

**SECTION 07 61 16
BATTEN SEAM COPPER ROOFING**

SPEC WRITER NOTES:

1. Delete between // // if not applicable to project. Also delete any other item or paragraph as required and renumber the paragraphs.
2. Use for roofing sloped 1 in 4 (3 in/ft.) or greater.

PART 1 - GENERAL

1.1 DESCRIPTION:

- A. This section specifies the installation of batten seam copper roofing.

1.2 RELATED WORK:

- //A. Sustainable Design Requirements: Section 01 81 13, SUSTAINABLE DESIGN REQUIREMENTS. //
- B. Sealant: Section 07 92 00, JOINT SEALANTS.

1.3 SUBMITTALS:

- A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.
- //B. Sustainable Design Submittals, as described below:
- //1. Postconsumer and preconsumer recycled content as specified in PART 2 - PRODUCTS.// //
- C. Fabricator's qualifications.
- D. Installer qualifications.
- E. Manufacturers literature, data, for copper, underlayment, sealant and accessories.
- F. Submit shop and erection drawings containing data necessary to clearly describe design, materials, sizes, layouts, seam configuration, construction details, provisions for thermal movement, line of panels, fastener sizes and spacings, sealants and installation procedures. Show waterproof connections to adjoining work; show obstruction and penetration details.
- G. Samples consisting of 152 mm (6 inch) or 305 mm (12 inch) square specimens of specified copper roofing material.

1.4 WIND UPLIFT LOADS:

- A. Provide roof assemblies meeting uplift pressures using a basic wind speed of // // km per hour (// // miles per hour), an importance factor of // //, and an exposure of // //.

1.5 QUALITY ASSURANCE:

- A. Fabricator’s Qualifications: Company specializing in copper sheet metal roofing work with three (3) years’ experience in similar size and type of installations. Submit qualifications.
- B. Installer: A firm with three (3) years of successful experience with installation of copper roofing of type and scope equivalent to Work of this Section. Submit qualifications.

1.6 APPLICABLE PUBLICATIONS:

- A. The publications listed below form a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only:
- B. ASTM International (ASTM):
 - B32-08(R2014).....Solder Metal
 - B370-12.....Copper Sheet and Strip for Building Construction
 - D1970/D1970M-14.....Self-Adhering Polymer Modified Bituminous Sheet Materials Used as Steep Roofing Underlayment for Ice Dam Protection
 - D226/D226M-09.....Asphalt-Saturated Organic Felt Used In Roofing and Waterproofing
 - D227-03.....Coal-Tar-Saturated Organic Felt Used in Roofing and Waterproofing
 - D2822/D2822M-05(R2011)..Asphalt Roofing Cement
 - F1667-13.....Driven Fasteners: Nails, Spikes and Staples
 - E1980-11Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces
- C. Copper Development Association Inc. (CDA):
 - A4050.....Copper in Architecture—Handbook
- D. Sheet Metal and Air Conditioning Contractors National Association (SMACNA): Architectural Sheet Metal Manual (Seventh Edition - 2012)

PART 2 - PRODUCTS

SPEC WRITER NOTE: Make material requirements agree with applicable requirements specified in the referenced Applicable Publications. Update and specify only that which applies to the project.

2.1 SHEET COPPER:

- A. ASTM B370, temper H00, cold-rolled (Hard); minimum 4.9 kg per square meter (16 oz. per square foot).
- B. Natural weathering mill finished copper. No applied finish.
- //C. Recycled Content of Steel Products: Post consumer content plus one-half of preconsumer content not less than // 30 // // // percent. //
- //D. Solar Reflectance Index: Not less than // 78 // // 29 // when calculated according to ASTM E1980. //

2.2 BATTENS:

- A. Copper Batten Caps: 4.9 kg per square meter (16 oz. per square foot).
- B. Wood Batten Strips: Fabricated to size indicated from lumber complying with requirements of 06 10 00, ROUGH CARPENTRY and preservative treated by pressure process using a chemical solution that is non-hygroscopic and non-corrosive to type of copper roofing.

2.3 FLASHING CEMENT:

- A. ASTM D2822/D2822M, Type I.

2.4 SOLDER:

- A. Copper solder conforming to ASTM B32. Provide muriatic acid flux neutralized with zinc or approved brand of soldering flux as required for use with metals to be soldered.

2.5 BITUMINOUS COATING:

- A. Provide cold-applied inert-type noncorrosive compound bituminous coating, nominally free of sulfur components and other deleterious impurities.

2.6 SEALANT:

- A. Provide sealant in accordance with CDA A4050 and manufacturer's recommendations. Submit descriptive information.

2.7 NAILS:

- A. ASTM F1667, copper slating nails with large flat heads and needle points.
- B. Nails of sufficient length to penetrate nailer at least 22 mm (7/8-inch).

2.8 RIVETS:

- A. Copper or copper alloy not less than 3 mm (1/8-inch) diameter with solid brass mandrels. Provide solid copper rivet (tinner's rivets) where structural integrity of seam is required.

2.9 UNDERLAYMENTS:

- A. Felt Underlayment: No. 30 felt in compliance with ASTM D226/D226M, Type II.
- B. Self-Adhering Modified Bitumen Underlayment:
 - 1. Self-adhering modified bitumen membrane underlayment material in compliance with ASTM D1970/D1970M, and suitable for use as underlayment for copper metal roofing.
 - 2. Membrane resistant to cyclical elevated temperatures for extended period of time is to be used in high heat service conditions.
 - 3. Membrane is to have integral non-tacking top surface of polyethylene film or other surface material to serve as separator between bituminous material and copper metal products.

SPEC WRITER NOTE: Confirm vapor retarder requirements has been shown on the drawings when required for local climatic conditions. A self-adhering modified bitumen membrane underlayment can act as a vapor barrier. Delete this paragraph if not required.

//C. Vapor Retarder: Laminated or reinforced, woven polyethylene or polypropylene, synthetic roofing underlayment; 0.254 mm (10 mil) minimum; bitumen free; slip resistant; suitable for high temperatures over 111 deg C (220 deg F); and complying with physical requirements of ASTM D226/D226M for Type I and Type II felts. Provide a compatible tape which has equal or better water vapor control characteristics than the vapor retarder material. //

- D. Slip Sheet: Slip sheet to be 0.24 kg per square meter (5 pounds per 100 square foot) rosin sized unsaturated building paper.

PART 3 - EXECUTION**3.1 INSTALLATION:**

- A. General Metal Fabrication: Shop-fabricate work to greatest extent possible. Comply with details, dimensions, profiles shown and with applicable requirements and recommendations of the CDA, the SMACNA Manual, and other recognized industry practices. Fabricate for waterproof and weather-resistant performance with expansion provisions for running work, sufficient to permanently prevent leakage, damage, or deterioration of the work. Form work to fit substrate. Comply with material manufacturer's instructions and recommendations for forming material. Form exposed copper work without excessive oil-canning,

buckling, and tool marks, true to line and levels indicated, with exposed edges folded back to form hems.

B. Roofing surface:

1. Clean, dry, and debris free before application.
2. Remove protrusions from the deck area.
3. Verify substrate has no voids, damaged, or unsupported areas.
4. Repair voids or unacceptable area before installing membrane.

SPEC WRITER NOTE: Most substrate conditions require underlayment and slip sheets. Provide either self-adhering sheet underlayment or felt underlayment. Delete below only upon recommendation of metal manufacturer for specific project condition. Review roof assembly with underlayment types to avoid creating double vapor barrier in the roof/insulation assembly.

//C. Self-Adhering Sheet Underlayment:

1. Prime substrates with manufacturer's approved primer if required for proper installation of membrane over substrate.
2. Install self-adhering sheet underlayment; wrinkle free on roofing substrate.
3. Comply with low-temperature installation restrictions of manufacturer where applicable.
4. Install underlayment, lapped in a direction to shed water.
5. Lap sides not less than 89 mm (3-1/2 inches).
6. Lap ends not less than 152 mm (6 inches) staggered 610 mm (24 inches) between courses.
7. Center membrane at valleys, hips, and ridges.
8. Roll laps with roller.
9. Cover underlayment within time requirements recommended by the manufacturer. //

//C. Roofing Felt Underlayment:

1. Install underlayment over solid substrates with horizontal overlaps and endlaps staggered.
2. Lay parallel to ridgeline with 63 mm (2-1/2 inch) sidelaps and 152 mm (6 inch) endlaps.
3. Start application at low point, working up deck laying plies in shingle fashion.
4. Fasten underlayment with copper roofing nails spaced on 305 mm (12 inch) centers maximum. //

SPEC WRITER NOTE: Delete this paragraph if vapor retarder is not required.

//D. Install vapor retarder over the entire roof substrate support surface. Use tape to seal the edges of the sheets to the support surface, or to the sheet below. Sheet edges to be lapped not less than 152 mm (6 inches). Provide sufficient material to avoid inducing stresses in the sheets due to stretching or binding. All tears or punctures that are visible in the finished surface at any time during the construction process to be sealed with the tape. //

SPEC WRITER NOTE: Slip sheets are required for installations. Slip sheets must be installed over vapor retarder when vapor retarder is specified.

E. Slip Sheet:

1. Apply specified slip sheet at time of roof panel installation when underlayment is used that may be in direct contact with and adhere to or adversely impact the underside of roof panels, and as otherwise recommended by the roof panel manufacturer.
2. Paper slip sheets must be installed over the underlayment. Use adhesive for temporary anchorage, where possible, to minimize use of mechanical fasteners under copper roofing.
3. Lap joints 50 mm (2 inch) minimum.

F. Form tapered wood batten 76 mm (3 inches) wide at top, 57 mm (2-1/4 inches) wide at bottom and 38 mm (1-1/2 inches) high unless otherwise indicated in construction documents. Secure battens to roof deck construction with lag bolts or wood screws having the heads recessed below the top of the batten. Space battens to suit width of pans.

G. Fabricate:

1. Fabricate pans to create center to center standing and batten seam spacing as indicated on construction documents.
2. Lay sheets of copper formed into pans with sides turned up to top of batten and out 13 mm (1/2-inch) for locking to cover.
3. Form cross seams by forming folds on upper and lower ends.
4. Stagger cross seams. Slit cross seam at each corner to form a tab.

G. Form cleats of 50 mm (2-inch) wide 450 g (16 ounce) copper. Place cleats at center of each cross seam and along battens at 305 mm (12 inches) on center.

H. Eaves and Rakes:

1. At eaves and rakes which do not abut vertical surfaces, turn roofing sheets over edge of roof sheathing and hook 19 mm (3/4-inch) over a 560 g (20 ounce) cold rolled copper edge strip.
 2. Form edge strip from 2438 to 3048 mm (8 to 10 foot) long pieces with ends butted together.
 3. Secure edge strip to roof deck with nails 101 mm (4 inches) on center.
 4. Do not face nail roofing.
- I. Cover batten with copper. Lock edges together with flanges of pans and mallet down against side of battens.
 - J. Ridges and Hips: Provide copper covered battens similar to roof battens.
 - K. Cover exposed ends of battens with copper caps locked in place.

3.2 JOINING:

- A. Solder seams where required to produce water tight joints. Remove flux after soldering is completed.
- B. Tin edges of copper required to be soldered with solder for a width of 38 mm (1-1/2 inches).
- C. Joints in copper up to 560 g (20 ounce) weight may be soldered.
- D. Make joints for copper over 560 g (20 ounces) weight by lapping, riveting, and soldering. Space rivets 76 mm (3 inches) on center in two (2) rows in a staggered position.

3.3 SEALING:

- A. Where dowels, fastening devices and similar items penetrate roofing, make penetrations watertight by means of sealing compound. Sealing compound is specified in Section 07 92 00, JOINT SEALANTS.

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