

SECTION 07 60 00

FLASHING AND SHEET METAL

PART 1 - GENERAL

1.1 DESCRIPTION

A. Formed sheet metal work for wall and roof flashing.

1.2 RELATED WORK

A. Single ply base flashing system: Section 07 53 23, ETHYLENE-PROPYLENE-DIENE-MONOMER ROOFING.

B. Sealant compound and installation: Section 07 92 00, JOINT SEALANTS.

C. Color of factory coated metal and anodized aluminum: Refer to Drawings.

1.3 APPLICABLE PUBLICATIONS

A. The publications listed below for a part of this specification to the extent referenced. The publications are referenced in the text by the basic designation only.

B. American Society for Testing and Materials (ASTM):

1. A167-99(R 2004) Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip

2. B32-04 Solder Metal

3. B209-07 Aluminum and Aluminum-Alloy Sheet and Plate

4. D173-03 Bitumen-Saturated Cotton Fabrics Used in Roofing and Waterproofing

5. D1187-97 (R2002) Asphalt Base Emulsions for Use as Protective Coatings for Metal

6. D4586-07 Asphalt Roof Cement, Asbestos Free

C. Sheet Metal and Air Conditioning Contractors National Association (SMACNA):

1. Architectural Sheet Metal Manual (2003 Edition).

D. National Association of Architectural Metal Manufacturers (NAAMM):

1. AMP 500-505-88 Metal Finishes Manual

E. American Architectural Manufacturers Association (AAMA):

1. 605-98 Voluntary Specification for High Performance Organic Coatings on Architectural Extrusions Panels

F. Federal Specification (Fed. Spec):

1. A-A-1925A Shield, Expansion; (Nail Anchors)
2. UU-B-790A Building Paper, Vegetable Fiber

1.4 PERFORMANCE REQUIREMENTS

Wind Uplift Forces: Resist the following forces per FM Approvals 1-49:

1. Wind Zone 2: 1.48 to 2.15 kPa (31 to 45 lbf/sq. ft.): 4.31-kPa (90-lbf/sq. ft.) perimeter uplift force, 5.74-kPa (120-lbf/sq. ft.) corner uplift force, and 2.15-kPa (45-lbf/sq. ft.) outward force.
2. Wind Design Standard: Fabricate and install copings, roof-edge flashings tested per ANSI/SPRI ES-1 to resist design pressure.

1.5 SUBMITTALS

A. Submit in accordance with Section 01 33 23, SHOP DRAWINGS, PRODUCT DATA, AND SAMPLES.

B. Shop Drawings:

1. Flashings

C. Manufacturer's Literature and Data:

1. Two-piece counterflashing
2. Thru wall flashing

PART 2 - PRODUCTS

2.1 FLASHING AND SHEET METAL MATERIALS

A. Stainless Steel: ASTM A167, Type 302B, dead soft temper.

B. Aluminum Sheet: ASTM B209, alloy 3003-H14.

C. Flexible Flashing - Stud Wall Backup: For flashing not exposed to the exterior, use the following, unless otherwise indicated:

1. Option 1: Surface Adhered Membrane with Rubberized Adhesive:
 - a. Surface adhered membrane to be a composite 40 mil membrane consisting of 25 mils of elastomeric/thermal plastic membrane incorporating DuPont Elvaloy and 15 mils of SBS asphaltic adhesive; 1-1/2 inch sealant compatible drip edge and silicone release sheet added.
 - b. Reinforce with synthetic fibers, calendered into sheet form, rolled and cut to standard widths.
 - c. Tear Strength: ASTM D624; 270 psi.
 - d. Low Temperature Flexibility: ASTM D146; -25 degrees F Pass.
 - e. Water Absorption: ASTM D471; less than 0.1 percent.
 - f. Color as selected from manufacturer's range.

- g. Compatible with urethane and silicone sealant.
- h. UV stable.
- i. System cloaks are pre-formed, three-dimensional flexible units used to detail corners, level changes, stop ends, and special applications; standard type cloaks and special designs to be fabricated as required by the design.
- j. Two-sided, self-adhering tape used must seal the top of cloaks against the back-up wythe; system adhesive to be used as an alternative; mastic must be used to seal laps, joints, and top terminations.

2. Option 2:

- a. Sheet Material: 40 mil membrane with DuPont Elvaloy Kee; pressure sensitive clear adhesive for full bond to backup construction.
- b. Provide system with preformed corners and end dams fabricated by manufacturer; Elvaloy Kee or stainless steel material.
- c. Termination bar to be predrilled; fastening provided directly at steel framing locations.
- d. Conforms to ASTM D412, ASTM D2240, ASTM D624 Die C, and ASTM G154.

D. Bituminous Paint: ASTM D1187, Type I.

2.2 FLASHING ACCESSORIES

A. Solder: ASTM B32; flux type and alloy composition as required for use with metals to be soldered.

B. Fasteners:

- 1. Use stainless steel for stainless steel and aluminum alloy.
- 2. Nails:
 - a. Minimum diameter for stainless steel nails: 2 mm (0.095 inch) and annular threaded.
 - b. Length to provide not less than 22 mm (7/8 inch) penetration into anchorage.
- 3. Rivets: Not less than 3 mm (1/8 inch) diameter.
- 4. Expansion Shields: Fed Spec A-A-1925A.

C. Sealant: As specified in Section 07 92 00, JOINT SEALANTS for exterior locations.

D. Roof Cement: ASTM D4586.

2.3 SHEET METAL THICKNESS

A. Except as otherwise shown or specified use thickness or weight of sheet metal as follows:

B. Concealed Locations (Built into Construction):

1. Stainless steel: 0.25 mm (0.010 inch) thick.

C. Exposed Locations:

1. Stainless steel: 0.4 mm (0.015 inch).

D. Thickness of aluminum is specified with each item.

2.4 FABRICATION, GENERAL

A. Jointing:

1. In general, stainless steel joints, except expansion and contraction joints, shall be locked and soldered.
2. Joints shall conform to following requirements:
 - a. Flat-lock joints shall finish not less than 19 mm (3/4 inch) wide.
 - b. Lap joints subject to stress shall finish not less than 25 mm (1 inch) wide and shall be soldered and riveted.
3. Flat and lap joints shall be made in direction of flow.
4. Soldering:
 - a. Pre tin both mating surfaces with solder for a width not less than 38 mm (1-1/2 inches) of stainless steel.
 - b. Treat in accordance with metal producers recommendations other sheet metal required to be soldered.
 - c. Completely remove acid and flux after soldering is completed.

B. Expansion and Contraction Joints:

1. Fabricate in accordance with the Architectural Sheet Metal Manual recommendations for expansion and contraction of sheet metal work in continuous runs.
2. Space joints as shown or as specified.
3. Space expansion and contraction joints for stainless steel at intervals not exceeding 7200 mm (24 feet).
4. Space expansion and contraction joints for aluminum at intervals not exceeding 5400 mm (18 feet), except do not exceed 3000 mm (10 feet) for gravel stops and fascia-cant systems.
5. Fabricate slip-type or loose locked joints and fill with sealant unless otherwise specified.
6. Fabricate joint covers of same thickness material as sheet metal served.

C. Cleats:

1. Fabricate cleats to secure flashings and sheet metal work over 300 mm (12 inches) wide and where specified.
2. Provide cleats for maximum spacing of 300 mm (12 inch) centers unless specified otherwise.

3. Form cleats of same metal and weights or thickness as the sheet metal being installed unless specified otherwise.
4. Fabricate cleats from 50 mm (2 inch) wide strip. Form end with not less than 19 mm (3/4 inch) wide loose lock to item for anchorage. Form other end of length to receive nails free of item to be anchored and end edge to be folded over and cover nail heads.

D. Edge Strips or Continuous Cleats:

1. Fabricate continuous edge strips where shown and specified to secure loose edges of the sheet metal work.
2. Except as otherwise specified, fabricate edge strips or minimum 0.6 mm (0.024 inch) thick stainless steel. or 1.25 mm (0.050 inch) thick aluminum.
3. Use material compatible with sheet metal to be secured by the edge strip.
4. Fabricate in 3000 mm (10 feet) maximum lengths with not less than 19 mm (3/4 inch) loose lock into metal secured by edge strip.
5. Fabricate Strips for fascia anchorage to extend below the supporting wood construction to form a drip and to allow the flashing to be hooked over the lower edge at least 19 mm (3/4 inch).
6. Fabricate anchor edge maximum width of 75 mm (3 inches) or of sufficient width to provide adequate bearing area to insure a rigid installation using 0.8 mm (0.031 inch) thick stainless steel or 1.6 mm (0.0625 inch) thick aluminum.

E. Drips:

1. Form drips at lower edge of sheet metal counter-flashings (cap flashings), by folding edge back 13 mm (1/2 inch) and bending out 45 degrees from vertical to carry water away from the wall.
2. Form drip to provide hook to engage cleat or edge strip for fastening for not less than 19 mm (3/4 inch) loose lock where shown.
3. Stainless Steel Drip Plates: Provide a embedded flashing locations over steel.
 - a. Provide with closed hemmed drip edge to extend past face of wall.
 - b. Provide vertical leg extending up backup wall minimum 2 inches.
 - c. Provide pitch in drip plate as indicated on Drawings.
 - d. Provide shop fabricated inside and outside corner.
 - e. At lip brick profiles, match profile with step in drip plate. Flexible flashing will cover drip plate; cut flush with face of mortar joint.
 - f. Provide 1/8 inch thick sealant tape between drip plate and steel structural member.
 - g. Bond flexible flashing to drip plate as recommended by flexible flashing manufacturer; product selection to ensure against adhesive drool beyond face of brick.

- h. Backer rod and sealant to be provided under drip edge per Section 07 92 00 JOINT SEALANTS, at locations protecting steel.
- i. Drip Plate Fasteners - Stud Backup: Corrosion-resistant screws located at every stud line.
- j. Self-adhering Flashing Seam Tape: Sheet Material: 40 mil membrane with DuPont Elvaloy Kee; pressure sensitive clear adhesive for full bond to stainless steel drip plate and backup construction.

F. Metal Options:

- 1. Where options are permitted for different metals use only one metal throughout.
- 2. Stainless steel may be used in concealed locations for fasteners of other metals exposed to view.

2.5 FINISH

- A. Use same finish on adjacent metal or components and exposed metal surfaces unless specified or shown otherwise.
- B. In accordance with NAAMM Metal Finishes Manual, unless otherwise specified.
- C. Finish exposed metal surfaces as follows, unless specified otherwise:
 - 1. Stainless Steel: Finish No. 2B or 2D.
 - 2. Aluminum:
 - a. Fluorocarbon Finish: AAMA 605, high performance organic coating.

2.6 BASE FLASHING

- A. Pipe Flashing: (Other than engine exhaust or flue stack)
 - 1. Fabricate roof flange not less than 100 mm (4 inches) beyond sleeve on all sides.
 - 2. Extend sleeve up and around pipe and flange out at bottom not less than 13 mm (1/2 inch) and solder to flange and sleeve seam to make watertight.
 - 3. At low pipes 200 mm (8 inch) to 450 mm (18 inch) above roof:
 - a. Form top of sleeve to turn down into the pipe at least 25 mm (1 inch).
 - b. Allow for loose fit around and into the pipe.
 - 4. At high pipes and pipes with goosenecks or other obstructions which would prevent turning the flashing down into the pipe:
 - a. Extend sleeve up not less than 300 mm (12 inch) above roofing.
 - b. Allow for loose fit around pipe.

2.7 COUNTERFLASHING (CAP FLASHING OR HOODS)

- A. Stainless steel, unless specified otherwise.
- B. Fabricate to lap base flashing a minimum of 100 mm (4 inches) with drip:
 - 1. Form lock seams for outside corners. Allow for lap joints at ends

and inside corners.

2. In general, form flashing in lengths not less than 2400 mm (8 feet) and not more than 3000 mm (10 feet).
3. Two-piece, lock in type flashing may be used in-lieu-of one piece counterflashing.
4. Manufactured assemblies may be used.
5. Where counterflashing is installed at new work use an integral flange at the top designed to be extended into the masonry joint or reglet in concrete.
6. Where counterflashing is installed at existing work use surface applied type, formed to provide a space for the application of sealant at the top edge.

C. One-piece Counterflashing:

1. Back edge turned up and fabricate to lock into reglet in concrete.
2. Upper edge formed to extend full depth of masonry unit in mortar joint with back edge turned up 6 mm (1/4 inch).

D. Two-Piece Counterflashing:

1. Receiver to extend into masonry wall depth of masonry unit with back edge turned up 6 mm (1/4 inch) and exposed edge designed to receive and lock counterflashing upper edge when inserted.
2. Counterflashing upper edge designed to snap lock into receiver.

E. Surface Mounted Counterflashing; one or two piece:

1. Use at existing or new surfaces where flashing can not be inserted in vertical surface.
2. One piece fabricate upper edge folded double for 65 mm (2-1/2 inches) with top 19 mm (3/4 inch) bent out to form "V" joint sealant pocket with vertical surface. Perforate flat double area against vertical surface with horizontally slotted fastener holes at 400 mm (16 inch) centers between end holes. Option: One piece surface mounted counter-flashing (cap flashing) may be used. Fabricate as detailed on Plate 51 of SMACNA Architectural Sheet Metal Manual.
3. Two pieces: Fabricate upper edge to lock into surface mounted receiver. Fabricate receiver joint sealant pocket on upper edge and lower edge to receive counterflashing, with slotted fastener holes at 400 mm (16 inch) centers between upper and lower edge.

F. Pipe Counterflashing:

1. Form flashing for watertight umbrella with upper portion against pipe to receive a draw band and upper edge to form a "V" joint sealant receiver approximately 19 mm (3/4 inch) deep.
2. Fabricate 100 mm (4 inch) over lap at end.
3. Fabricate draw band of same metal as counter flashing. Use 0.33 mm (0.013 inch) thick stainless steel.
4. Use stainless steel bolt on draw band tightening assembly.

5. Vent pipe counter flashing may be fabricated to omit draw band and turn down 25 mm (1 inch) inside vent pipe.
- G. Where vented edge decks intersect vertical surfaces, form in one piece, shape to slope down to a point level with and in front of edge-set notched plank; then, down vertically, overlapping base flashing.

PART 3 - EXECUTION

3.1 INSTALLATION

A. General:

1. Install flashing and sheet metal items as shown in Sheet Metal and Air Conditioning Contractors National Association, Inc., publication, ARCHITECTURAL SHEET METAL MANUAL, except as otherwise shown or specified.
2. Apply Sealant as specified in Section 07 92 00, JOINT SEALANTS.
3. Apply sheet metal and other flashing material to surfaces which are smooth, sound, clean, dry and free from defects that might affect the application.
4. Remove projections which would puncture the materials and fill holes and depressions with material compatible with the substrate. Cover holes or cracks in wood wider than 6 mm (1/4 inch) with sheet metal compatible with the roofing and flashing material used.
5. Coordinate with roofing work for the installation of metal base flashings and other metal items having roof flanges for anchorage and watertight installation.
6. Nail continuous cleats on 75 mm (3 inch) on centers in two rows in a staggered position.
7. Nail individual cleats with two nails and bend end tab over nail heads. Lock other end of cleat into hemmed edge.
8. Install flashings in conjunction with other trades so that flashings are inserted in other materials and joined together to provide a water tight installation.
9. Where required to prevent galvanic action between dissimilar metal isolate the contact areas of dissimilar metal with sheet lead, waterproof building paper, or a coat of bituminous paint.
10. Isolate aluminum in contact with dissimilar metals others than stainless steel, white bronze or other metal compatible with aluminum by:
 - a. Paint dissimilar metal with a prime coat of zinc-chromate or other suitable primer, followed by two coats of aluminum paint.
 - b. Paint dissimilar metal with a coat of bituminous paint.
 - c. Apply an approved caulking material between aluminum and dissimilar metal.
11. Paint aluminum in contact with or built into mortar, concrete, plaster, or other masonry materials with a coat of bituminous paint.

12. Paint aluminum in contact with absorptive materials that may become repeatedly wet with two coats of bituminous paint or two coats of aluminum paint.

3.2 THROUGH-WALL FLASHING

A. General:

1. Install continuous through-wall flashing between top of concrete foundation walls and bottom of masonry building walls; at top of concrete floors; under masonry, concrete and elsewhere as shown.
2. Where exposed portions are used as a counterflashings, lap base flashings at least 100 mm (4 inches) and use thickness of metal as specified for exposed locations.
3. Exposed edge of flashing may be formed as a receiver for two piece counter flashing as specified.
4. Terminate exterior edge beyond face of wall approximately 6 mm (1/4 inch) with drip edge where not part of counter flashing.
5. Lap end joints at least two corrugations, but not less than 100 mm (4 inches). Seal laps with sealant.
6. Coordinate with other work to set in a bed of mortar above and below flashing so that total thickness of the two layers of mortar and flashing are same as regular mortar joint.
7. Where ends of flashing terminate turn ends up 25 mm (1 inch) and fold corners to form dam extending to wall face in vertical mortar or veneer joint.
8. Turn flashing up not less than 200 mm (8 inch) behind exterior veneer.
9. Continue flashing around columns:
 - a. Where flashing cannot be inserted in column reglet hold flashing vertical leg against column.
 - b. Counterflash top edge with 75 mm (3 inch) wide strip of saturated cotton unless shown otherwise. Secure cotton strip with roof cement to column. Lap base flashing with cotton strip 38 mm (1 1/2 inch).

B. Flashing at Veneer Walls:

1. Install near line of finish floors over shelf angles or where shown.
2. Turn up against sheathing.
3. At stud framing, carry flashing across air space and secure flashing at non-masonry construction with termination bar; secure to each stud with stainless steel fasteners through sheathing.
4. Coordinate with installation of air barrier for lap over top of flashing.
5. Seal lapped ends and penetrations of flashing with adhesive or sealant, as recommended by flashing manufacturer, before covering with mortar. Lap end joints of flashings at least 6 inches and seal watertight as recommended by flashing manufacturer.

6. Seal lapped seams of stainless steel drip plates with self-adhering flashing seam tape; stop self-adhering flashing seam tape 3/8 inch of brick face and extend over turned up edge 3 inches onto backup construction; center tape on overlapping edge.

C. Lintel Flashing when not part of shelf angle flashing:

1. Install flashing full length of lintel to nearest vertical joint in masonry over veneer.
2. Turn ends up 25 mm (1 inch) and fold corners to form dam and extend end to face of wall.
3. Turn back edge up to top of lintel; terminate back edge as specified for back-up wall.

D. Door Sill Flashing:

1. Install flashing under bottom of plate sills of doors over curbs opening onto roofs. Extend flashing out to form counter flashing or receiver for counter flashing over base flashing. Set in sealant.
2. Extend sill flashing 200 mm (8 inch) beyond jamb opening. Turn ends up one inch in vertical masonry joint, extend end to face of wall. Join to counter flashing for water tight joint.
3. Where doors thresholds cover over waterproof membranes install sill flashing over waterproof membrane under thresholds. Extend beyond opening to cover exposed portion of waterproof membrane and not less than 150 mm (6 inch) beyond door jamb opening at ends. Turn up approximately 6 mm (1/4 inch) under threshold.

3.3 BASE FLASHING

A. Install where roof membrane type base flashing is not used and where shown.

1. Install flashing at intersections of roofs with vertical surfaces or at penetrations through roofs, to provide watertight construction.
2. Install metal flashings and accessories having flanges extending out on top of the built-up roofing before final bituminous coat and roof aggregate is applied.
3. Set flanges in heavy trowel coat of roof cement and nail through flanges into wood nailers over bituminous roofing.
4. Secure flange by nailing through roofing into wood blocking with nails spaced 75 mm (3 inch) on centers or, when flange over 100 mm (4 inch) wide terminate in a 13 mm (1/2 inch) folded edge anchored with cleats spaced 200 mm (8 inch) on center. Secure one end of cleat over nail heads. Lock other end into the seam.

B. For long runs of base flashings install in lengths of not less than 2400 mm (8 feet) nor more than 3000 mm (10 feet). Install a 75 mm (3 inch) wide slip type, loose lock expansion joint filled with sealant in joints of base flashing sections over 2400 mm (8 feet) in length. Lock and solder corner joints at corners.

C. Extend base flashing up under counter flashing of roof specialties and accessories or equipment not less than 75 mm (3 inch).

3.4 COUNTERFLASHING (CAP FLASHING OR HOODS)

A. General:

1. Install counterflashing over and in conjunction with installation of base flashings, except as otherwise specified or shown.
2. Install counterflashing to lap base flashings not less than 100 mm (4 inch).
3. Install upper edge or top of counterflashing not less than 225 mm (9 inch) above top of the roofing.
4. Lap joints not less than 100 mm (4 inch). Stagger joints with relation to metal base flashing joints.
5. Use surface applied counterflashing on existing surfaces and new work where not possible to integrate into item.
6. When fastening to concrete or masonry, use screws driven in expansion shields set in concrete or masonry. Use screws to wood and sheet metal. Set fasteners in mortar joints of masonry work.

B. One Piece Counterflashing:

1. Where flashing is installed at new masonry, coordinate to insure proper height, embed in mortar, and end lap.
2. Where flashing is installed in reglet in concrete insert upper edge into reglet. Hold flashing in place with lead wedges spaced not more than 200 mm (8 inch) apart. Fill joint with sealant.
3. Where flashing is surface mounted on flat surfaces.
 - a. When top edge is double folded anchor flat portion below sealant "V" joint with fasteners spaced not over 400 mm (16 inch) on center:
 - 1) Locate fasteners in masonry mortar joints.
 - 2) Use screws to sheet metal or wood.
 - b. Fill joint at top with sealant.
4. Where flashing is mounted on pipe.
 - a. Secure with draw band tight against pipe.
 - b. Set hood and secure to pipe with a one by 25 mm x 3 mm (1 x 1/8 inch) bolt on stainless steel draw band type clamp, or a stainless worm gear type clamp.
 - c. Completely fill joint at top with sealant.

C. Two-Piece Counterflashing:

1. Where receiver is installed at new masonry coordinate to insure proper height, embed in mortar, and lap.
2. Surface applied type receiver:
 - a. Secure to face construction in accordance, with manufacturers instructions.
 - b. Completely fill space at the top edge of receiver with sealant.

- 3. Insert counterflashing in receiver in accordance with fabricator or manufacturer's instructions and to fit tight against base flashing.
- D. Where vented edge occur install so lower edge of counterflashing is against base flashing.
- E. When counterflashing is a component of other flashing install as shown.

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