TECHNICAL NOTE
NO. 2

Small Homes Council—Building Research Council, University of Illinois at Urbana-Champaign

BUILT-UP ROOFING DETAILS

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Twenty-five Cents
On low-slope roofs where built-up roofing membranes are used, the roofing details become extremely critical. While working with the National Roofing Contractors Association, the SHC-BRC has developed a series of details for built-up roofing.

DETAILS

The line or joint where roofs meet walls or where roofs terminate can be the most vulnerable areas of the whole structure. Many reports of leaking walls, paint failure, efflorescence and roof failures can be traced back to poor flashing details.

Flashings are generally subjected to the worst possible conditions on the roof. They usually join two planes (roof to wall) of different materials with different thermal characteristics. They are exposed to severe weathering and to mechanical damage from traffic over the roof. Many built-up roofs do not perform satisfactorily because not enough consideration was given to the flashing design during the planning stages. Often the designer or owner will depend on the mechanical engineer or equipment supplier to devise the flashing details for the design of supports for equipment on the roof of the building. This does not always result in the best conditions for the roof. The equipment supplier or installer is primarily concerned with his equipment and cannot always be expected to be concerned about the roof. An incorrect flashing can result in a great deal of damage to the roof and contents of the building.

In developing these details, one of the objectives was to separate the fabric or felt part of the flashing system from the metal part. Another objective was to keep the metal work above the highest "water-line" on the roof wherever possible. Since the metals used in flashing systems have different thermal movement characteristics than the fabric or felt parts, any differential movement of the metal is likely to cause tears or cracks in the fabric or felt or even in the roof membrane if the metal is tied to the fabric or felt in anyway. With light gauge metals, such as 16 oz. copper, 24 gauge galvanized or 0.040" aluminum, this can be controlled by nailing or fastening the metal at intervals as close as 3 inches on center. With heavier gauge metals or extrusions, the metal should be kept above the water-line or the metal can be attached so that it is free to move without causing damage to the fabric or felt parts of the flashing system.

The details indicate the use of wood nailers at eaves and other terminal points of insulation. The nailers provide protection for the edge of the insulation and also provide anchorage for blow-off protection. The nailers must be anchored securely to the deck system to be effective. Bolting is preferred over nailing to provide anchorage. The use of treated wood for nailers should be approached with caution. The oil used as a carrier for many lumber treatments can act as a solvent on the roofing materials and cause bitumen drippage.

Pitch pans or pitch pockets have not been shown in these details. Pitch pockets or pans, by their design, are not intended to be continuously watertight. Their use should not be encouraged since better methods are available to accomplish the same end. Pitch pans or pockets require frequent inspection and maintenance, and usually a great deal of damage can occur before the leak.

COMMENTS ON DETAILS

A. FLASHING STRUCTURAL MEMBER THROUGH ROOF DECK

This detail illustrates one method of eliminating pitch pockets. The curbed system allows for movement in the structural member without disturbing the roofing system.

B. PIPING THROUGH ROOF DECK

Another method of eliminating pitch pockets. This detail illustrates a satisfactory method of grouping piping that must come up above the roof surface.

C. EXPANSION JOINT

This detail allows for building movement in both directions. It has proven successful with contractors for many years.

D. EQUIPMENT OR SIGN SUPPORT

This detail allows for roof maintenance around the equipment or sign. The continuous support is preferred in light weight roof systems since the equipment weight can be spread over more supporting members. Where heavy structural systems are used or where the load can be concentrated over
E. ROOF RELIEF VENT
This detail is used to "dry-out" insulation. The moisture may have entered due to leaks, faulty vapor barrier or during construction. The spacing is determined by the type of insulation used and the amount of moisture to be relieved. It is sometimes used for new roofs when vapor barriers are used and a venting system is desired.

F. STACK FLASHING
This detail allows the opening to be completed before the stack is placed. The metal sleeve and the clearance necessary will depend on the temperature of the material handled by the stack.

G. METAL ROOF EDGE
This detail is similar to Details L & O. The cant placed as shown will result in a higher fascia line. The No. 15 felt shown behind the fascia provides protection for the flashing edge and seals the system until the metal work is installed.

H. WALL FLASHING DETAIL
This detail should be used where there is any possibility that differential movement will occur between the deck and vertical surface, such as at a penthouse wall. The vertical wood member should be fastened to the deck only. It is possible to use a different method of joining the two-piece flashing system - This is one satisfactory method - others are possible.

J. BASE FLASHING & INSERT WALL COUNTER FLASHING
This detail is similar to Detail H. The joints in the two piece flashing should not be soldered. Breaks in soldered joints could channel water behind the flashing.

K. ROOFING RELIEF JOINT
This detail is used only to break up large areas of roofing. Where expansion joints are needed, use Details C & Q.

L. HEAVY METAL ROOF EDGE
This type of detail should be used with metals heavier than 22 ga. steel, 0.050 " aluminum or 24 ga. stainless steel. Metals of this weight are very rigid when formed and fastening at the center-line and joint cover will
allow expansion and contraction without damaging the base flashing material. Restraining the metal by additional fastening can result in one or more of the following:

1. Buckling of the face
2. Enlarging of the fastener holes
3. Loosening of the fasteners from the wood nailing
4. Shearing of the fasteners

M. SCUPPER THROUGH ROOF EDGES
This detail can be used with the roof edge shown in Details G, O, and P. It is easy to install after the building is completed to relieve standing water in areas along the roof edge.

N. MECHANICAL EQUIPMENT STAND
This detail is preferable to Detail D when the concentrated load can be located directly over columns or heavy girders in the structure of the building. This detail can be adapted for other uses such as sign supports.

O. LIGHT METAL ROOF EDGE DETAIL
This detail uses a tapered edge strip to raise the gravel stop. Frequent nailing is necessary to control thermal movement. Joint covers may be used as shown, or the edge may be doubled at laps.

P. LOW PROFILE ROOF EDGE
This detail allows a raised edge with minimum apparent additional height. This detail can be used to correct a situation where the gravel stop was installed too low.

Q. EXPANSION JOINT
Like Detail C this detail allows for movement in both directions. This detail has proven successful with many contractors and is sometimes preferred over Detail C.

R. CLEARANCES FOR MULTIPLE PIPES AND FROM WALLS AND CURBS
The dimensions shown allow enough space between pipes to install flashing and vertical surfaces to install cant strips.

S. COUNTERFLASHING FOR CONCRETE WALLS OR PARAPETS
This detail can be used for new or reroofing work. On new work it eliminates the need for installing raggle blocks in the concrete formwork.
ROOF RELIEF VENT

NOTES:
FLANGE SET IN MASTIC
MASTIC EDGES OF ROOFING FELTS

2" TO 6"

LOOSE INSULATION

1969

STACK FLASHING

NOTES:
METAL SLEEVE WHERE REQUIRED
VARIES

1969

METAL ROOF EDGE

1/2" MIN.
10'-0" MAX.

NO. 15 FELT
WOOD CANT

IF NECESSARY CONT.
CLEAT OR FASTEN THROUGH FACE

BASE FLASHING MATERIAL

NOTES:
MASTIC AT ALL FASTENERS
2 - FASTENERS AND NEOPRENE WASHERS AT CENTER OF EACH SECTION

1969

WALL FLASHING DETAIL

NOTES:
FASTENERS 24" O.C. TO HOLD COUNTERFLASHING
THIS DETAIL ALLOWS WALL AND DECK TO MOVE INDEPENDENTLY

1969
BASE FLASHING & INSERT WALL COUNTER FLASHING

- Fastener 24" O.C. to hold counterflashing
- Metal cap flashing
- 2" wide clip 24" O.C.
- Base flashing material

HEAVY METAL ROOF EDGE DETAIL

- 1/2"
- 10'-0" max
- No. 15 felt 4" to 6"
- Base flashing material
- Notes:
  - Mastic at all fasteners
  - Two fasteners and neoprene washers at center of each section and cover plate

ROOFING RELIEF JOINT

- Fasteners 24" O.C.
- Metal cap
- Base flashing material
- Cant
- Fasten to deck

SCUPPER THROUGH ROOF EDGE

- 3/4" x 1" L riveted & soldered to apron
- 2'-0" max.
- 2-PLY stripping
- 5" min.
MECHANICAL EQUIPMENT STAND

<table>
<thead>
<tr>
<th>WIDTH OF EQUIPMENT</th>
<th>HEIGHT OF LEGS</th>
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<tbody>
<tr>
<td>UP TO 24&quot;</td>
<td>14&quot;</td>
</tr>
<tr>
<td>25&quot; TO 36&quot;</td>
<td>18&quot;</td>
</tr>
<tr>
<td>37&quot; TO 48&quot;</td>
<td>24&quot;</td>
</tr>
<tr>
<td>49&quot; TO 60&quot;</td>
<td>30&quot;</td>
</tr>
<tr>
<td>60&quot; AND WIDER</td>
<td>48&quot;</td>
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CONCRETE DECK AND FRAME

NOTE:
FLANGE SET IN MASTIC OVER ROOFING
2-Ply STRIPPING OVER FLANGE
WELDED ANCHOR PLATE

INSULATED DECK STEEL FRAME

NOTE:
FLANGE SET IN MASTIC OVER ROOFING
2-Ply STRIPPING OVER FLANGE
WELDED ANCHOR PLATE

LIGHT METAL ROOF EDGE DETAIL

NOTE:
FLANGE SET IN MASTIC OVER ROOFING
2-Ply STRIPPING OVER FLANGE
LOW PROFILE ROOF EDGE

1/2" MIN
10'-6" MAX
4X4 WOOD CANT

BASE FLASHING MATERIAL

NOTES:
Mastic at all fasteners?
Fasteners and neoprene washers at center of each section

1969

CLEARANCES FOR MULTIPLE PIPES AND FROM WALLS AND CURBS

8" 8" 8"

1969

EXPANSION JOINT

FASTENERS 8" O.C.
FASTENERS 24" O.C.
SLOPE TO DRAIN
FELT COVER

BASE FLASHING MATERIAL
SHEET METAL MAX. LENGTH

FLEXIBLE INSULATION

1969

COUNTER FLASHING FOR CONCRETE WALLS OR PARAPETS

CAULK
CLAMPING BAR
FASTENERS IN EXPANSION SHIELDS

1969

1969

1969