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Walking on Roofs:

Safety and Damage Prevention

Also Inside:

- Life Cycle Cost Analysis Using Roof Coatings
- LAACCRP Structural and Re-roofing Problems

Don't Tread On Me

Guidelines & Helpful Hints for Walking on Roofs

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INTRODUCTION

A VARIETY OF PEOPLE MUST ACCESS A ROOF IN ORDER TO FULFILL SPECIFIC DUTIES. THIS work can consist of making roof repairs, conducting inspections/surveys, or performing repairs/maintenance to rooftop equipment. These tasks typically require the individual to walk all or most of a roof. A wide variety of roof coverings, various degrees of roof slopes, and changing weather conditions require that people take precautions to avoid physical endangerment, damage to the roof covering, or both.

GENERAL

Upon accessing the roof, whether via ladder, hatch, stairs, or door, an individual should make an immediate peripheral visual survey of the roof to become familiar with the rooftop conditions to identify obstacles, or note possible walkways.

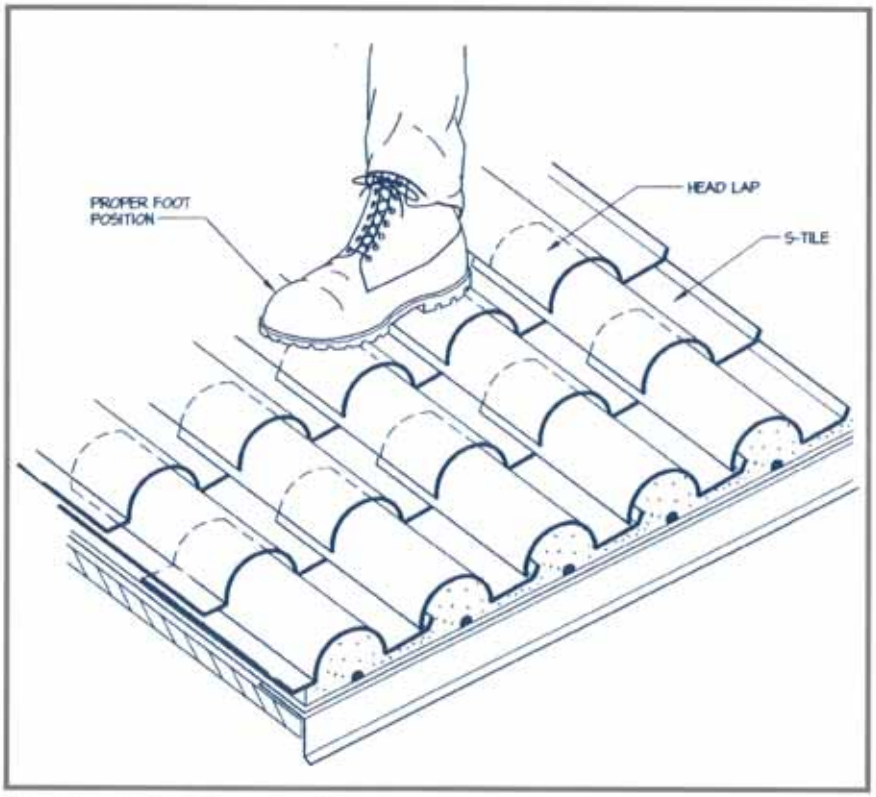
The weather often will dictate whether roof access is even viable. During inclement weather such as rain or snow, roof access should be avoided, particularly on steep slope constructions. Even though inclement weather may not be occurring, the remains and/or residue (i.e., standing water, wet surfaces, snow accumulations, ice buildup, etc.) can also create hazards. Snow, ice, or moisture (even on low-sloped roof assemblies with smooth surfaces, such as single-ply membrane, modified bitumen sheet membranes, and metal panels), can cause slick surfaces.

The occurrence of dew and/or frost early in the day can create similar hazards as those caused by inclement weather. Other naturally-occurring events that can create dangerous conditions include the accumulation of pine needles and/or leaves on the roof surface. These items, combined with surface moisture, will most likely create an extremely slick surface or conceal a potential hazard. Saps and other types of oily emissions from trees or other vegetation which may overhang a roof area, can also create slickness on a smooth roof surface by itself or combined with surface moisture. Ponding or standing water on roof surfaces due to inadequate drainage will often lead to silt deposits and/or result in the promotion of algae growth within the area subjected to the ponding water. The source of this water can be either weather-related or due to condensation discharge from HVAC equipment on the roof. These conditions can create treacherous footing, even on low-slope roof constructions with smooth surfaces.

Natural elements, including rain, vegetation debris, etc., create extremely dangerous conditions on steep slope roof

Early morning dew and pine needles on metal panel roof system.

Grease discharged on surface of metal panel roof system.



Detail of proper foot placement on tile roof.

coverings. These types of roof coverings include such materials as shingles, wood shakes, and tile. Walking in these affected areas on the roof should be avoided until the condition is rectified (i.e. cleaned, dried, etc).

Manmade emissions and/or contaminants such as grease and/or oil from HVAC equipment, exhaust vents, and facility operations (i.e., jet fuel at airports, grease exhaust vents above restaurants) can become deposited on the roof, consequently creating slippery surfaces for smooth-surfaced roof coverings. Other manmade types of elements such as sawdust and metal shavings (both commonly created during the construction/installation of the roof) can also create difficulties when accessing a roof.

ROOF TYPES

The type of roof system present will often determine particular precautions to follow when walking on a roof.

Tiles

Due to the common circular/curved profile of both clay and concrete tiles, walking on tile roof coverings is difficult. These products typically are not of sufficient strength to resist foot traffic by themselves without sustaining physical damage. The barrel and S-shaped tiles, having a convex profile, will in most instances crack or fracture when an individual steps on the center portion of the "cover" of the tile. However, if an individual positions the foot perpendicular to the long dimension of the tile and over the head lap (or overlapped portion of two tiles) and if possible, spanning two covers (i.e., heel on one cover and toe on the other cover), damage is less likely to occur. When possible, walking in an internal gutter or open valley that is lined with sheet metal, if present, would also minimize or avoid damage to the tile.

Care should also be taken to determine if the tiles are loose-laid or mechanically attached to a nailer or substrate. Foot traffic on loose-laid tile systems may cause unsecured tile(s) to become dislodged, resulting in a potential fall/trip hazard. Loose tiles may also be present in a nailed system. These tiles typically occur along valleys, eaves and/or rakes where underlying sheet metal flashing is installed.

Wood Shakes

Wood shingles or shakes are typically installed over relatively close-spaced wood battens and are capable of withstanding foot traffic without damage. Damage, however, can occur to weathered wood shingles if the individual traversing the roof is wearing outdoor-type footwear that commonly has relatively large knobby or "lug" soles. Weathered wood shingles/shakes have a tendency to retain moisture and develop

Moss growth on wood shingle roof covering.

Pine needle accumulation on wood shingle roof covering.

algae/moss growth on the surface of the shingle, particularly in shaded areas of the roof. Algae/moss growth on the surface of wood shingles fosters problematic conditions that can prevent adequate foot hold. In addition, the ridge cap shingles are typically the least supported of the shingles due to the nature of the installation and are often thinner sections of wood. Therefore, walking on the ridge of a wood shingle roof covering should be avoided to prevent resultant damage.

Asphaltic Shingles

Since shingles are installed over a continuous substrate and are fully supported, foot traffic typically poses very few problems. The difficulty with walking on shingle roof construction is typically dependent on the degree of slope present. Slopes of up to 4 inches per linear foot are normally readily accessible without the need for additional tools and/or equipment. On slopes greater than 4/12, personnel should consider using specialized tools/equipment (i.e., safety harness, ropes, etc.), in order to maintain proper safety. As with wood shingles, certain footwear (i.e., lug-soled shoes) can cause physical damage (i.e., dislodged granules, fractured mat) to deteriorated shingles, particularly organic ones. Again, as typical with most steep roof construction, moisture and/or debris accumulation on the surface of shingles creates conditions to be avoided or that warrant special care.

Slate

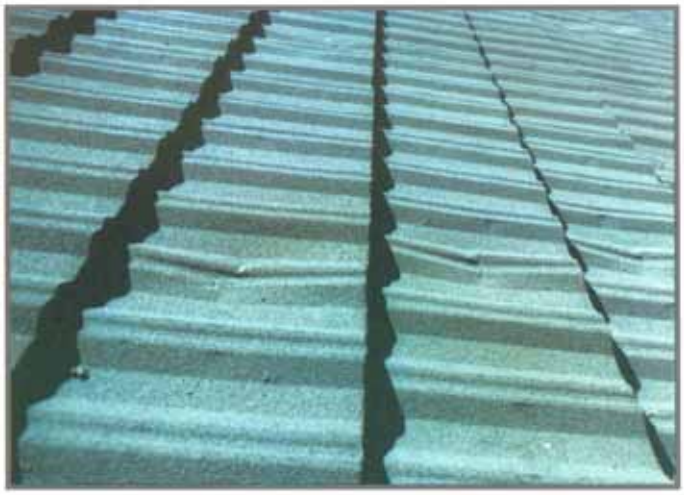
Similar to asphaltic shingles, slate is installed over a continuous substrate. The relative hardness of natural slate lends itself to durability to withstand impact. Synthetic slates which are traditionally lighter in weight and thinner in cross-sectional view than natural slate, however, appear to be somewhat "brittle" and are more susceptible to damage due to foot traffic. Since slate is rigid, an uneven substrate (joint differential in plank/plywood decking) or underlying debris located under the slate, will most likely result in breakage when foot pressure is applied across the field of the slate. Traditionally, slate is installed on greater slopes due to its appearance appeal. Therefore, access on these types of roofs is typically more difficult. In addition, due to the nature of slate, the surface is relatively quite smooth and slick. Moisture and/or debris on the surface of a slate roof covering makes the roof almost impassable. Because the slates are commonly secured to the substrate with nails that are concealed by the overlying upper slate, someone standing on the roof cannot readily determine the presence or adequacy of the attachment. A person should approach walking on a slate roof with extreme caution. When slates become detached from the substrate, for whatever reason, they easily slide out from beneath the upper slate, often due merely to gravity.

Metal Roofing

Metal panel roofing can be installed over either a continuous substrate or uniformly-spaced (typically five feet on-center) structural steel members. When installed over a continuous substrate, metal panel roof coverings (structural or architectural standing seam roof systems) provide a durable system that is relatively unaffected by foot traffic. When installed over structural steel members, structural standing seam metal panels also provide a relatively indestructible system in regard to foot traffic. There are several areas of caution in relation to foot traffic on corrugated metal panels that are installed over structural steel members. These panels are light gauge in nature, 24 to 28 gauge, and experience deflection when a load is positioned between support members. Although the panels themselves are designed to withstand such deflection, crimping of the ribs and separation of side lap sealant may occur under certain point loads (i.e., someone's foot). Therefore, a person walking on this type of roof system should position their foothold over the structural members (located at fasteners installed across the width of the panel and in the bottom of the flute).

Another area of concern is the presence of translucent corrugated fiberglass panels. These panels have been used as skylights in corrugated metal panel systems. After exposure to weathering elements, they characteristically become brittle and unable to withstand minimal, if any, foot traffic. They are often difficult to distinguish from surrounding metal panels with the same profile which have commonly been painted or coated, or due to sun reflection. Care should be taken to identify the presence of these panels and to avoid treading on them.

Proper foot position on metal tile panels.



Depressions in metal tile panels due to improper foot placement.

Galvanized and Galvalume® metal panels often come delivered to the project site from the manufacturer/supplier with a thin film of oil on the outer surface. This film is applied to the metal sheets for protection; however, the film can make the panels quite slippery.

Built-up Roofing

Traditionally, bituminous roof systems are durable roof coverings that can withstand repeated trafficking. But if certain conditions are present, even these durable systems can become vulnerable. Defects, such as blisters or ridges in the membrane, cause the felts to become raised above the plane of the roof and the underlying substrate. During cold weather, the bitumen and felts become brittle, and the raised and unsupported portions of the membrane (at the noted defect types) are therefore vulnerable to damage from foot traffic.

Although not related to damage or safety, personnel should be aware while walking on a built-up roof membrane during hot weather. Stepping into exposed bitumen that has become softened/molten—particularly coal-tar pitch—will result in bitumen accumulations on the underside of footwear. This soiling of the footwear could result in the contamination of interior building finishes (carpeting, flooring, etc.). This residue is relatively difficult to remove from building finishes without significant effort and possibly resulting in stains. The same logic applies to walking in areas on the roof that were recently repaired utilizing cold process roof cement.

Recently-applied mastics and plastic cements remain pliable or in a semi-viscous state for some time after application and can be easily disturbed by foot traffic. Consequently, a foot step in a repaired area can displace the materials and compromise the integrity of the patch and/or contaminate the individual's footwear.

Miscellaneous Roof Systems

Similar to built-up roof systems, blisters and/or raised delaminated areas can be present in spray-applied polyurethane foam (SPUF) roof coverings. SPUF is installed in either single or multiple layers or lifts. A single lift commonly has an overall thickness of one inch. When a blister or delaminated area occurs, the top layer(s) separate(s) or become detached from the underlying substrate. This delaminated portion and relatively thin section of foam becomes unsupported and can easily be damaged by foot impact.

A common steep-slope roof covering available today consists of metal panels that are preformed or stamped to simulate the appearance of wood shingles and/or tiles. Some common types of these products include the following: HomeCrest® and Country Cedar® Aluminum Roofing by Alcoa, Decra Tile® and Decra Shake® by Carter Holt Harvey and Gerard Tile® and Gerard Shake® by Gerard Roofing Technologies. These panels are manufactured from light gauge sheet metal (26 gauge, 0.0195 inches thick), either aluminum or galvanized. The panels are available in a variety of sizes, ranging from 40 to 50 inches in length and 12 to 18 inches in width. Since these products are made to mimic the look of "thick" products, they commonly have a cross-sectional thickness of one inch along the edges and a "hollow" profile in the field of the panel. The panels are installed over wood battens and joined to each other by snap-lock types of seams at the ends and sides. Since the panels are installed over battens, the portion of the panel between the battens is unsupported. Foot pressure applied in the field of the panel can cause permanent depressions. An individual should position footholds on the overlapped portions of the panels that are located over the wood battens. This particular portion of the panel is more resistant to foot impact.

Blisters in spray-applied polyurethane foam roof system.

SAFETY ISSUES

An important safety consideration for foot traffic is the avoidance of trip hazards. Rooftop piping, such as electrical conduit, gas, condensate, chill waterlines, etc., is often elevated above the roof surface and supported in some way. This piping can often become a series of criss-crossing networks which can easily trip up pedestrians. Other common potential trip hazards at the roof level include flexible cabling (i.e., telecommunications) and guy/support wires, which are typically installed for antennas, stacks, or other similar appurtenances extending above the roof surface. These are extremely dangerous, especially during the dusk or night-time hours, as they are difficult to discern due to the relatively thin nature of the material.

Traditional walkpads used in the past were made of material which typically did not weather as well as the roof membrane. Consequently, these walkpads become deteriorated and develop cracks and upwardly curled corners/edges. These can become trip hazards.

Other possible trip hazards are standing seam metal roofs. Due to the somewhat odd panel widths (16" to 18"), a person has to use either shortened or lengthened strides to traverse a typical standing seam metal panel roof. With the height of the standing seam (1" to 2"), an individual could be caught in mid-stride in the "modified" walking position.

Since various types of nails and fasteners are used to construct the roof or other related components, the extra fasteners are often discarded or left on the roof surface. The fasteners, if stepped on in improper footwear, can penetrate the shoe and cause injury. Proper footwear is therefore important. A work type of boot with a durable non-slick sole is the recommended type of shoe.

SUMMARY

Since a roof is commonly accessible and assumed to provide a relatively sound substrate when walked on, the roof covering is often treated as an indestructible working surface. However, each person that has to access a roof should take the necessary precautions to prevent inflicting unintentional physical damage to the protective covering for the building. In addition, the safety and well being of the individual are of utmost importance. If existing conditions are present that are considered questionable to an individual in relation to accessibility/walkability, then the task should be delayed until conditions improve or are corrected.

About The Author

Karl A. Schaack *received a bachelor of science degree in civil engineering from Clemson University and is a professional engineer in the states of South Carolina, North Carolina, and Texas. He is Vice President of Houston Operations for Price Consulting Inc., and is a Registered Roof Consultant through the Roof Consultants Institute.*

Insurance Discounts Mandated for Use of Hail-Resistant Roofs in Texas

For the first time, mandatory insurance premium discounts are going into effect for homeowners who install hail-resistant roofs in the state of Texas.

The new discounts were ordered recently by Texas Insurance Commissioner Elton Bomer and will range by percentage, up to 34 percent, from county to county, according to the history of hail severity from area to area. (Companies whose rates are not regulated by the agency will determine their own discounts).

Discounts went into effect for roofs installed on or after Feb. 17 which have passed UL Standard 2218 tests. The commission reported that hail-resistant roofing materials could cost $600 to $1,000 more than a conventional roof, but could save, in some parts of Texas traditionally hardest hit by hail, as much as $243 on a typical $716 premium ($80,000 brick veneer home) or $293 on the average $80,000 frame home with a normal premium of $862.

The regulations do not currently cover metal roofs, but this issue is being investigated.

Of the $1.3 billion in homeowners insurance losses in Texas in 1997, according to a report in the *Dallas Morning News*, $531 million was the result of wind and hailstorms.

For more information, contact the Texas Department of Insurance, 1-800-252-3439, or visit its Website at www.tdi.state.tx.us for a list of discounts.