

TYPICAL CAUSES OF ROOF PROBLEMS

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A. Lack of Maintenance

The failure to find and correct minor roof deterioration in the earliest stages is probably the greatest cause of premature roof problems. This is particularly true of roofing materials applied on relatively low-sloped roofs.

B. Weathering

All roofing materials deteriorate from exposure to the weather at rates determined largely by the kind of material and the conditions of exposure. In general, inorganic roofing materials tend to deteriorate less rapidly from exposure than organic roofing materials. All types of roofing materials may be damaged by hail. Exposure to air pollutants and industrial or salt-laden atmospheres may accelerate the deterioration process of some roofing materials.

C. Wind Damage

Roofing materials are subject to damage from strong winds and flying debris. Generally, roofs are not designed to withstand winds of hurricane and tornado intensity. However, roofs may also be damaged by winds of moderate intensity, with gust that may reach 50 to 75 miles per hour. The primary cause of wind damage is from the partial vacuum created by wind blowing over the edge of the roof. Nature tries to neutralize the low-pressure area by bringing in air from a higher pressure area, usually from inside the building. This air pushes up on the bottom side of the roof assembly and, over time, loosens fasteners and breaks the adhesion making the roof susceptible to damage from the next moderate or strong wind. To counteract the effects of wind-uplift forces, the roofing and insulation should be adequately fastened to the roof deck, and a securely-fastened perimeter detail should be provided.

D. Improper Design

Troublesome and costly roofing problems are often the result of faulty initial design of the roof system. Design deficiencies are costly to correct, and usually can only be corrected during roof replacement. However, unless design deficiencies are discovered and corrected during roof repair or re-roofing, the problems relating to them most likely will recur. Some examples of faulty design are:

Weak roof structures that deflect excessively under load, causing splitting of the roof membrane.

Inadequate roof slope, sagging roof structure, or insufficient number or location of drains, resulting in ponding water.

Inadequate provision for expansion and contraction at changes in deck material or direction, causing membrane splits.

Incompatible roof materials - i.e. the use of asphalt to adhere a torch-on material (APP).

E. Flashing Failures

The function of flashings is to provide a watertight junction between roofing materials and roof projections or other parts of the structure, and between roof sections. Flashings should be designed to furnish service for at least as long as the materials used in the field of the roof. Flashings are the most vulnerable part of any roof. Their importance and the importance of maintaining them properly cannot be overemphasized.

Many early roof problems are actually flashing problems. Often, repairing the flashings or providing new flashings is all that is needed to make the roof watertight again. Most flashing problems result from inadequate flashing design or faulty construction. Many flashing problems can be reduced or eliminated by careful examination by competent inspectors during roof installation, and by regularly scheduled inspection and maintenance.

In many instances, leaks occur at flashings where there are no flashing defects. These leaks may be the result of open joints in a masonry wall or coping cap, which permits water to enter behind the flashings and into the building. This problem may be eliminated by "through-wall" flashings.

F. Base-Flashing Problems

Some common causes of base-flashing problems are:

- Insufficient number of base-flashing plies.
- Improper base-flashing height.
- Insufficient protective coating, resulting in accelerated weathering and deterioration.
- Omission of cant strips, making the base flashing more susceptible to damage.
- Open vertical end laps or seams caused by insufficient sealing.
- Insufficient adhesion or movement between vertical surfaces and the roof deck, resulting in separation of base flashings from vertical surfaces.
- Loose insulation, causing base flashings to separate from vertical surfaces.
- Improper fastening of base flashings to walls or curbs, resulting in sagging or separation of the flashing from the vertical surface.
- Deteriorating substrates, causing base flashings to separate from the surface, or permitting water to enter behind base flashings.

G. Metal Base Flashing and Bituminous Counter flashing Problems

The use of metal base flashings in the construction of built-up roofs is not recommended. Metal base flashings easily separate from bituminous materials and stripping felts crack at the edge of the metal because of the difference in expansion coefficients between the materials. Open joints between metal pieces and deterioration of the metal are also sources for water entry. Inside and outside corners are particularly vulnerable areas.

For these reasons, metal base flashings should be replaced with bituminous base flashings whenever possible.

H. Metal Counter flashing Problems

Metal counter flashings protect the top of bituminous base flashings from water entry. The most common metal counter flashing problems are:

- Counter flashings located too high above the base flashing.
- Metal deterioration caused by a lack or loss of protective coating.
- Cracks and open joints between metal pieces.
- The separation of counter flashings from vertical surfaces.
- Reglets not being sealed.
- Counter flashings not tightly fit to base flashings.

I. Penetration Flashing Problems

Penetrations through the built-up roof membrane are usually flashed in one of two ways.

Individual pipes and small vents usually use flat, metal flange flashings that are placed directly on the last ply of roofing material and are stripped in with felts and mastic or felts and bitumen.

Larger penetrations and groups of smaller penetrations usually use curbs constructed of wood, metal or concrete, flashed with bituminous base flashing and metal counter flashings.

Common penetration flashing problems are:

- The failure to properly design the flashing for the penetration.
- Open or broken seams in metal curbs caused by expansion and contraction.
- Standing water behind penetration curbs caused by the omission of crickets.
- Sagging or separating base flashings caused by omission of top wood nailers.
- Missing or deteriorated counter flashing.
- Splitting or separation of the felt stripping over the edge of metal flanges.
- Improper priming and stripping of metal surfaces.
- Fastener backout and separation of the metal flashing flange from the roof around penetration flashings.
- Movement between stack vents or pipes and the flashing.

J. Drain Flashing Problems

A roof's drainage system includes the gutters, leaders, drain openings and scuppers, as well as the slope provided by the structural deck, tapered insulation, crickets and sumps. The primary function of the drainage systems is to prevent the retention of water on the roof by removing water from the roof as quickly as possible. Every roof, including so-called "dead-level" roofs, must have some provision for drainage. Further, it is important that the drainage system be kept free from debris that might interfere with the proper flow of surface water.

Many roof problems can be traced directly to inadequately designed or improperly installed drainage systems; for example, the use of only one drain; the failure to install overflow scuppers in parapet walls; the placement of drains next to support columns instead of at points of maximum deflection; loose or missing drain clamping rings. Ponded water is the principal indication of inadequate drainage, and may indicate the presence of structural defects.

K. Gravel Stop and Metal Edge Strip Problems

The primary function of gravel stops (for aggregate-surfaced roofs) and metal roof edge strips (for smooth-surface roofs) is to close off the edges of the roof to prevent wind damage or blow-offs. Another important function of gravel stops is to prevent the loss of aggregate surfacing near the edge of the roof.

The principal problems with gravel stops and metal edge strips are leakage through open or broken joints between metal pieces, and splitting of the stripping felts at metal edges. For these reasons, gravel stops and metal edge strips should be raised out the water line whenever possible by using raised wood nailers and tapered edge strips. The use of interior drainage is preferred. However, where water must drain over the metal edge, scupper cutouts are preferable to continuous edge drainage.

L. Problems with Rooftop Equipment, Signs, Braces and Supports

Often, the rooftop is used as a platform for all types of mechanical equipment, ladder struts, antennas, flag poles, signs, bracing, etc. These items should not be placed on the rooftop except when absolutely necessary.

They should never be mounted or placed directly to the top of the roof membrane, as leaks beneath or adjacent to the supports for this equipment are impossible to repair. Rather, they should be mounted to a support structure or to raised curb-type supports. Flat flange or curb flashings can then be used to keep the roof watertight, and roof replacement and recovering can be done without disturbing or removing the equipment. Pitch pans, however, should not be used to keep supports watertight, and should be avoided where possible. Refer to the ARI/NRCA/SMACNA Guidelines for Roof-Mounted Outdoor Air-Conditioner Installations, and the roof membrane manufacturer for recommendations concerning the proper mounting and flashing of these items.