ANCHORS to WEEPS

A PRACTICAL GUIDE TO SELECTING MASONRY ACCESSORIES

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On a daily basis calls are received from designers, engineers, construction managers, owners and mason contractors requesting input on selecting accessories for projects. Some are in the planning stage, others in progress with field conditions warranting a second opinion and unfortunately, on rare occasions, a problem.

A list of the most common questions asked about masonry accessories was compiled. Responses to them reflect 25 years of industry experience. The objective is to match the material to the project utilizing the highest performing, most cost effective means.

These questions, answers and simple charts offer a practical guide in selecting materials for your masonry projects.

What is the best type of flashing to use?

Fit the flashing to the job. Determine the expected lifespan of the building, the type of construction, compatibility of adjoining materials and conditions during installation prior to choosing a flashing material. (See Figure A)

Flashing is necessary wherever downward migration of water could be interrupted in a multi-wythe, veneer or single-wythe application (e.g., base of wall, sills, above door, window and miscellaneous openings, relief angles, parapets and under stone copings).

Seal stainless steel flashing with a double bead of non-skinning butyl sealant between 4"–6" laps. Avoid exposed metal drips accessible from grade, including base and first floor window sill flashing conditions. Sharp edges at laps and corners pose a hazard. Additionally, there is little advantage to placing drip edges near grade as they simply serve to deflect downward flowing moisture away from the wall below. Drip edges are important at all other flashing locations including door and window openings, relief angles, roof rakes, chimneys and miscellaneous openings.

Narrow strips of stainless steel sheet metal with formed and hemmed drip edges, lapped in the same manner described above, can supplement the performance of and are commonly used (2-piece flashing system) in conjunction with laminated copper, EPDM and rubberized bituthene flashings.

Give special attention to following manufacturer's recommendations when lapping or forming end dams and corners with laminated copper, EPDM, rubberized asphalt or any other membrane flashings.

Are cavity drainage materials necessary?

Resist the temptation to specify fancy drainage mesh. These products may cause more harm than good by elevating the mortar-dropping layer above the line where flashing is embedded into CMU backup. A layer of washed pea stone resting on flashing behind the veneer that reaches to the top of

FLASHING TYPE	DESCRIPTION	FREEZE-THAW	UV RESISTANCE	EXPECTED LIFE	RELATIVE COST
Stainless Steel	.015 (28 Gauge)	Very High	High	Very Long	High
Laminated Copper	3, 5 or 7 oz	High	Moderate/High	Long	Moderate
Rubberized Bituthene	40 MIL	Moderate/High	Low	Moderate/Long	Low/Moderate
EPDM	40 MIL	High	Moderate	Moderate/Long	Low/Moderate
PVC	20 MIL	Low	Very Low	Very Short	Low

Figure A

WEEP HOLES	DRAINABILITY	AIR MOVEMENT	RELATIVE COST
Open Head Joint	Very High	Very High	Very Low
Extruded Louver	High	High	Moderate
Cell Vent	High	High	Moderate
Cotton Sash	Very Low	Very Low	Low
Plastic Tubes	Moderate	Low	Very Low
Mesh	High	High	Moderate/High
Plastic Tube w/Cotton Sash & Stainless Screen	Moderate/Low	Low	Very High
Plastic Tube w/Cotton Sash	Moderate/Low	Low	Moderate

Figure B

Figure 1. Weeps

weep holes will lower the mortar dropping line, saving 6"–8" of critical area below the line of flashing termination, providing positive drainage to weep holes. Washed pea stone is available in convenient 50 lb bags and is simple and economical to install.

In some cases, such as high-rise construction, the mason may find it more economical to install drainage mesh. Make sure the flashing termination point is well above the top of the mesh. Thoughtful weep and flashing design will facilitate wall drainage.

What weep hole will provide the best performance?

OPEN HEAD JOINTS WITH WASHED PEA STONE in the cavity offer the highest performance for cavity wall drainage. For designers interested in less noticeable weeps, there are countless products available (See Figure 1). The weep vent selected should offer positive drainage to the exterior, allow air movement to help dry the cavity and should serve to support the mortar bed on the course above. Most units available are simple to install and are available in multiple colors. Many of these products have recently dropped in price and range from under 10¢ to well over a dollar per piece. (See Figure B, on page 82)

What is the best wire reinforcement to use?

CONCRETE MASONRY UNIT (CMU) WIRE reinforcement should be ladder in configuration, including interior single wythe and exterior adjustable, with 9 gauge side and cross rods. For optimum performance, cross rods should always be 16" on center (oc) no more and no less. This spacing places cross rods on the webs of the CMU, eliminating interference with the

WIRE REINFORCEMENT	CONFIGURATION	GAUGE	FINISH
Interior Single Wythe CMU	Ladder	9 Gauge Side Rods & 9 Gauge Cross Rods spaced 16" oc	Mill Galvanized 0.010 oz./sf.
Exterior Single Wythe CMU	Ladder	9 Gauge Side Rods & 9 Gauge Cross Rods spaced 16" oc	Hot Dipped per ASTM 153 after fabrication
Exterior Multi-Wythe (Brick on CMU)	Ladder Hook & Eye or Ladder Adjustable Tab	9 Gauge Side Rods & 9 Gauge Cross Rods spaced 16" oc w/flush welded 3⁄16" adjustable sections	Hot Dipped per ASTM 153 after fabrication

Figure C

VENEER CAVITY WALL ON METAL STUD	POSITIVE CONTACT TO STUD	SHEAR/TENSION	SCREW PENETRATION PRONE TO MOISTURE	SUPPORTS RIGID INSULATION	DIFFICULTY TO INSTALL	LENGTH OF SCREW	OVERALL COST
Side-Mounted Plate	Yes	S	No	Yes	High	Short	High
Plate w/ Prongs	Yes	T	No	Yes	Low	Standard	Low
Strap w/ Prongs	Yes	T	No	Yes	Moderate/High	Long	Moderate
Single Screw Barrel	Yes	T	No	Yes	Moderate/High	Special	Moderate

Figure D

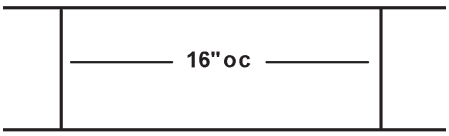

Figure 2. Wire reinforcement

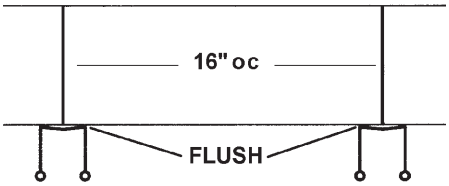

Figure 3. Wire reinforcement

placement of rebar, grout or loose fill insulation. The intersection of cross and side rods will form an interlocking tee in the mortar bed every 16" on the inner and outer face shells of the CMU. This wire performs better and is lighter, easier and more economical to install.

For multi-wythe brick with CMU back-up, use ladder adjustable hook and eye or adjustable tab with 9 gauge side rods and cross rods (same reasons as above). The 3⁄16" diameter eye or tabs are flush-welded to the outside face of longitudinal wire at the intersection of cross rods spaced 16" oc (See Figure 3). Thinner profile wire with flush welded eyes greatly improves the workability of the reinforced bed joint, simplifying construction and improving quality control.

Clay masonry units expand so it is not necessary to install wire reinforcement in brick veneers with standard running bond. The primary purpose of wire reinforcement is to control cracking related to wall shrinkage. Unlike brick, CMU shrink requiring wire in all walls including exterior CMU veneers.

Designers should eliminate prefabricated corners and tees from their specifications. Corners and tees should be cut and bent in the field by the mason using full 10' pieces. This promotes a staggered lap at the corners while reducing a serious safety concern with exposed wire during the construction of intersecting walls.

Standard interior wire should be mill galvanized with 0.10 oz/sf zinc coating while exterior wire and wire exposed to moisture should be hot dipped according to ASTM A153 Class B2 (1.50 oz/sf). (See Figure C)

How do you adhere insulation board to CMU and seal the seams?

POLYSTYRENE INSULATION BOARD CAN ALSO serve as a moisture barrier when the seam joints are sealed by using a thin bead of compatible adhesive/sealant that runs on the inside edge of head and bed joints prior to installing the next 16" wide by 8' piece. The bead will cross over the double eyes of the wire reinforcing that extend through the bed joints of the insulation, serving to mechanically adhere the insulation to the CMU substrate. Polystyrene insulation board is 99.94% impervious to water.

Are brick expansion joints and CMU control joint materials necessary?

OPTIMUM EXPANSION IN A BRICK EXPANSION joint can be accomplished by eliminating the expansion joint filler. Simply keep the expansion joint open and clean for third-party inspection prior to installing the backer rod and sealant.

For CMU control joints, specify contractor's options. Include an extruded PVC compound with 85 durometer hardness conforming to ASTM D 2287 and sized to fit in the standard sash of a CMU (See Figure 4). Option the use of the Michigan Control Joint with 15 lb felt on one side of two open-ended CMU meeting at the control joint location. Fill the opening with mortar to form a shear key. These options perform equally while giving the mason contractor more flexibility when choosing a local block manufacturer.

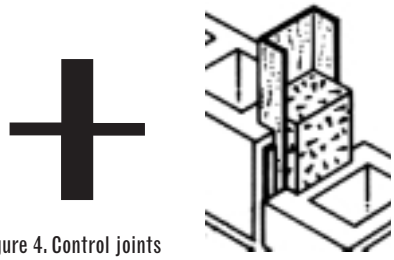

Figure 4. Control joints

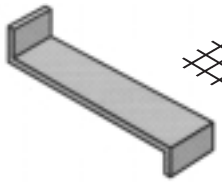

Figure 5. Z-strap

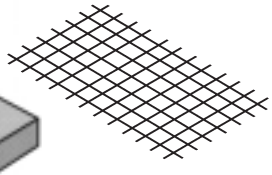

Figure 6. Mesh tie

Are anchors for intersecting CMU walls the same?

CODE REQUIRES TRANSFER OF SHEAR BETWEEN intersecting walls be connected. Z-straps sized and finished to suit (See Figure 5) are one of several ways according to code.

Empirically designed interior non-loadbearing intersecting walls require mesh ties sized to suit (See Figure 6). Mesh ties perform well and can be bent flush out of the way against the CMU to reduce the safety hazard. Mesh ties are pliable enough to be bent back into the bed joint when the intersecting wall is constructed.

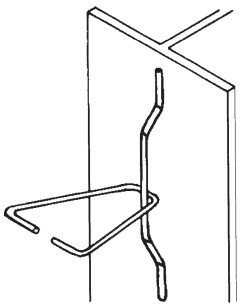

Figure 7. Column tie

Figure 8. Column wrap

Is there a preferred cost effective way to tie CMU to steel?

CONNECTING CMU TO STEEL COLUMNS should almost always be adjustable ¼" diameter x 9" straps (contractor's option to weld or shoot on) with 3⁄16" diameter triangular ties sized and finished to suit (See Figure 7). This simple system offers needed movement, vibration and installation flexibility. For similar reasons, use two-piece or clip-on anchors for tying CMU to structural beams.

Is it necessary to wrap steel columns prior to attaching CMU?

COLUMN WRAPS SERVE TO PROVIDE A MORTAR-free space between the CMU and structural steel columns. This space allows the steel to vibrate and move independently of the masonry. The service life of these wraps clearly ends once walls are constructed. Specifying standard column boxboard or an economical closed cell foam provides the same service life while simplifying installation and lowering purchase costs (See Figure 8).

Rigid foam insulation attached to the outside of exterior sheathing (like CMU cavity design) is gaining popularity over fiberglass batt insulation for metal stud systems. What brick ties are available to accommodate this trend?

SEVERAL MANUFACTURERS MARKET BRICK veneer tie systems that provide positive contact to the metal stud while accommodating rigid insulation board in the cavity (See Figure D, page 85). One system that has gained popularity recently is a flat plate inserted through the exterior sheathing and mounted to the side of the metal stud (See Figure 9). This unique anchor places the fasteners in shear and has round punched holes designed to reduce thermal bridging.

Two other brick ties on the market have prongs on the back of the plate designed to penetrate exterior sheathing and touch the outside flange of metal studs, placing them in tension. This second type of anchor requires long screws to mount the anchor on the face of the insulation with prongs extending through insulation and sheathing to the face of the stud flange (See Figure 10). Insulation for this system is typically installed in large sheets, requiring careful attention to locating stud centers.

A third anchor, requires standard length screws to mount the plate on the face of

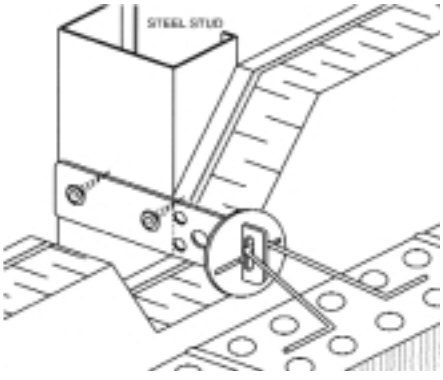

Figure 9. Shear tie

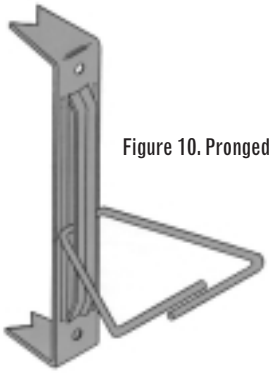

Figure 10. Pronged tie

Figure 11. Pronged plate

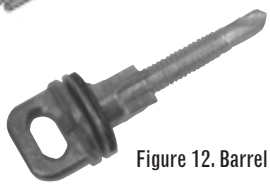

Figure 12. Barrel screw

exterior sheathing with short prongs reaching the face of the stud flange (See Figure 11). This anchor incorporates flat legs that extend through horizontal seams of the smaller cavity-cut insulation sheets into the air space.

A fourth anchor has a single screw threaded into a barrel designed to penetrate through the face of the insulation and exterior sheathing to the face of the metal stud flange (See Figure 12). As with the second anchor, insulation for this system is installed in large sheets, requiring careful attention to locating studs. All components for this system are proprietary in design and require careful thought when ordering.

Anchors mentioned above have a second tie component that is $^{3}/_{16}$" diameter by length needed to span air space and embed approximately 2" into the veneer. These cavity anchor systems provide a monolithic insulation envelope with high net thermal performance. All four protect screw penetrations from dew point related moisture.

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