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Building Slopes on Existing Roofs

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For many years ponded water on so-called flat roofs has been identified as a major cause of premature deterioration of roofing membranes. Water that stands for extended periods of time on a roof may, it is argued, find its way into the roofing system through weaknesses in the membrane, something that might not happen were the water to drain quickly and completely. A 2% slope is suggested as the minimum required to compensate for deflections of the deck and structure and for inaccuracies in building elevations. It is also recommended that slopes be achieved by tilting the deck itself rather than by other means.

While shallow slopes drain roofs effectively in summer and bare roofs in winter, they lose their effectiveness on snow-covered roofs, as snow acts like a sponge and prevents water from draining completely. Whether this water freezes or not depends on outside temperatures, the thickness and density of the snow and the insulating properties of the roofing system. Since many roofing problems develop in winter as a result of the cold temperatures or the presence of snow, ice and water on roofs, it is obvious that slopes alone do not offer a guarantee of good membrane performance.

Many owners and designers are now building slopes on existing flat roofs using tapered insulations or lightweight fills sloped to drain when re-roofing. While this practice may conserve energy by improving the thermal resistance of the roof, it requires that large amounts of insulation be installed around the perimeter of drainage basins. The practice involves a number of trade-offs that can affect the long-term performance of the roofing system itself. Before proceeding, one should examine the possible negative aspects of building slopes in this way.

Slopes should not be achieved to the detriment of: be heated to the required temperature for a short period of time.

- **a stable substrate**: - A major requirement of conventional built-up membranes is that they be adhered to a stable substrate which in turn is attached to a structural deck so that the stresses induced in the membrane are transferred to the deck instead of being resisted at the perimeter. This required good adhesion between layers of insulation and good contact between panels.
- **perimeter attachment**: - Wood blockings solidly secured to the deck are required around the perimeter of the roof, along expansion joints and roof dividers in order to secure cant strips, flashings and counterflashings. These nailers, because of cost, are often omitted when great thicknesses of insulation are installed. Such omissions are in violation of good roofing practice.
- **existing flashings**: - Cavity wall flashings at the base of penthouse walls and through wall flashings at parapet walls may be difficult if not impossible to raise. Installing the roofing membrane, because of slopes, at a higher level than these flashings interfered with their function and may create new problems.

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- **job program**: - Speed and ease of construction are two important considerations when re-roofing. Complicated installations make it difficult for a contractor to work efficiently, competently and economically while trying to maintain the roof watertight during re-roofing operations.
- **good design**: - The installation of certain proprietary membranes on lightweight fills voids their warranty. In order to get around this restriction some designers adopt solutions that are not consistent with good practice.
- **economics**: - The cost of supplying and installing the additional insulation, of raising the perimeter wood nailers and parapet, and of raising the roof curbs and vents may increase the cost of re-roofing considerably. Price alone may force an owner to abandon the idea of slopes and simply re-roof without consideration of other solutions.