Understanding How a Flat Roof Works

Historically flat roofs have been used mainly in the Middle East, the American southwest including other places where the climate is arid and dry and drainage of rainwater off a house roof is not of great concern. As opposed to a sloping roof that is pitched at an angle a flat roof is flat with a more or less horizontal layout. In fact is not totally flat but usually incorporates a slight slope that is roughly equivalent to 1 percent of the run of the roof to aid draining water from the roof into gutters/drains located at the lower side of the grade. Although sloping roof designs have been preferred in the US in the past flat roofs are fast gaining popularity because new technology has enabled a reduction/elimination of the disadvantages associated with flat roofs in cold climatic conditions that allowed formation of ice dams that blocked free flow of water off the roof making inhabitants suffer roof leaks as water pooled on the roof. An inherent advantage of a flat roof is that it is easier to inspect as compared to a sloping roof. The flat surface reduces dead space, which is common to sloping roofs and creates usable space that can serve as a terrace garden or open outdoor space to be used as a relaxing area or for other activities. Low construction cost is another advantage attributable to flat roofs. They also lower costs for constructing upper floors in the house. Flat roofs allow the most efficient use of urban space, cater to energy savings and offer architectural freedom to conveniently cover complex architectural plans. Flat roofs that invite regular pedestrian traffic are constructed more sturdily than those exposed to occasional foot traffic. The roof substrate of load bearing roofs is usually made from plywood panels that are 15mm in thickness where the joist spacing is not more than 480mm. 800 mm joist spacing would require 21 mm thick plywood. The face grain of the plywood is placed at right angles to the supporting joists with the long edges of the plywood panels laid in a brick bond pattern over the framing. Long panels are supported by nogging in the timber frame or incorporate tongue and groove edges allowing a continuous plywood surface over two spans. The smooth flat surface created by structural plywood panels provides the most perfect base for the membrane overlays to be placed on top. The membranes are attached to the roof substrate using three different methods known as fully adhered, independent and semi independent. Fully adhered membranes are attached completely to the surface, which should be very stable and have minimum flex. The membrane itself should be elastic and resilient to cope with any movement in the substrate. Bridging strips are used to cover the edging lines of the plywood panels in fully adhered systems. These strips are usually made from the membrane material itself. The fully adhered system has a higher resistance to foot traffic and is more stable in hot and cold contractions and expansions. It is also makes it easier to trace leaks. Independent membranes are made to be non attachable to the substrate and are just laid on top. To prevent automatic adhesion under the heat of the sun there is a fiber veil on the membrane underside along with fiber backed base sheet membranes with open non-woven polyester on their lower side. These are usually used on concrete slabs or pre-cast concrete panels as they are ballasted with gravel and therefore heavy. It is difficult to trace leaks in this type of membrane attachment. Semi-independent membranes are partially bonded to the substrate and are the best option in case of a less stable or partially damp bonding surface. The partial bonding is accomplished by adhesion through perforated vent sheet underlays or by applying adhesives partially in strips or certain areas only through trickle application of adhesives. Membranes that are fixed through flame bonding are partially flame bonded. This type does not require heavy protection and allows vapor to be diffused.

About the Author

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