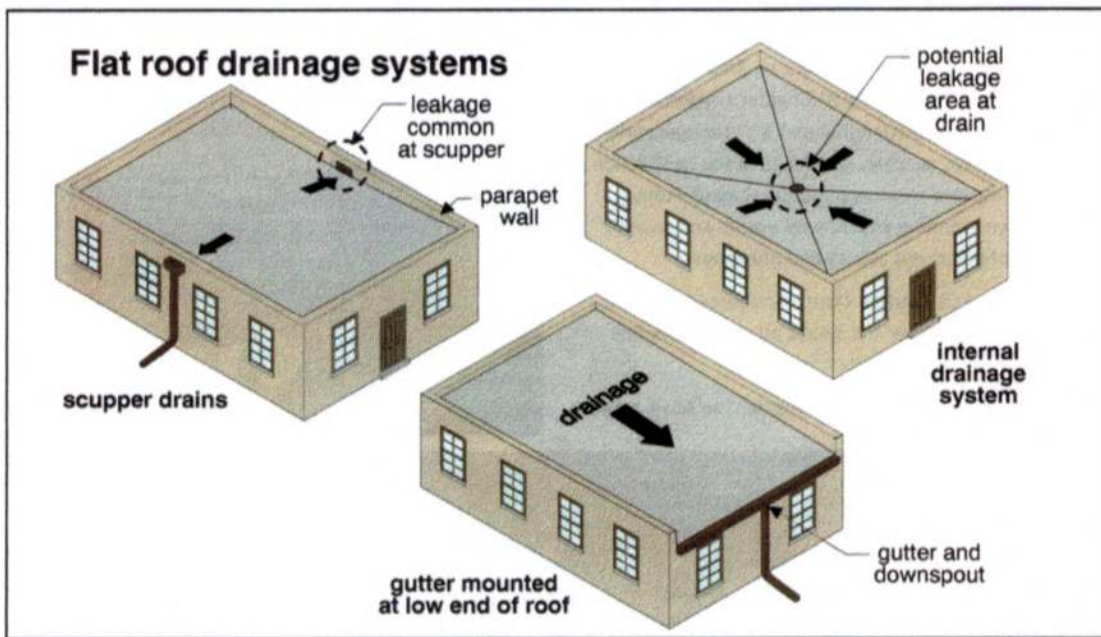


FLAT ROOF SYSTEMS



From ASHI@HOME by Carson Dunlop

FLAT ROOFING is an entirely different strategy from steep roofing. While steep roofing is a shedding system, flat roofing is a water-tight skin or membrane that is formed over the top of the building. If you think of a steep roof as an umbrella, houses with flat roofs don't use umbrellas but use wet suits (or to be more accurate, dry suits). Since we have a different approach, there is an entirely different set of materials, installation methods and conditions to look for.

Slope

Although we generically call these flat roofs, more correctly they should be described as low-sloped roofs. Roofs should never be flat. They should drain water. The drainage system can be gutters and downspouts, centrally located roof drains and/or scuppers (drainage openings through walls, including parapet walls).



Water ponding is a common problem with flat roofs

The functions of a flat roof

The perfect flat roof would –

1. keep water out
2. last the lifetime of the building
3. not pose any fire threat (during or after installation)
4. be strong enough to walk on, move equipment across and be suitable for attaching equipment to
5. control heat loss and heat gain from the building
6. add to the architectural appeal of the building
7. be inexpensive

No one has come up with the perfect roofing system yet. Every roof system keeps the water out, at least most of the water, most of the time. Most flat roofing systems do well if they last 20 to 30 years. Most will contribute to, rather than control, a fire. Installing asphalt-based systems (including built-up and modified bitumen) creates the risk of starting a fire while being applied.

Roofs are not durable with respect to foot traffic and equipment traffic. While equipment can be attached to roofs, this creates vulnerable spots. Most roofing does not help much with either heat loss or heat gain. Most flat roofs are expensive and are not considered attractive.

We will discuss briefly two of the most common flat roof systems used in residential applications: built-up and modified bitumen.

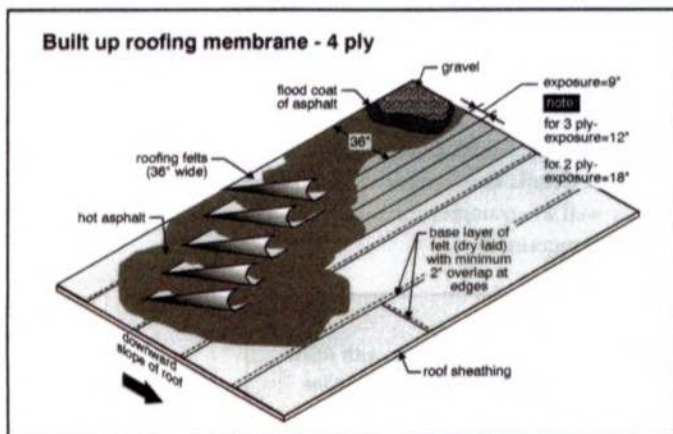
Built-up roofing

Built-up roofing has only been around since the mid-1800s. People have known for several centuries that bitumens have waterproofing and adhesive qualities.

However, it wasn't until the last half of the 19th century that asphalt was in excess supply (because of the asphalt products used in making roads).

Organic felts

The base of an asphalt built-up roof is the felts. These felts are fibrous materials saturated with asphalt (or coal-tar pitch in older systems). The felts traditionally were made from byproducts of the paper, wood and cloth manufacturing industries. These organic (rag or cellulose) felts have been common.



Felt and asphalt not enough

Roofing membranes made up of felts and mopped-in hot asphalt will not last anywhere near 20 years without additional protection. Asphalt is a good water-proofing material, but it is susceptible to rapid deterioration when exposed to the ultraviolet rays of the sun. The volatiles are boiled out of the asphalt, leaving it brittle and weak.

Gravel protection

Consequently, built-up roof membranes must be protected from ultraviolet light. The traditional protection, called aggregate, may be asbestos, marble, rock slag, gravel or crushed stone. This gravel (as it's usually called) is embedded in a flood coat of hot asphalt that has been mopped onto the top of the membrane. The flood coat of asphalt holds the gravel and also is a waterproofing layer. It is the primary defense for the felts below. None of the felts should penetrate the flood coat since exposed felts will wick water down into the roofing membrane.

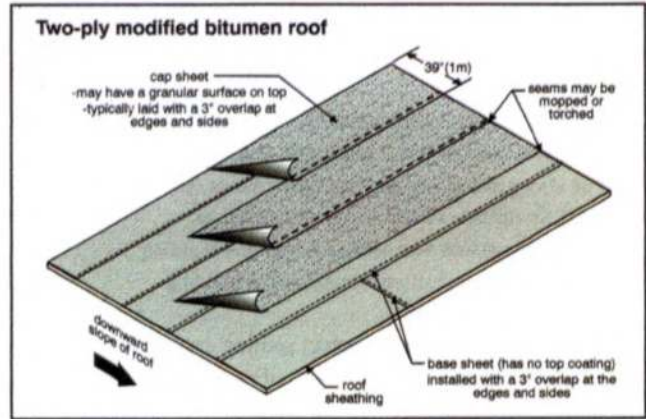
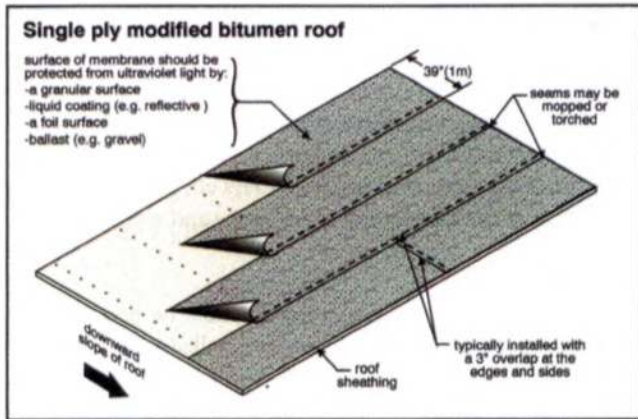
Roof membrane problems include –

1. old/worn out
2. mechanically damaged
3. patched
4. multiple layers
5. no protective surface (e.g., gravel or paint)
6. blisters
7. alligating
8. gravel erosion
9. ridging and fishmouths
10. membrane movement/splitting
11. ponding/vegetation
12. debris or storage on the roof
13. exposed felts ▶▶



Blisters and loss of gravel on a built-up roof

Flat roof systems



Modified Bitumen

Modified bitumens or polymer-modified bitumens or “mod bit,” as it is frequently called, has been used for both low-sloped (flat) and steep roofing since about 1975. This is an asphalt-based product with additives to enhance its strength and flexibility and to reduce the tendency of the asphalt to flow at high temperatures.

Rubberized asphalt

The product sometimes is referred to as rubberized asphalt and can be applied in liquid form or in sheets. We will restrict our discussion to the sheet form, which is almost exclusively limited to residential applications.

Protection From Ultraviolet Light

Many of the early applications were done with no ultraviolet protection and, in some areas, this still is a common installation technique. Recently, it has become more common to provide ultraviolet protection in the form of the following:

1. a granular surface (like the one on asphalt shingles)
2. liquid-applied latex coatings (e.g., latex or reflective asphalt)
3. foil surfaces (typically aluminum or copper)
4. ballasted (not common residentially)

Installation Method

There are three common installation methods:

1. torched-on (sometimes called heat-welding)
2. mopped-in with hot asphalt
3. peel and stick

Residentially, modified bits typically are installed in a single-ply system. Some higher-quality installations are two-ply. Occasionally, a single-ply modified bit sheet will be laid over two or three plies of felts impregnated with asphalt. This, however, is rare.



Membrane slippage and an open seam on a mod bit roof between two sloped roofs

Problems to watch for on mod bit roofs include:

1. old/worn out
2. openings at seams and flashings
3. surface cracking
4. loss of granules
5. slippage of the membrane
6. blisters
7. punctures or tears
8. ponding/vegetation
9. patched
10. installation problems

Summary

We have introduced the concept of flat roofs and outlined two common forms of flat roofing systems. We also listed some of the common conditions found during home inspections on these roofs. You can find more details about other material types and common deficiencies, as well as strategies for inspecting them in the ASHI@Home training program. ■

ABOUT ASHI@HOME
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