

Flat Roof

A **flat roof** is a type of covering of a building. In contrast to the sloped form of a roof, a flat roof is horizontal or nearly horizontal. Materials that cover flat roofs should allow the water to run off freely from a very slight inclination.

Traditionally flat roofs would use a tar and gravel based surface which, as long as there was no pooling of water, was sufficient to prevent penetration. However, these surfaces would tend to fail in colder climates, where ice dams and the like could block the flow of water. Similarly, they tend to be sensitive to sagging of the roof reversing the subtle grading of the surface.

Modern flat roofs tend to use a continuous membrane covering which can better resist pools of standing water. These membranes are applied as a continuous sheet where possible, though sealants and adhesives are available to allow for bonding multiple sheets and dealing with structures penetrating the roof surface. Far more expensive flat roof options include sealed metal roofs using copper or tin. These are soldered interlocking systems of metal panels.

Flat roofs tend to be sensitive to human traffic. Anything which produces a crack or puncture in the surface can quite readily lead to leaks. It is thus not generally advisable to use a flat roof as a living area unless steps are taken to protect the roofing membrane from those using the area, for example, by building a wooden deck over the surface or using paving stones or similar materials to protect the roof membrane.

One of the more interesting (re)emerging methods of protecting the roofing membrane is to use a layer of topsoil and grasses. Care should be taken not to plant anything the roots of which will penetrate the membrane surface. The green roof interestingly enough, tends to trap moisture on the roof, but keeps it up in the soil and plants, rather than having it pool down on the membrane surface.

Types of Flat Roofs

Asphalt Built Up Roof - The most common type of flat roof is the asphalt built up roof (BUR). It is made up of multiple layers of reinforcing plies and asphalt. The reflectivity of built up roofs depend on the surfacing material used. Gravel is the most common and they are referred to as tar and gravel roofs. Asphalt degradation is a growing concern. UV-rays oxidize the surface of the asphalt and produces a chalk-like residue. As plasticizers leach out of the asphalt, asphalt built up roofs becomes brittle. Cracking and alligating inevitably follows, allowing water to penetrate the system causing blisters, cracks and leaks.

CSPE - Chlorosulfonated Polyethylene is a synthetic rubber roof. It is more popularly known as [Hypalon](#).

EPDM - Ethylene Propylene Diene Monomer.

Modified Bitumen

PVC - Polyvinyl Chloride

TPO - Thermoplastic Polyolefin

Maintenance and assessment of flat roofs

The life expectancy of a flat roof can be proportional to the maintenance done on it. Some assessors use 10 years as an average life cycle, although this is dependent on the type of flat roof system in place. Some old tar and gravel roofers quietly acknowledge that unless a roof has been neglected for too long and there are many problems in many areas, a BUR (a built up roof of tar, paper and gravel) will last indefinitely. There are BUR systems in place dating to the early 1900's.

Maintenance includes getting rid of ponding water, typically within 48 hours. This is accomplished by adding roof drains or scuppers for a pond at an edge or automatic siphons for ponds in the center of roofs. An automatic siphon can be created with an inverted ring shaped sprinkler, a garden hose, a wet/dry vacuum, a check valve installed in the vacuum, and a digital timer. The timer runs two or three times a day for a minute or two to start water in the hose. The timer then turns off the vacuum, but the weight of water in the hose continues the siphon and soon opens the check valve in the vacuum. The best time to address the issue of ponding water is during the design phase of a new or roofing project. The quicker you get the water off the roof, the less chance there is for a roof leak to occur.

All roofs should be inspected semi-annually and after major storms. During the roof inspection particular attention should be paid to the flashings around all of the roof top penetrations. The sharp bends at such places can open up and need to be sealed with plastic cement, mesh and a small masons' trowel. Additionally, repairs to lap seams in base flashings should be made. 90% of all roof leaks and failure occur at the flashings. Another important maintenance item, often neglected, is to simply keep the roof drains free of debris. A clogged roof drain will cause water to pond, leading to increased "dead load" weight on building that may not be engineered to accommodate that weight. Additionally, ponding water on a roof can freeze. Often, water finds its way into a flashing seam and freezes, weakening the seam.

Maintenance also includes keeping the tar paper covered with gravel, an older method, currently being replaced with bituminous roofing membranes and the like, which must be 'glued' in place so wind and waves do not move it causing scouring and more bare spots. The glue can be any exterior grade glue like driveway coating.

Maintenance also includes fixing blisters (delaminations) or creases that may not yet be leaking but will leak over time. They may need experienced help as they require scraping away the gravel on a cool morning when the tar is brittle, cutting open, and covering with plastic cement or mastic and mesh. Any moisture trapped in a blister has to be dried before being repaired.

Roof coatings can be used to fix leaks and extend the life of all types of flat roofs by preventing degradation by the sun (ultra-violet radiation). A thickness of 30 dry mils is usually preferred and once it is fully cured, you will have a seamless, watertight membrane.

Infrared thermography is being used to take pictures of roofs at night to find trouble spots. When the roof is cooling, wet spots not visible to the naked eye, continue to emit heat. The infrared cameras read the heat that is trapped in sections of wet insulation.

Keeping Cool

These homes are extremely hot during tropical summer. In places like India, people traditionally built these kind of houses. Some people erect light weight asbestos sheets above the roof so as to shield it from direct sunlight. This method significantly helps to maintain the temperature inside the house to a tolerable limit. Other methods such as pouring water over the roof are also employed by the people.

Roof coatings are also considered cool roofs. When applied correctly, they can reflect up to 90% of the heat from the sun and the reduction in roof surface temperature can translate into savings on air conditioning.