire roofing system shall be inspected and a post final inspection report must be received from an ARCA Warranty Ltd. accepted roofing inspector and the cost borne by others.
 - b. Any damage or deficiencies found during the post final inspection must be corrected by the original ARCA contractor and the repair cost borne by others.

MR-1.4 REQUIREMENTS FOR ISSUANCE OF THE WARRANTY CERTIFICATE

- .1 A Metal Roofing Warranty Certificate will be issued only when the following conditions have been met:
 - a. The roofing contractor is a member in good standing with ARCA and,
 - b. All roofing has been applied under the on-site supervision of a journeyman roofer or sheet metal mechanic, employed by a member contractor,
 - c. The roofing system has been constructed within the Province of Alberta,
 - d. The metal roofing system is one which has been accepted by ARCA Warranty Ltd.,
 - e. The application standards outlined in Part 4, Metal Roofing, as well as any other specific specifications which the designer may incorporate which are not inconsistent with the application standards, have been adhered to,

- f. The construction of the metal roofing system has been inspected by an ARCA Warranty Ltd. accepted independent roofing inspector, and
- g. The structure on which the roofing system is installed has been permanently affixed to its building site at the time of installation.

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MR SECTION 2: ARCHITECTURAL STANDING SEAM METAL ROOFING

MR-2.1 GENERAL

- .1 This section provides generic guidelines for the fabrication and application of architectural standing seam metal roofing systems over a ventilated attic space. Architectural metal panel roof systems are considered "water-shedding" assemblies, intended to shed water by means of the roof slope. Architectural metal panel roof systems require a roofing underlayment membrane onto an accepted supporting substrate.
- .2 Architectural standing seam metal roofing is defined as job site manufactured (JSM), concealed clip fastened and mechanically seamed metal panel roofing system uniformly supported by a separate structural substrate. Structural roof panel system designs spanning structural supports without a continuous substrate for metal panel support are not included in this standard. Other standing seam metal roof types that are not in conformance with these standards may be considered for a five (5) year Innovative Warranty Certificate.
- .3 To be eligible for a Warranty Certificate all standing seam metal roof systems shall be provided with an engineered stamped shop drawing confirming fastening requirements of the metal panels onto the supporting substrate.
- .4 To reduce the formation of condensation on the underside of the metal roofing panels, buildings shall be designed using recognized building envelope practice.
- .5 ARCA recommends that architectural standing seam metal roofing systems be designed to permit the shedding of snow and ice off the roofs without restriction. ARCA Warranty Ltd. is not responsible for the design or determining if any snow retention devices are required. Should the design authority require snow retention; then it shall be designed by a professional engineer of which is not covered under warranty.
- .6 ARCA Warranty Ltd. is not responsible for the design and construction of the building components to which the underlayment membrane and architectural standing seam

metal roofing are attached. Their design by others shall be in accordance with the requirements of the Alberta Building Code.

MR-2.2 DECKS

MR-2.2.1 GENERAL

- .1 Design the structural roof deck to support anticipated design loads with a maximum allowable deflection of 1/180. Structural design shall be in accordance with the latest edition of CAN/CSA –S136.
- .2 The structural roof deck shall be minimum 22 gauge galvanized steel or minimum 12.7 mm (1/2") thick exterior grade plywood.

MR-2.2.2 METAL PANEL SUPPORT SUBSTRATE

- .1 The substrate of which the underlayment, eave protection and metal panels are attached shall be exterior grade wood sheathing under C.S.A Standards with a minimum thickness of 11 mm (7/16") O.S.B. or 12.7 mm (1/2") plywood.
- .2 When re-roofing with metal roofing systems, ARCA Warranty Ltd. requires that the existing roofing system be removed to expose the existing structural roof deck, or existing insulation.
- .3 For proper attachment of the underlayment membrane, the substrate for metal panel support shall be clean, dry and clear of all loose debris and fasteners.
- .4 When irregular or uneven substrate conditions exist after tear-off, mechanically fasten an auxiliary leveling surface with minimum 11 mm (7/16") thick wood sheathing to cover the existing sheathing. Metal panel fasteners are required to penetrate through the new and existing sheathing.

MR-2.3 SLOPE

- .1 The minimum slope for the application of architectural standing seam metal roofing is 2:12 (1:6). For slopes less than 3:12, see standing seam requirements in item 2.8.5.

MR-2.4 UNDERLAYMENT AND EAVE PROTECTION MEMBRANE

- .1 A continuous membrane underlayment is required under architectural standing seam metal roofing panels. The roof slope is the primary design consideration when selecting the membrane underlayment type, see Table 1 for requirements.

Table 1 - Membrane Types

Slope	Underlayment (see 2.4.1)	Eave Protection
2:12 to 4:12	type A	type A
>4:12 to <8:12	type A or C	type A, B
>8:12	type A or C	not required

MR-2.4.1 UNDERLAYMENT/EAVE PROTECTION MEMBRANE TYPES

- Type A

Hi-temp self-adhering S.B.S. modified bituminous membrane (Membranes with a high temperature resistant formulation). Temperature limitations for S.B.S. underlayment membranes shall be compatible with the metal panel type. In general, higher temperatures from the increased conductivity of dark coloured metal panels may cause some SBS membranes to break down.

- Type B

EPDM – as recommended by membrane manufacturer

- Type C

Synthetic sheet underlayment Tested to ASTM E96 Standard Test Methods for Water Vapor Transmission of Materials. If a synthetic underlayment is used, confirm proper application with the manufacturer including ventilation requirements (Confirm local building codes for compliance).

See 2.8.3 for underlayment/eave protection membrane application requirements.

MR-2.5 VENTILATION

MR-2.5.1 ROOF/ATTIC SPACE ABOVE INSULATED CEILINGS

- .1 Vent the roof space or attic space above insulated ceilings with openings to the exterior to provide an unobstructed vent area of not less than 1/300 of the insulated ceiling area. Vents may be roof type, eave type, soffit type, gable-end type, ridge vents, or any combination equally distributed on opposite sides of the building. Distribute roof vents so that approximately 50 percent of the required vent area is located near the lower part of the roof slope and approximately 50 percent of the required vent area is near the highest point of the roof structure. For exceptions, see the Alberta Building Code, Section 9.19.1 Venting.
- .2 For cathedral ceilings constructed with roof joists or buildings in high-altitude mountainous regions, the unobstructed vent area shall not be less than 1/150.

MR-2.5.2 HIPS AND RIDGES

- .1 Ventilation can be incorporated at hips, ridges or roof/wall junctions. For mansard type applications, venting may also be installed in the parapet walls.

MR-2.6 ROOFING MATERIALS

MR-2.6.1 METAL PANELS, TRIM, FLASHINGS AND ACCESSORIES

MR-2.6.1.1 STEEL

- .1 Standing seam roof panels, trim, flashings and accessories shall be manufactured from ASTM Standard A446, Grade A steel, with a minimum yield strength of 33,000 PSI, with a protective galvanizing coating to ASTM Standards, A653/A653M, minimum zinc coating designation Z275. The minimum base metal thickness shall be 0.8 mm or 24 gauge.

MR-2.6.1.2 ALUMINUM-ZINC

- .1 From aluminum-zinc alloy coated steel coil to ASTM Standard A-792/A792M, commercial quality, AZM150 coating, prefinished as specified, with minimum base thickness of 0.8 mm or 24 gauge.

MR-2.6.1.3 COPPER

- .1 Minimum 4.87 kg/sq. metre (16 oz.) copper sheet.

MR-2.6.1.4 ZINC ALLOY

- .1 Minimum thickness of 0.7 mm (0.027 in.) to ASTM Standard A308-2, Terne (Lead-Tin Alloy) coated by the hot-dip process or ASTM B86 - 11 Standard Specification for Zinc and Zinc-Aluminum (ZA) Alloy.

Note: Venting or an open drainage plane is required on the underside of Zinc panels.

MR-2.6.2 METAL FINISH

- .1 For pre-painted steel, the minimum paint finish shall be Stelco, Keynar 10 000 Series, or Dofasco 8000 Series or equivalent factory applied to the exposed side of the panels with a minimum of a wash coat applied on their reverse side.

Note: The Warranty Certificate does not cover the diminution of the metal finish.

MR-2.6.3 PANEL CLIPS

- .1 Panel clips shall be made from minimum 24 gauge corrosion resistant metal.
- .2 Fixed panel clips shall be used for the attachment of metal panels up to 10 meters (32.8 ft.) long.
- .3 Two (2) piece expansion panel clips shall be used for the attachment of metal panels over 10 meters (32.8 ft.) in length.
- .4 It is the responsibility of the design professional or Engineer of record to determine the spacing of clips required to meet the design wind-uplift requirements of the project. The metal roof system manufacturer shall confirm compliance with the designed wind uplift resistance for the buildings location.

MR-2.6.4 FASTENERS

- .1 Nails are not permitted for the fastening of metal roofing systems.
- .2 Metal flashing fasteners shall not penetrate the supporting substrate to allow for proper expansion and contraction of the metal panel.
- .3 Fasteners for metal roofing shall conform to ASME B18.6.3. Provide pullout resistance to the approval of the Engineer of record.

- .4 Tapping and drive screws shall be corrosion resistant.
- .5 Concealed fasteners shall be minimum #10 by 25 mm (1 in.) long pan-head or modified truss-head screws. The screw head shall be compatible with the clip design and provide suitable clearance from the underside of the panel.
- .6 Exposed fasteners shall be sealed rivets, or minimum #10 corrosion resistant sheet metal screws supplied with metal-backed EPDM or neoprene washers.
- .7 Nails and other fastening devices used in the application of the underlayment or eave protection membranes shall be hot-dipped galvanized.
- .8 Fasteners shall penetrate a minimum distance of 25 mm (1") into dimensional lumber decks and shall extend a minimum distance of 12.5 mm (0.5") beyond the underside of wood sheathing substrates.

MR-2.6.5 SEALANT/CAULKING

- .1 Sealant and caulking shall be selected for their ability to resist weathering, for their compatibility with and their ability to adhere to the metal panel/flashing finish.
- .2 Sealant/caulking shall be non-hardening, exterior type, applied in tape or gun form. Where permitted, provide a minimum of two (2) rows of a continuous bead of sealant at panel lap joints.

MR-2.6.6 PENETRATION FLASHINGS

- .1 Dektite type flashings or flashed curbs shall seal plumbing vent stacks. Flashing fasteners shall not penetrate the supporting substrate to allow for proper expansion and contraction of the metal panel.
- .2 Penetrations shall be curbed if the flange width of a penetration flashing exceeds 60% of the panel width. Sloped crickets are required on the upslope side of the curb.
- .3 Curb heights shall be a minimum of 200 mm (at upslope side of curb) from the surface of the metal panel.

MR-2.7 METAL FLASHINGS

MR-2.7.1 MATERIAL

- .1 Metal flashings shall be fabricated in maximum 3000 mm (10 ft.) lengths from similar materials and standards as specified in 2.6.1.

MR-2.7.2 JUNCTIONS

- .1 Roof/Wall junctions shall incorporate two-piece flashings to allow for thermal movement between the two metal flashings. (See Details No.6 & 7)

MR-2.7.3 VALLEY FLASHING

- .1

The valley flashing shall be formed from similar material and gauge as the roof panels and shall not be less than 600 mm (24") wide. A continuous waterproofing membrane shall be adhered to the substrate beneath the metal valley flashing and shall extend beyond the edges of the valley flashing flanges a minimum distance of 150 mm (6").

- .2 Metal valley flashings end laps shall be minimum 200 mm (8") wide and shall be sealed with two rows of an approved sealant. With roof slopes less than 4:12, increase the end lap dimension to a minimum distance of 300 mm (12").
- .3 The valley flashing shall contain a minimum 25 mm (1") high crimp located at the valley centre line.
- .4 At the eaves, form the metal valley flashing to fit the valley line and to overhang at the eaves (similar to a drip edge flashing).

MR-2.7.4 RIDGE AND HIP CAP FLASHINGS

- .1 Fasten ridge and hip cap flashings to underlying J-channels to allow the roof panels to move independently of the cap flashings. Join capping end laps with S-locks installed to shed water (See Detail No.2). Cap flashings shall overlap the roof panels a minimum distance of 50 mm (2").
- .2 Ends of panels in the J-channel shall incorporate a watertight end pan fold (bread pan).
- .3 When the panels are secured at the eave, proper allowance must be provided for panel movement at the ridge.
- .4 When the panels are secured at the ridge, proper allowance must be provided at the drip edge overlap to allow for expansion and contraction of the metal panel.
- .5 When long panels are used; fixation at the center of the panel may be specified. Both the ridge and eave must provide the required space to accommodate the expansion and contraction of the metal panel.

MR-2.7.5 WALL AND BASE FLASHINGS

- .1 Roof/Wall intersections shall be flashed with not less than one layer of sheet metal flashing. The metal flashing shall extend a minimum distance of 150 mm (6") up the wall and shall overlap a minimum distance of 100 mm (4") onto the underlying metal roof panels (See Detail No.6 & 7).

MR-2.7.6 GABLE AND RAKE EDGE FLASHINGS

- .1 The gable and rake edge flashings shall be formed to fully cover the machine-formed or hand-formed standing seam legs located along the gable/rake edge.
- .2 The flashing shall not be fastened directly to the metal roof panels. Flashing securement shall be made at the fascia and to the J-channel, which runs continuously under the flashing along the gable/rake edge (See Detail No.4).

MR-2.8 INSTALLATION

MR-2.8.1 GENERAL

- .1 Do not apply roofing material when the weather or the condition of the substrate is such that the required installation procedures cannot be followed or which would jeopardize the performance of the roofing system. It is recommended that prefinished sheets be formed near 20°C (68°F).
- .2 Protect the metal roofing materials and components from moisture during storage. Protect pre-finished metal panels and accessories from damage to their paint coating during fabrication, delivery and storage at the job site.
- .3 Co-ordinate roof application with other trades and minimize traffic on the completed roof panel surface.

MR-2.8.2 ICE DAM/EAVE PROTECTION

- .1 The ice dam/eave protection shall extend from the edge of the roof a minimum distance of 900 mm (36") up the roof slope to a line not less than 300 mm (12") measured from inside the inner face of the exterior wall.
- .2 Ice dam protection is not required:
 - a. Over unheated garages, carports and porches.
 - b. Where the roof overhang exceeds 900 mm (36") measured along the roof slope from the edge of the roof to the inner face of the exterior wall.
 - c. On roofs with slopes of 1:1.5 (8:12) or greater.

MR-2.8.3 UNDERLAYMENT

- .1 The underlayment membrane shall overlap the eave protection membrane a minimum distance of 100 mm (4").
- .2 Underlayment membranes shall be applied parallel to the eaves with minimum 75 mm (3") side and 150 mm (6") end laps onto panel support substrate.
- .3 The underlayment membrane shall extend a minimum distance of 200 mm (8") up curbs and walls.
- .4 The application of membranes shall be as follows:
 - a. S.B.S. Modified Bituminous Membranes

Install a single ply of a slip resistant, SBS modified bituminous membrane over the exposed deck as per the manufacturers written instructions.

At curbs and roof/wall junctions, the S.B.S. membrane flashing shall overlap the underlayment membrane a minimum distance of 150 mm (6") and shall extend a minimum vertical distance of 200 mm (8") above the surface of the underlayment.
 - b. EPDM

Install ARCA Warranty Ltd. accepted EPDM membranes in accordance with Part 2, Low-Slope Roofing, Section 7-Membrane

Flashing and the membrane manufacturer's written application instructions.

c. Synthetic Sheet

Membrane shall be mechanically attached to the supporting substrate spaced 6" in the overlaps, and at 12" on center along the center of the roll using 3/8 inch galvanized roofing nails; tin tag caps & nails; screws with washers; plastic cap nails or plastic cap staples with 7/16 inch legs or longer.

MR-2.8.4 METAL ROOFING PANELS

- .1 Form metal roof panels to field dimensions in continuous lengths, spanning from eave to ridge, free from dents and distortion. Optionally, two or three stiffening ribs may be incorporated into the panel profile while forming.
- .2 Curved metal roofing panels shall be machine curved to minimize seam buckling and panel deformation.
- .3 Panels shall be formed in 300 mm (12") to 510mm (20") widths.
- .4 The male and female standing seams shall be formed and mechanically seamed with a minimum 38 mm (1.5") high vertical leg and a minimum 9.5 mm (0.375") wide horizontal leg. To accommodate the single fold panel crimp, male seams shall be formed with an additional minimum 9.5 mm (0.375") long vertical return leg.
- .5 When joined together, the finished male and female standing seam profiles shall properly nest with the panel clips. Add in-seam sealant for roof slopes less than 3:12.
- .6 Where metal panels terminate at walls, curbs, ridge/hip junctions, the panel ends shall be finished with a watertight pan fold. The end pan fold height shall be equal to the standing seam height.
- .7 Panel end laps are not permitted in the field of the metal panel roofing system, except at curbs and roof penetrations.
- .8 Roof panels shall be prepared with lock folds for panel attachment at the eaves or at valleys without exposed fasteners.
- .9 Align panels parallel to the roof slope and square to the eaves.
- .10 The metal panels shall be uniformly supported by the substrate before their attachment.
- .11 Attach roof panels in accordance with engineered drawings and specifications to their supporting substrate with sheet metal panel clips using a minimum of two (2) fasteners per clip placed adjacent to the vertical leg of the panel clip. To provide for thermal panel movement, expansion panel clips may be substituted for fixed panel clips, see item 2.6.3 for application requirements. Install expansion clips carefully to avoid binding.

MR-2.8.5 SEAMING/FOLDING

- .1 For slopes 3:12 and greater, a 38 mm (1.5 in.) high single-fold crimp, that fully incorporates the panel clips, is required along the entire panel length at the standing seam.
- .2 For slopes less than 3:12, a 50 mm (2 in.) high double-lock seam, that fully incorporates the panel clips, is required along the entire panel length at the standing seam.

MR-2.8.6 DRIP EDGE

- .1 A 38mm (1½") wide fold lock shall be used at the drip edge flashings to permit thermal movement of the roof panels at the eave edge (See Detail No. 1).

MR-2.8.7 OIL CANNING

- .1 "Oil canning", a slight waviness in the appearance of the erected sheet metal roof panels, is an aesthetic condition common to metal roofing systems and will not affect overall system performance.

MR-2.9 PROTRUSIONS

MR-2.9.1 VENT PIPES AND OTHER PENETRATIONS

MR-2.9.1.1 VENT PIPE PENETRATIONS

- .1 Plumbing vents and round vent pipe penetrations, 300 mm (12") and smaller in diameter, with an outside temperature of less than 415° F, may be waterproofed with a Dektite type flexible flashing (See Detail No. 9). This type of flexible flashing shall be made from EPDM rubber and shall be resistant to ozone and ultraviolet light deterioration.
- .2 Curb circular vent penetrations when their locations coincide with the metal panel's standing seams.
- .3 Ensure fastening of flashing flanges to the metal panel do not penetrate the supporting substrate.

MR-2.9.1.2 OTHER PENETRATIONS

- .1 Penetrations shall be curbed when larger than 300 mm (12") in diameter or when the outside surface temperature of the pipe is higher than 415° F.
- .2 Curb roof penetrations when their locations coincide with metal panel standing seams.
- .3 Curbs shall be installed to maintain a minimum 200 mm (8") height measured from the panel surface at the up-slope side of the protrusion. When the curb widths exceed 750 mm (30"), install metal crickets to direct water flow around the up-slope side of the penetration (See Detail No. 8).
- .4

Detailing shall avoid obstructing the flow of rain water at stacks, ventilators, roof-top air handling units, and other roof penetrations to prevent standing (ponding) water.

MR-2.9.1.3 CIRCULAR CHIMNEYS

- .1 Circular chimney vent pipes shall be curbed. Use proper clearances to meet Fire Code requirements.

MR-2.10 GUTTERS

MR-2.10.1 GENERAL

- .1 ARCA Warranty Ltd. recommends that where a water collection system is specified, that it be installed beyond the exterior wall junction at the eave.
- .2 ARCA Warranty Ltd. does not recommend the installation of built-in gutters.

Note: The Warranty Certificate does not warrant water collection systems attached to the building after the installation of the metal roofing system.

MR-2.10.2 EXTERIOR GUTTERS

- .1 Where exterior gutters are required to control roof drainage, the gutters shall be installed outside of the building envelope, down-slope of the exterior roof/wall junction.

MR-2.10.3 BUILT-IN STRUCTURAL GUTTERS

- .1 Built-in structural gutters may be permitted when shop drawings are submitted to the ARCA Technical Committee for acceptance prior to their installation. The shop drawings for built-in water collection systems shall contain the gutter fabrication and assembly configuration as well as the waterproofing membrane installation details.
- .2 Where gutters are lined with a membrane, the membrane shall be an ARCA approved product and accepted by the membrane manufacturer as suitable for a gutter liner. The membrane shall be installed by a trained person approved by the membrane manufacturer.
- .3 The gutter liner roofing membrane shall be compatible with the roof underlayment membrane.

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MR SECTION 3: ARCHITECTURAL STANDING SEAM ROOFING DETAILS

It is impossible to illustrate every possible design scenario for sheet metal flashing details. The details illustrated by ARCA Warranty Ltd. are presented as suggested details only, incorporating sound roofing design principles.

ARCA Warranty Ltd. provides a no-charge evaluation and review service for roofing details not illustrated on the following plates. Designers are welcome to submit their roofing details to for review.

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